

2-3 Obligation of Recipient Country

In the implementation of the Project under Japan's Grant Aid Assistance, BMD is responsible for the following tasks.

1) General requirements

- a) To undertake all necessary institutional and juridical procedures in Bangladesh.
- b) To handle tax exemption procedures and to take necessary measures for customs clearance at the port of disembarkation for the materials and equipment imported for the Project.
- c) To accord Japanese nationals, whose services may be required in connection with the supply of products and services under verified contracts, such facilities as may be necessary for their entry into Bangladesh and stay therein for the performance of their work.
- d) To provide necessary space at the BMD Head Office for the Consultant and the Contractor for the implementation of the Project, if required.
- e) To allocate necessary personnel for meteorological observation and forecasting work.
- f) To complete the land owner transfer of the Project site in Moulvibazar from BWDB to BMD.

2) Requirements for the Equipment

- a) To remove and relocate the existing facilities for installation of the equipment at the expense of BMD, if required.
- b) To provide appropriate frequencies for the meteorological radar systems and the meteorological data communication systems to be installed.
- c) To obtain the VSAT user licenses from the Bangladesh Telecommunication Regulatory Committee: BTRC) for the use of satellite communication for the meteorological data satellite communication systems to be installed.
- d) To secure effective space at the existing facilities for installation of the equipment to be supplied.
- e) To provide suitable existing telephone links and interfaces to allow the correct operation of the systems.
- f) To maintain, and properly and effectively utilize, the equipment purchased under the Grant Aid.

3) Requirements for Construction of Radar Tower Building

- a) To obtain necessary permissions for construction of the radar tower buildings, if required.
- b) To secure land necessary for the Project and to clear, level and reclaim the land prior to commencement of the construction.
- c) To provide facilities for provision of electricity, water, telephone trunk lines, drainage, sewage and other incidental facilities at the site.
- d) To supply general use furniture such as carpets, curtains, tables, chairs and others, if necessary.

- e) To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the sites, if necessary.
- f) To provide temporary facilities for distribution of electricity, water, telephone, and other incidental facilities for the construction work.
- g) To secure sufficient spaces at the Project sites for temporary facilities such as a contractor's office, workshop, building materials storage, etc. for the construction work.
- h) To provide adequate maintenance of the buildings constructed under the Grant Aid Project, so they can function effectively.

2-4 Project Operation Plan

(1) Operation and Maintenance Plan for the Equipment

1) Operational Plan of Meteorological Radar System

Upon completion of the Project, the hours of operation of each meteorological radar system have been planned in accordance with annual transition of the climate in Bangladesh. BMD and FFWC have agreed to meet the following operational plan.

Table 28: Estimated Annual Radar Operation Hours

	Terms	Number of Tornadoes/year	Number of Observation/Day	Observation Hours (h/day)	Observation Days	Observation Hours
Dry Season	December- February	0	2	2	90	180
Pre-monsoon Season	March	0	8	8	31	248
	April	0	8	8	24	192
	Tornado (mainly in April)	6	Continuously	24	6	144
	May	0	Continuously	24	31	744
Monsoon Season	June-October 15	0	Continuously	24	137	3,288
Post-monsoon Season	16 October-November	0	8	8	46	368
					365	5,164

Annual Observation Hour : about 5,200 hours

2) Operation and Maintenance Plan for the Equipment

For appropriate operation of the meteorological radar system, the following number of staff is required.

Table 29: Required Number of Staff at Moulvibazar Meteorological Radar Station

	Required Number of Staff at Moulvibazar Meteorological Radar Station
Senior Electronic Engineer	1
Assistant Electronic Engineer	1
Assistant Communication Engineer	1
Assistant Meteorologist	1
Electronic Assistant	6
Foreman	1
Mechanic- II	5
MLSS (Peon)	3
Guard	5
Gardener	1
Sweeper	1
Total	26

3) Operation and Maintenance Plan for the Equipment

In connection with equipment maintenance, consideration must be given to the followings.

- Technical training for the BMD staff
- Establishment of appropriate measures against system failure
- A fully documented maintenance system, with proper document control
- Scheduled replacement of parts and overhauls
- Strengthening of the operation and maintenance structure of BMD
- Establishment of technical and financial self-reliance of BMD

4) Staff Allocation for Operation and Maintenance for the Equipment

<Appropriation of Required Staff for Moulvibazar Meteorological Radar Station >

The staff allocation plan of BMD for the Moulvibazar Meteorological Radar Station is that the existing staff who has sufficient technical skill and staff to be newly recruited are combined in order to smoothly operate and maintain the meteorological radar system as follows. For staff recruitment, permissions of the concerned government ministries are required after Development Project Proposal (DPP) approved by the Executive Committee for National Economic Council (ECNEC). During the Basic Design Study for the Project, BMD recruited a hundred and several tens of new staff. Therefore, it is expected that BMD recruit the required number of staff for the Moulvibazar Meteorological Radar Station.

Table 30: Allocation and Recruitment Schedule of Required Engineers and Staff for Moulvibazar Meteorological Radar Station

	Required Number of Staff at Moulvibazar Meteorological Radar Station	Existing Staff to be allocated at Moulvibazar Meteorological Radar Station from the following stations (All the required allocation indicated below will be completed by February 2008)							Staff newly recruited to be allocated at the following stations (All the required recruitment and allocation indicated below will be completed by February 2008)							
		Head Office	SWC	Dhaka Radar	Rangpur Radar	Cox's Bazar Radar	Khepupara Radar	Other	Moulvibazar Radar	Head Office	SWC	Dhaka Radar	Rangpur Radar	Cox's Bazar Radar	Khepupara Radar	Other
		Senior Electronic Engineer	1	1	-	-	-	-	-	-	-	1	-	-	-	-
Assistant Electronic Engineer	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Assistant Communication Engineer	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Assistant Meteorologist	1	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Electronic Assistant	6	-	-	1	1	-	1	-	3	-	-	1	1	-	1	-
Foreman	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Mechanic- II	5	2	-	-	-	-	-	1 (Bogra)	2	2	-	-	-	-	-	1 (Bogra)
MLSS (Peon)	3	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Guard	5	2	-	-	-	-	-	-	3	2	-	-	-	-	-	-
Gardener	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Sweeper	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-

<Recruitment of Electric Engineer/Staff >

Operation and maintenance of the meteorological radar systems is carried out mainly by BMD electronic engineers and technical staff, however, the number of engineers and technical staff to do this is not sufficient, so it is essential that the existing vacant positions be filled. In order to become a senior electronic engineer or an electronic engineer, the technical staff must have practical experience as an assistant electronic engineer for a certain period. BMD fully recognizes the need to fill the existing vacant positions and has made a firm commitment to recruit capable technical staff. For the staff recruitment, the Ministry of Defence as the supervising ministry of BMD should give its effective cooperation and special attention on this matter.

In order for BMD to become self-reliance in technical areas such as the operation and maintenance of radar systems, it is essential that it make continuing efforts to fill vacancies and promote technology transfer for all staff levels, from entry level technicians to senior engineers.

Table 31: Number of Engineers and Engineering Staff in Electronic Division of BMD

Name of Post	Number of Positions	Existing Number	Number of Vacant Positions	Required Number of Promotions from lower positions	Required Number of external Recruits	Scheduled Number of Recruits in 2006	Scheduled Number of Promotion in 2006	Scheduled Number of Recruits in 2007	Scheduled Number of Promotion in 2007	Scheduled Number of Recruits in 2008	Scheduled Number of Promotion in 2008
Senior Electronic Engineer	1	1	0	0	0	0	0	0	0	0	0
Electronic Engineer	4	0	4	4	0	0	2	0	2	0	0
Assistant Electronic Engineer	6 3 Recruit 3 Promotion	3 2 Recruit * 1 Promotion	3 1 Recruit 2 Promotion	2	1	1	1	0	1	0	0
Electronic Assistant	42 28 Recruit 14 Promotion	26 18 Recruit 8 Promotion	16 10 Recruit 6 Promotion	6	10	3	3	4	3	3	0

*Among the 2(two) Assistant Electronic Engineers: One (1) working in Dubai on lien and the other resigned but final decision is pending from the Ministry of Defence

Recruitment to the post of Electronic Assistant and promotion to the post of Assistant Electronic Engineer from Electronic Assistant is pending for a decision to be made by the Ministry of Defence to fix the seniority of the present diploma and non-diploma Electronic Assistants in the BMD

(2) Operation and Maintenance Plan for the Radar Tower Building

There are three key issues for the maintenance of the radar tower building to be implemented by BMD:

(i) daily cleaning; (ii) maintenance to cover wear and tear; damage and aging; and (iii) security measures to ensure safety and to prevent crimes.

The implementation of daily cleaning of the building gives a good impression to visitors/users and encourages people to respect the building and the equipment. Cleaning is also important to ensure the equipment continues to operate correctly, it helps in the rapid detection and repair damaged equipment and prolongs the life of the building equipment. The main repair work will be refurbishing or replacement of exterior and interior materials protecting the building structure. The required inspections are outlined below.

Table 32: Outline of Regular Inspection for the building

	Items of Maintenance Work	Frequency
Exterior	Repair and repainting of external walls	Repair: every 5 years, Repaint: every 15 years
	Inspection and repair of roofs	Inspection: every year Repair: as required
	Regular cleaning of drain pipes and drainage systems	Monthly
	Inspection and repair of sealing of external windows and doors	Every year
	Regular inspection and cleaning of ditches and manholes	Every year
Interior	Renewal of interior finishing	As required
	Repair and repainting of partition walls	As required
	Adjustment of window and door fitting	Every year

It is important that regular preventive maintenance of the building equipment is carried out before the equipment fails, or requires repair or replacement of part(s). The life of the building equipment can be significantly extended by proper operation and regular inspection, lubrication, adjustment and cleaning. These regular inspections can prevent equipment failure and accidents. Regular inspection, replacement of consumables and cleaning/replacement of filters for ventilation and air-conditioning units should be carried out in accordance with the maintenance manual.

It is essential to establish a proper maintenance structure in BMD, involving the rigorous implementation of regular inspection and maintenance procedures. This work may be assigned to the private sector (local agents), if required. The general life expectancy of the major building equipment is shown below.

Table 33: Life Expectancy of Building Equipment

System	Building Equipment	Life Expectancy
Electrical System	<ul style="list-style-type: none"> • Distribution panels • Fluorescent lamps • Incandescent lamps 	20 – 30 years 5,000 – 10,000 hours 1,000 – 1,500 hours
Water Supply and Drainage Systems	<ul style="list-style-type: none"> • Pipes and valves • Sanitary fixture 	15 years 25 – 30 years
Air-Conditioning System	<ul style="list-style-type: none"> • Pipes • Exhaust fans • Air-conditioning units 	15 years 20 years 15 years

2-5 Project Cost Estimate

2-5-1 Estimate of Project Cost and Capital Cost to be borne by BMD

The Project cost to be financed by the Japan’s Grant Aid Assistance and the required capital cost for the Project to be borne by BMD have been estimated and are shown in the following tables. However, the Project cost estimates are provisional and would be further examined by the Government of Japan for the approval of the Grant.

Project Cost Estimates of the Japan’s Grant Aid

Total Project Cost Estimate: 995 Million JP Yen

Table 34: Project Cost Estimate

Items		Estimate (JP Yen)	
Construction	Cox’s Bazar Radar Tower Building	JPY 283 Million	JPY 906 Million
Equipment	Meteorological Radar System	JPY 623 Million	
	Meteorological Radar Data Display System		
	Meteorological Data Satellite Communication System		
	Existing Meteorological Radar System 8bit Modification		
Consulting Services (Detailed Design, Supervision, Technical Guidance, etc.)		JPY 89 Million	
Total		JPY 995 Million	

Capital Cost to be borne by Bangladesh

Total Capital Cost: 122,284,500 Taka (approx. 208 Million JP Yen)

Table 35: Capital Cost of BMD

Items	Capital Cost (Bangladesh Taka)
Bank Commission for Payment for the Consultant and the Contractor	11,000,000 Taka
Custom Duties and Value Added Tax	104,000,000 Taka
Installation of a 150kVA step-down transformer at Moulvibazar Meteorological Radar Observation Station	3,500,000 Taka
VSAT user form for VSAT communication license (500 Taka x 1 site)	500 Taka
Evaluation fee for VSAT user forms for VSAT communication license (5,000 Taka x 1 site)	5,000 Taka
License Fee for VSAT Link (200,000 Taka x 1 site)	200,000 Taka
Data Speed Fee for VSAT Link (30,000 Taka x 1 site)	30,000 Taka
Space Segment Fee	294,000 Taka
Frequency user form for Meteorological Radar System	500 Taka
Telephone line laid down cost for 2 lines for the proposed building to be constructed at Moulvibazar Meteorological Radar Tower Building	30,000 Taka
Public water pipe laid down and connecting works cost at Moulvibazar Meteorological Radar Observation Station	250,000 Taka
Building Construction Permission Fee (Moulvibazar Municipality Corporation (Pourashava)	45,000 Taka
Renovation of SWC including 2 Air-conditioners	500,000 Taka
Unforeseen items	500,000 Taka
Total	120,355,000 Taka

Table 36: Equipment Cost of BMD

Prime Minister's Office, Bangladesh TV and Dhaka International Airport (Briefing Room and Area Control Room)

Items	No.	Unit Price	Equipment Cost (Bangladesh Taka)
Router	4 sets	130,000 Taka	520,000 Taka
Ethernet Switch	4 sets	5,000 Taka	20,000 Taka
Desktop PC	4 sets	125,000 Taka	500,000 Taka
Compact UPS	4 sets	20,000 Taka	80,000 Taka
AVR	4 sets	60,000 Taka	240,000 Taka
Cables and Miscellaneous	4 sets	10,000 Taka	40,000 Taka
Total			1,400,000 Taka

Table 37: Capital Cost of FFWC

Items	Capital Cost (Bangladesh Taka)
VSAT user form for VSAT communication license (500 Taka x 1 site)	500 Taka
Evaluation fee for VSAT user forms for VSAT communication license (5,000 Taka x 1 site)	5,000 Taka
License Fee for VSAT Link (200,000 Taka x 1 site)	200,000 Taka
Data Speed Fee for VSAT Link (30,000 Taka x 1 site)	30,000 Taka
Space Segment Fee	294,000 Taka
Total	529,500 Taka

Applied Exchange Rate: US\$ 1=116.73 JP Yen, US\$1=68.39 Taka

2-5-2 Estimate of Recurrent Cost for the Project to be borne by Bangladesh side

(1) Recurrent Cost to be borne by BMD

In case that the Project is financed by the Japan's Grant Aid Assistance, the annual recurrent costs to be borne by BMD for the first decade after the completion of the Project are attached hereunder. The recurrent costs have been calculated in accordance with the following fundamental conditions.

- Operation and maintenance to be carried out by BMD
- Appropriate operation in accordance with the operations manuals
- Regular and proper maintenance according to the maintenance manuals

The recurrent costs of all the project sites (Moulvibazar Meteorological Observation Station, Existing Dhaka and Rangpur Meteorological Observation Stations, SWC, FFWC, the Prime Minister's Office, the Bangladesh TV Centre and the Dhaka International Airport), which consist of operation and maintenance costs of the equipment and the radar tower building to be borne by BMD (BMD must include salary of the staff to be employed for Moulvibazar Meteorological Radar Observation Station in the recurrent cost) have been calculated as shown in the following tables.

Table 38: Recurrent Cost of Moulvibazar Radar Tower

-Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Antenna	Grease (For AZ/EL)	1	0	0	0	0	14,000	0	0	0	0	14,000	16kg/can. Every 5 years
	Timing belt (For AZ/EL)	2	0	0	0	0	12,000	0	0	0	0	12,000	
2. Transmitter/Receiver	Timer relay for pre-heating	1	0	0	0	0	1,200	0	0	0	0	1,200	
	Blower unit	2	0	0	0	0	5,000	0	0	0	0	5,000	
	AC fan	2	0	0	0	0	4,600	0	0	0	0	4,600	
	Fuse for the power supply unit	1	0	0	0	300	0	0	0	300	0	0	
	Lamp for operation panel	1	0	0	0	600	0	0	0	600	0	0	
3. Antenna controller	Fuse for the power supply unit	1	0	0	0	400	0	0	0	400	0	0	
4. Product Monitor (5 sets)	Hard disk	3	0	0	0	25,000	0	0	0	25,000	0	0	Every 4 years
	CD for data storage	20	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
5. Compact UPS	Battery (about 500VA)	5	0	0	28,000	0	0	28,000	0	0	28,000	0	For the each PC connection
6. 1kVA UPS	Battery	1	0	0	7,800	0	0	7,800	0	0	7,800	0	For VSAT
7. Printer	Printer ink cartridge	2	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	
8. Radar Power Distribution Board	Relay for remote power control	1	0	0	0	0	1,200	0	0	0	0	1,200	
9. Diesel Engine Generator	Oil seal and filter	2	0	0	2,300	0	6,300	2,300	0	0	2,300	6,300	
	Battery for Engine start	2	0	0	0	0	0	0	4,500	0	0	0	

Subtotal (Taka)	6,800	6,800	44,900	33,100	51,100	44,900	11,300	33,100	44,900	51,100
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-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	522,720	522,720	522,720	522,720	522,720	522,720	522,720	522,720	522,720	522,720	*1
2. Fuel Cost	Diesel Engine Generator	1	55,800	55,800	55,800	55,800	55,800	55,800	55,800	55,800	55,800	55,800	*2 & *3
3. Water Supply Charge	Water supply charge	1	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	*4

Subtotal (Taka)	593,520	593,520	593,520	593,520	593,520	593,520	593,520	593,520	593,520	593,520	593,520	593,520
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Total Amount (Taka)	600,320	600,320	638,420	626,620	644,620	638,420	604,820	626,620	638,420	644,620
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***1 Estimate of annual electricity charge**

Annual operation hours of Radar System: 5,200 hours (include 360 hours operated by Diesel Engine Generator)

Annual power consumption: 5,200 hours - 360 hours = 4,840 hours, 4,840 hours x 20kWh = 96,800kWh

Electrical charge: 5.4Taka/kWh

$$96,800\text{kWh} \times 5.4 = 522,720\text{Taka}$$

***2 Estimated annual power to be generated by Diesel Engine Generator**

Annual operation hours of Radar System by Diesel Engine Generator due to power stoppage = 360 hours

Annual power consumption: 360Hours x 20kWh = 7,200kWh

***3 Estimate of annual fuel cost of Diesel Engine Generator**

Fuel consumption: approx. 0.25L/kWh

7,200kWh x 0.25L = 1,800L, 1,800L x 31Taka/L = 55,800Taka

***4 Estimate of annual water supply charge**

Annual water supply charge of Malvibazar Radar Tower = 15,000 Taka

Table 39: Recurrent Cost of Dhaka Radar

-Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Product Monitor	Hard disk	1	0	0	0	8,400	0	0	0	8,400	0	0	Every 4 years
	CD for archiving product data	20	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
2. Compact UPS	Battery	1	0	0	5,600	0	0	5,600	0	0	5,600	0	For the each PC connection
Subtotal (Taka)			1,200	1,200	6,800	9,600	1,200	6,800	1,200	9,600	6,800	1,200	

-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	*1
Subtotal (Taka)			28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	
Total Amount (Taka)			29,583	29,583	35,183	37,983	29,583	35,183	29,583	37,983	35,183	29,583	

*1 Estimate of annual electricity charge

Equipment operation: 24hours/day Power consumption: 0.6kWh
 Annual power consumption: 8,760Hours x 0.6kWh = 5,256kWh
 Electricity charge: 5.4Taka/kWh
 5,256kWh x 5.4 Taka/kWh = 28,383 Taka

Table 40: Recurrent Cost of Rangpur Radar

-Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Product Monitor	Hard disk	1	0	0	0	8,400	0	0	0	8,400	0	0	Every 4 years
	CD for archiving product data	20	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
2. Compact UPS	Battery	1	0	0	5,600	0	0	5,600	0	0	5,600	0	For the each PC connection
Subtotal (Taka)			1,200	1,200	6,800	9,600	1,200	6,800	1,200	9,600	6,800	1,200	

-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	*1
Subtotal (Taka)			28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	28,383	
Total Amount (Taka)			29,583	29,583	35,183	37,983	29,583	35,183	29,583	37,983	35,183	29,583	

*1 Estimate of annual electricity charge

Equipment operation: 24hours/day Power consumption: 0.6kWh
 Annual power consumption: 8,760Hours x 0.6kWh = 5,256kWh
 Electricity charge: 5.4Taka/kWh
 5,256kWh x 5.4 Taka/kWh = 28,383 Taka

Table 41: Recurrent Cost of Dhaka Storm Warning Centre (SWC)

-Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Product Monitor	Hard disk	4	0	0	0	34,000	0	0	0	34,000	0	0	Every 4 years
	CD for archiving product data	80	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	4,500	20GB/cartridge
2. Pinter	Printer ink cartridge	2	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	
3. Compact UPS	Battery (about 500VA)	7	0	0	39,000	0	0	39,000	0	0	39,000	0	For the each PC connection
4. 3kVA UPS	Battery	1	0	0	12,000	0	0	12,000	0	0	12,000	0	For VSAT

Subtotal (Taka)	10,100	10,100	61,100	44,100	10,100	61,100	10,100	44,100	61,100	10,100
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-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	163,672	163,672	163,672	163,672	163,672	163,672	163,672	163,672	163,672	163,672	*1
2. Internet Connection Cost	Charges for Virus Security	1	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	45,000	

Subtotal (Taka)	208,672	208,672	208,672	208,672	208,672	208,672	208,672	208,672	208,672	208,672	208,672	208,672
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Total Amount (Taka)	218,772	218,772	269,772	252,772	218,772	269,772	218,772	252,772	269,772	218,772
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***1 Estimate of annual electricity charge**

Equipment operation: 24hours/day Power consumption: 3.46kWh
 Annual power consumption: 8,760Hours x 3.46kWh = 30,309.6kWh
 Electricity charge: 5.4Taka/kWh
 30,309.6kWh x 5.4 Taka/kWh = 163,672 Taka

Table 42: Recurrent Cost of BMD Head Office

-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Communication Cost	Annual License Fee for VSAT Link	1	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	
	Annual Data Speed Fee for VSAT Link	1	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
	Annual Space Segment Fee	1	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	

Total Amount (Taka)	524,000	524,000	524,000	524,000	524,000	524,000	524,000	524,000	524,000	524,000	524,000	524,000
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Table 43: Recurrent Cost of Flood Forecasting and Warning Centre (FFWC)

-Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Product Monitor	Hard disk	1	0	0	0	8,400	0	0	0	8,400	0	0	Every 4 years
	CD for archiving product data	40	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	
2. Compact UPS	Battery	1	0	0	5,600	0	0	5,600	0	0	5,600	0	For the each PC connection
3. 1kVA UPS	Battery	1	0	0	7,800	0	0	7,800	0	0	7,800	0	For VSAT

Subtotal (Taka)	2,400	2,400	15,800	10,800	2,400	15,800	2,400	10,800	15,800	2,400
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-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	*1
2. Communication Cost	Annual License Fee for VSAT Link	1	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	200,000	
	Annual Data Speed Fee for VSAT Link	1	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	
	Annual Space Segment Fee	1	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	294,000	

Subtotal (Taka)	550,491	550,491	550,491	550,491	550,491	550,491	550,491	550,491	550,491	550,491	550,491	550,491
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Total Amount (Taka)	552,891	552,891	566,291	561,291	552,891	566,291	552,891	561,291	566,291	552,891
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***1 Estimate of annual electricity charge**

Equipment operation: 24hours/day Power consumption: 0.56kWh
 Annual power consumption: 8,760Hours x 0.56kWh = 4,905.6kWh
 Electricity charge: 5.4Taka/kWh
 4,905.6kWh x 5.4 Taka/kWh = 26,491Taka

Table 44: Recurrent Cost of Prime Minister's Office

-Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Product Monitor	Hard disk	1	0	0	0	8,400		0	0	8,400	0	0	Every 4 years
	CD for archiving product data	20	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
2. Compact UPS	Battery	1	0	0	5,600	0	0	5,600	0	0	5,600	0	For the each PC connection
Subtotal (Taka)			1,200	1,200	6,800	9,600	1,200	6,800	1,200	9,600	6,800	1,200	

-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	*1
Subtotal (Taka)			26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	
Total Amount (Taka)			27,691	27,691	33,291	36,091	27,691	33,291	27,691	36,091	33,291	27,691	

*1 Estimate of annual electricity charge

Equipment operation: 24hours/day Power consumption: 0.56kWh

Annual power consumption: 8,760Hours x 0.56kWh = 4,905.6kWh

Electricity charge: 5.4Taka/kWh

4,905.6kWh x 5.4 Taka/kWh = 26,491Taka

Table 45: Recurrent Cost of Bangladesh TV Centre

-Estimated Recurrent Cost

Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Product Monitor	Hard disk	1	0	0	0	8,400	0	0	0	8,400	0	0	Every 4 years
	CD for archiving product data	20	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
2. Compact UPS	Battery	1	0	0	5,600	0	0	5,600	0	0	5,600	0	For the each PC connection
Subtotal (Taka)			1,200	1,200	6,800	9,600	1,200	6,800	1,200	9,600	6,800	1,200	

-Others

Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	*1
Subtotal (Taka)			26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	26,491	
Total Amount (Taka)			27,691	27,691	33,291	36,091	27,691	33,291	27,691	36,091	33,291	27,691	

*1 Estimate of annual electricity charge

Equipment operation: 24hours/day Power consumption: 0.56kWh

Annual power consumption: 8,760Hours x 0.56kWh = 4,905.6kWh

Electricity charge: 5.4Taka/kWh

4,905.6kWh x 5.4 Taka/kWh = 26,491Taka

Table 46: Recurrent Cost of Dhaka International Airport

-Estimated Recurrent Cost													
Equipment	Item	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Product Monitor (2 sets)	Hard disk	1	0	0	0	8,400	0	0	0	8,400	0	0	Every 4 years
	CD for archiving product data	20	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	
2. Printer	Printer ink cartridge	1	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	
3. Compact UPS	Battery	2	0	0	12,000	0	0	12,000	0	0	12,000	0	For the each PC connection
Subtotal (Taka)			4,000	4,000	16,000	12,400	4,000	16,000	4,000	12,400	16,000	4,000	

-Others													
Cost Item	Details	Qty	1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year	10th year	Remarks
1. Electricity Charge		1	37,844	37,844	37,844	37,844	37,844	37,844	37,844	37,844	37,844	37,844	*1
Subtotal (Taka)			37,844	37,844	37,844	37,844	37,844	37,844	37,844	37,844	37,844	37,844	
Total Amount (Taka)			41,844	41,844	53,844	50,244	41,844	53,844	41,844	50,244	53,844	41,844	

*1 Estimate of annual electricity charge
 Equipment operation: 24hours/day Power consumption: 0.8kWh
 Annual power consumption: 8,760Hours x 0.8kWh = 7,008kWh
 Electricity charge: 5.4Taka/kWh
 7,008kWh x 5.4 Taka/kWh = 37,844Taka

(2) Apportionment of Expenses by BMD and FFWC

As a consequence of discussions between BMD and FFWC, apportionment of the required expenses for space segment to be leased for the meteorological satellite data communication systems is as follows.

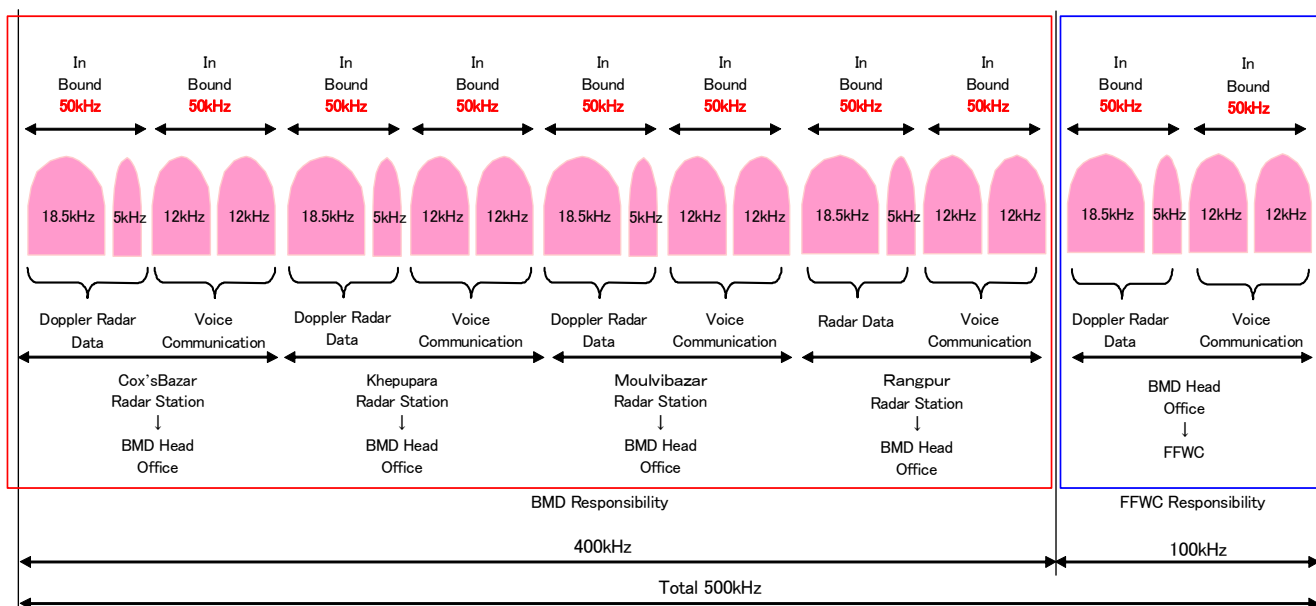


Figure 13: VSAT Space Segment Allocation for Radar Data Communication of BMD

(3) Annual Budget Trends

<BMD>

Prospective budget of BMD Head Office, each Meteorological Radar Station, SWC and the Moulvibazar Meteorological Radar Station are as follows.

Table 47: Movement of BMD Budget for Head Office

(Taka)

Item	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008 (Prospective)
Personnel Expenses	12,900,000	13,000,000	25,975,000	35,000,000	39,500,000
Consumable Cost	900,000	1,100,000	2,369,000	1,620,000	2,150,000
Electricity & Water Utilization Cost	2,800,000	3,000,000	2,510,000	2,510,000	3,015,000
Cost of Spare Parts	8,000,000	12,000,000	14,000,000	20,000,000	30,000,000
Telecommunication Cost	5,955,000	6,200,000	6,360,000	6,360,000	7,050,000
Space Segment	1,100,000	1,500,000	540,000	540,000	1,006,000
Total	31,655,000	36,800,000	51,754,000	66,030,000	82,721,000

Table 48: Movement of BMD Budget for Radar Stations & Storm Warning Centre (SWC) (Taka)

2002-03					
Item	Dhaka Radar Station	Rangpur Radar Station	Cox's Bazar Radar Station	Khepupara Radar Station	SWC, Dhaka
Personnel Expenses	1,250,000	1,626,000	2,013,000	1,330,000	27,225,000
Consumable Cost	75,000	100,000	70,000	63,000	850,000
Electricity & Water Utilization Cost	225,000	274,000	212,000	292,000	230,000
Radar Maintenance Cost	150,000	400,000	350,000	415,000	--
Total	1,700,000	23,94,000	2,645,000	2,100,000	28,305,000
2003-04					
Item	Dhaka Radar Station	Rangpur Radar Station	Cox's Bazar Radar Station	Khepupara Radar Station	SWC, Dhaka
Personnel Expenses	1,300,000	1,700,000	2,099,000	1,498,000	32,128,000
Consumable Cost	85,000	100,000	80,000	80,000	900,000
Electricity & Water Utilization Cost	215,000	280,000	213,000	272,000	200,000
Radar Maintenance Cost	200,000	500,000	400,000	450,000	--
Total	1,800,000	2,580,000	2,792,000	2,300,000	33,228,000
2004-05					
Item	Dhaka Radar Station	Rangpur Radar Station	Cox's Bazar Radar Station	Khepupara Radar Station	SWC, Dhaka
Personnel Expenses	1,400,000	1,440,000	2,373,000	1,696,000	30,000,000
Consumable Cost	85,000	205,000	85,000	90,000	1,000,000
Electricity & Water Utilization Cost	215,000	255,000	225,000	214,000	250,000
Radar Maintenance Cost	300,000	600,000	440,000	500,000	--
Total	2,000,000	2,500,000	3,123,000	2,500,000	31,250,000
2005-06					
Item	Dhaka Radar Station	Rangpur Radar Station	Cox's Bazar Radar Station	Khepupara Radar Station	SWC, Dhaka
Personnel Expenses	2,000,000	2,050,000	3,030,000	2,150,000	35,000,000
Consumable Cost	120,000	310,000	115,000	120,000	2,000,000
Electricity & Water Utilization Cost	300,000	320,000	310,000	300,000	440,000
Radar Maintenance Cost	450,000	500,000	500,000	610,000	-
Total	2,870,000	3,180,000	3,955,000	3,180,000	37,440,000
2006-07					
Item	Dhaka Radar Station	Rangpur Radar Station	Cox's Bazar Radar Station	Khepupara Radar Station	SWC, Dhaka
Personnel Expenses	2,150,000	2,210,000	3,140,000	2,250,000	41,500,000
Consumable Cost	150,000	375,000	165,000	150,000	2,100,000
Electricity & Water Utilization Cost	375,000	410,000	390,000	375,000	520,000
Radar Maintenance Cost	510,000	590,000	585,000	700,000	-
Total	3,185,000	3,585,000	4,280,000	3,475,000	44,120,000

Table 49: BMD Budget for Moulvibazar Radar Station (Taka)

2008-09 (Prospective)	
Item	Moulvibazar Radar Station
Personnel Expenses	3,800,000
Consumable Cost	200,000
Electricity & Water Utilization Cost	610,000
Radar Maintenance Cost	700,000
Total	5,310,000

<Annual Budget of BWDB in connection with Flood Forecasting and Warning>

Table 50: Annual Budget in connection with Flood Forecasting and Warning Services in BWDB, 2005-2006

	Establishment (Personnel Expenses and others)	Operation and Maintenance	Project	Total
Flood Forecasting & Warning Centre (FFWC)	3,400,000	725,000	400,000	4,525,000
Surface Water Hydrology (SWH)	15,800,000	4,300,000	-	20,100,000
Construction & Instrumentation Division (C&I)	4,000,000	3,000,000	-	7,000,000
Total	23,200,000	8,025,000	400,000	31,625,000

The results of the study regarding the recurrent cost of the Project to be borne by BMD and FFWC are as follows.

<Moulvibazar Meteorological Radar Observation Station>

BMD has surly agreed to ensure the necessary budget for recurrent cost. In addition, the required budget for the estimated recurrent cost for the Cox's Bazar and Khepupara Meteorological Radar Observation Stations has been secured by BMD, it is felt that BMD can afford it.

<Dhaka and Rangpur Meteorological Radar Observation Stations>

Annually about 30,000 Taka which is around 7% of the electricity & water utilization cost and 1% of the total annual budget in the 2006-07 is required, it is felt that BMD can afford it.

<SWC>

According to the estimated recurrent cost, annually 220,000 Taka is required. Since the electricity & water utilization cost in the 2006-07 budget is 2,620,000 Taka, this would be an increase of approximately 8%. The SWC budget for electricity & water utilization has constantly been increasing ever year, therefore, it has been assessed that there is no serious problem.

<BMD Head Office>

After completion of the Project, the total satellite communication cost, which consists of the VSAT license fee, data speed fee and space segment cost, is estimated at 524,000 Taka/year.

BMD has scheduled to secure 1,928,000 Taka including the total satellite communication cost in 2008-2009 which is the expected completion time of the Project. As a consequence of discussions with BMD, BMD has committed to obtain the required budget for the Head Office prior to completion of the Project.

Table 51: Movement of BMD Budget for Head Office's Space Segment

BMD Head Office	2003-2004	2004-2005	2005-2006	2006-2007	2007—2008 (Prospective)	2008-2009 (Prospective)
Space Segment	1,100,000	1,500,000	540,000	540,000	1,006,000	1,928,000

<FFWC>

Most of the required recurrent cost is the total satellite communication cost, which consists of the VSAT license fee, data speed fee and space segment cost, is estimated at 524,000 Taka/year. With electricity charge, etc., the estimated recurrent cost to be born by FFWC is totally 550,000 Taka. BWDB plans to cover the recurrent cost by combining their all budget in connection with Flood Forecasting and Warning. FFWC has agreed to secure the required budget prior to completion of the Project.

2-6 Other Relevant Issues

(1) Approval of Executive Committee for National Economic Council (ECNEC)

Any project to be implemented in Bangladesh is required to obtain an approval of ECNEC. In case that a project is not approved by ECNEC, allocation of the require budget, conclusion of consultant agreement and contract, tax exemption, import permission, etc. can not be made. Therefore, for smooth implementation of the Project, the Development Project Proposal (DPP) for the Project prepared by BMD and submitted through the Ministry of Defence and the Planning Commission must be approved by the ECNEC prior to commencement of the Project.

(2) Landownership Transfer and Demolishment of Existing Facilities

Prior to commencement of the Project, completion of the landownership transfer of the site in Moulvibazar from BWDB to BMD and demolishment of the existing facilities to be implemented by BWDB, which are a fundamental condition for implementation of the Project, are indispensable.

(3) Building Construction Permission

In order to construct a radar tower building in Moulvibazar, the acquisition of a building permission from the Moulvibazar Municipality Corporation (Pourashava) is required. For applying the building permission, the following documents and drawings must be submitted to the Municipality Corporation. After around 10 days from the submission, the permission is issued, if there is no problem. The documents of 2, 3, 4

and 5 indicated in the following table will be delivered to BMD by the Consultant immediately after the detailed study implemented in Bangladesh.

Table 52: Required Documents for obtaining Building Construction Permission of Moulvibazar Municipality Corporation (Pourashava)

	Documents	Required Number
1	Prescribed Form	1 Original
2	Site Plan	3 Copies
3	Building Design Drawings	2 Copies
4	Structural Design Drawing	2 Copies
5	Soil Test Report	2 Copies
6	Land Hand-over Documents (From BWDB to BMD)	2 Copies
7	BMD Forward Letter	1 Original

(4) Building Height Restriction in Moulvibazar

In Moulvibazar, construction of 4 buildings (3 buildings: under construction, 1 building: not yet started) higher than the existing tallest building (SALEH Tower Building: 35m) in the city have been permitted by the Moulvibazar (Pourashava). Since those buildings would become interference of meteorological radar observation, several discussions with the Moulvibazar (Pourashava) and BMD on possibility of building height restriction enforcement were held. As a consequence, the Moulvibazar (Pourashava), based on his consideration that the meteorological radar in Moulvibazar is an important country issue against floods causing the most serious disaster in Moulvibazar, suggested that it was possible to enforce building height restriction on any buildings in Moulvibazar. An official request on the building height restriction in Moulvibazar with the following drawing was submitted to Moulvibazar through MOD. It was requested that the maximum building height must be 35m which is the same height of SALEH Tower Building in 5 km radius from the Radar Tower Building. Enforcement of the building height restriction in Moulvibazar is dispensable for the implementation of the Project.

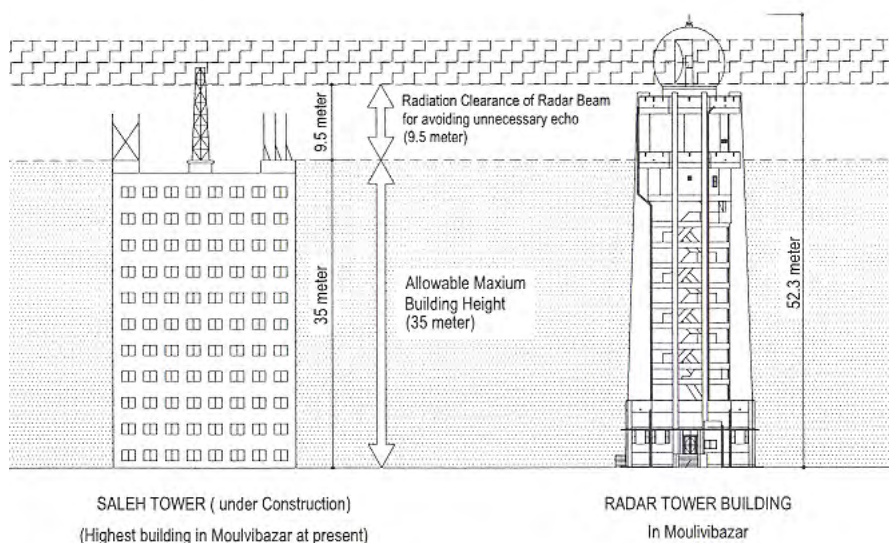


Figure 14: Building Height Restriction in Moulvibazar

(5) Satellite Communication

A VSAT user license issued by the Bangladesh Telecommunication Regulatory Commission (BTRC) will be required for the meteorological data satellite communication systems between the Moulvibazar and the SWC. The license includes; i) Purchase of 3 VSAT user forms (500 Taka) available at BTRC for Moulvibazar Meteorological Radar Observation Station and FFWC, ii) Submission of the forms, to be addressed to the Chairman of BTRC by BMD and FFWC respectively, iii) Evaluation of the submitted forms by BTRC (Evaluation fee: 5,000 Taka/form), iv) Provision of VSAT user licenses to BMD and FFWC respectively by BTRC (if there are no irregularities in the forms, it will take 2 months for issuance of the licenses to BMD).

BTRC will charge BMD for use of the meteorological data satellite communication systems to be supplied under the Project, according to the following. These costs have been included in the recurrent cost of the BMD Head Office.

- License Fee: annually 200,000 Taka/system
- Data Speed Fee: Less than 128Kbps Annually 30,000 Taka/system

(6) Air Force Surveillance Radar

An air surveillance radar belongs to the Air Force is located in the outskirts of Moulvibazar, 4.827km away from the Project site of Moulvibazar Meteorological Radar Observation Station. As it is anticipated that the radar beams of this radar and the Meteorological Radar System (BMS's existing frequency of 2,850MHz) would occur interference with each other, discussions at the Ministry of Defence were made among the Bangladesh Air Force (BAF), the Ministry of Defence, BMD and the Basic Design Study team on November 19, 2006. As a consequence of the discussions, finally BAF requested BMD to use 2,770MHz for the Moulvibazar meteorological radar system instead of the existing frequency of 2,850MHz permitted by the Bangladesh Telecommunication Regulatory Commission (BTRC) for the Cox's Bazar and Khepupara meteorological radar systems and previously agreed by BAF. The Ministry of Defence, BMD and the Basic Design Study team accepted the request of BAF. In addition, during the discussions, it was confirmed that BMD shall quickly obtain the official permission from BTRC for 2,770MHz through constructive cooperation of BAF and the Ministry of Defence.

Chapter 3

Project Evaluation and Recommendations

Chapter 3 Project Evaluation and Recommendations

3 - 1 Project Effect

(1) Project Effect

Table 53: Project Effect

Present Situation and Existing Issue	Remedial Measures under the Project	Direct Effects and Degree of Improvement	Indirect Effects and Degree of Improvement
Unable to issue forecasts and warnings of Flash Flood and local severe storm locally called “Nor’wester” to the public due to no quantitative observation data of precipitation in the northern Sylhet District (the wettest area in Bangladesh), the upper river basin of the Meghna and Meghalaya Hills (the world's wettest area) since these areas are located out of the detection range of the existing meteorological radar observation network	<ul style="list-style-type: none"> •Construction of Meteorological Radar Tower Building in Moulvibazar •Installation of Meteorological Radar System in Moulvibazar 	After detection of heavy rainfall by the meteorological radar system, flash flood forecast and warning will be issue every 1 hour.	Timely dissemination of evacuation order will be made. Damage caused by a flash flood will be reduced.
Unable to accurately and timely observe local severe storm associated with tornados briefly occur and create serious damage and promptly issue forecasts and warnings to the public since no Doppler radar system in the northern part of Bangladesh.	<ul style="list-style-type: none"> •Construction of Meteorological Radar Tower Building in Moulvibazar •Installation of Meteorological Radar System in Moulvibazar •Installation of Meteorological Data Satellite Communication System •Installation of Meteorological Radar Data Display System 	After detection of local severe storm by the meteorological radar system, local severe weather forecast and warning will be issue every 1 hour. After detection of heavy rainfall causing local rainwater flood by the meteorological radar system, of heavy rainfall forecast and warning will be issue within 1 hour.	Damages caused by local severe storms will be reduced. Safe operation and movement of the ship and vessel will be ensure.
Unable to improve accuracy of flood forecasts and issue forecasts and warnings of flash flood, local severe storm and local rainwater flood since the existing Dhaka and Rangpur radar systems can output precipitation intensity, however, these systems are no functioning of outputting hydrological data required for flood forecasting to be prepared though analysis and processing of observed precipitation data.	<ul style="list-style-type: none"> •Existing Radar System 8 bit Improvement •Installation of Meteorological Data Satellite Communication System •Installation of Meteorological Radar Data Display System 	Accuracy of flood forecasts and will be improved since precipitation data of 2.5 km mesh in the detection range of the meteorological radar observation network consisting of 5 radar systems can be inputted to the existing flood forecasting model (FF2003 Model).	Accuracy of weather forecasts will be improved. Accuracy of flood forecasts will be improved. Damages caused by local rain-water floods will be reduced.
Unable to improve accuracy of Flood Forecasts since insufficiency of observed data of the existing river and rainfall stations for inputting to the existing flood forecasting model (FF2003 Model), acquisition of the required data taking longer and lack of data in the India.	<ul style="list-style-type: none"> •Installation of Meteorological Radar System in Moulvibazar •Installation of Meteorological Data Satellite Communication System •Installation of Meteorological Radar Data Display System •Existing Radar System 8 bit Improvement 	Accuracy of flood forecasts and will be improved since precipitation data of 2.5 km mesh in the detection range of the meteorological radar observation network consisting of 5 radar systems can be inputted to the existing flood forecasting model (FF2003 Model).	Timely dissemination of evacuation order will be made. Damages caused by floods will be reduced.

(2) Achievement Indicators for the Project

Discussions with BMD, the following Achievement Indicators for the Project have been set as follows.

Table 54: Achievement Indicator

Summary	Present (Base Line)	Target	Expected Achievement Time
Enhancement of Capability of FFWC for flash flood forecasting and warning	No activity for flash flood forecasting and warning of FFWC due to no grid rainfall data at real time	After detection of heavy rainfall by the meteorological radar system, flash flood forecast and warning will be issued every 1 hour to the public by FFWC.	1 year from the completion of the Project
Enhancement of Capability of BMD for thunderstorm and heavy rainfall forecasting and warning	Forecasts and warnings of a local severe storm locally called “Nor’wester” is issued every 6 hours by BMD	After detection of local severe storm by the meteorological radar system, local severe storm forecast and warning will be issued every 1 hour to the public by BMD.	1 year from the completion of the Project
	Forecasts and warnings of heavy rainfall causing local rain water flood is issued once a day by BMD	After detection of heavy rainfall causing local rain water flood by the meteorological radar system, heavy rainfall forecast and warning will be issued within 1 hour to the public by BMD.	1 year from the completion of the Project
Enhancement of Observation Capability of BMD	No capability to observe precipitation in the whole area of Meghna catchment area	Since rainfalls in the whole area of Meghna river are detectable by Moulvibazar meteorological radar system, meteorological information will be issued to the organizations concerned with disaster prevention and the public by BMD.	After the completion of the Project

(3) Population to directly benefit from the Implementation of the Project

Flood in Bangladesh is a perennial problem. North-eastern and central parts of Bangladesh are frequently flooded seriously causing human sufferings and economic losses. These extensive losses from floods are a significant set-back to the national economy and for development in Bangladesh. Therefore, it would not be an exaggeration to say that the number of population to be benefited by the implementation of the Project is the whole nation of Bangladesh which is 123,851,120 indicated in the 2004 Statistical Yearbook of Bangladesh.

The overall objective of the Project is to reduce devastation caused by floods. This will be achieved by improving meteorological observation and flood forecasting capability in Bangladesh through the establishment of one meteorological Doppler radar system (S-band) at Moulvibazar for monitoring rainfall in wettest area of Bangladesh, Meghna catchment area and Meghalaya Hills in the India and improvement of the function of the existing Dhaka and Rangpur radar systems.

To estimate how the Project will benefit the people of Bangladesh, the number of the potentially affected people has been calculated using “Flood Indication Map” attached herewith, based on the 2004 Statistical Yearbook of Bangladesh, published by the Bangladesh Bureau of Statistics. The results are as follows.

The population in the areas affected by flood which will directly benefit from the Project is estimated to be 82,414,590 which is 67% of the population of Bangladesh.

Since FFWC will be able to issue forecasts and warnings of flash flood by unifying precipitation data in the detection range of the meteorological radar observation network consists of 3 Doppler radar systems in Cox’s Bazar, Khepupara and Moulvibazar and 2 existing Dhaka and Rangpur radar systems to be improved to be 2.5 km mesh data and 256 gradation level indication, the population in the areas affected by flash flood which will directly benefit from the Project is estimated to be 4,719,160 in the north-west area, 16,705,020 in the north-east area and 9,345,360 in the Chittagong hilly area bring the total to 30,769,540 which is 22% of the population of Bangladesh.

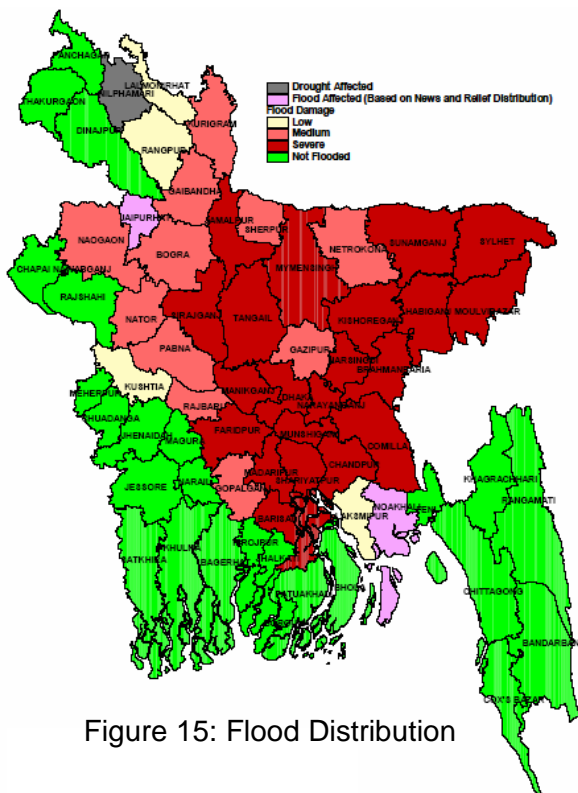


Figure 15: Flood Distribution

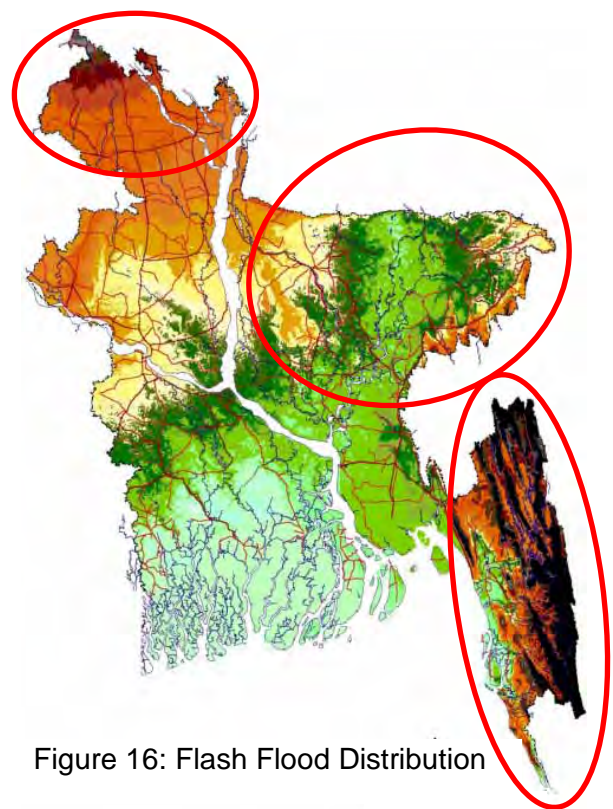


Figure 16: Flash Flood Distribution

3 - 2 Recommendations

In order to further enhance the benefits of the Project, the following recommendations should be implemented.

- a) The development of more qualified technical personnel.
- b) Securing the necessary budget for the efficient operation & maintenance of the systems and the procurement of spare parts & consumables for all of the equipment to be supplied under the Project.

- c) Protection of the equipment against damage and disappearance.
- d) Creation of effective communications and collaboration with the various government agencies and international institutions, for better coordination of natural disaster prevention and management.
- e) Conducting research to increase the level of understanding/knowledge about meteorological and hydrological disasters.
- f) Devising effective and consistent disaster prevention schemes from weather and flood forecasting, announcement of warning, disaster occurrence, information dissemination, up to evacuation.
- g) Wide dissemination of knowledge and information on disaster-prevention activities to all sectors, including government disaster management agencies, the private sector and the population at risk.

BMD is able to implement the fundamental routine works such as meteorological observation and forecasting using the meteorological radar systems and also the meteorological radar operation and maintenance. For further improvement of BMD's technical skill and effectively longer utilization of the meteorological radar systems, technical training and technology transfer are required for the staff of BMD. The knowledge, technical skills and ability of BMD personnel can be improved by training in Japan in radar meteorology and the operation and maintenance of the meteorological radar systems, and this will be augmented by BMD's own training.

Appendices

Appendix 1. Member List of the Survey Team

(1) Basic Design Survey Team

Mr. Eiichiro CHO	Team Leader	Additional Representative of JICA Bangladesh Office, Japan International Cooperation Agency (JICA)
Mr. Naoki TSUKAMOTO	Technical Advisor	Scientific Officer, Observation Division, Observation Department, Japan Meteorological Agency (JMA)
Ms. Mariko KOMAZAKI	Project Coordinator	ICT (Information and Communication Technology) and Governance Team, Project Management Group I, Grant Aid Management Department, Japan International Cooperation Agency (JICA)
Mr. Yoshihisa UCHIDA	Project Manager /Meteorological Radar System Planning/Operation and Maintenance Planning	Japan Weather Association (JWA)
Mr. Takehiro YOSHIDA	Meteorological Observation, Communication, Forecasting and Warning System Planning /Equipment Procurement Planning /Equipment Cost Estimate	Japan Weather Association (JWA)
Mr. Teruaki HIRAOKA	Construction Planning /Construction Cost Estimate	Japan Weather Association (JWA) (Kume Sekkei Co., Ltd.)
Mr. Katsutoshi KOJIMA	Facility Planning / Natural Conditions Survey	Japan Weather Association (JWA) (Kume Sekkei Co., Ltd.)
Mr. Nasir Uddin Bhuiyan	Local Consultant (Meteorological Radar Operation and Maintenance)	Japan Weather Association (JWA)

(2) Second Basic Design Survey Team

Mr. Eiichiro CHO	Team Leader	Additional Representative of JICA Bangladesh Office, Japan International Cooperation Agency (JICA)
Mr. Yoshihisa UCHIDA	Project Manager /Meteorological Radar System Planning/Operation and Maintenance Planning	Japan Weather Association (JWA)
Mr. Takehiro YOSHIDA	Meteorological Observation, Communication, Forecasting and Warning System Planning /Equipment Procurement Planning /Equipment Cost Estimate	Japan Weather Association (JWA)
Mr. Nasir Uddin Bhuiyan	Local Consultant (Meteorological Radar Operation and Maintenance)	Japan Weather Association (JWA)

Appendix 2. Study Schedule

(1) Basic Design Study

Schedule	Governmental Member			Consultant Member				
	Mr. Eiichiro Cho	Mr. Naoki TSUKAMOTO	Ms. Mariko KOMAZAKI	Mr. Yoshihisa UCHIDA	Mr. Takehiro YOSHIDA	Mr. Teruaki HIRAOKA	Mr. Katsutoshi KOJIMA	Mr. Nasir Uddin Bhuiyan
2006	Team Leader	Technical Advisor	Project Coordinator	Project Manager / Meteorological Radar System Planning/ Operation and Maintenance Planning	Meteorological Observation, Communication, Forecasting and Warning System Planning / Equipment Procurement Planning / Equipment Cost Estimate	Construction Planning / Construction Cost Estimate	Facility Planning / Natural Conditions Survey	Local Consultant (Meteorological Radar Operation and Maintenance)
1	20 Jun.	Tue		Tokyo→Bangkok TG641 (11:00-15:30)				
2	21 Jun.	Wed		Bangkok→Dhaka TG321 (10:30-11:55) Preliminary Discussion with Bangladesh Meteorological Department (BMD)				Preliminary Discussion with BMD
3	22 Jun.	Thu		Preliminary Discussion with JICA Bangladesh Office, Preliminary Discussion with BMD, Discussion with Processing and Flood Forecasting Circle (BWDB)				Preliminary Discussion with BMD, Discussion with BWDB
4	23 Jun.	Fri		Visit to local contractors for requesting a cost estimate of Topographic and Geotechnical Survey, Data Collection, Study for Unit Price of Construction Materials				Data Collection
5	24 Jun.	Sat		Tokyo→Singapore SQ997 (11:30-17:40) Singapore→Dhaka SQ436 (20:30-22:30)	Visit to local contractors for requesting a cost estimate of Topographic and Geotechnical Survey, Data Collection, Study for Unit Price of Construction Materials			Data Collection
6	25 Jun.	Sun	Courtesy call on Embassy of Japan, Preliminary Discussion with JICA Bangladesh Office, Courtesy call on BMD, Discussion with BMD					Discussion with BMD
7	26 Jun.	Mon	Courtesy call on Economic Relations Division (ERD), Courtesy call on Ministry of Defence (MOD), Site Survey at BMD Head Office and Storm Warning Centre (SWC), Site Survey at Dhaka Radar Station					Site Survey at Dhaka Head Office and SWC, Site Survey at Dhaka Radar Station
8	27 Jun.	Tue	Discussion with BMD, Discussion with BMD and Bangladesh Water Development Board (BWDB)/Flood Forecasting and Warning Centre (FFWC)			Data Collection, Study for Unit Price of Construction Materials		Discussion with BMD, Discussion with BMD and BWDB/FFWC
9	28 Jun.	Wed	Discussion with BMD and MOD, Discussion with BMD and ERD, Discussion with Planning Commission			Data Collection, Study for Unit Price of Construction Materials		Discussion with BMD
10	29 Jun.	Thu	Dhaka→Moulvibazar, Discussion with Moulvibazar BWDB, Discussion with Moulvibazar Municipality Corporation (Pourashava), Discussion with Bangladesh Telegraph and Telephone Board (BTTB) Moulvibazar, Site Survey at Moulvibazar BWDB, Moulvibazar→Sylet					Dhaka→Moulvibazar, Discussion with Moulvibazar BWDB, Discussion with Moulvibazar Municipality Corporation (Pourashava), Site Survey at Moulvibazar BWDB, Moulvibazar→Sylet
11	30 Jun.	Fri	Sylet→Moulvibazar, Site Survey at Moulvibazar Proposed Site, Site Survey at BTTB Moulvibazar Steel Tower, Moulvibazar→Dhaka					Sylet→Moulvibazar, Site Survey at Moulvibazar Proposed Site, Site Survey at BTTB Moulvibazar (Steel Tower), Moulvibazar→Dhaka
12	1 Jul.	Sat	Intenal Meeting, Data Collection					
13	2 Jul.	Sun	Signing on Minutes of Discussions, Report to Embassy of Japan and JICA Bangladesh Office (Political Demonstration)			Data Collection, Study for Unit Price of Construction Materials	Tokyo→Bangkok TG641 (11:00-15:30)	Discussion with BMD
14	3 Jul.	Mon		Dhaka→Singapore SQ435 (23:50-05:50)	Discussion with BMD, Site Survey at Dhaka Head Office, Data Collection	Data Collection, Quantity Survey	Bangkok→Dhaka TG321 (10:30-11:55)	Discussion with BMD, Site Survey at Dhaka Head Office
15	4 Jul.	Tue		Singapore→Tokyo SQ012 (09:45-17:35)	Discussion with DHI Water and Environment of Denmark, Intenal Meeting, Data Collection (Political Demonstration)	Site Survey at Dhaka Head Office, Data Collection		
16	5 Jul.	Wed	Intenal Meeting, Data Collection (Political Demonstration)			Intenal Meeting, Data Collection (Political Demonstration)		
17	6 Jul.	Thu	Dhaka→Moulvibazar, Site Survey at Moulvibazar Proposed Site, Discussion with BTTB Moulvibazar, Site Survey at BTTB Moulvibazar Steel Tower, Moulvibazar→Dhaka			Discussion with Bangladesh Telecommunication Regulatory Commission (BTRC), Discussion with Disaster Management Bureau (DMB), Discussion with BTTB	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials, Collection of Questionnaires	Discussion with BTRC, Discussion with DMB, Discussion with BTTB
18	7 Jul.	Fri	Site Survey at SWC and Dhaka Radar Station			Site Survey at SWC and Dhaka Radar Station		
19	8 Jul.	Sat	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials, Collection of Questionnaires			Data Collection, Quantity Survey, Study for Unit Price of Construction Materials, Collection of Questionnaires		

Appendix 2. Study Schedule

20	9 Jul.	Sun		Discussion with BMD and BWDB/FFWC, Discussion with BMD	Dhaka→Rangpur, Site Survey at Rangpur Radar Station, Rangpur→Dhaka	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials, Collection of Questionnaires	Dhaka→Rangpur, Site Survey at Rangpur Radar Station, Rangpur→Dhaka	Discussion with BMD and BWDB/FFWC, Discussion with BMD
21	10 Jul.	Mon			Discussion with BMD, Discussion with Central Procurement Technical Unit (CPTU), Data Collection	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials, Collection of Questionnaires		Discussion with BMD, Data Collection
22	11 Jul.	Tue		Discussion with BMD and BWDB/FFWC, Data Collection		Site Survey at FFWC, Survey at Dhaka International Airport		Discussion with BMD and BWDB/FFWC, Data Collection
23	12 Jul.	Wed		Discussion with BMD and BWDB/FFWC, Data Collection	Dhaka→Bangkok TG322 (13:10-16:30)	Site Survey at Prime Minister Office, Data Collection, Quantity Survey, Study for Transportation		Discussion with BMD and BWDB/FFWC, Data Collection
24	13 Jul.	Thu		Discussion with BMD, Data Collection	Bangkok→Tokyo TG676 (07:30-15:40)	Data Collection, Quantity Survey, Study for Transportation		Discussion with BMD, Data Collection
25	14 Jul.	Fri		Dhaka→Cox's Bazar, Site Survey at Cox's Bazar		Data Collection, Study for Unit Price	Dhaka→Cox's Bazar, Site Survey at Cox's Bazar	
26	15 Jul.	Sat		Site Survey at Cox's Bazar, Cox's Bazar→Dhaka		Data Collection, Study for Unit Price, Study for Construction Materials and Methods	Site Survey at Cox's Bazar, Cox's Bazar→Dhaka	
27	16 Jul.	Sun		Discussion with JICA Bangladesh Office, Discussion with BMD, Data Collection		Discussion with JICA Bangladesh Office, Discussion with BMD, Data Collection		Discussion with BMD, Data Collection
28	17 Jul.	Mon		Discussion with BMD, Discussion with DMB, Data Collection		Site Survey at Bangladesh TV Centre, Data Collection, Quantity Survey, Study for Unit Price of Construction Materials		Discussion with BMD, Discussion with DMB, Data Collection
29	18 Jul.	Tue		Site Survey at Bangladesh TV Centre, Discussion with BMD, Data Collection		Site Survey at Bangladesh TV Centre, Visit Local Contractor of Topographic and Geotechnical Survey, Discussion with BMD, Data Collection		Site Survey at Bangladesh TV Centre, Discussion with BMD, Data Collection
30	19 Jul.	Wed		Discussion with BWDB, Discussion with BMD, Data Collection, Report to Embassy of Japan		Discussion with BMD, Data Collection, Quantity Survey, Study for Unit Price of Construction Materials, Report to Embassy of Japan		Discussion with BWDB, Discussion with BMD, Data Collection
31	20 Jul.	Thu		Discussion with Bangladesh Air Force, MOD and BMD, Report to BMD, Data Collection, Report to JICA Bangladesh Office		Report to BMD, Data Collection, Report to JICA Bangladesh Office		Discussion with Bangladesh Air Force, MOD and BMD, Report to BMD, Data Collection
32	21 Jul.	Fri			Dhaka→Bangkok TG322 (13:10-16:30)		Dhaka→Bangkok TG322 (13:10-16:30)	
33	22 Jul.	Sat			Bangkok→Tokyo TG676 (07:30-15:40)		Bangkok→Tokyo TG676 (07:30-15:40)	

(2) Explanation of Draft Report

Study Schedule			Governmental Member	Consultant Member		
			Mr. Eiichiro CHO	Mr. Yoshihisa UCHIDA	Mr. Takehiro YOSHIDA	Mr. Nasir Uddin Bhuiyan
2006年			Team Leader	Project Manager / Meteorological Radar System Planning / Operation and Maintenance Planning	Meteorological Observation, Communication, Forecasting and Warnig, System Planning / Equipment Procurement Planning / Equipmet Cost/Estimate	Lacal Consultant (Meteorological Radar Operation and Maintenance)
1	17 Nov.	Fri		Narita-Bangkok (TG641, 10:45-15:45)		
2	18 Nov.	Sat		Bangkok-Dhaka (TG321, 10:30-12:00) Courtesy call on BMD, Explanation of Draft Report to BMD		
3	19 Nov.	Sun	Meeting with JICA Bangladesh Office, Courtesy call on Embassy of Japan, Courtesy call on Economic Relations Division and Ministry of Defence, Discussion with BMD, Explanation of Draft Report to BMD and FFWC			Discussion with BMD and FFWC, Explanation of Draft Report to BMD
4	20 Nov.	Mon	Discussion with BMD, Explanation of Draft Report to BMD			
5	21 Nov.	Tue	Discussion with BMD, Explanation of Draft Report to BMD			
6	22 Nov.	Wed	Discussion with BMD, Explanation of Draft Report to BMD			
7	23 Nov.	Thu	Signing on Minutes of Discussions, Report to Embassy of Japan and JICA Bangladesh Office			Data Collection
8	24 Nov.	Fri		Dhaka-Bangkok (TG322 13:10-16:25)		
9	25 Nov.	Sat		Bangkok - Narita (TG676, 07:30-15:40)		

Appendix 3. List of Party Concerned in the Recipient Country

- **Ministry of Defence**

Mr. Abu Md. Maniruzzaman Khan	Secretary
Mr. Shah Muhammad Sultan Uddin Iqbal	Joint Secretary
Mr. Md. Abdul Quadir	Engineering Adviser
Mr. Altaf Hossain	Senior Assistant Chief

- **Economic Relations Division, Ministry of Finance**

Mr. M. Emdadul Haque	Deputy Secretary
Dr. Krishna Gayen	Senior Assistant Chief

- **Planning Commission, Ministry of Planning**

Communication Wing, Physical Infrastructure Division

Mr. Md. Abu Bakar Siddique	Joint Chief
Mr. Md. Shaheenur Rahman	Assistant Chief

- **The United Nations World Food Programm**

Vulnerability Analysis and Mapping Unit, Program & Resourcing Section

Ms. Nusha Yamina Choudhury	Head
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- **Bangladesh Meteorological Department (BMD)**

BMD Head Office and Storm Warning Centre (SWC), Dhaka

Mr. Md. Akram Hossain	Director
Dr. Samaredra Karmakar	Deputy Director, Headquarter
Ms. Aujumand Habib	Deputy Director, Storm Warning Centre
Mr. Md. Mohammad Nuruddin	Deputy Director, Agro-meteorology
Mr. Alauddin Biswas	Deputy Director, Engineering
Mr. Md. Shah Alam	Deputy Director, Climate
Mr. B. N. Podder	Senior Electronic Engineer
Mr. Md. Muzammel Haque Tarafder	Senior Communication Engineer
Mr. Ahmed Arif Rashid	Senior Mechanical Engineer, Planning Division
Mr. Md. Sozzad Hossain	Assistant Communication Engineer

Sylhet Meteorological Observatory

Mr. Sayeed Ahmed Chowdhury	Meteorologist, Chief Observatory
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- **Bangladesh Water Development Board (BWDB)**

Mr. Md. Habibur Rahman Chief Planning
Mr. Md. Azizul Haque Director, Planning-1

Processing and Flood Forecasting Circle

Mr. Md. Sazedul Karim Chowdhury Superintending Engineer & NPD
Mr. Md. Saiful Hussain Executive Engineer

Flood Forecasting and Warning Centre (FFWC)

Mr. Md. Salim Bhuiyan Executive Engineer

BWDB Moulvibazar

Mr. Sheikh Abdul Momin Superintending Engineer
Mr. Kazi Abu Baker Siddique Executive Engineer

- **Moulvibazar Municipality Corporation (Pourashava)**

Mr. Md. Fayzul Karim Moyun Chairman
Mr. Ayas Ahmed Commissioner, Panel of Chirmam-1
Mr. Abul Hossain Khan Executive Engineer
Mr. Shama Proshad Bapary Chief Executive Officer

- **Bangladesh Telegraph and Telephone Board (BTTB)**

Mr. Binoy Krishna Gayeen Divisional Engineer, Moulvibazar
Mr. Ashraful Islam Divisional Engineer, Mohakhali, Dhaka

- **Central Procurement Technical Unit (CPTU), Ministry of Planning**

Mr. ANM Mustafizur Rahman System Analyst

- **Bangladesh Telecommunication Regulatory Commission (BTRC)**

Mr. A.M.M. Reza-e-Rabbi Vice-Chaiman
Mr. Md. Golam Razzaque Deputy Director
Mr. Md. Masud Uddin Bhuiyan Assistant Director
Ms. Anamika Bhakta Assistant Director

- **Disaster Management Bureau (DMB)**

Mr. Mohammad Abu Sadeque Director, Monitoring & Information Management

- **Bangladesh Television**

Mr. Md. Moshtaqur Rahman
Ms. Latifa Chowdhury
Mr. Hafizur Rahman
Mr. Kazi Solaiman

Additional Chief Engineer
Senior Engineer
Controller/ Engineering Manager
Engineering Manager

- **Bangladesh Air Force**

Mr. Ahsanul Haque
Mr. Maksudum Nabi
Mr. M. Momenul Islam

Wing Commander
Wing Commander (Communication and Electronics)
Squadron Leader (Meteorology)

Appendix 4. Minutes of Discussion

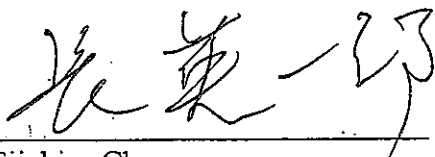
Minutes of Discussions on the Basic Design Study on the Project for Establishment of Meteorological-cum-Hydrological S-Band Doppler Radar at Moulvibazar in the People's Republic of Bangladesh

In response to the request from the Government of the People's Republic of Bangladesh (hereinafter referred to as Bangladesh"), the Government of Japan decided to conduct a Basic Design Study on "Establishment of Meteorological-cum-Hydrological S-Band Doppler Radar at Moulvibazar" (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent the Basic Design Study Team (hereinafter referred to as "the Team") to Bangladesh, headed by Mr. Eiichiro Cho, Additional Resident Representative of the JICA Bangladesh Office, and is scheduled to stay in the country from June 21, 2006 to July 22, 2006.

The Team held discussions with the officials concerned of the Government of Bangladesh and conducted a field survey at the study area. As the result of the discussions and field survey, both sides have confirmed the main items described in the attached sheets. The Team will proceed to further study and prepare the Basic Design Study Report.

Dhaka, July 03, 2006



Eiichiro Cho
Leader
Basic Design Study Team
Japan International Cooperation Agency



M. Emdadul Haque
Deputy Secretary
Economic Relations Division
Ministry of Finance

ATTACHMENT

1. Objective

Both sides confirmed that the objective of the Project is to establish the weather observation radar system in Moulvibazar and improve the precision of flood forecasting in the Meghna basin in the northeast area of Bangladesh.

In addition Bangladesh side requested the Team that the objective should include the improvement of other radar observation facilities of Bangladesh Meteorological Department (hereinafter referred to as "BMD") so that the devastations caused by floods, heavy rain and other natural disasters could be reduced in the whole country.

2. Project Name

Establishment of Meteorological-cum-Hydrological S-Band Doppler Radar at Moulvibazar

3. Project Sites

The project sites are shown in Annex-1.

4. Project components

The components in the original request are [1), 2) and 3)].

- 1) Construction of the Radar Tower Building in Moulvibazar
- 2) Installation of Meteorological Doppler Radar System at Moulvibazar
- 3) Installation of data communication equipment;
 - Moulvibazar Meteorological Radar Station, BMD
 - Storm Warning Centre (hereinafter referred to as "SWC"), Dhaka, BMD
 - Flood Forecasting and Warning Centre (hereinafter referred to as "FFWC"), Dhaka, BWDB

Through a series of discussions between both sides, Bangladesh side made additional requests for the following components [4) and 5)] to make the Project's outcome maximized and extend its benefit to the whole country.

- 4) Installation of data communication equipment;
 - Rangpur Meteorological Radar Station, BMD
- 5) Improvement of the data processing functions;
 - Dhaka Meteorological Radar Station, BMD
 - Rangpur Meteorological Radar Station, BMD

Bangladesh side agreed to implement the following component [6)] at its own responsibility.

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- 6) Improvement of data display systems at Prime Minister's Office, Bangladesh TV Centre and Dhaka International Airport

The project components finally requested by Bangladesh side and the component [6] indicated above are shown in Annex-2. The Team will carry out further assessment of necessity of the components [4) and 5)] additionally requested by Bangladesh side and make necessary recommendations to the Government of Japan according to the result of the assessment.

5. Responsible Organization and Implementing Agency

- 1) The responsible organization is the Ministry of Defence. The organization chart of the ministry is shown in Annex-3.
- 2) The implementing agency is the BMD. The organization chart of BMD is shown in Annex-3.

6. Japan's Grant Aid Scheme

- 1) Bangladesh side understands the Japan's Grant Aid scheme explained by the Team as described in Annex-4.
- 2) Bangladesh side will take necessary measures, as described in Annex-5, for smooth implementation of the Project, as a condition for the implementation of Japan's Grant Aid.

7. Schedule of the study

- 1) The Team will proceed to further study in Bangladesh up to July 21, 2006.
- 2) JICA will prepare the draft report in English and dispatch a mission to Bangladesh in order to explain its contents around the middle of November, 2006.
- 3) In case that the contents of the report are accepted in principle by the Government of Bangladesh, JICA will complete the final report and send it to Bangladesh by the end of February, 2007.

8. Other Relevant Issues

- 1) Schedule of the Project
 - Both sides agree to follow the schedule of the Project as attached in Annex-6.
 - Bangladesh side agrees to take necessary measures for the smooth implementation of the Project, if approved by the Government of Japan.
- 2) Land Preparation

Bangladesh side agrees to complete the following works according to the schedule indicated in Annex-6. The land preparation is indispensable to implement the Project.

 - Official land ownership transfer from BWDB to BMD, demolition of the existing facilities and clearing of the land shall be completed by the end of October, 2006. The

procedures are as described in Annex-7.

- The environmental impact evaluation of the Project will be included in the Development Project Proposal (hereinafter referred to as "DPP"), and if any assessment or examination is required, BMD shall take necessary procedures for implementation of the Project.

3) Radar System Network Preparation

Bangladesh side agrees to complete the following works prior to the commencement of the Project;

- To provide the space segment to be required by the Basic Design Study Report for satellite communication.
- To obtain the necessary permission of the Bangladesh Telecommunication Regulatory Commission (BTRC) to use the existing radar frequency of 2,850MHz allocated to BMD and other required frequency for implementation of the Project.
- To ensure no interference to the telecommunication links of Bangladesh Telegraph and Telephone Board (BTTB) by Meteorological Radar System with the frequency of 2,850MHz to be established at Moulvibazar.
- To provide stable power supply enough to operate the equipment to be supplied under the Project and other incidental facilities including telephone line and water supply, if any.
- To secure necessary spaces for the equipment to be installed at the project sites. BMD shall be responsible for coordination with BWDB for implementation of the Project.
- For the data communication between SWC and FFWC, usage of Digital Data Network (DDN) link operated by BTTB may be an alternative option for a satellite communication. Japanese side will continue to study the reliability, efficiency and cost of both data communications to recommend the most suitable data communication for the Project.

4) Other Preparation for the implementation of the Project

- Japanese side will provide necessary data and information for the DPP to be prepared by Bangladesh side according to the Basic Design Study. Bangladesh side shall complete preparation of the DPP and obtain the approval of the Executive Committee for National Economic Council (ECNEC) before signing of the Exchange of Notes.
- Bangladesh side shall obtain the consent of Implementation Monitoring and Evaluation Division (IMED) and other relevant authorities to comply with "The International Obligation" of the Public Procurement Regulations (PPR)-2003 prior to the signing of the Exchange of Notes.
- Bangladesh side shall secure appropriate amount of budget to ensure prompt tax exemption and customs clearance of the materials, equipment and miscellaneous for the

Project at the port of disembarkation. Moreover, Bangladesh side shall exempt the value added tax (VAT) concerning local procurement of goods and services under the Project to contractor(s) which are to be selected through tendering procedures of the Japan's Grant Aid Scheme.

5) Operation and Maintenance

- Bangladesh side agrees to allocate sufficient budget and qualified staff for proper and effective operation and maintenance of the equipment and facility to be provided under the Japan's Grant Aid.
- Bangladesh side shall employ 26 additional staff of BMD prior to the operation of the Moulvibazar Meteorological Radar Station under the Project.
- For smooth operation, Bangladesh side shall register the Moulvibazar Meteorological Radar Station and equipment as property of the Government of Bangladesh immediately after completion of the project.
- In case the Project is implemented, the five meteorological radar systems will cover the whole country of Bangladesh. Therefore, both sides agree that the future improvement/replacement of meteorological radar systems will be implemented by the Government of Bangladesh with its own finance from the viewpoint of self-reliance.

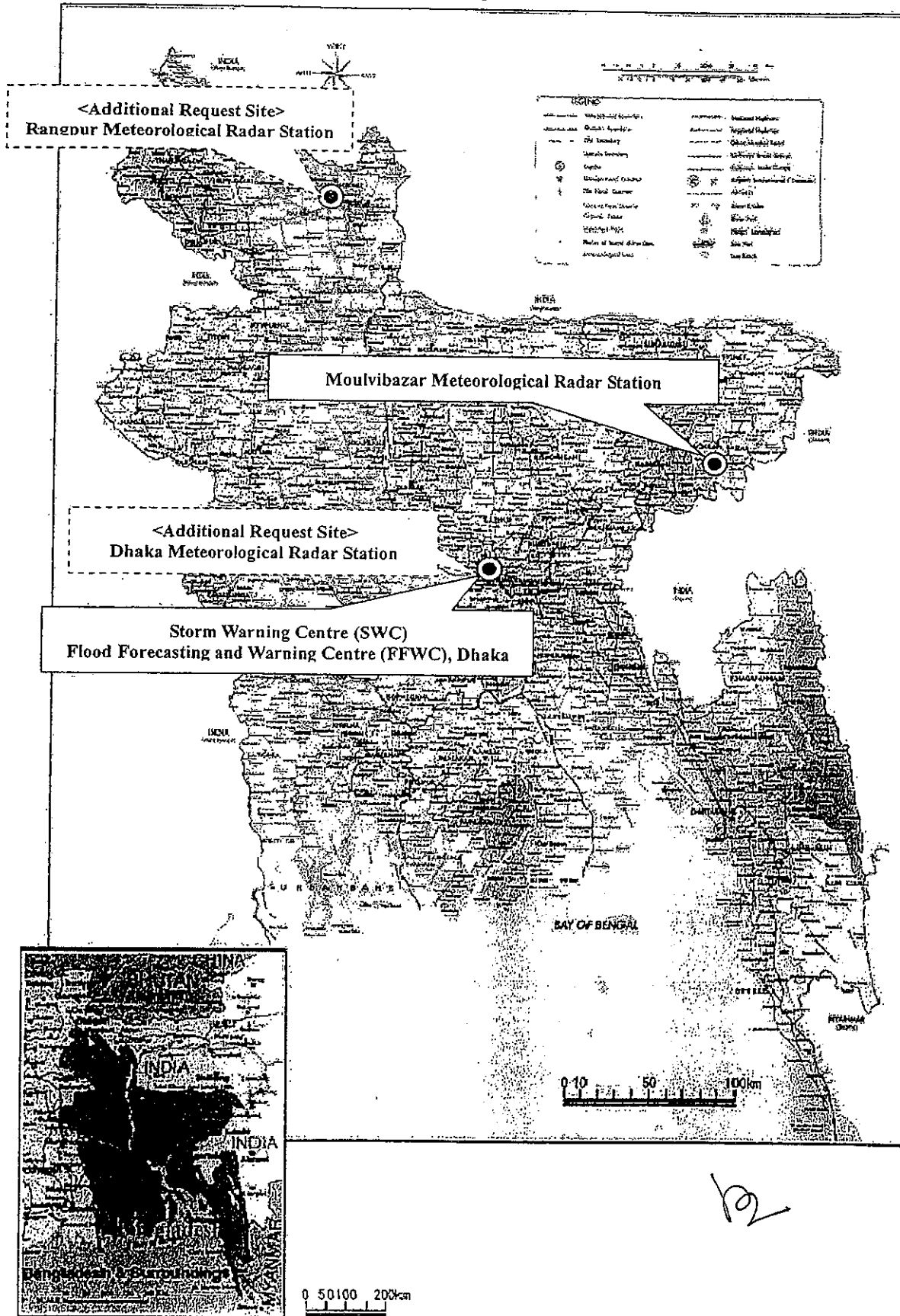
6) Technical Cooperation

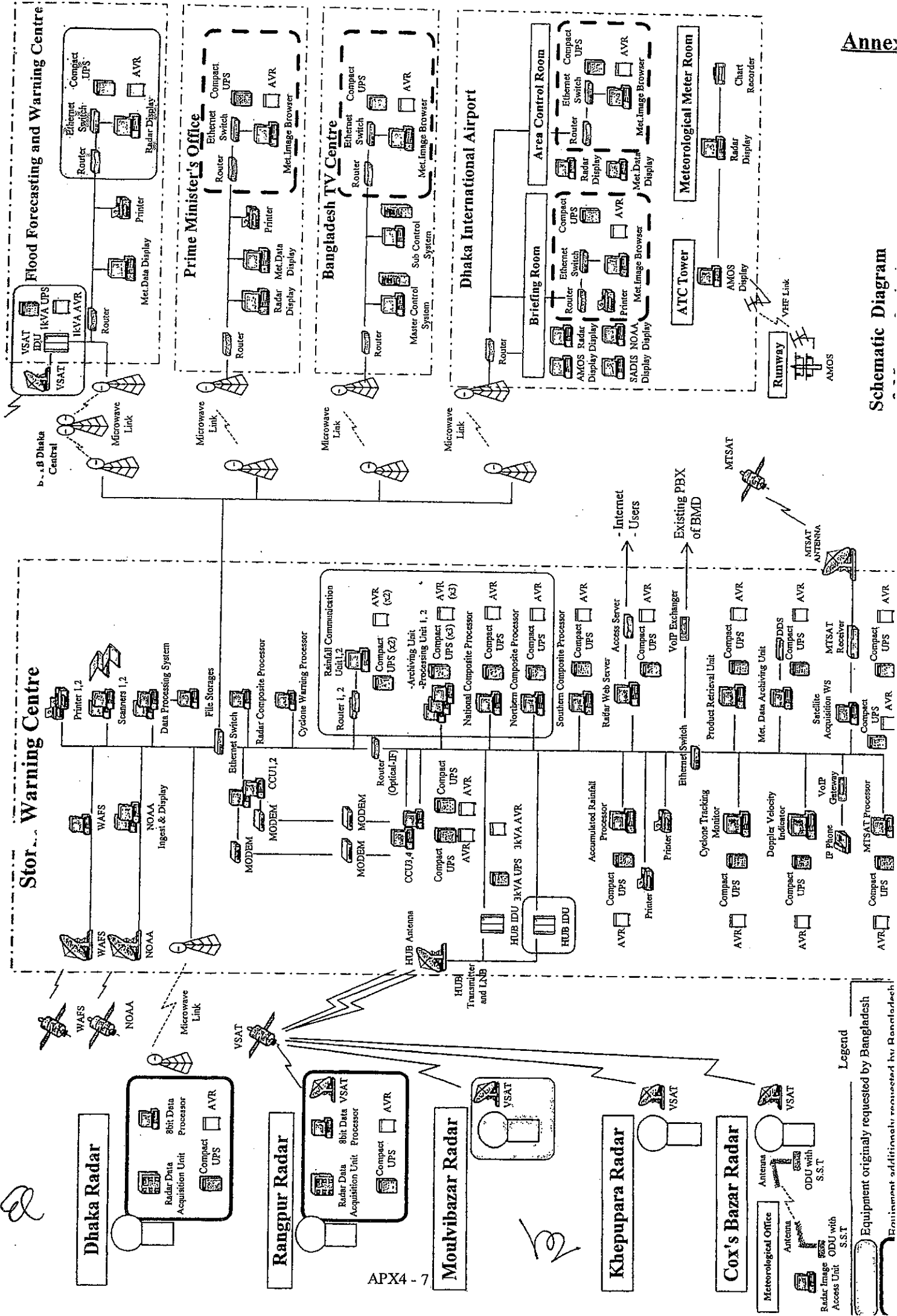
- Bangladesh side requested a counterpart training in Japan on radar meteorology and operation/maintenance of the equipment and a technical cooperation on human capacity building of BMD with FFWC. The Team agreed to inform of the request to the Government of Japan.
- Bangladesh side understands that the request to the Government of Japan for the technical cooperation and training should be officially made through the diplomatic channel.
- In case that the technical cooperation is implemented, Bangladesh side agrees that BMD staff who receives the cooperation should positively and effectively implement technology transfer in BMD.

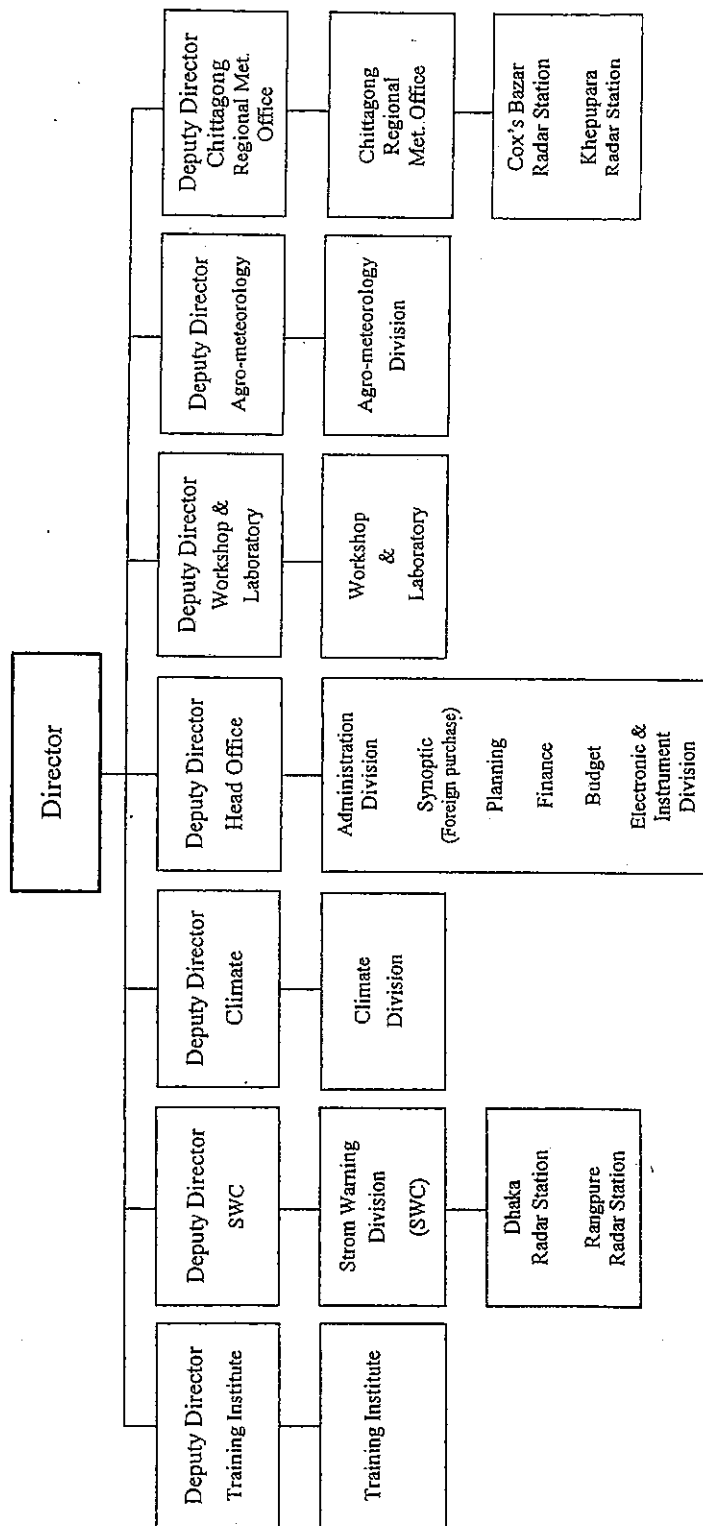
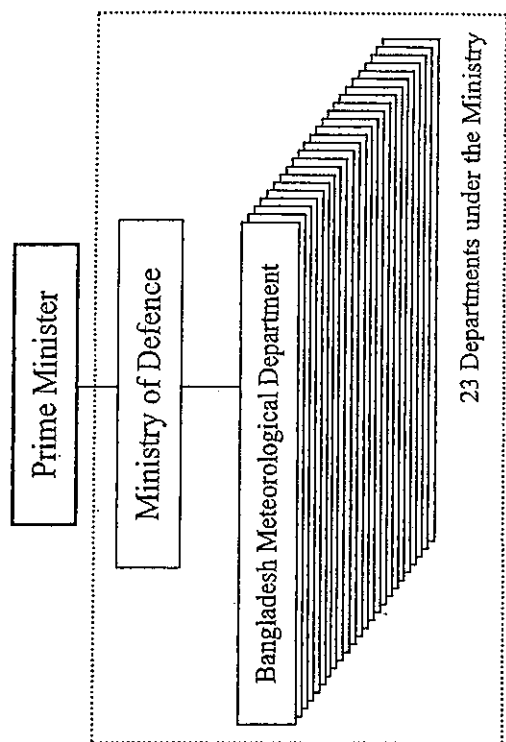
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Map of Project Sites







Organization Chart of BMD

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JAPAN'S GRANT AID

The Grant Aid scheme provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. The Grant Aid is not supplied through the donation of materials as such.

1. Grant Aid Procedures

Japan's Grant Aid scheme is executed through the following procedures:

Application	(Request made by the recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by the Cabinet)
Determination of Implementation	(The Note exchanged between the Governments of Japan and recipient country)

Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study) using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Scheme, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes (E/N) signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

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2. Basic Design Study

(1) Contents of the study

The aim of the Basic Design Study (hereafter referred to as "the Study") conducted by JICA on a requested project (hereafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Government of Japan. The contents of the Study are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of a basic design of the Project.
- Estimation of costs of the Project.

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of the Japan's Grant Aid scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

(2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA. The consultant firm(s) used for the Study is (are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency.

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3. Japan's Grant Aid Scheme

(1) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

(2) "The period of the Grant Aid" means the one fiscal year, which the Cabinet approves, the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed. However, in case of delays in delivery, installation or construction due to unforeseen factors such as national disaster, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

(3) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country. However, the prime contractors, namely, consulting, constructing and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

(4) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as the following:

- a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction,
- b) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,
- c) To secure buildings prior to the procurement in case the installation of the equipment,

- d) To ensure all the expenses and prompt excursion for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,
- e) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,
- f) To accord Japanese nationals, whose services may be required in connection with the supply of the products and services under the Verified contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

(6) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and the equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

(7) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

(8) Banking Arrangements (B/A)

- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.
- b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(End)

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Major undertakings to be taken by each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1.	To secure land		●
2.	To clear, level and reclaim the site when needed		●
3.	To construct gates and fences in and around the site		●
4.	To construct the parking lot	●	
5.	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6.	To construct the buildings	●	
7.	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1) Electricity		
	a. The distributing line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer	●	
	2) Water Supply		
	a. The city water distribution main to the site		●
	b. The supply system within the site (receiving and elevated tanks)	●	
	3) Drainage		
	a. The city drainage main (for storm, sewer and others) to the site		●
	b. The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
8.	To bear the following commissions to the Japanese foreign exchange bank for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9.	To ensure unloading and customs clearance at port of disembarkation in recipient country		
	1) Marine (Air) transportation of the products from Japan to the recipient country	●	
	2) Tax exemption and custom clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
10.	To accord Japanese nationals, whose services may be required in connection with the supply of the products and the services under the verified contract, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.		●
11.	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contracts.		●
12.	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant.		●
13.	To bear all the expenses, other than those to be borne by the Grant, necessary for construction of the facilities as well as for the transportation and installation of the equipment.		●



(B/A: Banking Arrangement, A/P: Authorization to Pay)

Schedule of the required procedures for implementation of the Project

Year and month Procedures	2006							2007										
	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9		
Field survey in Bangladesh	■																	
Study in Japan		▬																
Completion of the land ownership transfer from BWDB to BMD					▽													
Explanation of draft report in Bangladesh					■													
Submission of Final Basic Design Report										▽								
Preparation and submission of DPP						▬												
DPP approved by ECNEC											▽							
Preparation and submission of revised DPP												▬						
Revised DPP approved by ECNEC																▽		
Project approved by the Government of Japan (Tentative Schedule)													▽					
Signing of Exchange of Notes (Tentative Schedule)																	▽	

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Procedures for transfer of the land from BWDB to BMD	
BMD requested through the Ministry of Defence to BWDB for the land ownership to transfer to BMD.	
The Ministry of Land called one meeting including the Ministry of Defence, BMD and BWDB to take quick decision about the land ownership transfer to BMD.	
In the meeting mentioned above, BWDB agreed to transfer the land to BMD.	
According to the decision of the meeting, BWDB and BMD jointly visited the proposed site belonging to BWDB in Moulvibazar.	
BMD and BWDB sent letter attaching the minutes of discussion for taking necessary action to the Ministry of Land through their administrative ministry.	
BMD is waiting for permission of the Ministry of Land for handing over formalities.	<p>Completed</p> 
Demolishment of the existing facilities and land clearing by BWDB.	
<i>Land Transfer from BWDB to BMD completed by the end of October, 2006.</i>	

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Minutes of Discussions
on the Basic Design Study on the Project for
Establishment of the Meteorological Radar System at Moulvibazar
(Explanation of Draft Final Report)

From June to July 2006, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Basic Design Study Team on the Project for Establishment of the Meteorological Radar System at Moulvibazar (hereinafter referred to as "the Project") to the People's Republic of Bangladesh (hereinafter referred to as "Bangladesh"), and through discussions, field survey, and technical examination of the results in Japan, JICA prepared a draft final report of the study.

In order to explain and to consult with concerned officials of the Government of Bangladesh on the components of the draft final report, JICA sent to Bangladesh the Draft Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Mr. Eiichiro Cho, Additional Resident Representative of the JICA Bangladesh Office, from November 17 to 24, 2006.

As a result of discussions, both sides confirmed the main items described on the attached sheet.

Dhaka, November 28, 2006



Eiichiro Cho
Leader
Basic Design Study Team
Japan International Cooperation Agency



M. Emdadul Haque
Deputy Secretary
Economic Relations Division
Ministry of Finance

ATTACHMENT

1. Components of the Draft Final Report

Bangladesh side has agreed and accepted in principle the components of the draft final report explained by the Team.

2. Project Name

The Project requested by the Bangladesh side was named "Establishment of Meteorological-cum-Hydrological S-Band Doppler Radar at Moulvibazar". As a consequence of series of the discussions between Bangladesh side and Japanese side, it was agreed to change the project name to "Establishment of the Meteorological Radar System at Moulvibazar".

3. Japan's Grant Aid Scheme

Bangladesh side understands the Japan's Grant Aid scheme and the necessary undertakings to be taken by the Government of Bangladesh as explained by the Team and described in Annex-4 and Annex-5 of the Minutes of Discussions signed by both sides on July 03, 2006.

4. Schedule of the Study

JICA will complete the final report and send it to the Government of Bangladesh by the end of February, 2007.

5. Other Relevant Issues

- 5-1 Bangladesh side shall complete all the necessary procedures in accordance with "the Schedule of the Required Procedures for Implementation of the Project" attached in Annex-1 prior to the signing of the Exchange of Notes (E/N).
- 5-2 Particularly, the official land ownership transfer of the Project site (Moulvibazar) from Bangladesh Water Development Board (BWDB) to Bangladesh Meteorological Department (BMD) including demolition of the existing facilities and clearing of the site by BWDB shall be completed by the end of March, 2007, at the latest. Bangladesh side entirely understands that the completion of the official land ownership transfer of the Project site is one of the fundamental and essential conditions for realization of the Project.
- 5-3 As a consequence of re-technical consideration for avoiding interference of the existing air surveillance radar system in Moulvibazar by the Bangladesh Air Force (BAF), BAF

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requested BMD to use 2,770MHz for the Moulvibazar meteorological radar system instead of the existing frequency of 2,850MHz permitted by the Bangladesh Telecommunication Regulatory Commission (BTRC) for the Cox's Bazar and Khepupara meteorological radar systems and previously agreed by BAF. The Team has accepted the request of BAF and requested that Bangladesh side shall obtain the official permission from BTRC for 2,770MHz by March 31, 2007. Bangladesh side agreed to start the required procedures immediately for acquisition of the permission from BTRC and confirmed that there is no technical issue for the Moulvibazar meteorological radar system in case of 2,770MHz to be utilized. The official letter from the Ministry of Defence regarding the frequency change as per the request of BAF is attached herewith.

5-4 Bangladesh side understands the schedule of the Project after signing of the Exchange of Notes (E/N) and agrees to complete the required procedures indicated below in accordance with the implementation schedule of the Project;

- Acquisition of the construction permission of the radar tower building:
Prior to the commencement of the construction work.
- Provision of the space segment for satellite communication:
Before the disembarkation of the products.
- Allocation of 26 staff of BMD at the Moulvibazar Meteorological Radar Station:
Before completion of the Project.
- Prompt tax exemption and customs clearance of the materials, equipment and miscellaneous for the Project at the port of disembarkation:
During the project implementation period.

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Annex-1

Schedule of the Required Procedures for Implementation of the Project

Procedures	2006			2007								
	10	11	12	1	2	3	4	5	6	7	8	9
Explanation of draft report in Bangladesh		■										
Submission of Final Basic Design Report						▽						
Preparation and submission of DPP		▬										
DPP approved by ECNEC							▽					
Completion of the official land ownership transfer from BWDB to BMD							▽					
Compliance of "The International Obligation" of PPR-2003							▽					
Enforcement of Building Height Restriction by the Moulvibazar Municipality							▽					
Acquisition of the official permission for using 2,770MHz for Moulvibazar Radar System from BTRC							▽					
Preparation and submission of revised DPP								▬				
Revised DPP approved by ECNEC									▽			
Project approved by the Government of Japan (Tentative Schedule)									▽			
Signing of Exchange of Notes (Tentative Schedule)										▽		

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গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
প্রতিরক্ষা মন্ত্রণালয়
গণভবন কমপ্লেক্স
শেরে বাংলা নগর, ঢাকা।

নথি নং-প্রম/পিসি/আবঃ৫/২০০৫/ ৬০৭

তারিখঃ ২৩-১১-২০০৬

বিষয়ঃ “Establishment of Meteorological-Cum Hydrological S-Band Doppler Radar at Moulvibazar” শীর্ষক প্রকল্পের আওতায় স্থাপিতব্য রাডারের Frequency ব্যবহার প্রসংগে।

- সূত্রঃ (ক) বিমান বাহিনী সদর দপ্তরের পত্র নং-বিস/১৩৪১৫/যো ও ই/খন্ড-৩/৮১ক তারিখঃ ০৮-১১-২০০৬।
(খ) এ মন্ত্রণালয়ের পত্র নং-প্রম/পিসি/আবঃ৫/২০০৫/৫৯৫ তারিখঃ ১৯-১১-২০০৬
(গ) বিমান বাহিনী সদর দপ্তরের পত্র নং-Air HQ/12415/C&ENo1-3, 21 November 2006
(ঘ) বিএমডির পত্র নং-পিএল-২(৫৮)/২০০৬/২৩৭৮ তারিখঃ ২৩-১১-২০০৬

উপর্যুক্ত বিষয় ও সূত্রানুযায়ী বিষয়ে বর্ণিত প্রকল্পের আওতায় স্থাপিতব্য রাডার পরিচালনায় Frequency Band 2770± 15 MHz ব্যবহারে এ মন্ত্রণালয়ের সম্মতি/অনুমোদন এতদ্বারা নির্দেশক্রমে জ্ঞাপন করা হলো।

- ২। উপর্যুক্ত বিষয়ে পরবর্তী প্রয়োজনীয় কার্যক্রম গ্রহণের জন্য সংশ্লিষ্ট সকলকে অনুরোধ জানানো হলো।

(মোঃ আলতাফ হোসেন)
সিনিয়র সহকারী প্রধান
৯১১৩১৮৭

পরিচালক
বাংলাদেশ আবহাওয়া অধিদপ্তর
আগারগাঁও, ঢাকা।

জ্ঞাতার্থে অনুলিপিঃ

- ১। সচিব, অর্থনৈতিক সম্পর্ক বিভাগ, শেরে বাংলা নগর, ঢাকা।
(দৃঃ আঃ ডঃ কৃষ্ণা গায়ন, সিনিয়র সহকারী প্রধান)
২। সচিব মহোদয়ের একান্ত সচিব, প্রতিরক্ষা মন্ত্রণালয়, ঢাকা।
৩। যুগ্ম-সচিব (পুঃউঃ) মহোদয়ের ব্যক্তিগত কর্মকর্তা, প্রতিরক্ষা মন্ত্রণালয়, ঢাকা।
৪। প্রকৌশল উপদেষ্টা মহোদয়ের ব্যক্তিগত কর্মকর্তা, প্রতিরক্ষা মন্ত্রণালয়, ঢাকা।

Appendix 5. References

No	Name of References	Original/Copy	Publisher	Data of Publication
1	Standing Order on Disaster, August 1999	Original	Ministry of Disaster Management and Relief, Disaster Management Bureau	1999
2	The Public Procurement Regulation, Oct 01, 2003	Copy	Ministry of Planning, Government of Bangladesh	2003
3	The Public Procurement Processing and Approval Procedures (PPPAP), Oct 11 2004	Copy	Ministry of Planning, Government of Bangladesh	2004
4	2004 Statistical Yearbook of Bangladesh, 24th Edition	Original	Bangladesh Bureau of Statistics	2004
5	Compendium of Environment Statistics of Bangladesh 2005	Original	Sustainable Environment Management Programme Component 1.3, Bangladesh Bureau of Statistics	2005
6	UNITEDNATION' Common Country Assessment of Bangladesh	Original	United Nations Country Team in Bangladesh	2005
7	Flood 2004 Response and Learning	Original	CARE Bangladesh	2005
8	Natural Hazards in Bangladesh (Studies in Perception Impact and Coping Strategies)	Original	Disaster Research Training and Management Centre (DRTMC)	2005
9	Options for Flood Risk and Damage Reduction in Bangladesh	Original	the University Press Limited	2006