

Chapter 3

Project Evaluation

Chapter 3 Project Evaluation

3-1 Preconditions

The procedures required for the implementation of this Project are as follows.

Table74: Details of the Procedures required for the Project Implementation

Required Procedures	Office Concerned	Approximate Period required	Required Documents to be submitted to Ministry of Defence by Pakistan Meteorological Department (PMD)	Applicant
Application for Commercial Power Supply and Step-down Transformer Installation for Radar Tower Buildings to be constructed	Islamabad Electric Supply Company (IESCO)	2 months	<ul style="list-style-type: none"> • Application Form: 1 set • Site Location Map: 1 set • Allotment Letter: 1 set 	PMD
Building Construction Permit	Cabinet Directory/Capital Development Authority (CDA)	4 months	Application Form with the following drawings and documents <ul style="list-style-type: none"> • Architectural Drawings: 6 sets • Structural Drawings: 6 sets • Electrical Drawings: 6 sets • Air-conditioning & Ventilation Drawings: 6 sets • Plumbing Drawings: 6 sets • Structural Calculation Sheet: 5 sets • Allotment Letter: 1 set • Possession Letter: 1 set • Indemnity Bond: 1 set 	
Frequency Permit for Meteorological Radar System/ Wind Profiler System	Pakistan Telecommunication Authority (PTA)/Frequency Allocation Board (FAB)	2 months	<ul style="list-style-type: none"> • Application Form: 14 sets • Letter of Intent: 14 sets • Detailed Technical Literature of the Equipment: 14 sets • Antenna Pattern: 14 sets • Spectrum Chart for Transmitter: 14 sets • Network Diagram/Site Plan: 14 sets 	

<General Sales Tax (GST)>

The General Sales Tax (GST) imposed on the materials and equipment to be locally purchased by the main contractor under this Project will be exempted in accordance with the following figure of GST exemption procedures as advised by the Economic Affairs Division (EAD) of the Ministry of Economic Affairs and Statistics. The required period for the GST exemption procedures is about one month. It has to be noted that the GST imposed on materials and equipment to be purchased by a subcontractor(s) shall not be exempted.

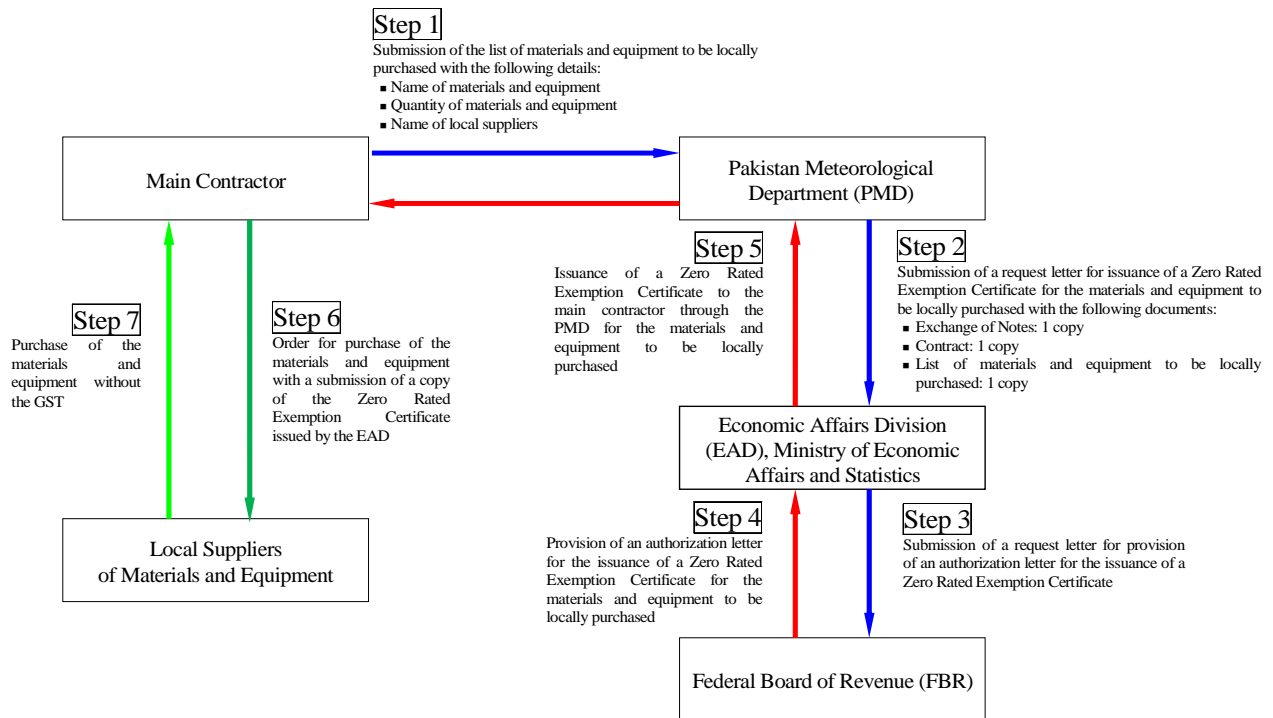


Figure16: GST Exemption Procedures for Materials and Equipment to be locally purchased

3-2 Necessary Inputs from the Recipient Country

In order to further enhance the benefits of this Project, the following recommendations are strongly encouraged and should be implemented accordingly.

- 1) Manpower Development
 - a) Continuous recruitment of human resources for the next generation; and,
 - b) Development of more qualified technical personnel through training and other related manpower development programs.
- 2) Natural Disaster Prevention and Management
 - a) Setting up of redundancies in the announcement of warnings and other information dissemination methods through multi-channels to ensure reaching out to the general populace; and,
 - b) Continuing educational activities for the general public in coordination with various related disaster management agencies and the mass media for a more effective natural disaster prevention and management strategy.
- 3) Longer Life Span of the Equipment procured and the Radar Tower Buildings constructed under the Project

- a) Regularly secure the necessary budget for the efficient operation and maintenance of the systems and building equipment, and the procurement of requisite spare parts and consumables for all the equipment to be supplied under the Project;
- b) Ensure the protection of the buildings, equipment and facilities against theft and vandalism; and,
- c) Regularly paint and caulk the caulking grooves of the Radar Tower Buildings.

3-3 Important Assumptions

- 1) Utilization of the meteorological information/data and forecasts/warnings by the mass media (TV, radio, newspaper), the Prime Minister's Office, the National/State/Provincial Disaster Management Authority, the Federal Flood Commission, Ministry of Water & Power, Provincial Information and Public Works Department, other government ministries, police departments, other government-affiliated organizations, Pakistan Red Crescent Society, etc.
- 2) No change in global warming countermeasures, natural disaster countermeasures, and meteorological service policies as determined by the government of Pakistan.
- 3) Maintenance of a cooperative structure among the mass media (TV, radio, newspaper), the Prime Minister's Office, the National/State/Provincial Disaster Management Authority, the Federal Flood Commission, Ministry of Water & Power, Provincial Information and Public Works Department, other government-affiliated organizations, Pakistan Red Crescent Society, etc.
- 4) Continuance of service by a PMD staff who has received the soft component training or on-site training related to the Project.

3-4 Project Evaluation

3-4-1 Relevance

- 1) Population to directly benefit from the Implementation of the Project

The overall objective of the Project is to reduce the devastation arising from meteorological disasters. This could be achieved by improving the PMD's capabilities of meteorological observation and forecast/warning in preparation for heavy rain. Floods caused by heavy rain are extreme manifestations of nature that may lead to immeasurable loss and distress for quite a number of people and have also become determining factors for the significant set-back of the national economy. Therefore, the population to be benefited both directly and indirectly by the Project will be the whole nation of Pakistan (approx. 172 million based on below figures). There is also real concern that the number of victims will proportionally

increase due to the fact that the population of Pakistan has been steadily increasing by 2% and will be the 4th largest country in the world after India, China and the United States in 2050. The table below indicates the population of 8 respective administrative districts.

Table75: Administrative Districts and Population of Pakistan

No.	Administrative District	Capital	Area (km ²)	Population (2008)
1	Balochistan	Quetta	347,190	10,247,362
2	Khyber Pakhtunkhwa	Peshawar	74,521	20,215,000
3	Punjab	Lahore	205,344	81,845,433
4	Sindh	Karachi	140,914	46,378,000
5	Islamabad Capital Territory	Islamabad	1,165	955,629
6	Federally Administered Tribal Areas	Peshawar	27,220	6,500,000
7	Azad Jammu and Kashmir	Muzaffarabad	13,297	4,567,982
8	Gilgit-Baltistan	Gilgit	72,496	1,800,000
Total			882,147	172,509,406



2) Objectives of the Project

In line with real concerns that global climate change will increase the frequency and scale of natural disasters in the medium-to-long-term run and create more adverse impacts on Pakistan, one of the natural disaster-prone areas, the improvement of the disaster management system including early warning systems is also an urgent task in Pakistan. Therefore, a key objective of this Project is to contribute to the effective mitigation of the devastation caused by these natural disasters. To achieve this objective, the Islamabad existing meteorological radar system will be replaced, the upper-air observation system, forecast & development system, meteorological data trunk communication system and GTS message switch system will be installed, and the SMRFC will be established in the PMD Islamabad Head Office. This assistance from the Government of Japan will enable the PMD to: 1) enhance its monitoring capability of hazardous meteorological phenomena; 2) improve the accuracy of its short-range weather forecast (within 24-48 hours); 3) have the capability to handle medium-range weather forecast (over 48 hours); and, 4) strengthen its prompt dissemination capability of forecasts/warnings.

3) Development Plan of Pakistan

In response to the fact that enormous damages caused by abnormal weather due to climate change have been increasing, the National Climate Change Policy has been developed under the Ministry of Climate Change in August 2012. In this policy, vulnerability to climate change and its adoption plan are described according to each sector (water resource, agriculture, forestry, ecosystem, disaster preparedness etc.). Under disaster preparedness, the Government of Pakistan is supposed to implement the following measures in cooperation with the related organizations:

1. Securement of financial resources for the implementation of the National Disaster Risk Management Framework formulated by the NDMA.
2. Clarification of the roles and responsibilities of the ministries concerned in case natural disaster occurs.

3. Strengthening of early warning systems for cyclones and formulation of evacuation plans for coastal areas.
4. Dissemination of early warnings and community participation for disaster risk mitigation activities.
5. Strengthening of observation, forecast and early warning systems for floods, flash floods, drought, etc.
6. Infrastructure construction of electricity, communication and transportation in which quick restoration is required in case abnormal weather occurs

Furthermore, the concrete Action Plan for the above National Climate Change Policy has been formulated and categorized into four timelines: top priority, short-term, medium-term and long-term. For the implementation of the National Climate Change Policy, National and Provincial Climate Change Policy Implementation Committees have been established and it holds a conference every six months to report policy implementation progress and modify & update the National Climate Change Policy every five years.

As indicated above, this Project accords with the climate change policy and disaster prevention policy in Pakistan.

4) Aid Policy of Japan

Japan and Pakistan have developed congenial bilateral relations and have commemorated the sixtieth anniversary of the establishment of diplomatic ties between the two countries in 2012. Japan's major aid policy in Pakistan is the "establishment of a stable and sustainable society through economic growth." Pakistan is expected to have the fourth largest population in the world after India, China and the United States by 2050. In order to fully realize its potential, it is imperative to build up a stable and sustainable society through private-sector-led economic growth while ensuring a stable economy. The Government of Japan focuses on the following three priority areas for the realization of the aid policy indicated above.

1. Development of an economic foundation
2. Ensuring human security and improvement of social foundation
3. Stability and balanced development in the border area


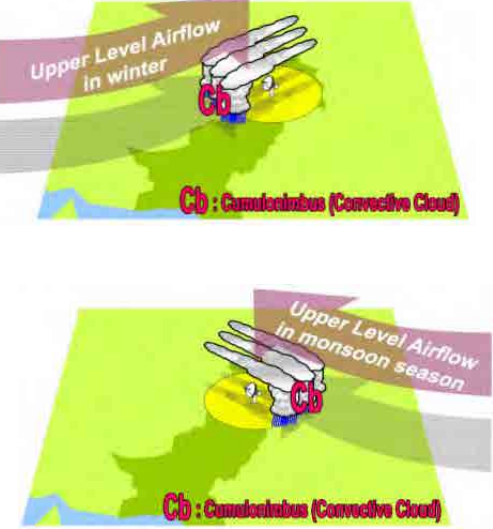
Under the second priority area, the provision of aid for the "strengthening of disaster prevention capability against frequent natural disasters" is stated as one of Japan's important roles. Specifically, the establishment of an early warning system, the strengthening of disaster preparedness on a community level and the human resource development plan of disaster management organizations are included. It is truly significant to strengthen the meteorological monitoring system and improve disaster prevention capabilities in the whole of Pakistan through the Grant Aid from Japan as it is in congruence with Japanese priorities in terms of international cooperation.

3-4-2

Effectiveness

Table76: Achievement Indicator

Indicator	Present (Base Line)	Target
Enhancement of Severe Weather Monitoring Capability	Wind velocity: only manual observation	Wind velocity within the radar detection range: maximum 75m/s within a 200km radius
	Precipitation intensity 1mm/h or more within the radar detection range: within a 350km radius from the existing meteorological radar system	Radar precipitation intensity 1mm/h or more within the radar detection range: within a 450km radius from the meteorological radar system
	No hourly radar accumulated rainfall data within a 350km radius from the existing meteorological radar system	Hourly radar accumulated rainfall data within a 450km radius from the meteorological radar system
	Spatial resolution and observation intervals of the existing 120 synoptic observation stations in Pakistan: 81.9km mesh on average at 180 minutes observation intervals	Spatial resolution and observation intervals of precipitation data within the radar detection range: not more than 2.5 km mesh within a 450km radius from the meteorological radar systems
	Observation intervals of rainfall intensity within the radar detection range: PPI mode	Observation intervals of wind direction, wind velocity, and rainfall intensity within the radar detection range: PPI mode and CAPPI mode
	6 gradation level rainfall qualitative data	0-250mm/h rainfall intensity quantitative data
	Periodical pilot balloon upper air observation to monitor wind direction and wind speed approx. 1.5-3km high.	Continuous upper-air observation to monitor wind direction and wind speed during: Monsoon season (raining weather) maximum 12 km high
Enhancement of weather forecast capability	Qualitative Regional Weather Forecast (until 24 hours Forecast)	Quantitative Short Range Weather Forecast (until 72 hours Forecast) <Calculated Value by Weather Guidance> <ul style="list-style-type: none"> · Regional 24 hours Precipitation · Regional 3 hours Precipitation (until 48 hours) · Daily Maximum Wind Speed (until 48 hours) · Daily Maximum Temperature · Daily Minimum Temperature · Daily Minimum Relative Humidity
	Qualitative Cities Weather Forecast (until 96 hours Forecast)	
	Qualitative Regional Weekly Weather Outlook (until 168 hours Forecast)	Quantitative Medium Range Forecast (until 240 hours) <Calculated Value by Weather Guidance> <ul style="list-style-type: none"> · Regional 24 hours Precipitation · Daily Maximum Temperature · Daily Minimum Temperature · Daily Minimum Relative Humidity
Enhancement of weather data/information provision capability	No provision of continuous upper-air observation data to WMO and global community (provision of only surface observation data)	Provision of continuous upper-air observation data to SMRFC, WMO and the global communities through the GTS
Enhancement of the capability for downburst and wind shear monitoring around the Islamabad International Airport	Subjective observation of the area surrounding the Islamabad International Airport	Objective observation of downburst and wind shear through radar observation within a 200km radius from the Islamabad Meteorological Radar Station
	No provision of radar images to the Islamabad International Airport (Benazir Bhutto International Airport)	Provision of radar images to the Islamabad International Airport (New Benazir Bhutto International Airport: NBBIA)

<p>Enhancement of Torrential Rain Prediction Capability</p>	<p>Detection of upper level clouds, especially cirrus form clouds at top of the troposphere, more clearly than the lower convective clouds by Feng-Yun-2 (FY-2, Chinese Meteorological Satellite)</p> 	<p>Detection of cirrus form clouds at top of the troposphere by Feng-Yun-2 (FY-2, Chinese Meteorological Satellite) and precipitation clouds which grow from the lower level of the troposphere within the radar detection range</p> 
	<p>No activity on very short range prediction for precipitation cloud movement</p>	<p>Implementation of 0.5-1 hour very short range prediction for precipitation cloud movement by radar observation data (images) in the radar detection range</p>

As adequately pointed out in the careful and comprehensive evaluation of the effects of the Project, considerable and enhanced benefits can be achieved vis-à-vis the improvement of the PMD’s capabilities in reducing human loss and the recurrent economic set-back brought about by meteorological disasters such as tropical cyclone and heavy rain. In addition, there is a global concern that climate change mainly due to global warming has a potential to increase the serious meteorological disasters and become the greatest threat to the sustainability of the very foundations of human survival. The Project would substantially contribute to the mitigation of the adverse effects of the meteorological disasters and effectively safeguard the basic human needs of the Pakistan people as well as those of its neighboring countries.

Moreover, in order to reduce the PMD’s operational and maintenance costs, the equipment was designed to minimize spare parts and consumables. Since the biggest expected recurrent cost of the Project is electricity, the equipment and facilities were designed in such a way so as to minimize power consumption. As a result, the PMD’s budget is expected to be able to cover the Pakistani portion of the capital and recurrent costs of the Project.

In conclusion, the implementation of the Project is considered to be an appropriately suitable and worthwhile endeavor.

Appendices

Appendix 1. Member List of the Study Team

(1) Preparatory Survey (1) Team

Mr. Toshiya SATO	Team Leader	Deputy Chief Representative, Pakistan Office, Japan International Cooperation Agency (JICA)
Mr. Nobuo SATO	Technical Advisor on Meteorology 1	Japan Meteorological Agency (JMA)
Mr. Kunio AKATSU	Technical Advisor on Meteorology 2	Technical Advisor, Water Resources and Disaster Management Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Kenji TANAKA	Mission Planning/Project Design	Deputy Assistant Director, Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Nobutaka NOGUCHI	Chief Consultant/Project Effect Evaluation/ Analysis, Forecast and Warning Technical Guidance Planning	International Meteorological Consultant Inc. (IMC)
Mr. Kenji MORI	Deputy Chief Consultant/Meteorological Radar Facility Planning	Japan Weather Association (JWA)
Mr. Toshihide ENDO	Meteorological Observation Equipment/ Operation & Maintenance	International Meteorological Consultant Inc. (IMC)
Mr. Yuichi MIZUKOSHI	Broadcasting Equipment	International Meteorological Consultant Inc. (IMC)
Mr. Yoshihisa UCHIDA	Meteorological Radar and Data Transmission System Planning/Equipment Cost Estimation	Japan Weather Association (JWA)

(2) Preparatory Survey (2) Team

Mr. Toshiya SATO	Team Leader	Deputy Chief Representative, Pakistan Office, Japan International Cooperation Agency (JICA)
Mr. Nozomu YAMASHITA	Acting Head of the Mission/Project Design	Deputy Director, Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Nobuo SATO	Technical Advisor on Meteorology 1	Japan Meteorological Agency (JMA)
Mr. Kunio AKATSU	Technical Advisor on Meteorology 2	Technical Advisor, Water Resources and Disaster Management Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Nobutaka NOGUCHI	Chief Consultant/Project Effect Evaluation/ Analysis, Forecast and Warning Technical Guidance Planning	International Meteorological Consultant Inc. (IMC)
Mr. Kenji MORI	Deputy Chief Consultant/Meteorological Radar Facility Planning	Japan Weather Association (JWA)
Mr. Toshihide ENDO	Meteorological Observation Equipment/ Operation & Maintenance	International Meteorological Consultant Inc. (IMC)
Mr. Yoshihisa UCHIDA	Meteorological Radar and Data Transmission System Planning/Equipment Cost Estimation	Japan Weather Association (JWA)
Mr. Hiroyuki INOMATA	Construction Planning/Procurement Planning/Construction Cost Estimate	International Meteorological Consultant Inc. (IMC)
Mr. Soshi IWATA	Disaster Damages & Natural Conditions Survey 1	Japan Weather Association (JWA)
Mr. Masakazu MIYAGI	Project Coordinator/Disaster Damages & Natural Conditions Survey 2	CTI Engineering International Co., LTD
Mr. Takayuki MOTOYA	Numerical Weather Product (NWP) System Planning	International Meteorological Consultant Inc. (IMC)

(3) Preparatory Survey (3) Team

Mr. Mitsuyoshi KAWASAKI	Team Leader	Chief Representative, Pakistan Office, Japan International Cooperation Agency (JICA)
Mr. Koichi KITAMURA	Project Planning	Disaster Management Division 1, Water Resources and Disaster Management Group, Global Environment Department, Japan International Cooperation Agency (JICA)
Mr. Nobutaka NOGUCHI	Chief Consultant/Project Effect Evaluation/ Analysis, Forecast and Warning Technical Guidance Planning	International Meteorological Consultant Inc. (IMC)
Mr. Toshihide ENDO	Meteorological Observation Equipment/ Operation & Maintenance	International Meteorological Consultant Inc. (IMC)
Mr. Yoshihisa UCHIDA	Meteorological Radar and Data Transmission System Planning/Equipment Cost Estimation	Japan Weather Association (JWA)
Mr. Hiroyuki INOMATA	Construction Planning/Procurement Planning/Construction Cost Estimate	International Meteorological Consultant Inc. (IMC)

(4) Preparatory Survey (4) Team

Mr. Kenji MORI	Deputy Chief Consultant/Meteorological Radar Facility Planning	Japan Weather Association (JWA)
Mr. Hiroyuki INOMATA	Construction Planning/Procurement Planning/Construction Cost Estimate	International Meteorological Consultant Inc. (IMC)

Appendix 2. Study Schedule

Preparatory Survey (1)

Schedule	Governmental Member				Consultant Member				
	Mr. Toshiya SATO	Mr. Nobuo SATO	Mr. Kunio AKATSU	Mr. Kenji TANAKA	Mr. Nobutaka NOGUCHI	Mr. Kenji MORI	Mr. Toshihide ENDO	Mr. Yuichi MIZUKOSHI	Mr. Yoshihisa UCHIDA
2012	Leader	Technical Advisor on Meteorology 1	Technical Advisor on Meteorology 2	Mission Planning/Project Design	Chief Consultant/Project Effect Evaluation/Analysis, Forecast and Warning Technical Guidance Planning	Deputy Chief Consultant/Meteorological Radar Facility Planning	Meteorological Observation Equipment/Operation & Maintenance	Broadcasting System	Meteorological Radar and Data Transmission System Planning/Equipment Cost Estimation
1	17 Sep	Mon	Tokyo → Bangkok → Islamabad		Visit to JICA Pakistan Office	Tokyo → Bangkok → Islamabad			
2	18 Sep	Tue	Courtesy call on Embassy of Japan, Pakistan and JICA Pakistan Office. Courtesy call on and Discussion with Pakistan Meteorological Department (PMD), National Disaster Management Authority (NDMA) and Economic Affairs Division (EAD). Explanation of Inception Report		Courtesy call on Embassy of Japan, Pakistan and JICA Pakistan Office, Courtesy call on and Discussion with Pakistan Meteorological Department (PMD), National Disaster Management Authority (NDMA) and Economic Affairs Division (EAD). Explanation of Inception Report		Courtesy call on JICA Pakistan Office, Courtesy call on and Discussion with Pakistan Meteorological Department (PMD), National Disaster Management Authority (NDMA) and Economic Affairs Division (EAD). Explanation of Inception Report		
3	19 Sep	Wed	Site Survey at Existing Radar Tower Building (Islamabad), Site Survey at Specialized Medium Range Forecasting Centre (SMRFC), Discussion with PMD		Site Survey at Existing Radar Tower Building (Islamabad), Site Survey at Specialized Medium Range Forecasting Centre (SMRFC), Discussion with PMD				
4	20 Sep	Thu	Discussion with PMD		Discussion with PMD				
5	21 Sep	Fri	Data Collection, Internal Meeting		Data Collection, Internal Meeting			Tokyo → Bangkok → Islamabad	
6	22 Sep	Sat	Discussion with PMD, Internal Meeting		Discussion with PMD, Internal Meeting				
7	23 Sep	Sun	Islamabad → Karachi		Islamabad → Karachi	Discussion with PMD, Site Survey	Islamabad → Karachi		Discussion with PMD, Site Survey
			Site Survey and Confirmation of Existing GTS/MMS and WPR at the Krachi PMD Office		Site Survey and Confirmation of Existing GTS/MMS and WPR at the Krachi PMD Office		Site Survey and Confirmation of Existing GTS/MMS and WPR at the Krachi PMD Office		
8	24 Sep	Mon	Site Survey and Confirmation of Existing GTS/MMS and WPR at the Krachi PMD Office		Site Survey and Confirmation of Existing GTS/MMS and WPR at the Krachi PMD Office	Discussion with PMD, Site Survey	Site Survey and Confirmation of Existing GTS/MMS and WPR at the Krachi PMD Office		Discussion with PMD, Site Survey
			Karachi → Islamabad		Karachi → Islamabad		Karachi → Islamabad		
9	25 Sep	Tue	Preparation of Draft of Minutes of Discussions, Discussion about Minutes of Discussions with PMD, NDMA and EAD		Discussion about Minutes of Discussions with PMD				
10	26 Sep	Wed	Signing on Minutes of Discussions		Signing on Minutes of Discussions				
			Islamabad → Bangkok		Detailed Discussion with PMD	Site Survey, Quantity Suevey	Detailed Discussion with PMD, Site Survey	Detailed Discussion with PMD	Detailed Discussion with PMD
11	27 Sep	Thu	Bangkok → Tokyo		Detailed Discussion with PMD	Site Survey, Quantity Suevey	Detailed Discussion with PMD, Site Survey	Detailed Discussion with PMD	Detailed Discussion with PMD
12	28 Sep	Fri			Detailed Discussion with PMD	Site Survey, Quantity Suevey	Detailed Discussion with PMD, Site Survey	Detailed Discussion with PMD	Detailed Discussion with PMD
13	29 Sep	Sat			Data Collection, Internal Meeting, Preparation of Survey Report				
14	30 Sep	Sun			Data Collection, Internal Meeting, Preparation of Survey Report				
15	1 Oct	Mon			Detailed Discussion with PMD				
					Islamabad → Bangkok				
16	2 Oct	Tue			Bangkok → Tokyo				

Preparatory Survey (2)

Schedule	Governmental Member				Consultant Member								
	Mr. Toshiya SATO Head of the Mission	Mr. Naomasa YAMASHITA Acting Head of the Mission, Project Design	Mr. Nobuo SATO Technical Advisor on Meteorology 1	Mr. Kunio AKATSU Technical Advisor on Meteorology 2	Mr. Nobuhiko NAGAKI Chief Consultant/Project Effect Evaluation/ Analysis/ Forecast and Warning Technical Guidance Planning	Mr. Kenji MORI Deputy Chief Consultant/Meteorological Radar Facility Planning	Mr. Toshitake ENDO Meteorological Observation Equipment Operation & Maintenance	Mr. Yoshitaka UCHIDA Meteorological Radar and Data Transmission System Planning/Equipment Cost Estimation	Mr. Hiroyuki INOMATA Construction Planning/Procurement Planning/Construction Cost Estimation	Mr. Soichi IWATA Disaster Damages & Natural Conditions Survey 1	Mr. Mutsaers MEYER Project Coordination/Disaster Damages & Natural Conditions Survey 2	Mr. Takayuki MIYOTA Numerical Weather Product (NWP) System Planning	
1 14 Nov Wed					Tokyo → Bangkok → Islamabad					Tokyo → Bangkok → Islamabad			
2 15 Nov Thu					Discussion with PMD, Data Collection					Site Survey at PMD Islamabad			
3 16 Nov Fri					Discussion with PMD, Data Collection								
4 17 Nov Sat					Internal Meeting, Data Collection	Internal Meeting, Data Collection, Discussion with the local contractor for Topographic and Geotechnical Survey		Internal Meeting, Data Collection, Discussion with the local contractor for Topographic and Geotechnical Survey					
5 18 Nov Sun					Tokyo → Dubai → Islamabad								
6 19 Nov Mon						Internal Meeting, Data Collection			Internal Meeting, Data Collection				
7 20 Nov Tue						Internal Meeting, Data Collection			Internal Meeting, Data Collection				
8 21 Nov Wed						Discussion with PMD			Discussion with PMD, Data Collection				
9 22 Nov Thu						Discussion with PMD			Discussion with PMD, Data Collection				
10 23 Nov Fri						Discussion with PMD			Discussion with PMD, Data Collection				
11 24 Nov Sat						Discussion with PMD			Discussion with PMD, Data Collection				
12 25 Nov Sun						Discussion with PMD			Discussion with PMD, Data Collection				
13 26 Nov Mon						Discussion with PMD			Discussion with PMD, Data Collection				
14 27 Nov Tue						Discussion with PMD			Discussion with PMD, Data Collection				
15 28 Nov Wed						Discussion with PMD			Discussion with PMD, Data Collection				
16 29 Nov Thu						Discussion with PMD			Discussion with PMD, Data Collection				
17 30 Nov Fri						Discussion with PMD			Discussion with PMD, Data Collection				
18 1 Dec Sat						Discussion with PMD			Discussion with PMD, Data Collection				
19 2 Dec Sun						Discussion with PMD			Discussion with PMD, Data Collection				
20 3 Dec Mon						Discussion with PMD			Discussion with PMD, Data Collection				
21 4 Dec Tue						Discussion with PMD			Discussion with PMD, Data Collection				
22 5 Dec Wed						Discussion with PMD			Discussion with PMD, Data Collection				
23 6 Dec Thu						Discussion with PMD			Discussion with PMD, Data Collection				
24 7 Dec Fri						Discussion with PMD			Discussion with PMD, Data Collection				
25 8 Dec Sat						Discussion with PMD			Discussion with PMD, Data Collection				
26 9 Dec Sun						Discussion with PMD			Discussion with PMD, Data Collection				
27 10 Dec Mon						Discussion with PMD			Discussion with PMD, Data Collection				
28 11 Dec Tue						Discussion with PMD			Discussion with PMD, Data Collection				
29 12 Dec Wed						Discussion with PMD			Discussion with PMD, Data Collection				
30 13 Dec Thu						Discussion with PMD			Discussion with PMD, Data Collection				
31 14 Dec Fri						Discussion with PMD			Discussion with PMD, Data Collection				
32 15 Dec Sat						Discussion with PMD			Discussion with PMD, Data Collection				
33 16 Dec Sun						Discussion with PMD			Discussion with PMD, Data Collection				
34 17 Dec Mon						Discussion with PMD			Discussion with PMD, Data Collection				
35 18 Dec Tue						Discussion with PMD			Discussion with PMD, Data Collection				
36 19 Dec Wed						Discussion with PMD			Discussion with PMD, Data Collection				
37 20 Dec Thu						Discussion with PMD			Discussion with PMD, Data Collection				
38 21 Dec Fri						Discussion with PMD			Discussion with PMD, Data Collection				
39 22 Dec Sat						Discussion with PMD			Discussion with PMD, Data Collection				
40 23 Dec Sun						Discussion with PMD			Discussion with PMD, Data Collection				
41 24 Dec Mon						Discussion with PMD			Discussion with PMD, Data Collection				
42 25 Dec Tue						Discussion with PMD			Discussion with PMD, Data Collection				
43 26 Dec Wed						Discussion with PMD			Discussion with PMD, Data Collection				
44 27 Dec Thu						Discussion with PMD			Discussion with PMD, Data Collection				

APX2-2

Preparatory Survey (3) (Explanation of Draft Final Report)

Schedule			Governmental Member		Consultant Member			
			Mr. Mitsuyoshi KAWASAKI	Mr. Koichi KITAMURA	Mr. Nobutaka NOGUCHI	Mr. Hiroyuki INOMATA	Mr. Toshihide ENDO	Mr. Yoshihisa UCHIDA
2013			Leader	Project Planning	Chief Consultant/Project Effect Evaluation/ Analysis, Forecast and Warning Technical Guidance	Construction Planning/Procurement Planning/Construction Cost Estimate	Meteorological Observation Equipment/Operation & Maintenance	Meteorological Radar and Data Transmission System Planning/Equipment Cost Estimation
1	29 Jun	Sat		Tokyo → Bangkok → Islamabad	Tokyo → Bangkok → Islamabad			
2	30 Jun	Sun		Data Collection, Internal Meeting	Internal Meeting, Data Collection			
3	1 Jul	Mon	Meeting with JICA Pakistan Office		Meeting with JICA Pakistan Office			
			Explanation of Draft Final Report, Discussion about Minutes of Discussion with PMD, Discussion with Economic Affairs Division (EAD)		Explanation of Draft Final Report, Discussion about Minutes of Discussion with PMD, Discussion with Economic Affairs Division (EAD)			
4	2 Jul	Tue		Discussion with PMD	Discussion with PMD			
5	3 Jul	Wed		Discussion with PMD, Discussion with National Bank of Pakistan (NBP)	Discussion with PMD			Discussion with PMD, Discussion with National Bank of Pakistan (NBP)
			Discussion with PMD, Report to Embassy of Japan		Discussion with PMD, Report to Embassy of Japan			
6	4 Jul	Thu		Discussion with PMD	Discussion with PMD			
7	5 Jul	Fri	Signing on Minutes of Discussions		Signing on Minutes of Discussions			
				Islamabad → Bangkok	Discussion with PMD			
8	6 Jul	Sat		Bangkok → Tokyo	Internal Meeting, Data Collection			
			Islamabad → Bangkok					
9	7 Jul	Sun			Bangkok → Tokyo			

Preparatory Survey (4)

Schedule			Consultant Member	
			Mr. Kenji MORI	Mr. Hiroaki INOMATA
			Deputy Chief Consultant/Meteorological Radar Facility Planning	Construction Planning/Procurement Planning/Construction Cost Estimate
1	Oct 28	Mon	Tokyo → Bangkok → Islamabad	
2	Oct 29	Tue	Meeting with JICA Pakistan Office, Discussion with PMD	
3	Oct 30	Wed	Discussion with PMD, Discussion with Capital Development Authority (CDA), Discussion with Economic Affairs Division (EAD)	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials
4	Oct 31	Thu	Discussion with PMD, Discussion with Capital Development Authority (CDA)	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials
5	Nov 01	Fri	Discussion with PMD Data Collection, Quantity Survey, Study for Unit Price of Construction Materials	
6	Nov 02	Sat	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials	
7	Nov 03	Sun	Data Collection, Internal Meeting	
8	Nov 04	Mon	Discussion with PMD, Discussion with Environmental Protection Agency (EPA), Discussion with Frequency Allocation Board (FAB)	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials
9	Nov 05	Tue	Discussion with PMD, Discussion with Pakistan Telecommunication Authority (PTA)	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials
10	Nov 06	Wed	Discussion with PMD, Discussion with Economic Affairs Division (EAD)	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials
11	Nov 07	Thu	Discussion with PMD, Data Collection	Data Collection, Quantity Survey, Study for Unit Price of Construction Materials
12	Nov 08	Fri	Discussion with PMD, Discussion with Pakistan Telecommunication Authority (PTA), Discussion with Economic Affairs Division (EAD), Report to JICA Pakistan Office Islamabad → Bangkok	
13	Nov 09	Sat	Bangkok → Tokyo	

Appendix 3. List of Parties Concerned in the Recipient Country

- **Economic Affairs Division, Ministry of Economic Affairs and Statistics**

Dr. Kazim Niaz	Joint Secretary
Mr. Syed Zain Gillani	Deputy Secretary
Mr. Asghar Ali	Sector Officer, ADB-Japan Wing

- **Pakistan Meteorological Department (PMD)**

Islamabad Head Office

Dr. Qamar Uz Zaman Ch.	Advisor (Meteorological and Climate Affairs)
Mr. Arif Mahmood	Director General
Dr. Ghulam Rasul	Deputy Director General (Chief Meteorologist)
Mr. Hazrat Mir	Chief Meteorologist
Dr. Muhammad Hanif	Director (Forecasting)
Dr. Khalid M. Malik	Director (Agro-meteorology)
Mr. Azmat Hayat Khan	Director (Drought)
Mr. Jan Muhammad Khan	Director (Planning)
Mr. Usman Rafique	Electric Engineer, Weather Surveillance Radar
Mr. Wadar Ali	Sub Engineer
Mr. Muhamood Atif Nawaz	Sub Engineer
Mr. Ali Hussain Abbasi	Sub Engineer
Mr. Amjad Ali	Sub Engineer
Mr. Shahid Abbasi	Assistant Mechanic Sub Engineer
Mr. Abdus Rahman	Sub Engineer
Mr. Nazir Khan Niazi	Electronic Engineer

Multan Meteorological Office

Mr. Muhammad Zawar	Deputy Director
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Karachi Tropical Cyclone Warning Centre

Mr. Muhammad Touseef Alam	Chief Meteorologist
---------------------------	---------------------

Lahore Regional Meteorological Centre

Mr. Mahr Sahibzad Khan	Director
------------------------	----------

Lahore Flood Forecasting Division

Mr. Mohammad Riaz	Chief Meteorologist
Mr. Fayyaz Nazeer	Senior Electric Engineer

- **National Disaster Management Authority (NDMA)**

Mr. Ahmed Kamnal	Member (Planning)
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- **Ministry of Defence**

Mr. Farooq Hassan Deputy Secretary (Finance)

- **Federal Flood Commission (FFC)**

Mr. Alamgir Khan Chief Engineer (Floods)

- **Capital Development Authority (CDA)**

Mr. Mahboob Ali Khan Director, Urban Planning
Mr. Tavaeer Nawaz Deputy Director, Urban Planning
Mr. Ibtisam Peerzada Deputy Director, Building Control

- **Islamabad Electric Supply Company (IESCO)**

Mr. Mahboob Ali Khan Sub-divisional Officer, Urban Planning
Mr. Khalid Mahmood Sub Engineer, Line Superintend I

- **Multan Electric Power Company (MEPCO)**

Mr. Abdul Mateen Khan (Engr.) Chief Engineer

- **Frequency Allocation Board (FAB)**

Mr. Saifullah Khan Bangash Director
Mr. Imran Zahoor Deputy Director

- **Habib Bank Limited (HBL)**

Mr. Syed Ahsan Raza Manager Operations

- **National Bank of Pakistan (NBP)**

Mr. Shahzad Naeem Khokher Incharge Forex Dept. International Banking Department, Main Branch

- **Pakistan Telecommunication Authority (PTA)**

Ms. Abida Shaukat Director , Radio Based Services (RBS)
Mr. Umair Tariq Deputy Director (Software), Radio Based Services (RBS)
Mr. Yasir Khan Assistant Director, Radio Based Services (RBS), Licensing
Mr. Anwar Ul Haq Assistant Engineer, Radio Based Services (RBS)

- **Civil Aviation Authority (CAA)**

Mr. Muhammad Farooq Rashid

Airport Manager, Multan Airport

Mr. Muhammad Pervaiz

Chief Technical Officer, Multan Airport

Mr. Rana M. Ashraf

Senior Air Traffic Control Officer, Multan Airport

Mr. Iqtidar Haider

Corporate Manager, Multan Airport

- **Environmental Protection Agency (EPA)**

Mr. Ijlal Hussain

Deputy Project Manager

Appendix 4-1. Minutes of Discussions


**MINUTES OF DISCUSSIONS
OF
THE PREPARATORY SURVEY (FIELD SURVEY-1)
ON
THE PROJECT ORIGINALLY TITLED
"ESTABLISHMENT OF SPECIALIZED MEDIUM RANGE WEATHER
FORECASTING CENTRE (SMRFC) AND
STRENGTHENING OF EARLY WARNING AND DISSEMINATION NETWORK"
IN
THE ISLAMIC REPUBLIC OF PAKISTAN .**

In response to a request from the Government of the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan"), the Government of Japan decided to conduct a Preparatory Survey on the Project originally titled "Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Early Warning and Dissemination Network" (hereinafter referred to as "the Project") and entrusted the Preparatory Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Pakistan the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Mr. Shiro NAKASONE, Director of Disaster Management Division1, Global Environment Department, JICA, and stayed in Pakistan from September 17 to 26, 2012.

The Team explained the contents of Inception Report to the officials concerned of the Government of Pakistan, and the Pakistani side agreed the purpose and contents of the Preparatory Survey.

Both sides held discussions and conducted a Field Survey-1 at two localities of Islamabad and Karachi. In the course of discussions and Field Survey-1, both parties confirmed the main items described in the attached sheets. The Team will proceed to further works and prepare the Field Survey-2 based on the result of the Field Survey-1.



Mr. Shiro NAKASONE
Head of the Mission
Preparatory Survey Team
Japan International Cooperation Agency
Government of Japan




Mr. Kazim Niaz
Joint Secretary (ADB/Japan)
Economic Affairs Division
Ministry of Economic Affairs & Statistics
Government of Pakistan

(SYED ZAIN GILLANI)
Deputy Secretary
Economic Affairs Division
Government of Pakistan
Islamabad

Islamabad, September 26, 2012



Mr. Arif Mahmood
Director General
Pakistan Meteorological Department
Ministry of Defence
Government of Pakistan



Mr. Ahmed Kamal
Member Disaster Risk Reduction
National Disaster Management Authority
Ministry of Climate Change
Government of Pakistan

ATTACHMENT

1. Objective of the Project

Both sides confirmed that the objective of the Project is to improve the capacity of the weather observation and forecasting through establishment of new meteorological radar system at Islamabad and installation of necessary equipment and machineries for Specialized Medium Range Forecasting Centre to mitigate the disasters caused by meteorological phenomena in Pakistan.

2. Title of the Project

The Project was originally titled "Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Early Warning and Dissemination Network" by the Government of Pakistan. The Team explained that the title of Japanese Grant Aid project is required to reflect the contents of the Project appropriately by the Government of Japan. In this regard, the Team proposed the Pakistani side to change the title as "The Project for Strengthening Weather Forecasting and Dissemination System of Early Warning".

However, the Pakistani side requested the Japanese side to make no change in the title of the Project in order to proceed with the Project approval procedure by the Government of Pakistan without any hindrance.

Both sides agreed that the title of the Project is tentative "Establishment of Specialized Medium Range Weather Forecasting Centre -SMRFC- (Project for Strengthening Weather Forecasting and Dissemination System of Early Warning)", and to be discussed and finalized during the Field Survey-2.

3. Sites of the Project

Specialized Medium Range Forecasting Centre and available site in Pakistan Meteorological Department (hereinafter referred to as "PMD") Complex, Headquarters office, Islamabad are proposed for installation of necessary equipment and machineries and new meteorological radar system, respectively. Suitable location for new meteorological radar system is finally to be verified thorough the Field Survey-2.

On the other hand, locations for five (5) Upper-Air Observation Systems and Meteorological Information Dissemination Systems are to be further discussed with PMD during the Field Survey-2 after the relevancy, effectiveness and necessity of these Systems are confirmed by the Japanese side.

4. Responsible, Implementing and Coordinating Agency

4-1. The Responsible/Sponsoring Agency: Ministry of Defence

4-2. The Implementing Agency: Pakistan Meteorological Department

4-3. The Coordinating Agency: National Disaster Management Authority (NDMA)

The organization chart is shown in **Annex-1**.

5. Items requested by the Government of Pakistan

Both sides conducted a series of discussions to identify the requested components and recognized the purpose, necessity, benefit and emergency of the respective items. As a result, the Team almost identified the contents of the respective items and compiled the result as described in **Annex-2**.

Both sides confirmed that the items described in **Annex-2** would be intended for the further survey and the appropriateness of the request would be examined in Japan. The result of the analysis in Japan would be shared and discussed with the Pakistani side in the Field Survey-2. Therefore, Pakistani side understood that all requested items, as listed in **Annex-2**, may not be accepted as the final component of the Project.

6. Items to be procured by the Pakistani side

Both sides confirmed that the priorities of the items described in **Annex-3** are relatively lower than those in **Annex-2**; however the items in **Annex-3** are important and effective for the Project. Therefore, the Team proposed the Pakistani side to procure these items through their own resources, not out of Japan's Grant Aid to make the mutual effort for the Project. The Pakistani side agreed with the proposal and it was confirmed by the Team that a vehicle has already been purchased for the Project by the Government of Pakistan. Both sides agreed that the items described in **Annex-3** would not be intended for the further survey.

7. Japan's Grant Aid Scheme

7-1. The Pakistani side has shown a full understanding to the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-4**.

7-2. The Pakistani side will take the necessary measures, as described in **Annex-5**, for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

8. Schedule of the Preparatory Survey

The Preparatory Survey is divided into five (5) stages which consist of

1. Field Survey-1,
2. Study in Japan-1,
3. Field Survey-2,
4. Study in Japan-2, and
5. Explanation of Outline Design and Draft Report.

The Team explained the details of each stage in the Inception Report.

8-1. The Field Survey-1 will continue in Pakistan until October 2, 2012.

8-2. Based on the result of the Field Survey-1, JICA will prepare the draft layout and design of the facilities and equipment which will be incorporated to the scope of the Project.

8-3. JICA will dispatch the team of Field Survey-2 in order to explain the draft layout and design and

agree the contents with the Pakistani side. The team of Field Survey-2 will conduct the further study in November, 2012.

8-4. Based on the result of the Field Survey-2, JICA will conduct the analytical work on design of the facilities and equipment and cost estimation from December 2012 to April 2013, in Japan.

8-5. JICA will prepare the Draft Final Report and provide cost estimation for the preparation of the PC-1 in English and dispatch a team to Pakistan in order to explain and agree its contents around April, 2013.

8-6. If the contents of the Draft Final Report are accepted in principle by the Government of Pakistan, JICA will complete the Final Report and send it to the Government of Pakistan by August, 2013.

8-7 The above schedule is tentative and subject to change.

9. Other relevant issues

9-1. Security arrangement

The Government of Pakistan will take all possible measures to secure the safety for the concerned people during the Survey and implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

9-2. Approval of PC-I

The Team explained that the Project would be sent to the Japanese Cabinet for approval only after approval of the PC-I by the Government of Pakistan.

The Pakistani side assured that all the effort shall be made for the approval of the PC-I from the competent fora by August, 2013. JICA will provide necessary information acquired through the Survey to Pakistani side for preparation of the PC-I.

9-3. Soft Component

The Team explained that the initial guidance for operation and maintenance of the equipment and machineries could be included in the Project to support smooth operation. Necessity and contents of the support will be examined during the Field Survey-2 in detail.

9-4. Tax Exemption

The tax exemption including Value Added Tax (VAT), custom duty, and any other taxes and fiscal levies in Pakistan which is to be arisen from the Project activities shall be ensured by the Government of Pakistan. The Government of Pakistan shall take necessary procedures for tax exemption.

9-5. Clearance of Existing Facilities

Both sides confirmed that procedure of clearance of existing facilities is to be discussed during the Field Survey-2.

9-6. Assessment for Environmental and Social Impacts and Disaster Risk Reduction

Both sides agreed that the Pakistani side would complete necessary procedures relating to environmental and social impact assessment and disaster risk reduction in accordance with the regulations in Pakistan.

9-7. Visibility of the Project

The Pakistani side affirmed the following measures to be taken in order to enhance publicity of the Project:

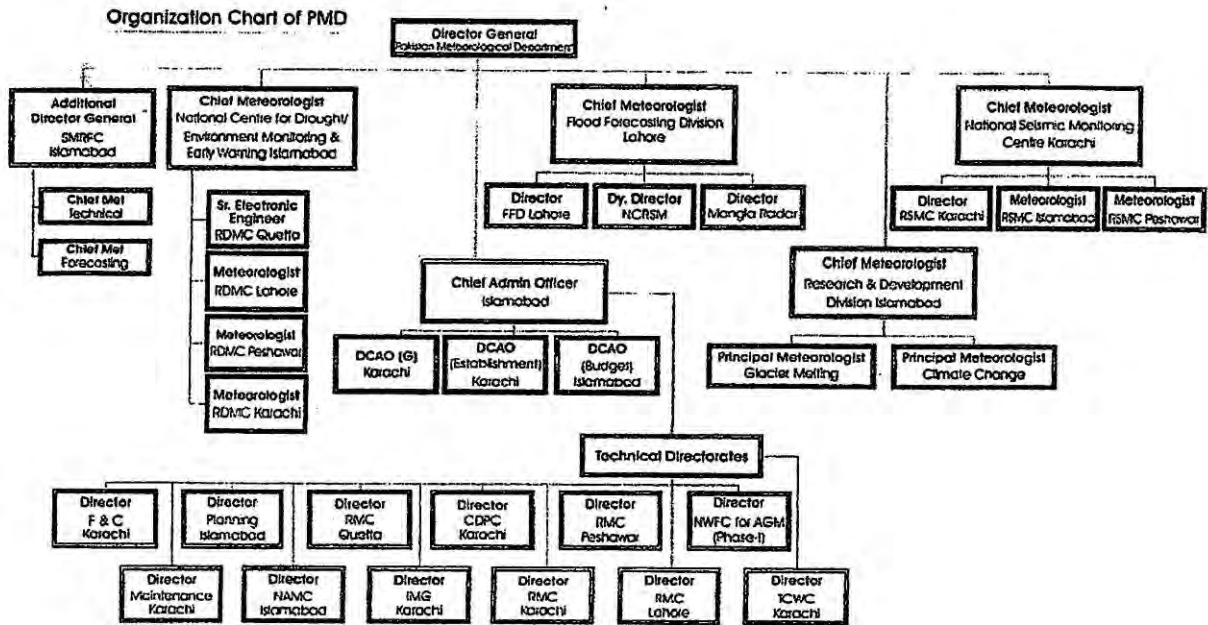
- (a) Mass media sources
- (b) Brochures
- (c) Commemoration panels

9-8. The Team explained that the preparatory survey report to be prepared at the end of the survey would be disclosed to the public in principle in Japan. However, the Team also explained that a confidential part which might affect bidding process such as cost estimation should be kept undisclosed until the bidding has completed.

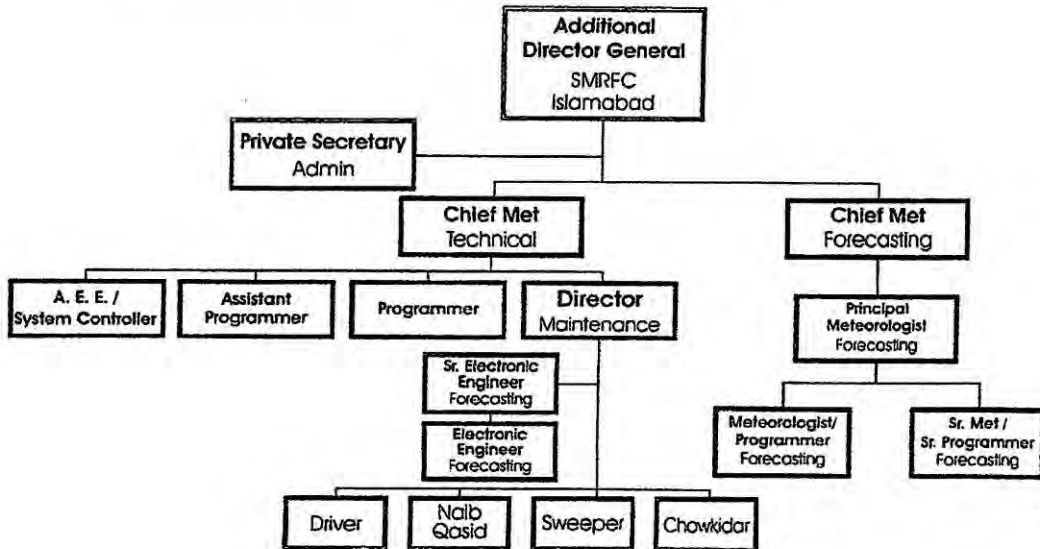
- Annex-1 Organization Chart (Pakistan Meteorological Department & Specialized Medium Range Forecasting Centre)
- Annex-2 Items Requested by the Pakistani Side
- Annex-3 Items to be procured by the Pakistani Side
- Annex-4 Japan's Grant Aid Scheme
- Annex-5 Major Undertakings to be taken by each Government

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Annex-1 Organization Chart (Pakistan Meteorological Department & Specialized Medium Range Forecasting Centre)



Proposed staff for "SMRFC and Strengthening of Early Warning & Dissemination Network"



Annex-2 Items Requested by the Pakistani Side

No.	Component	Q'ty	Description of the Request (PMD)	Purpose of the Component (PMD)
1	<i>SMRFC (Specialized Medium Range Forecasting Centre)</i>			
1-1	Meteorological Data Processing, Analyzing & Forecasting System with High Speed Computer including Agro meteorological Data Processing & Analysis Unit	1	Enhancement of the existing PC clustering system from 2T flops/sec to 20T flops/sec for operating Regional NWP Model with resolution of 5km grid size Model operation round the clock producing the output on 3 hourly bases	High accuracy weather forecasts up to 3 days will be produced by the enhanced computing system. For extended period to cover middle range up to 10 days weather forecasts to charter the needs of additional outlooks (weather guidance). Severe weather phenomena such as heavy rainfall can be predicted. For future climate prediction, regional climate model can be leaned on the enhanced computing system.
		1	Decision support system for farming community using output of the NWP model	Decision support system using output of the NWP Model: advisory on crop water requirement, timing of pest control, sowing/harvesting and field operation for agriculture sector. Issuance of 5 days or 7 days advance agro meteorological information to the farmers on periodical bases for all the agro-climatic zones of Pakistan using the existing Mass media and SMS.
1-2	Meteorological Information Dissemination System and Weather Information Broadcasting Program Production System	1	Simplified radio broadcast transmission system (30 transmitters on local weather observatories) for regional area and radio programme production system (radio booth, recorder and data transfer equipment).	For timely dissemination of accurately severe weather forecasts and warnings to vulnerable districts of the Pakistan. To educate communities for response and adaptation.
1-3	NOAA HRPT System	1	Direct Receiving System of NOAA Polar Orbit Meteorological Satellite.	Monitoring of dense fog, sea surface temperature, soil moisture, outgoing long radiation (OLR), snow cover, NDVI, land use products and global precipitation estimates from Polar Orbit Meteorological Satellite.

1-4	GTS Message Switch System	1	Replacement of the existing GTS Message Switching System at Karachi to a New GTS Message Switching System to be installed in PMD Islamabad.	The New GTS Message Switching System to be installed in PMD Islamabad for switching over the existing GTS Message Switching System in Karachi.
1-5	Meteorological Data Trunk Communication System including Network Management System (VPN)	8	Communication Network for the data exchange among PMD offices, and publication and dissemination of weather forecasts and warnings to the government organizations related to disaster management. Network Management System for the Meteorological Data Trunk Communication System (VPN).	Designed to reduce risks from a cyber-assault etc. utilizing VPN (virtual private network) technology. For stable data exchange, publication and dissemination, even when the internet situation of PMD HP is crowded at the time of a heavy rain and a flood, etc. For stable communication traffic on the data trunk communication system with network management.
1-6	Lightning Protection for SMRFC SMRFC Power Supply System - Power Backup System (UPS) - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator	1	Same as description of the Component.	For the protection of equipment and systems for SMRFC from lightning and surge and provision of stable power.
1-7	Necessary Spare Parts and Test Equipment for SMRFC	1	Spare parts and test instruments required for the equipment and systems for SMRFC supplied under the Project.	For maintenance of the equipment and systems for SMRFC supplied under the Project.
2	Meteorological Radar			
2-1	Meteorological Radar - Meteorological Radar System - Meteorological Radar Data Display System - Necessary Spare Parts and Test Equipment for Meteorological Radar Construction of Radar Tower Building including Power Supply System mentioned below; - Power Backup System (UPS) - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility	1	Same as description of the Component.	For continued radar observation. For stable and highly accurate radar observation.

	- Automatic Voltage Regulator Engine Generator			
2-2	Meteorological Radar Data Composite Picture System Existing Meteorological Radar 8 bit Modification System	1	The equipment to describe and display the Radar Composite Pictures among newly established Islamabad radar data and other existing radar data. Data modification system to convert the existing radar data into 8 bit data.	In order to obtain highly accurate rainfall intensity and to detect accurate weather situation by utilizing radar composite pictures.
3	<i>Upper-air Observation System</i>			
3-1	Upper-air Observation System (Wind Profiler) with Meteorological Data Satellite Communication System (VSAT)	5	The equipment for recording upper-air meteorological parameter.	Currently PMD cannot carry out periodical upper air observation using radio sonde due to lack of the financial resources. With the help of 5 radio sonde stations, the upper air data will be produced and will be consumed by the local forecasting system. In addition, the upper air data will be shared with the Global Communities.
4	<i>Mobile-type Micro Weather Radar System</i>			
4-1	Mobile-type Micro Weather Radar System with Power Supply Apparatus	1	The required mobile radar system (X band) enables PMD to monitor severe weather events (small and local scale phenomena) in the disaster prone areas in Pakistan.	The radar system will be moved to the vicinity of heavy rainfall to monitor the event continuously conveying the information to main forecasting centre. Based upon the conditions, the early warning will be issued to save the lives of the people living in vulnerable areas.

Annex-3 Items to be procured by the Pakistani side

No.	Component	Q'ty	Description of the Request (PMD)	Purpose of the Component (PMD)
1	<i>Others</i>			
1-1	Forecast Support System with Plotting Apparatus	1	The equipment which can printout (or plot) some kinds of weather charts, drawn by the free software, on one sheet of larger paper such as 1.3 m × 1m.	Some kinds of weather charts on one larger sheet of paper is used for transfer of the routine work results to the next routine forecast team.
1-2	Meteorological Product Display System	3	Three (3) large size (52 inches) LCD Displays.	Each display is installed at (1) Forecast room for forecasting work, (2) the entrance lobby of PMD for the reference and viewing of visitors and (3) airport lobby for displaying the weather information to general airport users.
1-3	Vehicle	1	Government of Pakistan has already purchased for the Project.	For daily works.
1-4	Environmental Monitoring System with Spread Spectrum Data Transmission System with Power Supply Apparatus	2	The system which has the similar functions of the existing one in Multan provided by the Government of Italy for monitoring the environmental conditions	Monitoring environmental conditions such as aerosol and carbon emissions from industrial and transportation sectors in Karachi and Lahore. Supporting research activities on cloud physics by the recorded data which is useful in high impact weather phenomena forecast.

APX4-1 - 10

Annex-4 Japan's Grant Aid Scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, a new JICA law was entered into effect on October 1, 2008. Following this law and the decision of the GOJ, Grant Aid for General Project, for Fisheries and for Cultural Cooperation, etc. are extended by JICA.

Grant Aid is non-reimbursable fund to a recipient country 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 (Attachment 1)

Japanese Grant Aid is conducted as follows-

- Preparatory Survey (hereinafter referred to as "the Survey")
 - The Survey conducted by JICA
- Appraisal & Approval
 - Appraisal by the GOJ and JICA, and Approval by the Japanese Cabinet
- Determination of Implementation
 - The Notes exchanged between the GOJ and a recipient country
- Grant Agreement (hereinafter referred to as "the G/A")
 - Agreement concluded between JICA and a recipient country
- Implementation
 - Implementation of the Project on the basis of the G/A

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey 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 implementation of the Project.
- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

The contents of the original request by the recipient country are not necessarily approved in their initial form as the contents of the Grant Aid Project. The Outline Design of the Project is confirmed based on the guidelines of the Japan's Grant Aid scheme.

JICA 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 Survey, JICA employs (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

The Report on the Survey is reviewed by JICA, and after the appropriateness of the Project is confirmed, JICA recommends the GOJ to appraise the implementation of the Project.

3. Japan's Grant Aid Scheme

(1) The E/N and the G/A

After the Project is approved by the Cabinet of Japan, the E/N will be signed between the GOJ and the Government of the recipient country to make a pledge for assistance, which is followed by the conclusion of the G/A between JICA and the Government of the recipient country to define the necessary articles to implement the Project, such as payment conditions, responsibilities of the Government of the recipient country, and procurement conditions.

(2) Selection of Consultants

In order to maintain technical consistency, the consultant firm(s) which conducted the Survey will be recommended by JICA to the recipient country to also work on the Project's implementation after the E/N and the G/A.

(3) Eligible Source Country

Under the Japanese Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased. When JICA and the Government of the recipient country or its designated authority 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, constructing and procurement firms, and the prime consulting firm 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 JICA. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

(5) Major undertakings to be taken by the Government of the Recipient Country

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

(6) Proper Use

The Government of 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) Export and Re-export

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

(8) Banking Arrangements (B/A)

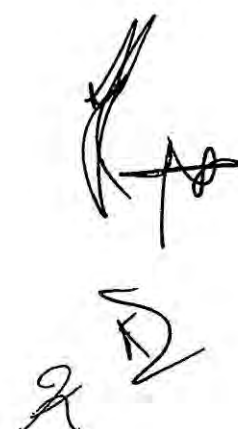
- a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in a bank in Japan (hereinafter referred to as "the Bank"). JICA will execute the Grant Aid by making payments in Japanese yen to cover the obligations 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 JICA 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)

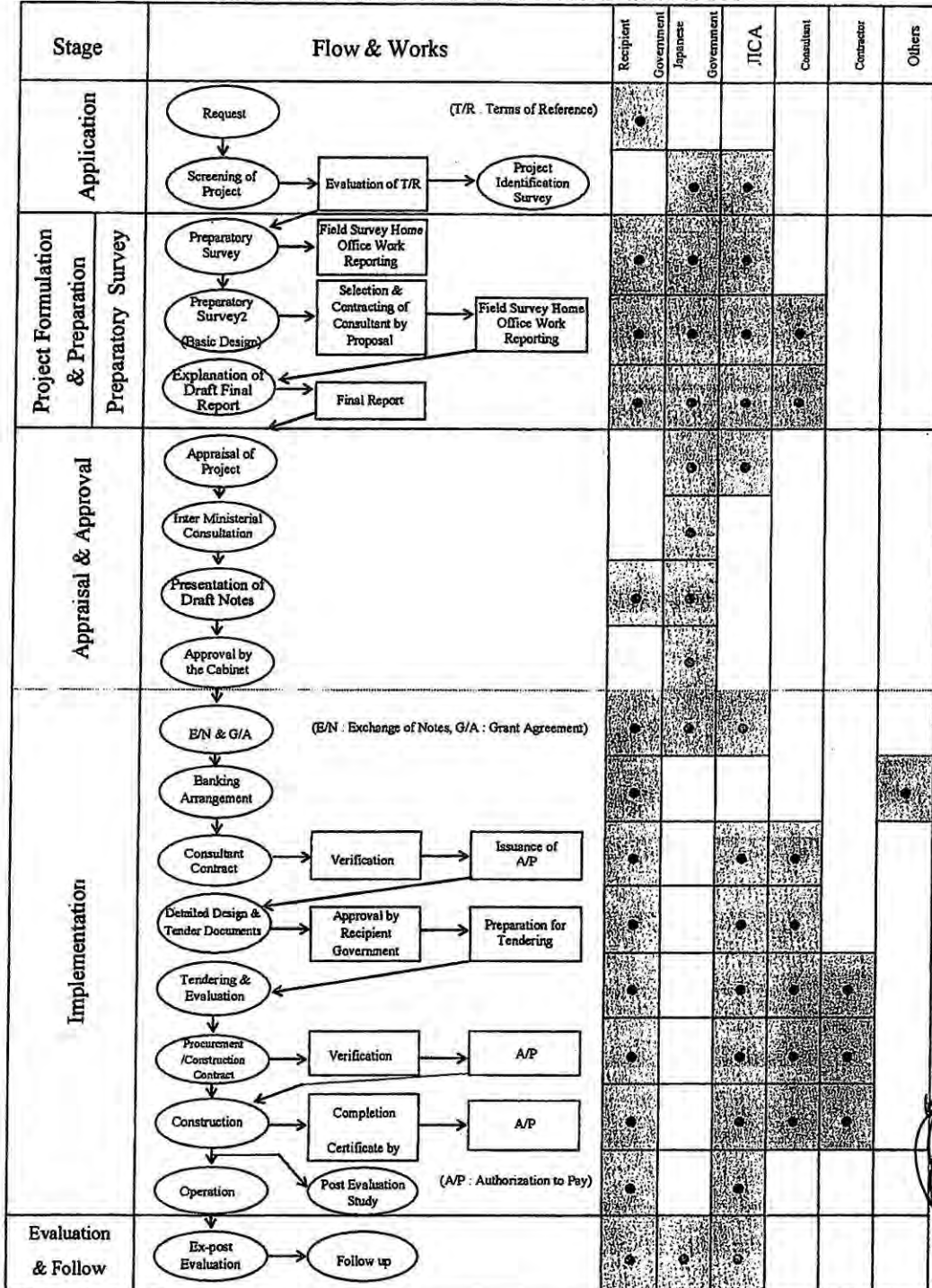
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(10) Considerations for Environmental and Social Impacts and Disaster Risk Reduction

A recipient country must ensure DRR and the social and environmental considerations for the Project and must follow the regulations concerned of the recipient country and JICA socio-environmental guideline.

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FLOW CHART OF JAPAN'S GRANT AID PROCEDURES



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Annex-5: 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 necessary for the implementation of the Project and to clear the sites		○
2	To construct the following facilities		
	1) The building	○	
	2) The gates and fences in and around the site		○
	3) The parking lot	○	
	4) The road within the site	○	
3	5) The road outside the site		○
	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the sites		
	1) Electricity		
	a. The distributing power 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, common 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	○	
4	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	○	
5	6) Furniture and Equipment		
	a. General furniture		○
	b. Project equipment	○	
6	To ensure prompt unloading and customs clearance of the products at the port of disembarkation in the recipient country and to assist internal transportation of the products		
	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		○
7	3) Internal transportation from the port of disembarkation to the project site	○	(●)*
	To ensure that customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the purchase of the products and the services be exempted		●
8	To accord Japanese nationals whose services may be required in connection with the supply of the products and the services such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
9	To ensure that the facilities and the products be maintained and used properly and effectively for the implementation of the Project		●
10	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●
	To bear the following commissions paid to the Japanese bank for banking services based upon the B/A		
	1) Advising commission of A/P		●
10	2) Payment commission		●
	To give due environmental, social consideration and Disaster Risk Reduction during the planning and the implementation of the Project		●

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

* Internal transportation to the sites where Japanese nationals cannot enter due to the security situation would be covered by the Pakistani Side.

Appendix 4-2. Minutes of Discussions

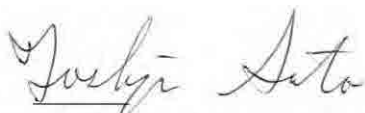
**MINUTES OF DISCUSSIONS
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IN
THE ISLAMIC REPUBLIC OF PAKISTAN”**

In response to the request from the Government of the Islamic Republic of Pakistan (hereinafter referred to as “Pakistan”), the Government of Japan decided to conduct a Preparatory Survey on the Project originally titled “Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Early Warning and Dissemination Network” and entrusted the Preparatory Survey to Japan International Cooperation Agency (hereinafter referred to as "JICA").

Following the Field Survey-1 conducted from September 17 to 26th, 2012, JICA sent to Pakistan the second Preparatory Survey Team (hereinafter referred to as "the Team") to undertake the Field Survey-2, which is headed by Mr. Toshiya Sato, Senior Representative of JICA Pakistan Office from November 19 to 23rd, 2012.

The Team explained the result of the Field Survey-1 and the Study in Japan-1 to the officials concerned of the Government of Pakistan (Pakistan Meteorological Department (hereinafter referred to as “PMD”)), and the Pakistani side agreed to the scope of the Project as well as relevant details as described as attached. The Team will proceed to further works and prepare the Outline Design and Draft Report based on the result of Field Survey-1 and Field Survey-2.

Islamabad, November 22nd, 2012




Mr. Toshiya Sato

Head of the Mission
Preparatory Survey Team
Japan International Cooperation Agency
Government of Japan



Mr. Syed Zain Gillani

Deputy Secretary
Economic Affairs Division
Ministry of Economic Affairs & Statistics
Government of Pakistan



Mr. Arif Mahmood

Director General
Pakistan Meteorological Department
Ministry of Defence
Government of Pakistan



Mr. Muhammad Idrees Mahsud

Member Disaster Risk Reduction
National Disaster Management Authority
Ministry of Climate Change
Government of Pakistan

ATTACHMENT

1. Result of discussions for Draft Layout and design of the facilities and equipment of the Project

Based on the result of Field Survey-1 and Study in Japan-1, Japanese side proposed the Draft Layout and design of the facilities and equipment of the Project.

Through series of meetings, both sides undertook discussions to reach a common understanding on what items to focus for this Project, considering its purpose, necessity, benefit, relevance and urgency. As a result, both sides reached an agreement as described in Annex-1.

2. Title of the Project

Although the title of the Project was pending in the discussion of the Field Survey-1, both sides understood in principle that the title of the Project should reflect the content of the Project. Thus, as a result of agreement as in Annex-1, pending on the finalization of the Project detail, both sides agreed to set the title, "Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Weather Forecasting System in the Islamic Republic of Pakistan".

3. Final layout with priority and site

Both sides agreed that the final layout with priority and sites are as described in Annex-2.

JICA committed to recommend to the Government of Japan for the approval of each item agreed described in Annex-2. Pakistani side understood that according to the overall cost of the Project, there may be possibility that not all agreed items could be approved.

Also, Pakistani side understood that Draft Final outline of the Project with project cost will be discussed by both sides in the Field Survey-3.

4. Schedule of the Preparatory Survey

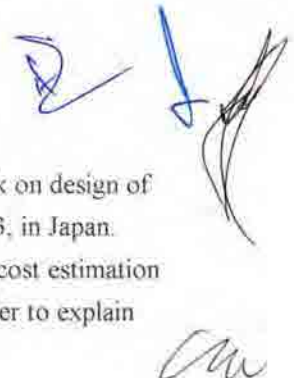
The Preparatory Survey is divided into five (5) stages which consist of

1. Field Survey-1 (Completed)
2. Study in Japan-1 (Completed)
3. Field Survey-2 (On-going)
4. Study in Japan-2
5. Field Survey-3

4-1. The Field Survey-2 will continue in Pakistan until 24 December, 2012.

4-2. Based on the result of the Field Survey-2, JICA will conduct the analytical work on design of the facilities, equipment and cost estimation from December 2012 to April 2013, in Japan.

4-3. JICA will prepare the Draft Final Report including Outline Design and provide cost estimation for the preparation of the PC-1 in English and dispatch a team to Pakistan in order to explain and agree its contents around April, 2013 as the Field Survey-3.



4-4. If the contents of the Draft Final Report are accepted in principle by the Government of Pakistan, JICA will complete the Final Report and send it to the Government of Pakistan by August, 2013.

The above schedule is tentative and subject to change.

5. Other relevant issues

5-1. Security arrangement

The Government of Pakistan shall take all possible and necessary measures to ensure the safety of the concerned Japanese people during the implementation of the Project at the Projects sites and movement to the Project sites from their accommodations, if Japanese side requests. The Project sites are as described in Annex-2.

5-2. Approval of PC-1 (Revised)

The Team explained that the Project would be sent to the Japanese Cabinet for approval only after approval of the PC-1 (Revised) by the Government of Pakistan.

The Pakistani side assured that all the effort shall be made for the approval of the PC-1 (Revised) from the competent authority by the end of August, 2013. JICA will provide necessary information acquired through the Survey to Pakistani side for preparation of the PC-1 (Revised) by the end of April.

5-3. Soft Component

Both sides agreed that initial guidance for operation and maintenance of the equipment and machineries should be included in the Project to support smooth operation.

5-4. Clearance of Existing Facilities

The Pakistani side agreed that all expense that derives from clearing the existing residential building shall be covered by PMD. The Pakistani side committed that clearance will be commenced immediately after signing of Exchange of Notes of the Projects by both sides, and completed within 2 months.

5-5. Provision of internet facilities

The Pakistani side agreed to provide reliable and high-speed internet facilities at all proposed sites for the Project.

5-6. Provision of No Objection Certificate (NOC)

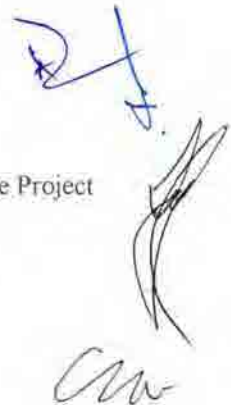
The Pakistani side agreed to take necessary measures to get NOC for Japanese people involved in the Project whenever required.

Annex-1:

Result of discussions for Draft Layout and design of the facilities and equipment of the Project

Annex-2:

Final layout with priority and site



Annex-1 Result of discussions for Draft Layout and design of the facilities and equipment of the Project

No.	Component	Q'ty	Description of the Request (PMD)	Purpose of the Component (PMD)	Include/Omit	Remarks
1 SMRFC (Specialized Medium Range Forecasting Centre)						
1-1	Meteorological Data Processing, Analyzing & Forecasting System with High Speed Computer including Agro meteorological Data Processing & Analysis Unit	1	Enhancement of the existing PC clustering system from 2T flops/sec to 20T flops/sec for operating Regional NWP Model with resolution of 5km grid size Model operation round the clock producing the output on 3 hourly bases	High accuracy weather forecasts up to 3 days will be produced by the enhanced computing system. For extended period to cover middle range up to 10 days weather forecasts to cater the needs of additional outlooks (weather guidance). Severe weather phenomena such as heavy rainfall can be predicted. For future climate prediction, regional climate model can be leaned on the enhanced computing system.	Partially include	Computing system and spare parts requested by PMD for operation/development of weather products utilizing the existing global model outputs was agreed to be included. PMD requested capacity building of their staffs on NWP in form of a series of short-term training courses in Japan to support developing their Regional NWP Model. PMD also requested to provide NWP model at a later stage. JICA understood the relevance and importance of such capacity building needs and took note of the request.
		1	Decision support system for farming community using output of the NWP model	Decision support system using output of the NWP Model: advisory on crop water requirement, timing of pest control, sowing/harvesting and field operation for agriculture sector. Issuance of 5 days or 7 days advance agro meteorological information to the farmers on periodical bases for all the agro-climatic zones of Pakistan using the existing Mass media and SMS.		
1-2	Meteorological Information Dissemination System and Weather Information Broadcasting Program Production System	1	Simplified radio broadcast transmission system (30 transmitters on local weather observatories) for regional area and radio programme production system (radio booth, recorder	For timely dissemination of accurately severe weather forecasts and warnings to vulnerable districts of the Pakistan. To educate communities for response and adaptation.	Omit	It was agreed that mechanism and framework of timely dissemination of accurate severe weather forecasts and warnings should be considered at the national level. It was recommended that PMD

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			and data transfer equipment).			should work together with other relevant stakeholders, such as the media, for dissemination of weather information, forecast and warning.
1-3	NOAA HRPT System	1	Direct Receiving System of NOAA Polar Orbit Meteorological Satellite.	Monitoring of dense fog, sea surface temperature, soil moisture, outgoing long radiation (OLR), snow cover, NDVI, land use products and global precipitation estimates from Polar Orbit Meteorological Satellite.	Include	It was agreed not to prioritize the NOAA HRPT System in terms of its urgency, with a recognition that the system will be of benefit to PMD. JICA noted that equivalent data could be obtained via internet, while PMD insisted that NOAA system is essential for their operational activity.
1-4	GTS Message Switch System	1	Replacement of the existing GTS Message Switching System at Karachi to a New GTS Message Switching System to be installed in PMD Islamabad.	The New GTS Message Switching System to be installed in PMD Islamabad for switching over the existing GTS Message Switching System in Karachi.	Include	It was agreed to include GTS message switch system.
1-5	Meteorological Data Trunk Communication System including Network Management System (VPN)	8	Communication Network for the data exchange among PMD offices, and publication and dissemination of weather forecasts and warnings to the government organizations related to disaster management. Network Management System for the Meteorological Data Trunk Communication System (VPN).	Designed to reduce risks from a cyber-assault etc. utilizing VPN (virtual private network) technology. For stable data exchange, publication and dissemination, even when the internet situation of PMD HP is crowded at the time of a heavy rain and a flood, etc. For stable communication traffic on the data trunk communication system with network management.	Include	It was agreed to include VPN. It was also agreed that all VPN should be installed where Japanese experts have access, by following security measures for regulation of the Japanese side.
1-6	Lightning Protection for SMRFC SMRFC Power Supply System - Power Backup System (UPS) - Isolation Transformer for the	1	Same as description of the Component.	For the protection of equipment and systems for SMRFC from lightning and surge and provision of stable power.	Include	It was agreed to include Lightning Protection and Power Supply System.

	<p>Equipment</p> <ul style="list-style-type: none"> - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator 					
1-7	Necessary Spare Parts and Test Equipment for SMRFC	1	Spare parts and test instruments required for the equipment and systems for SMRFC supplied under the Project.	For maintenance of the equipment and systems for SMRFC supplied under the Project.	Include	It was agreed to include necessary spare parts and test equipment in relation to equipment agreed in 1-1.
2 Meteorological Radar						
2-1	<p>Meteorological Radar</p> <ul style="list-style-type: none"> - Meteorological Radar System - Meteorological Radar Data Display System - Necessary Spare Parts and Test Equipment for Meteorological Radar <p>Construction of Radar Tower Building including Power Supply System mentioned below:</p> <ul style="list-style-type: none"> - Power Backup System (UPS) - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator 	1	Same as description of the Component.	For continued radar observation. For stable and highly accurate radar observation.	Include	<p>It was agreed to include Meteorological Radar (S-band radar).</p> <p>It was also agreed to consider installing one Radar Display System in the New Benazir Bhutto International Airport (NBBIA). In case NBBIA is not completed till the installation of Radar System, the Radar Display System was agreed to be installed in the MET Office in the existing Islamabad International Airport, and PMD will shift it to its new setup within their own resources.</p>
2-2	<p>Meteorological Radar Data Composite Picture System</p> <p>Existing Meteorological Radar 8 bit Modification System</p>	1	<p>The equipment to describe and display the Radar Composite Pictures among newly established Islamabad radar data and other existing radar data.</p> <p>Data modification system to convert the existing radar data into 8 bit data.</p>	In order to obtain highly accurate rainfall intensity and to detect accurate weather situation by utilizing radar composite pictures.	Omit	It was agreed that since other radar systems are not digitalized, it is not functional to utilize this system for the time being.

3 Upper-air Observation System						
3-1	Upper-air Observation System (Wind Profiler) with Meteorological Data Satellite Communication System (VSAT)	5	The equipment for recording upper-air meteorological parameter.	Currently PMD cannot carry out periodical upper air observation using radio sonde due to lack of the financial resources. With the help of 5 radio sonde stations, the upper air data will be produced and will be consumed by the local forecasting system. In addition, the upper air data will be shared with the Global Communities.	Include	It was agreed to provide 2 radio wave wind profiling systems (wind profiler) at Islamabad and Multan for upper air observation. PMD committed to share all data obtained from the wind profilers via GTS. PMD requested Nawab Shah to be considered as the third site if budget permits.
4 Mobile-type Micro Weather Radar System						
4-1	Mobile-type Micro Weather Radar System with Power Supply Apparatus	1	The required mobile radar system (X band) enables PMD to monitor severe weather events (small and local scale phenomena) in the disaster prone areas in Pakistan.	The radar system will be moved to the vicinity of heavy rainfall to monitor the event continuously conveying the information to main forecasting centre. Based upon the conditions, the early warning will be issued to save the lives of the people living in vulnerable areas.	Omit	Both sides agreed that this item is utilized as research purpose and thus not suitable to the Project at this stage.

Annex-2 Final layout with priority and site

No.	Component	Q'ty	Priority	Site
1	SMRFC (Specialized Medium Range Forecasting Centre)			
1-1 & 1-7	Computing system and spare parts for operation/development of weather products utilizing the existing global model outputs	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad
1-3	NOAA HRPT System	1	B	Pakistan Meteorological Department, Headquarters Office, Islamabad
1-4	GTS Message Switch System	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad
1-5	Meteorological Data Trunk Communication System including Network Management System (VPN)	6	A	Islamabad Lahore (2) Multan Karachi Gilgit
1-6	Lightning Protection for SMRFC SMRFC Power Supply System - Power Backup System - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad
2	Meteorological Radar			
2-1	Meteorological Radar - Meteorological Radar System - Meteorological Radar Data Display System - Necessary Spare Parts and Test Equipment for Meteorological Radar Construction of Radar Tower Building including Power Supply System mentioned below: - Power Backup System - Isolation Transformer for the Equipment - Isolation Transformer for the Building Facility - Automatic Voltage Regulator Engine Generator	1	A	Pakistan Meteorological Department, Headquarters Office, Islamabad, including one Radar Display System in the New Benazir Bhutto International Airport (NBBIA). In case NBBIA is not completed till the installation of Radar System, the Radar Display System was agreed to be installed in the MET Office in the existing Islamabad International Airport, and PMD will shift it to its new setup within their own resources.
3	Upper-air Observation System			
3-1	Upper-air Observation System (Wind Profiler)	2 (3)	A A B	Islamabad Multan (Nawab Shah)

Appendix 4-3. Minutes of Discussions

MINUTES OF DISCUSSIONS
OF
THE PREPARATORY SURVEY (FIELD SURVEY-3)
ON
THE PROJECT FOR
ESTABLISHMENT OF SPECIALIZED MEDIUM RANGE WEATHER
FORECASTING CENTER (SMRFC) AND STRENGTHENING OF WEATHER
FORECASTING SYSTEM
IN
THE ISLAMIC REPUBLIC OF PAKISTAN
(Explanation of Draft Preparatory Survey Report)

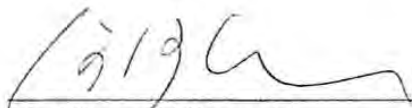
In response to a request from the Islamic Republic of Pakistan (hereinafter referred to as "Pakistan"), the Government of Japan decided to conduct the Preparatory Survey (hereinafter referred to as "the Survey") on "the Project for Establishment of Specialized Medium Range Weather Forecasting Center (SMRFC) and Strengthening of Weather Forecasting System in the Islamic Republic of Pakistan" (hereinafter referred to as "the Project") and entrusted the survey to Japan International Cooperation Agency (hereinafter referred to as "JICA"). JICA sent the Preparatory Survey Team in September and November 2012. The said Preparatory Survey Team held discussions with the officials concerned of the Government of Pakistan (hereinafter referred to as "GoP") and Pakistan Meteorological Department (hereinafter referred to as "PMD") and conducted a field survey at the survey area. In the course of discussions and field survey, both parties confirmed the main items and signed on the Minutes of Discussions on 26th September, 2012 and 22nd November, 2012.

According to the Minutes of Discussions above, JICA finally prepared the Draft Preparatory Survey Report. In order to explain and consult with PMD on the components of the draft report, JICA has sent the Draft Preparatory Survey Report Explanation Team (hereinafter referred to as "the Team"), headed by Mr. Mitsuyoshi Kawasaki, Chief Representative, JICA Pakistan Office from 29th June to 7th July, 2013.

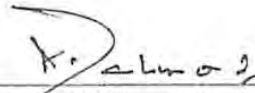
As a result of the discussions, both parties confirmed the items described on the attached sheets.

Islamabad, 5th July, 2013


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Mr. Mitsuyoshi Kawasaki
Leader
Chief Representative
JICA Pakistan Office



Mr. Arif Mahmood
Director General
Pakistan Meteorological Department
Aviation Division
Government of Pakistan



Mr. Zafar Nasrullah Khan
Joint Secretary (ADB/Japan)
Economic Affairs Division
Government of Pakistan



Mr. Idrees Mahsud
Member Disaster Risk Reduction
National Disaster Management Authority
Climate Change Division
Government of Pakistan

ATTACHMENT


1. Components of the Draft Preparatory Survey Report

PMD agreed and accepted in principle the components of the Draft Preparatory Survey Report explained by the Team. The components of the Project are shown in Annex-1. JICA will finalize the Final Report as per comments of PMD.

2. Tentative Schedule of the Project

2-1 The Team explained the Project Implementation Schedule (Detailed Design & Tendering Procedures, Construction of Islamabad Meteorological Radar Tower Building, Equipment Procurement and Soft Components) starting expectedly from June, 2014 (after signing of the Grant Agreement) to August, 2017 for approximately 39 months as shown in Annex 2 and PMD agreed on it.

2-2 Both sides confirmed the timetable of the following key actions for the Project;

- 1) Initial Environmental Examination (IEE) on the Project shall be completed by the beginning of November, 2013.
- 2) In order to submit the Project to the Japanese Cabinet, the PC-I (Revised) shall be approved by Central Development Working Party (CDWP)/ Executive Committee of the National Economic Council (ECNEC) by the beginning of November, 2013.
- 3) The required procedures for the Building Construction Permit to be issued by the Capital Development Authority (CDA) shall be commenced immediately after signing of the Exchange of Notes of the Project and shall be completed before the commencement of the tendering procedures (by the end of September, 2014).
- 4) The required procedures for the Frequency Permit for Meteorological Radar System and Wind Profiler Systems to be issued by the Pakistan Telecommunication Authority (PTA)/Frequency Allocation Board (FAB) shall be commenced immediately after signing of the Exchange of Notes of the Project and shall be completed before the commencement of the tendering procedures (by the end of September, 2014).
- 5) In order to secure and allocate ample space for the construction of a new Radar Tower Building, demolition of the existing residential quarter in the premises of PMD Islamabad Head Office shall be completed by the end of September, 2014. 
- 6) PC-IV shall be submitted right after the completion of the Project.



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3. Confidentiality of the Project

3-1 Detailed Specification

Both sides confirmed all the information related to the Project including technical specifications, drawings and other technical information shall not be released to any other party(ies) before the signing of all the Contract(s) for the Project.

3-2 Project Cost Estimate

The Team explained the estimated project cost to be borne by the Government of Japan as attached in Annex-3

PMD agreed to allocate necessary budget in order to bear requested undertakings as shown in Annex-3 and Annex-4. The Team also explained that these cost estimations are subject to change since they are provisional. In order to conduct re-examination of these cost estimations, the team will be dispatched to Pakistan around October 2013 as the Field Survey-4.

Both sides agreed that the Project Cost Estimate should never be duplicated in any form nor disclosed to any other part(ies) before the signing of all the Contract(s) for the Project. This confidentiality of the estimated project cost is necessary to ensure fairness of the tender procedure.

4. Actions to be taken by GoP/PMD

Both sides confirmed that GoP/PMD would carry out the items indicated in the table in Annex-5 for the implementation of the Project in accordance with the Project Implementation Schedule.

5. Gilgit Meteorological Office

The Team explained that the Team could not visit one of the site of the Project i.e. Gilgit Meteorological Office, due to the restriction of traveling to Gilgit-Baltistan as prescribed in JICA and the Government of Japan regulation. PMD agreed to conduct the site survey for the proposed equipment installation by August 2013 in accordance with the technical instructions and the drawings attached in the Draft Preparatory Survey Report provided by the Team. Both sides also agreed that in case Japanese consultants and contractors are still restricted to travel to Gilgit based on the above restriction during the implementation of the Project, Japanese Consultants will provide the required technical guidance to PMD for proper installation of the equipment.



6. Existing Facilities in PMD Islamabad

PMD agreed to secure ample and strategically located space/s at the existing facilities for the installation of the equipment to be supplied under the Project such as PC terminals & peripherals, solar panels, furniture, etc. indicated in the drawings attached in the Draft Preparatory Survey Report provided by the Team.

7. High-speed Internet Environment

For the establishment of a Virtual Private Network (VPN), PMD agreed to make reliable & high-speed Internet connection at the Specialized Medium Range Forecasting Center (SMRFC) Building: at least 3Mbps and at each Project site: at least 1Mbps.

8. New Organization chart of PMD

PMD informed that it now lies under the Aviation Division of Cabinet Secretariat instead of the Ministry of Defence as shown in Annex-6.

9. Reallocation of the existing data communication antennae at the roof top of the existing Islamabad Radar Tower Building

PMD agreed to reallocate the existing data communication antennae installed under the Lai Nullah Flood Forecasting and Warning System Project to maintain appropriate data communication according to the Consultant's assistance during the construction work of a new Radar Tower Building in PMD Islamabad under the Project.

- Annex-1: Components of the Project
- Annex-2: Tentative Implementation Schedule
- Annex-3: Project Cost Estimation
- Annex-4: Project Annual Recurrent Cost to be borne by GoP/PMD
- Annex-5: Major Undertakings to be taken by GoP/PMD
- Annex-6: New Organization chart of PMD

Annex-1: Components of the Project

Component	Islamabad		Lahore		Karachi	Multan	Gilgit
	PMD Islamabad Head Office	Meteorological Office in New Benazir Bhutto International Airport (NBBIA)	PMD Lahore Regional Meteorological Center	PMD Lahore Flood Forecasting Division	PMD Karachi Tropical Cyclone Warning Center	PMD Multan Meteorological Office	PMD Gilgit Meteorological Office
I Procurement and Installation of Equipment							
SMRFC (Specialized Medium Range Forecasting Center) Weather Forecasting & Development System (including Lightning System, Power Back-up System, Isolation Transformer, Auto Voltage Regulator, Power Supply Capacitor and Test Instruments, Spare Parts and Ancillary Facility)	1	-	-	-	-	-	-
Meteorological Data Trunk Communication System	1	-	1	1	1	1	1
GTS Message Switch System	1	-	-	-	-	-	-
S-Band Doppler Pulse Compression Solid State Radar System (including Power Back-up System, Isolation Transformer, Auto Voltage regulator, Power Supply Capacitor and Test Instruments and Spare Parts)	1	-	-	-	-	-	-
Meteorological Rader Data Display System	2	1	-	-	-	-	-
Wind Profiler System (including Ancillary Facility)	1	-	-	-	-	1	-
II Construction of Radar Tower Building							
Construction of Radar Tower Building	1	-	-	-	-	-	-
III Soft components							
1. Meteorological Doppler Rader Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery 2. Meteorological Doppler Rader Operation and Maintenance utilizing the System Manual and Maintenance & Management Record Book 3. Meteorological Rader Observation in accordance with the Sequence & Schedule for intensity Mode and Doppler Mode 4. Preparation of Weather Guidance							

Annex-2 Tentative Implementation Schedule

The Project for Establishment of Specialized Medium Range Weather Forecasting Center and Strengthening of Weather Forecasting System																												
	2014				2015				2016				2017															
	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8
E.N, G.A and Consulting Agreement																												
Exchange of Notes (E.N)	■																											
Grant Agreement (G.A)		■																										
Consulting Agreement			■																									
Detailed Design & Tendering Procedures																												
Detailed Design			■	■																								
Internal Work in Japan			■	■	■	■	■																					
Tendering Procedures					■	■	■	■	■	■																		
Construction of Automated Meteorological Radar Tower Building																												
Preparation Work								■	■																			
Temporary/Filing Earth Works									■	■	■	■	■	■														
Structure Work										■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Finishing Works																					■	■	■	■	■	■	■	■
Building Equipment																												
External Work																												■
Equipment Procurement																												
Equipment Manufacturing																												
Equipment Transportation																												
Equipment Installation/Adjustment																												
Soft Component																												
Soft Component (Activity No. 1)																												■
Soft Component (Activity No. 2)																												■
Soft Component (Activity No. 3)																												■
Soft Component (Activity No. 4)																												■

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Annex-3: Project Cost Estimation

Total Project Cost:

This item is closed due to confidentiality

Annex-3-1: Project Cost to be borne by Japan's Grant Aid

This item is closed due to confidentiality

Annex-3-2: Project Capital Cost already incurred by GoP/PMD

Approx. 27,649,000 PKR (approx. 27 Million JP Yen)

No.	Items	Capital Cost (PKR)
1	To construct 2-Storey Building (SMRFC: Specialized Medium Range Forecasting Center)	15,938,000
2	To procure PC terminals and peripherals for SMRFC	7,687,000
3	To shoulder the miscellaneous cost (electricity, petrol, etc.)	1,613,000
4	To shoulder the manpower cost (staff salary, allowance, etc.)	881,000
5	To procure a vehicle	1,400,000
6	To procure library book	40,000
7	To shoulder other items	90,000
	Total	27,649,000

Annex-3-3: Project Capital Cost to be borne by GoP/PMD

Approx. 33,883,000 PKR (approx. 34 Million JP Yen)

No.	Items	Capital Cost (PKR)
1.	To pay bank commission for issuance of the Authorization to Pay (A/P) and FED etc. to the Consultant and the Contractor.	10,750,000
2.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Islamabad Radar Tower Building in the PMD Islamabad Head Office.	300,000
3.	To install the required step-down transformers as well as service entrance connections for the commercial power supply at the PMD Islamabad Head Office for the Radar Tower Building.	1,800,000
4.	To provide water supply for the Radar Tower Building in the PMD Islamabad Head Office.	100,000
5.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Specialized Medium Range Forecasting Center (SMRFC) in the PMD Islamabad Head Office.	300,000
6.	To provide reliable and high-speed Internet environment at the Specialized Medium Range Forecasting Center (SMRFC) and at each Project site for the establishment of a Virtual Private Network (VPN).	1,000,000
7.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply for the wind profiler system in the PMD Islamabad Head Office.	300,000
8.	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply for the wind profiler system in the PMD Multan Meteorological Office.	300,000

9.	To shoulder the dispatching cost of the trainees to the training sites, such as daily allowance, transportation fee, accommodation, etc.	500,000
10.	To shoulder the miscellaneous expenditures such as library books, petrol, telephone, application fee (obtaining the required frequencies for the meteorological radar system & the wind profiler systems, and the construction permissions of a new Radar Tower Building).	2,500,000
11.	To shoulder manpower cost (staff salary, allowance, etc.)	16,033,000
Total		33,883,000

Applied Exchange Rate: US\$ 1 = 80.18 JP Yen, 1 PKR= 0.989 JP Yen as of December 2012

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Annex-4 Project Annual Recurrent Cost to be borne by GoP/PMD

Approx. 17,335,000 PKR (approx. 17 Million JP Yen)

Sr. No	Description	Rs. In Million		
		Local	FEC	Total
1	Pay & Allowance of Staff	10.700	0.000	10.700
2	Electricity Charges	1.950	0.000	1.950
3	Water and Gas Charges	0.400	0.000	0.400
4	Telephone, Fax, Leased Lines, Internet Connections	1.500	0.000	1.500
5	Spare Parts, Consumables and Special Maintenance of the Systems	0.900	0.000	0.900
6	Radar Radome caulking repair and exterminating vermination for the facilities	0.450	0.000	0.450
7	Consumables, Stationary, etc.	0.100	0.000	0.100
8	Books & Journals	0.035	0.000	0.035
9	Contingencies	0.300	0.000	0.300
10	P.O.L. Charges (for engine generators, vehicles, etc.)	1.000	0.000	1.000
	Total	17.335	0.000	17.335

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Annex5: Major Undertakings to be taken by GoP/PMD

No	Items
General Items	
1	To undertake all necessary institutional and juridical procedures in Pakistan.
2	To undertake Initial Environmental Examination (IEE) procedures in Pakistan.
3	To handle duty (Tax) exemption procedures and to take necessary measures as well as provide requisite legal and/or administrative documentations for customs clearance to customs broker/forwarder to be employed by Contractor at the port of disembarkation for the materials and equipment imported for the Project.
4	To provide necessary working spaces with Internet Connection at the PMD Islamabad Head Office for the Consultant and the Contractor for the implementation of the Project.
5	To accord Japanese and other foreign nationals including their dependent/s (if any), whose services may be required in connection with the supply of products and services under the signed contracts, such facilities as may be necessary for their entry into Pakistan and stay therein for the smooth and uninterrupted performance of their work (i.e. to secure the appropriate Visa including its extension/s required by the recipient country in connection thereof).
6	To exempt Japanese and other foreign 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 signed contracts.
7	To pay bank commission for the issuance of the Authorization to Pay (A/P) and amendments of A/P, if required, for the Consultant and the Contractor.
8	To bear all the expenses, other than those to be borne by the Japan's Grant Aid, necessary for the implementation of the Project
9	To ensure the security of the whole Project site/s and of the Japanese and other foreign nationals assigned to the Project prior to the commencement of and during Project implementation.
For the Construction of the Radar Tower Building	
10	To clear, level and reclaim the land prior to the commencement of construction work.
11	To secure sufficient spaces at the respective Project sites for temporary facilities such as a contractor's office, workshop, building materials storage, etc. for the construction work.
12	To demolish the existing building in premises of the PMD Islamabad Head Office in order to secure and allocate ample space for the construction of a new Radar Tower Building
13	To obtain necessary permissions for the construction of the Radar Tower Building in the PMD Islamabad Head Office.
14	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Radar Tower Building in the PMD Islamabad Head Office.
15	To install the required step-down transformers as well as service entrance connections for the commercial power supply at the PMD Islamabad Head Office for the Radar Tower Building.
16	To provide incidental facilities, such as water supply, telephone line and internet provision, for the Radar Tower Building in the PMD Islamabad Head Office.
17	To provide temporary facilities for the availability or accessibility of electricity, water, etc. for the construction work.
18	To undertake incidental outdoor works such as gardening, fencing, constructing gates, boundary walls and exterior lighting in and around the sites, if necessary.
19	To shoulder dispatching cost of the trainees to the training sites, such as daily allowance,

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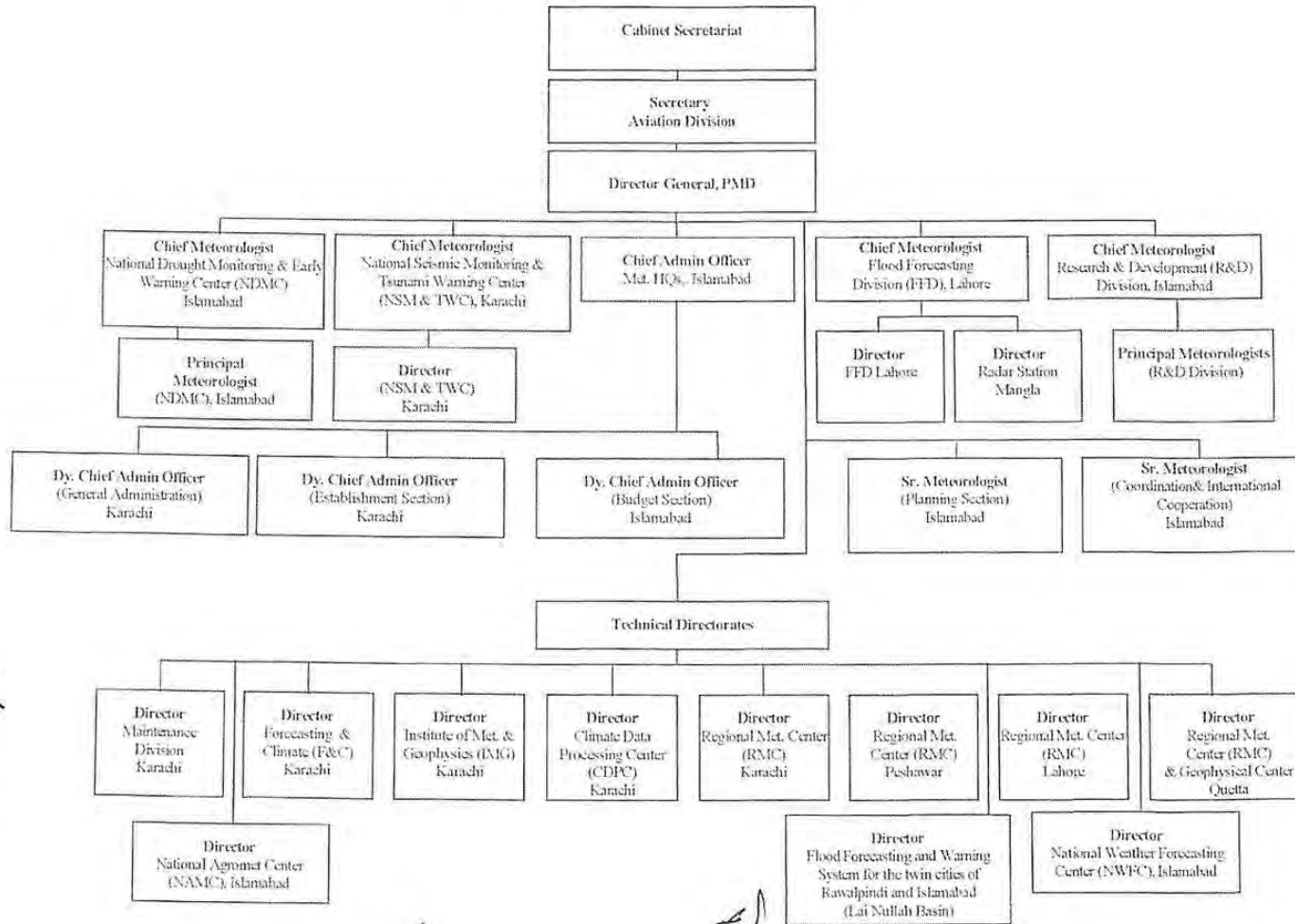
	transportation fee, accommodation, if any.
For Installation Work of the Equipment	
20	To remove and relocate the existing facilities, if available, for the installation of the equipment, if necessary.
21	To provide and allocate secure temporary storage area/room for the materials, tools and equipment needed during the installation process.
22	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply (capacity: 100kVA) for the Specialized Medium Range Forecasting Center (SMRFC) in the PMD Islamabad Head Office.
23	To provide reliable and high-speed Internet environment at the Specialized Medium Range Forecasting Center (SMRFC) and at each Project site for the establishment of a Virtual Private Network (VPN).
24	To provide the commercial power (400V, 3-phase, 4-wire, 50Hz) supply for the wind profiler system in the PMD Islamabad Head Office and the PMD Multan Meteorological Office.
25	To obtain the required frequency(s) for the meteorological radar system and the wind profiler system(s).
26	To set up new assigned IP addresses under the Project in the existing computing equipment in the Specialized Medium Range Forecasting Center (SMRFC).
27	To migrate the PMD's own data to the computing equipment to be procured under the Project, if necessary.
28	To install software(s) procured/to be procured by the PMD on the computing equipment to be procured under the Project, if required.
29	To secure ample and strategically located space/s at the existing facilities for the installation of the equipment (PC terminals and peripherals) to be supplied under the Project.
30	To shift and adjust the existing computing equipment, if required.
31	To shoulder dispatching cost of the trainees to the training sites, such as daily allowance, transportation fee, accommodation, if any.
After the completion of the Project	
32	To renovate the existing gates, boundary walls and exterior lighting in and around the sites, if required.
33	To assign staff necessary for the smooth operation and maintenance of the Equipment.
34	To procure the required spare parts and consumables for the smooth operation and maintenance of the Equipment.
35	To provide adequate maintenance of the Radar Tower Building constructed under the Project, so that they can function effectively.
36	To operate and maintain, and properly and effectively utilize the facilities constructed and the Equipment procured under the Project.
37	To allocate the necessary budget and personnel for appropriate meteorological radar observation and forecasting works.
38	To periodically update all the operation/antivirus/application software.

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Annex-6: New Organization chart of PMD



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Appendix 5. Soft Component Plan

Soft Component Plan

<Background of the Soft Component Plan>

Pakistan is often affected and damaged by various natural disasters such as earthquakes, floods, landslides, cyclones, drought, etc. Most of the natural disasters in Pakistan occur during the monsoon period as a result of the cumulonimbi of the Inter Tropical Convergence Zone or of tropical depressions which bring about torrential rain, hail, strong wind, etc. Natural disasters occurring almost every year cause tremendous damages to Pakistan such as flooding of farms, collapse of houses, cutoff of electric line, landslide, loss of many lives and damage to property as well as adverse impacts on the national economy. In particular, poor people who are extremely vulnerable to natural disasters can be most easily and seriously damaged creating a major obstacle for Poverty Reduction, one of the development strategies of the Government of Pakistan. Moreover, there is a big concern that global climate change will increase the frequency and scale of natural disasters from the medium to long-term and create more adverse impact on Pakistan, one of the natural disaster-prone areas. Thus, in Pakistan, there is a strong need and demand for the improvement of disaster management systems including the early warning system.

The key objective of this Project is to contribute to the effective mitigation of the devastation caused by these natural disasters. To achieve this objective, the Islamabad-existing meteorological radar system will be replaced; the upper-air observation system, weather forecast & development system, meteorological data trunk communication system and GTS message switch system will be installed; and, the Specialized Medium Range Weather Forecasting Center (SMRFC) will be established in the PMD Islamabad Head Office. These aids from the Government of Japan will enable the PMD to: 1) enhance the monitoring capability of hazardous meteorological phenomena; 2) improve the accuracy of short-range weather forecast (within 24-48 hours); 3) develop the capability to handle medium-range weather forecast (over 48 hours); and, 4) strengthen the prompt dissemination capability of forecasts/warnings.

Majority of the PMD's technical staff is proficient in the use of computers and computerized meteorological observation equipment. Unfortunately, none of them have the practical experience in operating a digital meteorological radar system which is planned to be procured under the Project as Islamabad's existing meteorological radar system is of the analog type. In addition, they do not have ample experience and technical knowledge in weather guidance (rainfall, temperature, humidity and wind speed) through the weather forecast & development system to be established in the SMRFC for high accuracy medium range weather forecasts to be prepared through the utilization of the global NWP products made by meteorological agencies in developed countries. For the smooth operation and maintenance of the digital meteorological radar system, for the dissemination of high accuracy medium range weather forecasts to be prepared through weather guidance to the public, and for the assurance of

the required sustainability of the project outcomes, the implementation of the technology transfers in the soft component mentioned below (soft component schedule is indicated in the Implementation Schedule attached hereunder) is required.

<Soft Component Target>

The Soft Component Targets are as follows.

- Inspection, adjustment, minor fault finding, remedy and recovery (replacement of spare parts & consumables, etc.), and major fault countermeasures (report to the Consultant and Manufacturer and collection of technical advice, etc.) to be appropriately carried out by the PMD.
- Prompt and appropriate meteorological radar operation and maintenance utilizing the meteorological Doppler radar system manual summary and the meteorological radar system maintenance & management record book.
- Meteorological radar observation in accordance with the sequence & schedule for Intensity Mode and Doppler Mode in order to appropriately understand weather phenomena and to utilize the observed radar data for forecasting.
- Preparation of individual Weather Forecasting Guidance for each element in consideration of meteorological characteristics for forecasting.

<Soft Component Outputs>

Soft Component Outputs are as follows.

Table: Soft Component Outputs

No.	Item	Output
1	Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery (replacement of spare parts & consumables, etc.), and Major Fault Countermeasures	Acquisition of technical know-how on appropriate inspection, adjustment, minor fault finding, remedy and recovery. 1) Routine maintenance using measuring instruments and tools. 2) Practice of replacing spare parts into the actual system and the subsequent confirmation of system operation. 3) Practice of fault finding, remedy (replacement of spare parts & consumables, etc.) and recovery. Acquisition of know-how on major fault countermeasures (report to the Consultant and Manufacturer and collection of technical advice, etc.).
2	Prompt and Appropriate Meteorological Doppler Radar Operation and Maintenance utilizing the Meteorological Doppler Radar System Manual Summary and the Meteorological Radar System Maintenance & Management Record Book	Technical knowledge acquisition of prompt and appropriate meteorological Doppler radar operation and maintenance utilizing the meteorological Doppler radar system manual summary and the meteorological radar system maintenance & management record book.
3	Meteorological Radar Observation in accordance with the Sequence & Schedule for Intensity Mode and Doppler Mode	Commencement of meteorological radar observation in accordance with the sequence & schedule for Intensity Mode and Doppler Mode in order to appropriately understand weather phenomena and to utilize the observed radar data for forecast operation.
4	Preparation of Weather Forecasting Guidance through the use of the observed data and NWP value	Technical knowledge acquisition on the preparation and operation of individual Weather Forecasting Guidance for each element in consideration of meteorological characteristics for forecasting.

<Means of Verification for Outputs Achievement>

Means of verification for outputs achievement of the Soft Component are as follows.

Table: Soft Component Indicators

No.	Item	Objectively Verifiable Indicators	Means of Verification
1	Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery and Major Fault Countermeasures	Inspection, adjustment, minor fault finding, remedy and recovery, and major fault countermeasures are carried out appropriately by the PMD.	Confirmation of proficiency through 1) routine maintenance using measuring instruments and tools; 2) practice of replacing spare parts into the actual system and the subsequent confirmation of system operation; 3) practice of minor fault finding, remedy and recovery; and 4) major fault countermeasures.
2	Prompt and Appropriate Meteorological Doppler Radar Operation and Maintenance utilizing the Meteorological Radar System Manual Summary and the Meteorological Radar System Maintenance & Management Record Book	Meteorological Doppler radar operation and maintenance utilizing the meteorological radar system manual summary and the meteorological radar system maintenance & management record book are implemented promptly and appropriately.	<ul style="list-style-type: none"> Evaluation of the frequency of usage of the meteorological Doppler radar system manual summary. Confirmation of indication (daily, weekly, monthly) in the meteorological radar system maintenance & management record book.
3	Meteorological Radar Observation in accordance with the Sequence & Schedule for Intensity Mode and Doppler Mode Sequence & Schedule	Meteorological radar observation is implemented according to the radar observation sequence & schedule for Intensity Mode and Doppler Mode.	Confirmation of meteorological radar observation in accordance with the sequence & schedule for Intensity Mode and Doppler Mode in order to appropriately understand weather phenomena and to utilize the observed radar data for forecast operation.
4	Preparation of Weather Forecasting Guidance through the use of the observed data and NWP value	Preparation and Operation of individual Weather Forecasting Guidance for each element in consideration of meteorological characteristics for forecasting.	Confirmation of the improvement of weather forecast accuracy (decrease in RMSE) through the elimination of systematic errors of NWP values as a result of (by) preparation and operation of the Guidance Formula.

<Scheduled Activities of Soft Component>

Scheduled Activities of Soft Component are as follows.

Table: Scheduled Activities of Soft Component

Output	Required Technique and Field	Current Technique and Required Technique Level	Target Group	Means of Implementation	Source of Implementation	Product
1. Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery, and Major Fault Countermeasures	An engineer capable of meteorological radar adjustment and fault finding.	Since technicians in the PMD have no practical experience of adjusting and fault finding in a digital meteorological radar system, it is imperative that the PMD technicians should acquire such capability.	Indicated in the table below	Routine maintenance using measuring instruments and tools.	Expert Consultant on meteorological radar adjustment and fault finding: 1.17 Man-Months. (Period of Technology Transfer in Pakistan: 35days)	Manual on routine maintenance using measuring instruments and tools.
				Practice of replacing spare parts into the actual system and the subsequent confirmation of system operation.		Manual on replacing spare parts into the actual system and the subsequent confirmation of system operation.
				Practice of countermeasure, minor fault finding, remedy and recovery.		Manual on fault finding, remedy and recovery.
				Practice of major fault countermeasures.		Manual on major fault countermeasures.
2. Preparation of Meteorological Doppler Radar System Manual Summary and Meteorological Radar System Maintenance &	An engineer capable of meteorological radar operation and maintenance.	Since technicians in the PMD have no practical experience of operating and maintaining a digital meteorological radar system, it is imperative that the PMD technicians	Indicated in the table below	Discussion with the PMD technicians.	Expert Consultant on meteorological radar operation and maintenance: 1.17 Man-Months (Period of Technology Transfer in Pakistan: 35	Meteorological Doppler radar system manual summary
				Selection of the most important points from the meteorological Doppler radar system manual.		Meteorological radar system maintenance & management record book
				Production of the meteorological Doppler		Date and time of

Management Record Book		should obtain the capability to conduct meteorological radar operation and maintenance utilizing the meteorological Doppler radar system manual summary and the meteorological radar system maintenance & management record book.		<p>radar system manual summary.</p> <p>Production of the meteorological radar system maintenance & management record book.</p> <p>Utilization of the meteorological Doppler radar system manual and the meteorological radar system maintenance & management record book by the PMD technicians.</p>	<p>days)</p> <p>Direct Support</p>	<p>occurrence of system failure/trouble</p> <p>→ Cause/s of system failure/trouble (abnormal noise, part degradation, etc.)</p> <p>→ Repair procedures implemented</p> <p>→ Name and quantity of replaced parts</p> <p>→ Name of engineer/s who perform/s the repair /troubleshooting</p>
3. Preparation of the Sequence & Schedule for Intensity Mode and Doppler Mode	An engineer who can identify Clutter and Blind Area by using radar observation data and prepare a sequence & schedule for meteorological radar observation which is suited to the weather phenomena in Pakistan	Since technicians in the PMD have no practical experience CAPPI observation using a digital meteorological Doppler radar system and has no capability in preparing sequences & schedules for Intensity Mode and Doppler Mode, it is imperative that the PMD technicians should obtain the capability to prepare sequences & schedules for meteorological radar observation with an awareness of its importance.	Indicated in the table below	<p>Discussion with the PMD technicians and lecture.</p> <p>Identification of Clutter of meteorological radar system and Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degree).</p> <p>Preparation of Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degree).</p> <p>Preparation of Sequence & Schedule for Intensity Mode and Doppler Mode.</p> <p>Implementation of radar observation using Sequence & Schedule for Intensity Mode and Doppler Mode.</p>	<p>Expert Consultant on meteorological radar observation: 1.0 Man-Month (Period of Technology Transfer in Pakistan: 30 days)</p> <p>Direct Support</p>	Sequence & Schedule for Intensity Mode and Doppler Mode
4. Preparation of Weather Guidance	An engineer who can prepare NWP and Weather Guidance	Since technicians in the PMD have no practical experience of preparation and operation of the statistical analysis program utilizing the observed data and NWP value, it is imperative that the PMD technicians should acquire the techniques on the preparation and operation of the statistical analysis program.	Indicated in the table below	<p>Discussion and analysis with the PMD technicians on the forecasting elements in order to understand the meteorological characteristics.</p> <p>Lecture on Weather Forecasting Guidance.</p> <p>Preparation of Weather Forecasting Guidance Program (Lecture and Practical Training).</p> <p>Operation and accuracy verification of Weather Forecasting Guidance (Practical Training and Discussion).</p> <p>Examination of accuracy and the need of tuning of Weather Forecasting Guidance.</p>	<p>Expert Consultant on Weather Forecasting Guidance : 0.53 Man-Month (Period of Technology Transfer in Pakistan: 16 days)</p> <p>Direct Support</p>	Weather Forecasting Guidance Program and Accuracy Verification Document

Table: Target Personnel in the PMD for the Technology Transfer in the Soft Component

Technology Transfer of No. 1 & 2		Technology Transfer of No. 3 & 4	
Electronic Technician Section: Position	Number	Forecasting Section: Position	Number
Chief Engineer	1	Meteorologist in Weather Forecasting Center	15
Electronic Engineer	1	Meteorologist in NWP Division	5
Assistant Electronic Engineer	1		
Mechanics	4		
Sub Electronic & Mechanic Engineer	8		
Professional Assistant	2		
Assistant Programmer	1		

Details of each activity schedule are as follows.

Table: Details of the Activity Schedule of the Soft Component

	Activity No. 1	Activity No. 2	Activity No. 3
Date	Meteorological Doppler Radar Inspection, Adjustment, Minor Fault Finding, Remedy and Recovery, and Major Fault Countermeasure	Meteorological Doppler Radar System Manual Summary and Meteorological Radar System Maintenance & Management Record Book	Preparation of Sequence & Schedule for Intensity Mode and Doppler Mode
1	Japan → Islamabad	Japan → Islamabad	Japan → Islamabad
2	Preparatory Work	Preparatory Work	Preparatory Work
3	Preparatory Work at Islamabad Meteorological Radar Tower Building		Discussion with the PMD technicians and lecture.
4			
5	Practice of routine maintenance using measuring instruments and tools.	Discussion with the PMD technicians. Selection of the most important points from meteorological Doppler radar system manual.	Identification of Clutter of meteorological radar system and Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degree).
6	Production of operation and maintenance manual.		
7			
8	Sat.(Holiday)	Sat.(Holiday)	Sat.(Holiday)
9	Sun.(Holiday)	Sun.(Holiday)	Sun.(Holiday)
10	Production of operation and maintenance manual.	Production of meteorological Doppler radar system manual summary (Draft). Production of meteorological radar system maintenance & management record book (Draft).	Preparation of Blind Area at antenna elevation angle (0.5 interval degree, between 1-3 degrees).
11			Preparation of Sequence & Schedule for Intensity Mode and Doppler Mode (Draft).
12	Practice of replacement of spare parts to actual system and confirmation of system operation.		
13	Production of operation and maintenance manual.		Discussion with the PMD technicians.
14			
15	Sat.(Holiday)	Sat.(Holiday)	Sat.(Holiday)
16	Sun.(Holiday)	Sun.(Holiday)	Sun.(Holiday)
17	Production of operation and maintenance manual.	Production of meteorological Doppler radar system manual summary (Draft).	Review of Sequence & Schedule for Intensity Mode and Doppler Mode (Draft).
18		Utilization of the meteorological Doppler radar system manual (Draft) and the meteorological radar system maintenance & management record book (Draft) by the PMD technicians.	Implementation of radar observation using Sequence & Schedule for Intensity Mode and Doppler Mode.
19	Practice of minor fault finding, remedy and recovery.		
20	Production of operation and maintenance manual.		
21			
22	Sat.(Holiday)	Sat.(Holiday)	Sat.(Holiday)
23	Sun.(Holiday)	Sun.(Holiday)	Sun.(Holiday)
24	Production of operation and maintenance manual.	Review of the Meteorological Doppler radar system manual summary (Draft) and the Meteorological radar system maintenance & management record book (Draft).	Completion of Radar observation using Sequence & Schedule for Intensity Mode and Doppler Mode.
25		Utilization of the meteorological Doppler radar system manual and the meteorological radar system maintenance & management record book by the PMD technicians.	Production of Soft Component Completion Report.
26	Practice of major fault countermeasure		
27	Review of training by the PMD.		
28	Production of operation and maintenance manual.		Technical discussion with the PMD.
29	Sat.(Holiday)	Sat.(Holiday)	Departure from Islamabad
30	Sun.(Holiday)	Sun.(Holiday)	Arrival in Japan
31	Production of Soft Component	Production of Soft Component	
32	Completion Report.	Completion Report.	
33	Technical discussion with the PMD	Technical discussion with the PMD	

34	Departure from Islamabad	Departure from Islamabad
35	Arrival in Japan	Arrival in Japan

Activity No. 4	
Date	Preparation of Weather Forecasting Guidance
1	Japan → Islamabad
2	Preparatory Work
3	Study for Features of Local Observed Data
4	Training on Weather Forecasting Guidance (theory)
5	Training on Weather Forecasting Guidance (practical training)
6	Selection of Weather Forecasting Guidance to be used
7	Preparation of Weather Forecasting Guidance Formula
8	Sat.(Holiday)
9	Sun.(Holiday)
10	Trial operation of the Guidance
11	Trial operation of the Guidance
12	Accuracy verification and result report
13	Production of Soft Component Completion Report
14	Production of Soft Component Completion Report.
15	Departure from Islamabad
16	Arrival in Japan

<Procurement Method of Soft Component Implementation Resources>

Implementation Resources are procured based on the direct support of Japanese consultants who are in charge of equipment procurement for the Project. The reasons are presented below.

- Personnel with advanced technique and knowledge of weather services and meteorological radar system is necessary.
- Personnel as indicated above usually belongs to weather organizations which actually conduct weather services.
- Personnel who has similar experience to the proposed technology transfer is required.

<Implementation Schedule>

The implementation schedule of the whole Project and soft component is indicated in the following table. The soft component is planned to be implemented during the adjustment stage after the installation of the meteorological radar system and before the completion of the Project.

Table: Implementation Schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32			
Construction of Islamabad Meteorological Radar Tower Building	Total: 17.0 months																																		
Preparation Work	■																																		
Temporary/Piling/Earth Works	■	■	■	■	■																														
Structure Work						■	■	■	■	■	■	■	■	■	■	■	■	■																	
Finishing Works																																			
Building Equipment																																			
External Work																																			
Equipment Procurement	Total: 18.0 months																																		
Equipment Manufacturing																																			
Equipment Transportation																																			
Equipment Installation/Adjustment																																			
Soft Component																																			
Soft Component (Activity No. 1)																																		1.17 MM	■
Soft Component (Activity No. 2)																																		1.17 MM	■
Soft Component (Activity No. 3)																																		1.00 MM	■
Soft Component (Activity No. 4)																																		0.33 MM	■

<Soft Component Product>

Soft Component Products are as follows.

Table: Soft Component Products in Technology Transfer

Product Name	Submission Time	No. of Pages	
Implementation report on 1) routine maintenance using measuring instruments and tools, 2) practice of replacing spare parts into the actual system and the subsequent confirmation of system operation, 3) practice of minor fault finding, remedy and recovery, and 4) major fault countermeasure.	After Technology Transfer	20	
Meteorological Doppler radar system manual summary		30	
Meteorological radar system maintenance and management record book		10	
Radar observation sequence & schedule for Intensity Mode and Doppler Mode		10	
Weather Forecasting Guidance Program, Accuracy Verification Document		10	
Output Name	Content	Submission Time	No. of Pages
Soft Component Completion Report	<ul style="list-style-type: none"> Scheduled Activities and Actual Achievement Scheduled Outputs and Achievement Factors which influence Achievement of Outputs Recommendation Outputs 	Completion of Soft Component	50

<Obligations of the Recipient Country>

Obligations of the PMD for the implementation of Soft Component are as follows.

- 1) Manpower Development
 - a) Continuous recruitment of human resources for the next generation.
 - b) Development of more qualified technical personnel through training and other related manpower development programs.
- 2) Longer Life Span of the Equipment procured and the Radar Tower Building constructed under the Project

- a) Regularly secure the necessary budget for the efficient operation and maintenance of the systems and building equipment, and the procurement of requisite spare parts and consumables for all the equipment to be supplied under the Project.
- b) Ensure protection of the building, equipment and facilities against theft and vandalism.

The PMD will be able to implement the above obligations through its organizational and personnel capabilities. Most especially, the “continuous recruitment of human resources for the next generation” is of vital concern. It is imperative for the PMD to become self-reliant in technical areas such as the operation and maintenance of radar systems. Hence, it is essential that it puts forth continued efforts to recruit and fill vacancies, thereby, promoting technology transfer across all staff levels, from the assistant personnel to the engineer(s). The PMD fully recognizes the need to strengthen its technical section/s.

Appendix 6. References

No	Name of References	Original/Copy/ Digital File	Publisher	Data of Publication
1	National Climate Change Policy	Digital File	Ministry of Climate Change	2012
2	Pakistan Climate Change Action Plan	Digital File	Ministry of Climate Change United Nations Pakistan	2011
3	High Performance Computing Cluster (HPCC) Facility	Digital File	Research & Development Division, Pakistan Meteorological Department	2012
4	Pakistan Map	Original	Nelles Map	2009
5	Islamabad Street Map	Original	Saeed Book Bank	-