

【APPENDICES】

1. Member List of the Study Team.....	A-1
2. Study Schedule	A-2
3. List of Parties Concerned in the Recipient Country.....	A-3
4. Minutes of Discussions	A-4
5. Soft Component Plan	A-5
6. Field Report	A-6
7. Technical Memorandum	A-7

1. Member List of the Study Team

(1) First Field Survey

Name	Responsible Work Area	Current Position
Masashi NAKAZONO	Team Leader	Japan International Cooperation Agency
Chiyoko MIYATA	Planning Management	Japan International Cooperation Agency
Kazunari NOGAMI	Chief Consultant / Solar Power System / Grid-connected Photovoltaic System	Yachiyo Engineering Co., Ltd.
Toshio YANO	Deputy Chief Consultant / Civil Design	Yachiyo Engineering Co., Ltd.
Kazuaki KONDO	Electrical Equipment Planning / Environmental and Social Considerations	Yachiyo Engineering Co., Ltd.
Yota KIKUCHI	Procurement and Installation Plan / Cost Estimation	Yachiyo Engineering Co., Ltd.
Koji KUMAKURA	Architectural Design / Cost Estimation	Yachiyo Engineering Co., Ltd.

(6) Second Field Survey

Name	Responsible Work Area	Current Position
Masashi NAKAZONO	Team Leader	Japan International Cooperation Agency
Chiyoko MIYATA	Planning Management	Japan International Cooperation Agency
Kazunari NOGAMI	Chief Consultant / Solar Power System / Grid-connected Photovoltaic System	Yachiyo Engineering Co., Ltd.
Toshio YANO	Deputy Chief Consultant / Civil Design	Yachiyo Engineering Co., Ltd.
Kazuaki KONDO	Electrical Equipment Planning / Environmental and Social Considerations	Yachiyo Engineering Co., Ltd.

2. Study Schedule

(1) First Field Survey

No.	Date	Day	Contents of Field Survey			Stay at	
			Official Members	Consultant Members			
			Mr. Nakazono, Ms. Miyata	A Group	B Group		C Group
1	14-Sep	Sat		<ul style="list-style-type: none"> • Trip {Tokyo 00:40 → Paris, CDG (France) 6:20 by JL- 041} • Trip {Paris, CDG (France) 11:10 → Abuja (Nigeria) 16:05 by AF- 514} 			Abuja
2	15-Sep	Sun	<ul style="list-style-type: none"> • Trip {Tokyo → Paris} • Trip {Paris → Abuja} 	<ul style="list-style-type: none"> • Internal meeting to confirm plan and output for survey 			ditto
3	16-Sep	Mon	<ul style="list-style-type: none"> • Courtesy Call and discussion on the Inception Report at JICA Nigeria Office • Explanation of the Inception Report and the discussions on the component of the Project (FMOP) • Explanation of the Inception Report and the discussions on the component of the Project (FCT Administration) 			Discussion on the component of the Project	ditto
4	17-Sep	Tue	<ul style="list-style-type: none"> • Explanation of the Inception Report and the discussions on the component of the Project (Federal Capital Territory Water Board • Site survey (Usuman Dam Water Treatment Station) 				ditto
5	18-Sep	Wed	<ul style="list-style-type: none"> • Confirmation of the component of the Project Discussion on the Minutes of Meetings 	<ul style="list-style-type: none"> • Site survey (present condition of existing institution) 	<ul style="list-style-type: none"> • Market survey • Data analysis (Structural calculation) 		ditto
6	19-Sep	Thu	<ul style="list-style-type: none"> • Discussion and signing of the Minutes of Meetings, report to JICA Nigeria Office and EOJ Trip {Abuja→Paris} [Mr. Nakazono, Ms. Miyata] 	<ul style="list-style-type: none"> • Site survey (present condition of existing institution) 	<ul style="list-style-type: none"> • Data analysis (Structural calculation) 		ditto
7	20-Sep	Fri	<ul style="list-style-type: none"> • Trip {Paris→Tokyo} 	<ul style="list-style-type: none"> • Site survey (Confirmation of array arrangement, location of the building for electrical equipment, and storage area during the project implementation) 			ditto
8	21-Sep	Sat	<ul style="list-style-type: none"> • Trip {→ Tokyo} 	<ul style="list-style-type: none"> • Site survey (Operation record of existing electrical equipment) • Internal meeting and data sorting for the component of the Project 			ditto
9	22-Sep	Sun		<ul style="list-style-type: none"> • Internal meeting and data sorting for the outline design survey 			ditto

Continue

	Date	Day	A Group		B Group			Stay at
			Mr. Nogami, Mr. Kondo, Mr. Kikuchi		Mr. Yano, Mr. Kumakura			
10	23-Sep	Mon	<ul style="list-style-type: none"> • Analysis of the interconnection method • Preparation for the Field Report 		<ul style="list-style-type: none"> • Site survey (Foundation of mounting structure, analysis of the array arrangement between No.3 and No.4 tanks) 		Outline Design	Abuja
11	24-Sep	Tue	<ul style="list-style-type: none"> • Discussion with FCTWB on the Outline Design (Draft) (Interconnection method, array arrangement) 		<ul style="list-style-type: none"> • Evaluation of construction • Preparation for the Field Report 			ditto
12	25-Sep	Wed	<ul style="list-style-type: none"> • Site survey (Interconnection method) • Preparation for the Field Report 		<ul style="list-style-type: none"> • Evaluation of construction • Preparation for the Field Report 			ditto
13	26-Sep	Thu	<ul style="list-style-type: none"> • Preparation for the Field Report 					ditto
14	27-Sep	Fri	<ul style="list-style-type: none"> • Discussions and signature on the Field Survey Report with FCTWB and UDWPP 					ditto
15	28-Sep	Sat	<ul style="list-style-type: none"> • Internal meeting and data sorting 					ditto
16	29-Sep	Sun	Ditto					ditto

Continue

	Date	Day	Mr. Nogami	Mr. Kikuchi	Mr. Kondo	Mr. Yano	Mr. Kumakura		Stay at
			<ul style="list-style-type: none"> • Preparation for the Field Survey Report • Discussion on the cost estimation (EOJ) 				<ul style="list-style-type: none"> • Discussion with FMOP on the EIA 		
18	1-Oct	Tue	<ul style="list-style-type: none"> • Preparation for the Field Survey Report 				ditto		
19	2-Oct	Wed	<ul style="list-style-type: none"> • Site survey (Confirmation of terminal points with the existing equipment and facilities) • Preparation for the draft technical memorandum 		<ul style="list-style-type: none"> • Discussion with FMOP on the EIA process 	<ul style="list-style-type: none"> • Technical discussion with the Energy Commission of 	<ul style="list-style-type: none"> • Arrangement of soil survey 	ditto	

No.	Date	Day	Contents	Location	Remarks				
20	3-Oct	Thu	• Site survey (Data confirmation and confirmation of existing facilities)	Nigeria	ditto				
21	4-Oct	Fri	• Discussions and signature on the Technical Memorandum with FCTWB	• Technical discussion with FMOP	• Preparation for the soil survey				
22	5-Oct	Sat	• Preparation of the Field Survey Report			ditto			
23	6-Oct	Sun	Ditto			ditto			
24	7-Oct	Mon	• Preparation of the Field Survey Report	• Technical discussion with FMOP	• Site survey (confirmation of the existing SCADA system)	• Technical discussion with NPC	• Site survey (Supervision of the soil survey)	Preparation of the Report and reporting	ditto
25	8-Oct	Tue	• Report (FMOP, FCTWB) • Report (EOJ) [Mr. Nogami, Mr. Yano]			ditto			
26	9-Oct	Wed	• Preparation of the Field Survey Report • Technical discussion with FMOP [Kikuchi, Kondo] • Trip {Abuja (Nigeria) 23:15→Paris, CDG (France) 6:10+1 by AF-513}			ditto			
27	10-Oct	Thu	• Trip {→Paris, CDG (France) 6:10 by AF-513} • Trip {Paris, CDG (France) 11:30→Tokyo 6:30+1 by JL-042}			On board			
28	11-Oct	Fri	• Trip {→Tokyo 6:30 by JL-042}						

(2) Second Field Survey

No.	Date	Day	Contents of Field Survey		Stay at
			Official Members	Consultant Members	
			Mr. Nakazono, Ms. Miyata	Mr. Nogami, Mr. Yano, Mr. Kondo	
1	1-Mar	Sat		• Trip {Tokyo 01:30→Paris, CDG (France)06:20} • Trip {Paris, CDG (France)11:00→Abuja (Nigeria)16:55}	Abuja
2	2-Mar	Sun	• Trip {Tokyo 01:30→Paris, CDG (France)06:20} • Trip {Paris, CDG (France)11:00→Abuja (Nigeria)16:55}	• Internal meeting	Abuja
3	3-Mar	Mon	• 8:30 Courtesy call and explanation of the draft Final Report (JICA Nigeria Office) • 10:00 Explanation of the draft Final Report (FMOP) • 13:00 Explanation of the draft Final Report (FCTWB) • 15:00 Explanation of the draft Final Report (FCTA)		Abuja
4	4-Mar	Tue	• 10:00 Site Survey (Lower Usuma Dam Water Treatment Plant) • 12:00 Internal meeting • 15:00 Technical discussion (Abuja Electricity Distribution Company)		Abuja
5	5-Mar	Wed	• 10:00 Discussion and modification of the M/D (FMOP and FCTWB) • 12:30 Technical meeting (FMOP) • 14:30 Internal meeting (M/D) • 17:00 Technical meeting (FCTWB)		Abuja
6	6-Mar	Thu	• 11:00 Sign of the M/D (FMOP) • 14:00 Report (JICA Nigeria Office) • Trip {Abuja (Nigeria)23:55 →Paris, CDG (France)05 :50+1} [Mr. Nakazono, Ms. Miyata]		Abuja/On board
7	7-Mar	Fri	• Trip {→Paris, CDG (France)11:00→Tokyo 06:55+1}	• Report (Federal Ministry of Power) • Report (JICA Nigeria Office, and Embassy of Japan in Nigeria) • Trip {Abuja (Nigeria) 23:55 →Paris, CDG (France)05:50+1}	On board
8	8-Mar	Sat	• Trip {→Tokyo 06:55}	• Trip {→Paris, CDG (France)11:00→Tokyo 06:55+1} [Mr. Nogami, Mr. Yano]	On board
9	9-Mar	Sun	• Trip {→Tokyo 06:55} [Mr. Nogami, Mr. Yano]		

3. List of Parties Concerned in the Recipient Country

<u>Affiliation and Name</u>	<u>Position</u>
National Planning Commission	
Mr. R. O. Ibraheem	Acting Director, Economic Growth Department
Energy Commission of Nigeria	
Prof. Eli Jidere Bala	Director General / CEO
Engr. Okon N. Ekpenyong	Deputy Director
Federal Ministry of Finance	
Mrs. Apeji	Deputy Director of Revenue (oil & gas)
Mr. Omata	Assistant Director of Revenue (non-oil)
Federal Ministry of Power	
Engr. A. Adebisi	Director
Engr. P. O. Ewesor	Deputy Director
Engr. Faruk Yusuf Yabo	Assistant Director
Engr. A. D. Abubakar	Assistant Director
Engr. Anthony E. Umuenyem	Assistant Director
Engr. E. E. Ezeeputo	Assistant Director
Engr. Babalola Olurin	Electrical Engineer
Engr. T. O. Dina	Senior Electrical Engineer
Federal Ministry of Environment	
Mr. K. B. Odusanya	Acting Director
Mr. J. A. Alonge	Deputy Director
Mr. F. F. Odika	Chief Environment Scientist
Federal Capital Territory Administration	
Mr. Ari Isa Mohammad	Director, Economic Planning Research & Statistics Department
Mr. Muhammad Lawal Abubakar	FCT Co-ordinator
Mr. Haruna S. Koku	Economic Planning Research & Statistics Department
Mr. Amina Usman	Economic Planning Research & Statistics Department

Engr. B. O. Solomm	Engineer
Engr. M. E. Mohammed	Engineer (FCDA)
Mr. Lawal Astafa	Assistant Director (Economic Planning)
Mr. Asmau Ashata	Account Officer

Federal Capital Territory Water Board

Engr. J. B. Anto	Director
Mr. M. O. Adebayo	Head, Quality Control
Mr. Hudu Bello	Head, Commerce
Mr. S. T. Bello	Head, Administration & Supplies
Engr. Ahmed A. Nahuche	Head, Distribution
Dr. M. A. Dan-Hassan	Head, Rural Water Supply and Sanitation
Mrs. Hafsat Ahmed	Head, Finance and Account
Engr. U. A. Aliyu	Head, Reservoir & Production
Mrs. Hamzat R. T.	Head, Internal Audit
Mrs. Janet A. Peni	Head, Public Relations
Engr. M. O. Adebato	Head, Quality Control
Engr. Olufemi Oyekenu	Plant Manager
Engr. Oyekenu O.	Plant Manager (No.1 & No.2)
Engr. R. A. Bello	Plant Manager (No.3 & No.4)
Engr. Julius Afolabi	Head, Mechanical & Electrical
Mr. Billy Oboigbe	Asst Head, Finance & Accounts
Engr. K. M. Kabi	Water Engineer
Engr. A. R. Lawal	Head, Projects
Engr. Amos Babus	Head (Booster Station)
Engr. Victor Wenegiene	Senior Engineer (Electrical)

Federal Capital Territory Abuja Environmental Protection Board

Ms. Jokotola Akwni	Assistant Director Environmental Monitoring Planning Research & Statistic Department
Mr. Abdullahi Yahaya	HOU (Environmental Assessment)
Engr. Alaya T. N.	Assistant Director (PRS)
Engr. Zainab Umar	Assistant Director (Environmental Conservation)

Abuja Electricity Distribution Company

Mr. Neil F Croucher	Chief Executive Officer
Mr. Joe Chiyassa	Executive Director Technical Services

Mr. Joshua E. Michael
Mr. Emmanuel Sampa Katepa
Ms. Clara Musama

Planning & Construction, KANN Abuja
Business Development (CEC Africa)
Business Development (CEC Africa)

Power Holding Company of Nigeria

Engr. A. M. Bala

Staff assigned to Lower Usuma Dam Water
Treatment Plant

JICA Nigeria Office

Mr. Tetsuo Seki
Mr. Masato Mikamo
Mr. Agidani Gabriel O.

Office Manager
Staff member
Consultant

Embassy of Japan in Nigeria

Mr. Tsuyoshi Hagino
Mr. Kazuhito Kibana
Mr. Keiji Aoki
Ms. Mariko Chiba

First Secretary
First Secretary
First Secretary
Researcher

**Minutes of Discussions
on the Preparatory Survey
on the Project for Introduction of Clean Energy by Solar Electricity Generation System
in the Federal Republic of Nigeria**

The Government of Japan (hereinafter referred to as "GoJ") has established Cool Earth Partnership as a new financial mechanism. Through this, GoJ is cooperating actively with developing countries' efforts to reduce greenhouse gasses emissions, such as efforts to promote clean energy. A new scheme of grant aid, "Program Grant Aid for Environment and Climate Change", was also created by GoJ as a component of this financial mechanism. According to the initiative of Cool Earth Partnership, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), in consultation with GoJ, decided to conduct a Preparatory Survey (hereinafter referred to as "the Survey") on the Project for Introduction of Clean Energy by Solar Electricity Generation System (hereinafter referred to as "the Project").

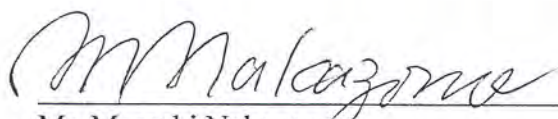
JICA sent to the Federal Republic of Nigeria (hereinafter referred to as "Nigeria") the Preparatory Survey Team (hereinafter referred to as "the Team"), headed by Mr. Masashi Nakazono, Executive Technical Advisor to Director General, Industrial Development and Public Policy Department, JICA Headquarter, and is scheduled to stay in Nigeria from September 15th to October 9th, 2013.

The Team held discussions with the concerned officials of the Government of Nigeria and conducted a field survey.

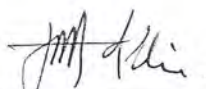
In the course of discussions and field survey, both sides confirmed the main items described in the attached sheets.

Abuja

September 19, 2013



Mr. Masashi Nakazono
Leader
Preparatory Survey Team
Japan International Cooperation Agency



Engr. A. Adebisi
Acting Director
Electrical Inspectorate and Services Department
Federal Ministry of Power



Engr. J. B. Anto
Director
Federal Capital Territory Water Board

ATTACHMENT

1. Current Situation

The Government of Nigeria recognizes the renewable energy could play a more important role in terms of enabling to meet their energy requirement. In the National Energy Policy, established in 2003, it states that the Solar Photovoltaic (PV) is one of the alternative technologies with high potential for promotion of the use of renewable energy, diversification of energy source and saving the utilization of natural resources in Nigeria

In this situation, both sides confirm that the Project, which introduces photovoltaic (PV) power generation systems connected with the national power grid, is one of the pilot systems to enhance the possibility of applying renewable energy.

2. Objective of the Project

The objective of the Project is to promote clean energy utilization and achieve reduction of greenhouse effect gas emissions by installing the photovoltaic system to be connected to the national grid.

3. Project Implementation Structure

The responsible and implementing organization of the Project is the Federal Ministry of Power, Electrical Inspectorate Services Department (FMOP). The organization which is responsible for operation and maintenance of PV system (including relevant facilities and equipment) installed by the Project is the Federal Capital Territory Water Board (FCTWB), which is the direct beneficiary of the Project as well. (The organization charts of FMOP and FCTWB are shown in Annex-1.)

FMOP agreed to support operation and maintenance activities of FCTWB for the PV system of the Project by arranging technical assistance from the power distribution company managing the area where the Lower Usuma Dam Water Treatment Plant is located in accordance with necessity.

FMOP also agreed to arrange and attend the meeting for interconnection of the PV system of the Project to the commercial grid between FMOP, FCTWB, the Team and the power distribution company managing the area where Lower Usuma Dam Water Treatment Plant is located.

4. Items Requested by Nigerian Side

4-1. The Exchange of Note (E/N) and Grant Agreement (G/A) for the Project were already concluded in 2012 between the Nigerian side and Japanese side. According to the E/N and G/A, the grant amount is nine hundred and eighty million Japanese Yen (¥980,000,000). After discussions with the Team considering this, the installation of the on-grid power generating system using PV without power storage system including following equipment was requested by the Nigerian side. However, the Nigerian side and the Team confirmed that the capacity of PV arrays of the Project might be changed as the result of detail analysis in Japan including system design and cost estimation based on the data and information collected in the first field survey in Nigeria.




Table 1 Projects requested by Nigerian Government

	Description
Location	Lower Usuma Dam Water Treatment Plant
Outline	The power produced is used for the Lower Usuma Dam Water Treatment Plant
Requested component	(1) Solar photovoltaic arrays (Crystalline Silicon Type: total capacity might be 800 to 900 kWp) (2) Mounting structures and foundations for photovoltaic arrays of 800 to 900 kWp (3) Junction box and collecting box (4) Power Conditioner (5) Display system (6) Data management system (7) Other relevant component for photovoltaic array such as switchgears cables and fitting materials (8) Spare parts (9) Test equipment (10) Training for operation and maintenance of PV system (11) One building for the electrical equipment (Approx. 50 to 75 m ²)

4-2. The project site is as shown in Annex-2.

4-3. The Nigerian side explained that there is no duplication between requested contents of the Project and any other plans implemented by the other donors or the Nigerian side.

4-4. The Team will report the findings and items requested by the Nigerian side to JICA Headquarters and the Government of Japan.

5. Japan's Program Grant Aid for Environment and Climate Change

The Nigerian side understood the Japan's Program Grant Aid for Environment and Climate Change scheme explained by the Team, (as described in Annex-3, 4, 5, 6 and 7).

6. Schedule of the Study

6-1. The Team will proceed to further survey in Nigeria until October 9th 2013 as the Preparatory Survey.

6-2. After the completion of the Preparatory Survey, the Team will report the results to Nigerian side, JICA Headquarters and GoJ.

6-3. JICA will prepare the draft report and reference document in English and dispatch a mission to Nigeria in order to explain their contents in the middle of February 2014.

6-4. When the contents of the report and reference document are accepted in principle by the Government of Nigeria, JICA will complete the final report and reference document, and submit them to the Government of Nigeria and to the Procurement Agent by the end of March, 2014.

7. Other Relevant Issues

7-1 Permission of Land Acquisition / Usage

FMOP, FCTWB and the Team agreed that the PV arrays of the Project will be located on the top surface of No.3 and No.4 Reservoirs at the Lower Usuma Dam Water Treatment Plant (approximately 8,250m²) as per attached in Annex-8. FMOP, FCTWB and the Team also agreed that the building for the electrical equipment of the Project will be located near the PV arrays of the Project as per attached in Annex-8.

In addition, the Team explained that an area for temporary use such as temporary office, stockyard, workshop, etc., is also necessary to be secured during installation work of the equipment and materials (approximately 2,500m²).

Also, FCTWB agreed to permit the usage of above mentioned land and facilities for installation of the equipment.

7-2 Procurement of Equipment

The Team explained that, in accordance with the policy of Government of Japan, products of Japan shall be procured for major equipment in the Project. The Nigerian side agreed with the policy of Government of Japan and requested that major equipment and materials shall be made in Japan.

7-3 Basic concept of PV system design

The Team explained and FMOP and FCTWB agreed that the proposed system has the function of the detection of islanding operation during the power outage of national grid and during the operation of private generators. Through this function, the system will suspend its operation during the above-mentioned durations.

The system is composed of the followings.

- Photovoltaic System of 800 to 900 kWp composed of crystalline silicon cells
- Mounting structures and foundations for photovoltaic arrays installed on the top surface of No.3 and No.4 Water Reservoirs
- Electrical equipment for interconnection

- One-story building for the electrical equipment of the Project (Approx. 50~75 m²)

7-4 Coordination with Relevant Organizations

The responsible Organization for the Project shall be the focal point for the Team, and responsible for the coordination with relevant organizations.

The Nigerian side agreed to establish a consultative committee in order to coordinate with the Japanese side which consists of the JICA office and the procurement agency. Terms of Reference of the Consultative Committee is referred to Annex-9.

7-5 Environmental and Social Considerations

The Team explained the outline of JICA Environmental and Social Considerations Guideline (hereinafter referred to as “the JICA Guideline”) to the Nigerian side. The Nigerian side agreed to take the JICA Guideline into consideration, and shall complete the necessary procedures.

7-6 Operation and Maintenance

The operation and maintenance organization, FCTWB agreed to secure and allocate the necessary budget and personnel for the operation and maintenance of the PV system of the Project including cleaning of the PV arrays. FMOP, FCTWB and the Team agreed that the benefit obtained from reduced expenditure for electricity charge shall be reverted to FCTWB and FCTWB shall allocate it to the budget for the operation and maintenance of the PV system of the Project.

7-7 Customs and Tax exemption

The Nigerian side agreed that the Nigerian side shall be responsible for the exemption and/or reimbursement (payment/assumption) of all customs, tax, levies and duties incurred in Nigeria for implementation of the Project.

The responsible organization, FMOP agreed to manage procedures for custom clearance and tax exemption for smooth progress of the Project without delay with making a positive approach to related organizations such as the Federal Ministry of Finance.

FMOP also agreed to arrange and attend the meeting for custom clearance and tax exemption of the Project between FMOP, the Team and related organizations.

7-8 The Nigerian side shall ensure the security of all concerned Japanese nationals working for the Project, if deemed necessary.

7-9 The Nigerian side shall provide necessary numbers of counterpart personnel to the Team during the period of their studies in Nigeria

7-10 The Nigerian side shall submit all the answers to the Questionnaire, which the Team handed to the Nigerian side, by September 30th 2013.

7-11 The Nigerian side shall submit the technical documents and drawing required for the Outline Design to the Team, especially such as related technical documents and drawings of No.3 and No.4 Reservoir.

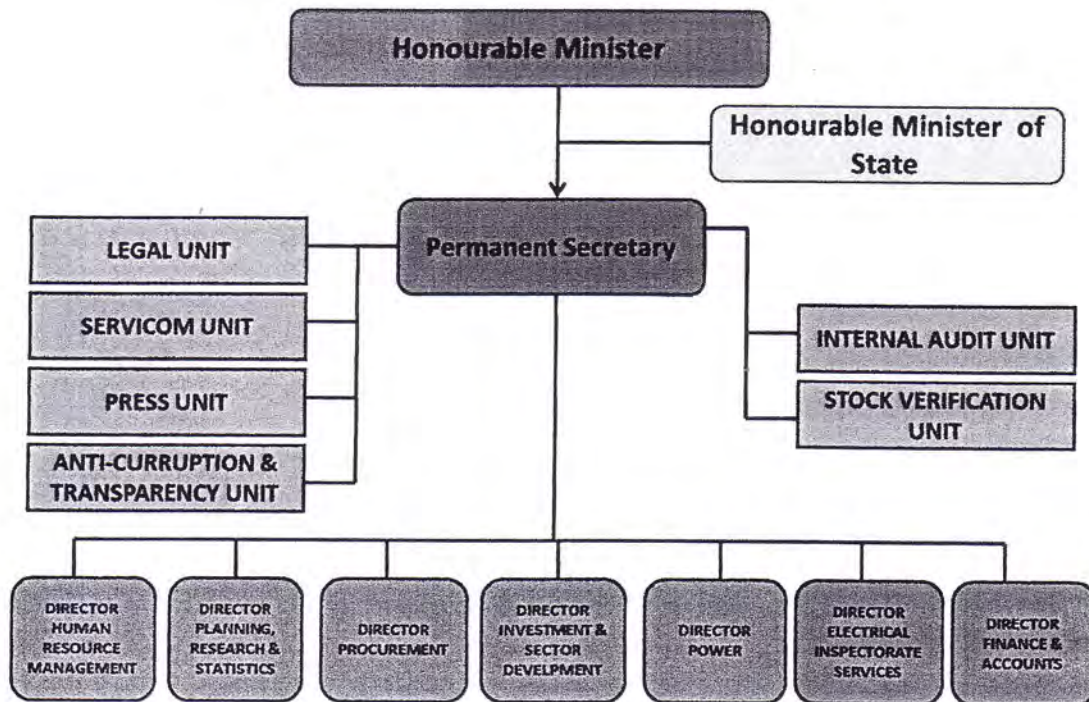
The responsible organization, FMOP agreed to obtain such technical documents and drawing from the Lower Usuma Dam Water Treatment Plant, FCTWB immediately in accordance with the requests from the Team. The responsible organization, FMOP also agreed to obtain approval on the Outline Design planned by FMOP and the Team, including the field report of the first field survey, from the Lower Usuma Dam Water Treatment Plant, FCTWB immediately in accordance with the requests from the Team.

<List of Annex>

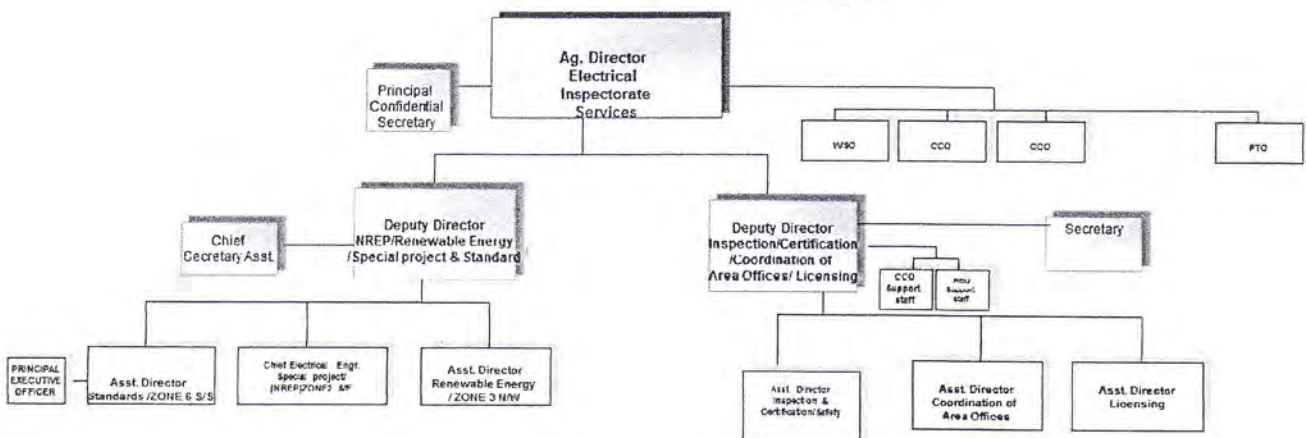
- Annex-1 Organization Chart of Responsible and Implementing Organization of the Project
Organization Chart of Operation and Maintenance Organization of PV system
- Annex-2 Location of Project Site
- Annex-3 Program Grant Aid for Environment and Climate Change
- Annex-4 General Flow of Program Grant Aid for Environment and Climate Change
- Annex-5 Flow of Funds for Project Implementation
- Annex-6 Project Implementation System
- Annex-7 Major Undertakings to be taken by Each Government
- Annex-8 Layout of Photovoltaic System at the Lower Usuma Dam Water Treatment Plant
- Annex-9 Terms of References of the Consultative Committee

**Organization Chart of Responsible and Implementing Organization
Federal Ministry of Power**

CURRENT ORGANIZATIONAL STRUCTURE OF THE MINISTRY

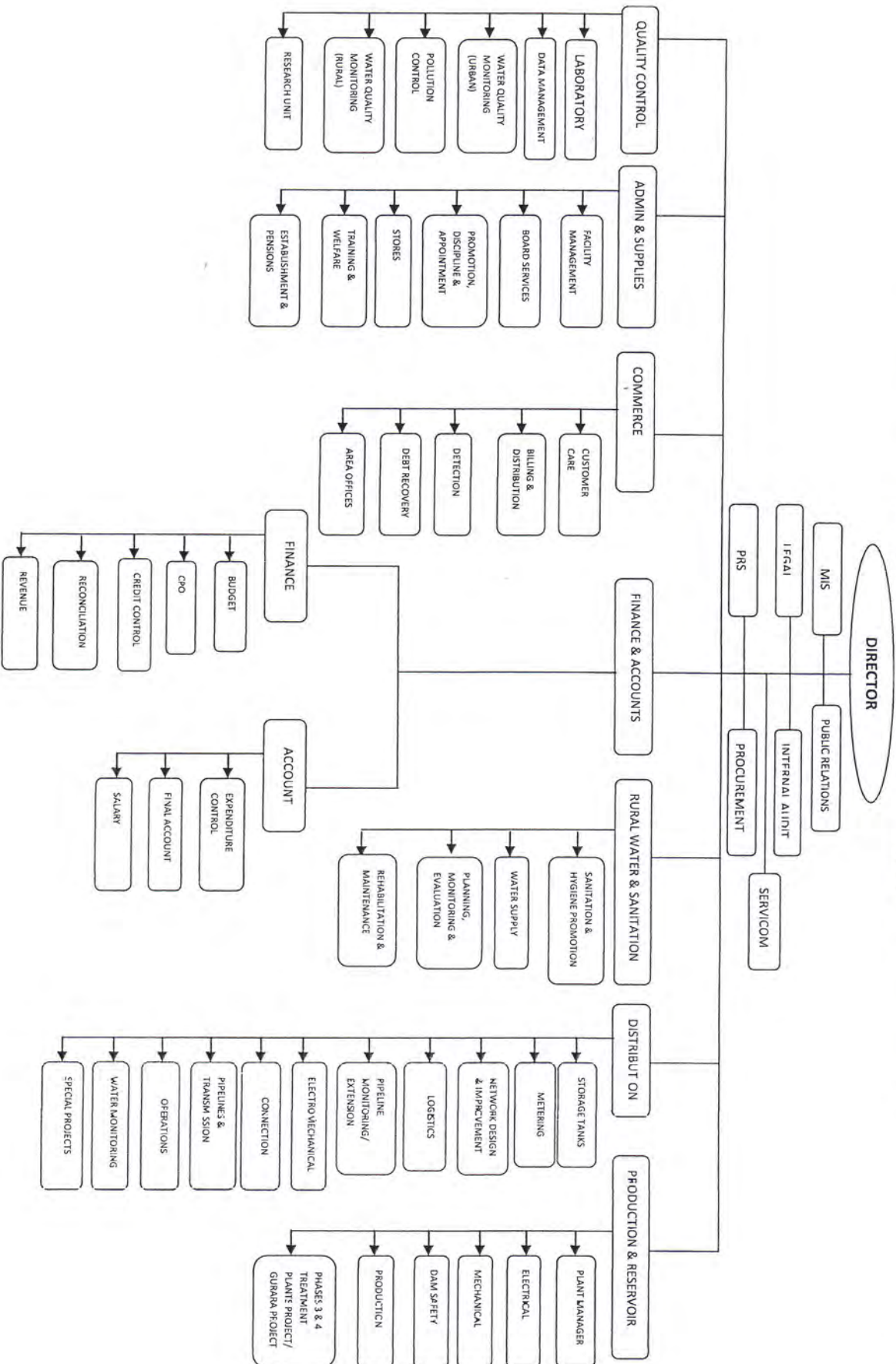


**ELECTRICAL INSPECTORATE SERVICES DEPARTMENT
FEDERAL MINISTRY OF POWER
Current Department Organogram**



[Handwritten signatures and initials]

Organization Chart of Operation and Maintenance Organization of PV system Federal Capital Territory Water Board



[Handwritten signatures and initials]

**Program Grant Aid for Environment and Climate Change
of the Government of Japan**

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

Based on “Cool Earth Partnership” initiative of the Government of Japan, the Program Grant Aid for Environment and Climate Change (hereafter referred to as “GAEC”) aims to mitigate effects of global warming by reducing GHGs emission (mitigation; e.g. improvement of energy efficiency) and to take adaptive measures (adaptation; e.g. measures against disasters related to climate change, including disaster prevention such as enhancing disaster risk management). GAEC may contain multiple components that can be combined to effectively meet these needs.

1. Procedures for GAEC

GAEC is executed through the following procedures.

Preparatory Survey 1	Preparatory Survey for project identification conducted by Japan International Cooperation Agency (JICA)
Application	Request made by a recipient country
Appraisal & Approval	Appraisal by the Government of Japan and Approval by the Cabinet
Determination of Implementation	The Notes exchanged between the Government of Japan and the Recipient Country
Grant Agreement (hereinafter referred to as the “G/A”)	Agreement concluded between JICA and the Recipient
Preparatory Survey 2	Preparatory Survey for design conducted by JICA
Implementation	Procurement through the Procurement Agency by the Recipient

Firstly, if the candidate project for a GAEC is identified by the Recipient and the Government of Japan, the Government of Japan (the Ministry of Foreign Affairs) examines it whether it is eligible for GAEC. When the request is deemed appropriate, JICA, in consultation with the Government of Japan, conducts the Preparatory Survey (hereafter referred to as “the Survey”) on the candidate project as Phase 1 of the Survey with Japanese consulting firms.

Secondly, the Recipient submits the official request to the Government of Japan, while the appropriateness, necessity and the basic components of the project are examined in the course of Phase 1 of the Survey,

Thirdly, the Government of Japan appraises the project to see whether it is suitable for Japan's GAEC, based on the Survey report prepared by JICA, and the results are then submitted to the Cabinet for approval.

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

Fifthly, JICA engages Grant Agreement (G/A) with the Recipient and executes the Grant by making payments of the amount agreed in the E/N and strictly monitors that the funds of the Grant are properly and effectively used.

Procurement Management Agent is designated to conduct the procurement services of products and services (including fund management, preparing tenders, contracts) for GAEC on behalf of the Recipient. The Agent is an impartial and specialized organization that will render services according to the Employment Contract with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the Agreed Minutes ("A/M").

2 Preparatory Survey

1) Contents of the Survey

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

- Confirmation of background, objectives, and benefits of the Project and institutional capacity of agencies and communities concerned of the Recipient necessary for project implementation.
- Evaluation of relevance of the Project to be implemented under the Grant Aid Scheme for Environment and Climate Change from a technical, social, and economic point of view.
- Confirmation of items agreed upon by both parties concerning the basic concept of the Project.
- Preparation of the design of the Project and reference document for tender.
- Estimation of cost for the Project.

The contents of the original request will be modified, as found necessary, in the design of the Project according to the guidelines of Japan's Grant Aid scheme.

The Government of Japan requests the Government of the Recipient to take whatever measures necessary to ensure its responsibility in implementing the Project. Such measures must be guaranteed even if they may fall outside the jurisdiction of the implementing organization of the Recipient. This has been confirmed by all relevant organizations of the Recipient through the Minutes of Discussions.

2) Selection of consulting firms

For the smooth implementation of the Survey, JICA will conduct the Survey with registered consulting firms. JICA selects the firms based on proposals submitted by firms with interest in implementing the Survey. The firms selected will carry out the Preparatory Survey and prepare a report, based on the terms of reference set by JICA.

3. Implementation of GAEC after the E/N

1) Exchange of Notes (E/N)

The content of GAEC will be determined in accordance with the Notes exchanged by the two

Governments concerned, in which items including, objectives of the project, period of execution, conditions and amount of the Grant Aid are confirmed.

2) Details of Procedures

Details of procedures on procurement and services under GAEC will be agreed between the authorities of the two governments concerned at the time of the signing of the G/A.

Essential points to be agreed are outlined as follows:

- a) JICA will supervise the implementation of the Project.
- b) Products and services will be procured and provided in accordance with JICA's "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change (Type I-E)."
- c) The Recipient will conclude a contract with the Agent.
- d) The Agent is the representative acting in the name of the Recipient concerning all transfers of funds to the Agent.

3) Focal points of "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change (Type I-E)"

a) The Agent

The Agent is the organization, which provides procurement of products and services on behalf of the Recipient according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the A/M.

b) Employment Contract

The Recipient shall conclude an Employment Contract with independent and competent agent, in principle, within two months after the date of entry into force of the G/A, in accordance with the A/M. The scope of the Agent's services will be clearly specified in the Employment Contract.

c) Approval of the Employment Contract

The Agent Agreement is prepared as two identical documents and the copy of the Agent Agreement will be submitted to JICA by the Recipient through the Agent. JICA confirms whether the Agent Agreement is concluded in conformity with the E/N, A/M, and G/A and the Procurement Guidelines for the Program Grant Aid for Environment and Climate Change then approves the Agent Agreement.

The Employment Contract concluded between the Recipient and the Agent shall become effective upon the approval by JICA in a written form to be eligible for the Grant and accrued interest.

d) Payment Methods

The Employment Contract will stipulate that "Regarding all transfers of the fund to the Agent, the Recipient will designate the Agent to act on behalf of the Recipient and issue a Blanket Disbursement Authorization ("the BDA") to conduct the transfer of the fund (hereinafter referred to as "the Advances") to the Procurement Account from the Recipient Account.

The Employment Contract will clearly state that the payment to the Agent will be made in Japanese yen from the Advances and that the final payment to the Agent will be made when the total remaining amount become less than three percent (3%) of the Grant and its accrued interests excluding the Agent's fees.

e) Products and Services Eligible for Procurement

Products and services to be procured will be selected from those defined in the G/A.

f) Firm and Consultant

The firm and consultant who would contract with the Agent shall be Japanese Nationals.

The consultants that will be employed to do detail design and supervise the work for the Project, however will be in principle, Japanese nationals recommended by JICA for the purpose of maintaining technical consistency with the Study.

g) Method of Procurement

When conducting the procurement, sufficient attention will be paid to transparency in selecting the firms and for this purpose, competitive tendering will be employed in principle.

h) Tender Documents

The tender documents should contain all information necessary to enable tenderers to prepare valid offers for the products and services to be procured by GAEC.

The rights and obligations of the Recipient, the Agent and the firms supplying products and services should be stipulated in the tender documents to be prepared by the Agent. Aside from this, the tender documents will be prepared in consultation with the Recipient.

i) Pre-qualification Examination of Tenderers

The Agent may conduct a pre-qualification examination of tenderers in advance of the tender so that the invitation to the tender can be extended only to eligible firms. The pre-qualification examination should be performed only with respect to whether the prospective tenderers have the capability of concluding the contracts.

For this, the following points should be taken into consideration:

- (1) Experience and past performance in contracts of similar kind
- (2) Financial credibility (including assets such as real estate)
- (3) Existence of offices and other items to be specified in the tender documents.
- (4) Their potentialities to use necessary personnel and facilities.

j) Tender Evaluation

The tender evaluation should be implemented on the basis of the conditions specified in the tender documents.

Those tenderers which substantially conform to the technical specifications and other stipulations of the tender documents, will be judged in principle on the basis of the submitted price, and the tenderer who offers the lowest price will be designated as the successful tenderer.

The Agent will submit a detailed evaluation report of tenders to JICA for its information, while the notification of the results to the tenderers will not be premised on the confirmation by JICA.

k) Additional procurement

If there is any remaining balance after the competitive and/or selective tendering and/or direct negotiation for a contract, and if the Recipient would like to procure additional items, the Agent is allowed to conduct this additional procurement, following the points mentioned below:

(1) Procurement of same products and services

When the products and services to be additionally procured are identical with the initial tender and a competitive tendering is judged not efficient, additional procurement can be

conducted by a negotiated contract with the successful tenderer of the initial tender.

(2) Other procurements

When products and services other than those mentioned above in (1) are to be procured, the procurement should be conducted through competitive tendering. In this case, the products and services for additional procurement will be selected from among those in accordance with the G/A.

l) Conclusion of the Contracts

In order to procure products and services in accordance with the guideline, the Agent will conclude contracts with firms selected by tendering or other methods.

m) Terms of Payment

The contract will clearly state the terms of payment. The Agent will make payment from the "advances," against the submission of the necessary documents from the firm on the basis of the conditions specified in the contract. When the services are the object of procurement, the Agent may pay certain portion of the contract amount in advance to the firms on the conditions that such firms submit the advance payment guarantee worth the amount of the advance payment to the Agent.

4) Undertakings required by the Government of the Recipient Country

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

- a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the Project.
- b) To provide facilities for distributing electricity, water supply and drainage and other incidental facilities in and around the sites.
- c) To ensure all the expense and prompt execution for unloading, customs clearing at the port of disembarkation and domestic transportation of products purchased under the Grant Aid,
- d) To ensure that customs duty, internal taxes and other fiscal levies that may be imposed in the Recipient with respect to the purchase of the Components and the Agent's services will be exempted by the Government of the Recipient.
- e) To accord all the concerned parties, whose services may be required in connection with supply of the products and services under the contracts, such facilities as may be necessary for their entry into the Recipient and stay therein for the performance of their work.

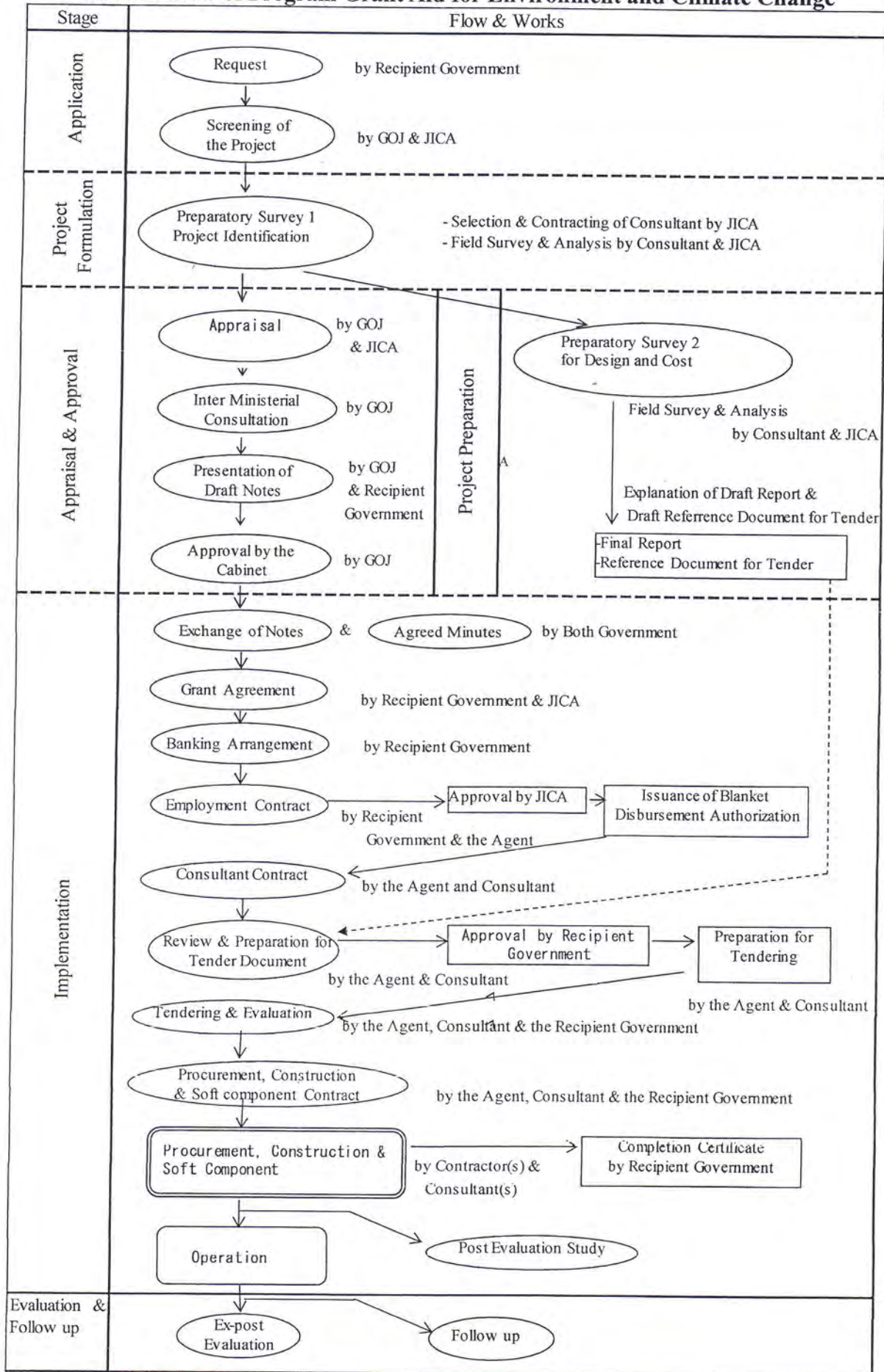
5) "Proper use of funds"

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

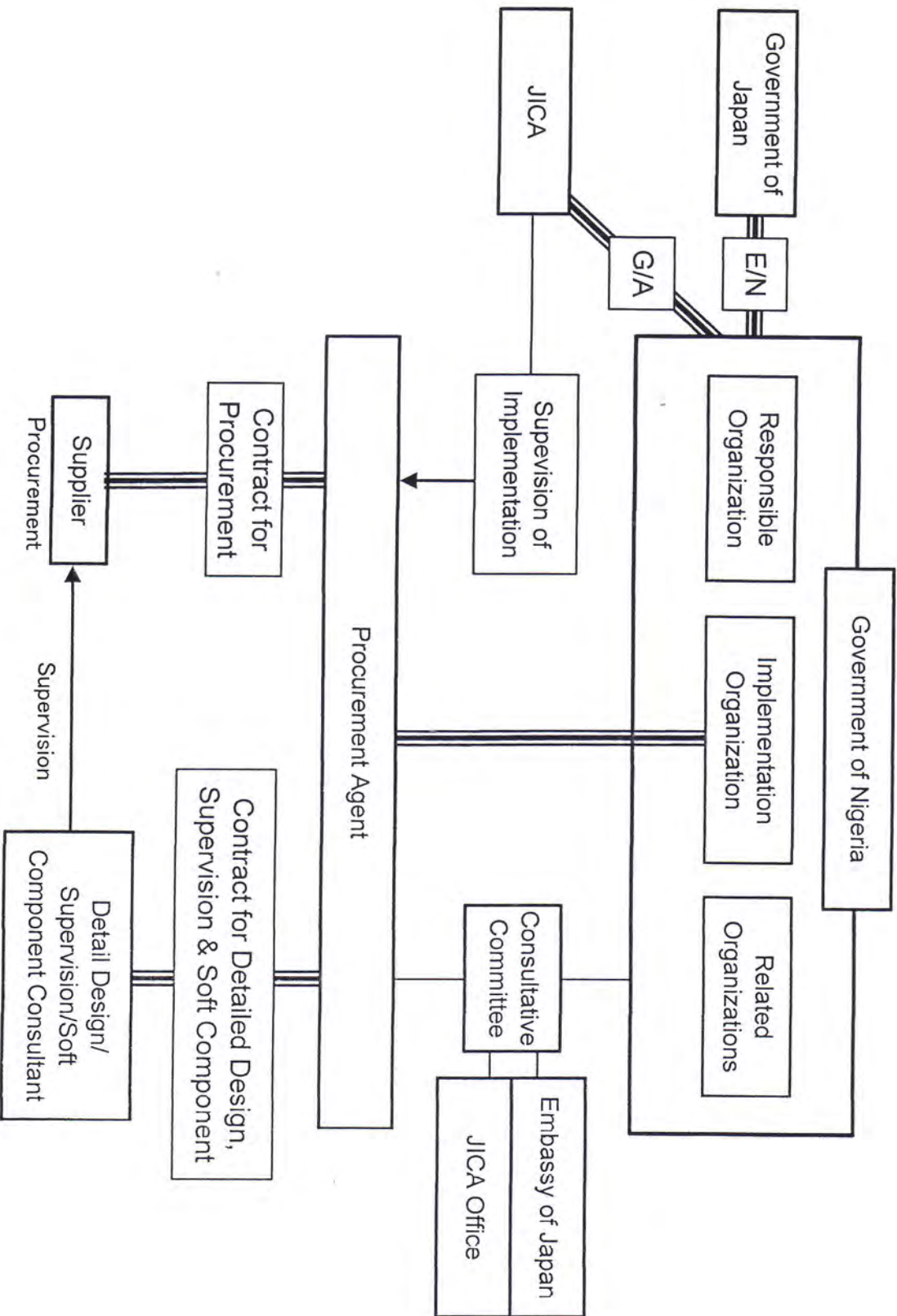
6) "Export and Re-export" of products

The products purchased under the Grant and its accrued interest will not be exported or re-exported from the Recipient.

General Flow of Program Grant Aid for Environment and Climate Change

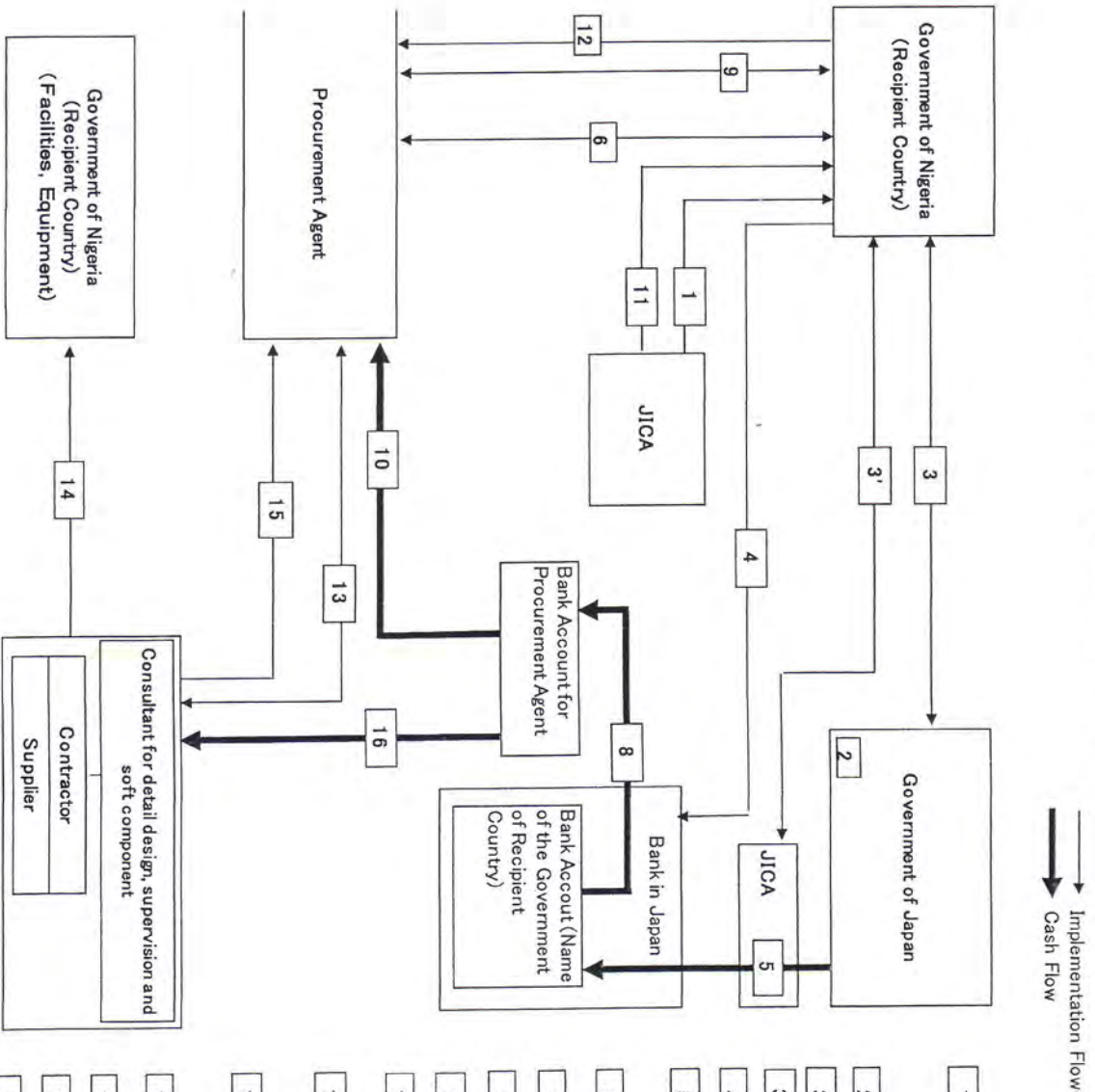


Project Implementation System



Annex-5
[Handwritten signature]

Flow of Funds for Project Implementation



- 1 Preparatory Survey / Reference Document for Tender
- 2 Approval of Cabinet
- 3 Signing of Exchange of Notes (E/N)
- 3' Signing of Grant Agreement (G/A)
- 4 Banking Arrangement (B/A)
- 5 Disbursement of Funds from the Government of Japan
- 6 Signing of Employment Contract + Blanket Disbursement Authorization N/A
- 7 N/A
- 8 Transfer of Funds
- 9 Decision of Project Components
- 10 Payment of Remuneration for Agent
- 11 Recommendation of Consultant for Detail Design/Supervision (JICA→Government of Nigeria)
- 12 Recommendation of Consultant for Detail Design / Supervision (Government of Nigeria →Procurement Agent)
- 13 Conclusion of Contract
- 14 Construction and Procurement
- 15 Application for Payment
- 16 Payment

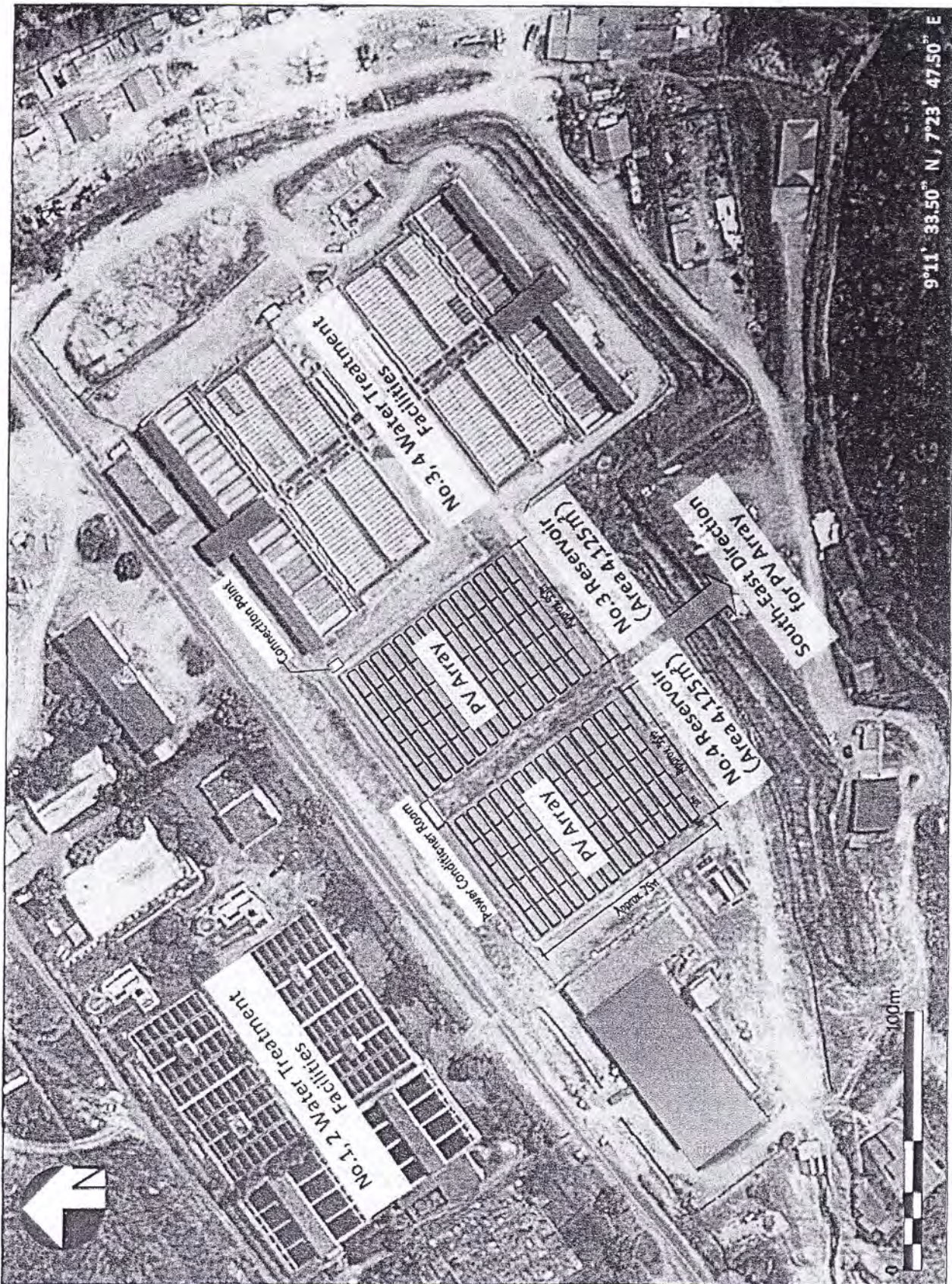
[Handwritten signature]

[Handwritten signature]

Major undertakings to be taken by each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side
1	To secure land		●
2	To clear, level and reclaim the site when needed urgently		●
3	To construct gates and fences in and around the site		●
4	To construct a parking lot if necessary		●
5	To construct roads		
	1) Within the site	●	
	2) Outside the site and Access road		●
6	To construct the facility and install the equipment	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities if necessary:		
	1) Electricity		
	a. The power distribution line to the site		●
	b. The drop wiring and internal wiring within the site	●	
	c. The main circuit breaker and transformer for the site	●	
	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 conveying storm water, sewage, etc. from the site)		●
	b. The drainage system within the site (for sewage, ordinary waste, storm water, etc.)	●	
	4) Gas Supply		
	a. The city gas main to the site		●
	b. The gas supply system within the site	●	
	5) Telephone System		
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		●
	b. The MDF and the extension after the frame/panel	●	
	6) Furniture and Equipment		
	a. General furniture		●
	b. Project equipment	●	
8	To bear the following commissions applied by the bank in Japan for banking services based upon the Bank Arrangement (B/A):		
	1) Payment of bank commission		●
9	To ensure all the expense and prompt execution of unloading and customs clearance at the port of disembarkation in the recipient country		
	1) Marine or air transportation of the products from Japan or third countries to the recipient	●	
	2) To ensure all the expense and prompt execution of unloading, tax exemption and customs clearance of the products at the port of disembarkation		●
	3) Internal transportation from the port of disembarkation to the project site	●	
10	To accord Japanese nationals and / or nationals of third countries, including persons employed by the agent whose services may be required in connection with the Components such facilities as may be necessary for their entry into recipient country and stay therein for the performance of their work.		●
11	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 Components and to the employment of the Agent will be exempted by the Government of recipient country		●
12	To maintain and use properly and effectively the facilities that are constructed and the equipment that is provided under the Grant.		●
13	To bear all the expenses, other than those covered by the Grant and its accrued interest, necessary for the purchase of the Components as well as for the agent's fees.		●
14	To ensure environmental and social consideration for the Programme.		●

Layout of Photovoltaic System at the Lower Usama Dam Water Treatment Plant



*The strength of No.3 and No.4 Reservoirs will be evaluated in the Outline Design. Based on the analysis, usage of the area for installation of PV arrays will be decided.

Handwritten signatures and initials.

Terms of Reference of the Consultative Committee (Provisional)

1. To confirm an implementation schedule of the Program for the speedy and effective utilization of the Grant and its accrued interest.
2. To discuss the modifications of the Program, including modification of the design of the facility.
3. To exchange views on allocations of the Grant and its accrued interest as well as on potential end-users.
4. To identify problems which may delay the utilization of the Grant and its accrued interest, and to explore solutions to such problems.
5. To exchange views on publicity related to the utilization of the Grant and its accrued interest.
6. To discuss any other matters that may arise from or in connection with the G/A.



**Minutes of Discussions
on the Preparatory Survey
on the Project for Introduction of Clean Energy by Solar Electricity Generation System
in the Federal Republic of Nigeria**

In September 2013, the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched to the Federal Republic of Nigeria (hereinafter referred to as "Nigeria") a Preparatory Survey Team on the Project for Introduction of Clean Energy by Solar Electricity Generation System (hereinafter referred to as "the Project"), to hold discussions with relevant officials of the Federal Government of Nigeria and the Federal Capital Territory (hereinafter referred to as "Nigerian side") to conduct field surveys and to make technical evaluations. After discussing results of the Preparatory Survey in Japan, JICA prepared a Draft Final Report of the Outline Design.

In order to explain and to make consult with the concerned officials of the Nigerian side on the components of the Draft Final Report, JICA dispatched a Preparatory Survey Team for Draft Final Report Explanation (hereinafter referred to as "the Team"), which is headed by Mr. Masashi Nakazono, Executive Technical Advisor to Director General, Industrial Development and Public Policy Department, JICA Headquarter, from March 1st to 9th, 2014.

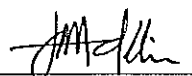
As a result of discussions between JICA and concerned officials of Nigerian side, both sides confirmed the main items described on the attached sheets.

Abuja

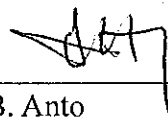
March 6th, 2014

中園 雅也

Mr. Masashi Nakazono
Leader
Preparatory Survey Team
Japan International Cooperation Agency

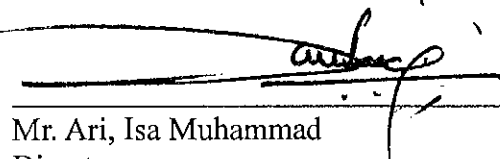


Engr. A. Adebisi
Director
Electrical Inspectorate Services Department
Federal Ministry of Power



Engr. J. B. Anto
Director
Federal Capital Territory Water Board

Witnessed by:



Mr. Ari, Isa Muhammad
Director
Economic Planning, Research and Statistics
Department
Federal Capital Territory Administration

ATTACHMENT

1. Contents of the Draft Final Report

The Federal Ministry of Power (hereinafter referred to as "FMOP"), Federal Capital Territory Administration (hereinafter referred to as "FCTA") and Federal Capital Territory Water Board (hereinafter referred to as "FCTWB") agreed and accepted in principle the contents of the Draft Final Report explained by the Team.

2. Program Grant Aid for Environment and Climate Change of the Government of Japan

The Nigerian side understood contents of the Minutes of Discussions signed by JICA and the Nigerian side (hereinafter referred to as "both sides") on September 19th, 2013 (hereinafter referred to as "the previous M/D"), and agreed to take the necessary measures confirmed on the previous M/D for smooth implementation of the Project following procedures of the Program Grant Aid for Environment and Climate Change of the Government of Japan as described in Annex-1,2,3,4 and 5.

3. Schedule of the Study

JICA will complete the final report in accordance with the confirmed items and send it to FMOP, FCTA and FCTWB by the end of April 2014.

4. Confirmation of progress made from the previous M/D

4.1. Project site and capacity of Solar Photovoltaic system

Both sides confirmed that project site is the top surfaces of No3 and No.4 water tanks of the Lower Usuma Dam Water Treatment Plant as shown in Annex-6. The Team explained that the design capacity of Solar Photovoltaic (PV) system (hereinafter referred to as "PV system") to be procured and installed in the Project would be 975kW based on the result of outline design and cost estimation (See Annex 7). However, the actual capacity of PV system in the Project depends on the result of tender opening.

4.2. Project Implementation Structure

Both sides confirmed the responsible and implementing organization of the Project is FMOP. The organization which is responsible for operation and maintenance of PV system (including relevant facilities and equipment) installed by the Project is the FCTWB, which is the direct beneficiary of the Project as well. FCTA is responsible for securing and providing necessary budget to FCTWB for proper implementation of O&M.

FMOP agreed to support operation and maintenance activities of FCTWB for the PV system in the Project by arranging technical assistance from Abuja electricity distribution company (Abuja DISCO) managing the area where the Lower Usuma Dam Water Treatment Plant is located in accordance with necessity. FCTA agreed to manage budgetary allocation for proper operation and maintenance activities of FCTWB.




5. Items of Equipment to be procured

The Team explained the items of equipment to be procured as below based on the results of the Preparatory Survey conducted from September to October 2013. After discussion, both sides confirmed that the major equipment such as PV modules consisting of PV cells and Power Conditioners should be produced and purchased in Japan, while products of third country could be acceptable for other type of equipment as a part of components.

Table 1. List of Major Equipment

	Components	Quantity or Capacity
Procurement and Installation	1. Photovoltaic system	
	1.1 Solar photovoltaic arrays	975 kWp
	1.2 Junction box	1 lot
	1.3 Collecting box	1 lot
	1.4 Power conditioners	Total capacity of the connected photovoltaic modules or more
	1.5 AC Distribution Panel	1 unit
	1.6 Interconnection Transformer	Total capacity of the connected photovoltaic modules or more
	1.7 Interconnection equipment	1 unit
	2. Data management system	
	2.1 Data logger including UPS system	1 set
2.2 Display system	1 set	
2.3 Weather monitoring instruments (Pyranometer, Temperature meter)	1 set	
3. Cables and fitting materials	1 lot	
Procurement	1. Spare parts	1 lot
	2. Maintenance tools (including high pressure washing machines)	1 lot
Construction	a. Mounting Structures for the photovoltaic arrays b. Foundations for the photovoltaic arrays c. Power Conditioner Building	for the photovoltaic arrays of 975 kWp for the photovoltaic arrays of 975 kWp Gross floor area: Approx. 77.5 m ²

6. Soft Component

The Team explained that the following technical guidance is included in the soft component of the Project:

- (1) Operation and maintenance of the PV system;
- (2) Protection system of the grid connected PV system; and
- (3) Operation and maintenance of the data management system.

7. Ownership and Responsibilities for Operation and Maintenance

The Nigerian side explained to the Team that the PV system of the Project will be operated and maintained by FCTWB, the Operation and Maintenance organization of the Project. FCTA agreed

to allocate the budget for FCTWB to operate and maintain the PV system in the Project with applying the expenses saved through their operation and maintenance which reduce consumption of purchased electricity. Operation and maintenance cost for the PV system in the Project is estimated as shown in the table below. The annual cost of the PV system in the Project is approximately 3,341,580 N (20,460 US\$)

Table 2. Operation and Maintenance Cost

	Annual cost (N/year)	Remarks
Employment cost	2,691,500	Panel cleaners: 2 people (1 year)
Equipment cost	70,000	Cooler (1 year)
Electricity charge (*1)	276,300	Power conditioner building High-pressure washing machine
Others (contingencies)	303,780	10%
Total	3,341,580	

Note: Electricity charge calculation

- Power conditioner room, High-pressure washing machine, etc. is estimated as 8.0 kW/hour (assuming room temperature of 27-35°C).
- Electricity usage: $365 \times 9 \times 0.5 \times 8.0 = 13,140\text{kWh} / \text{year}$ (assuming 50% conduction rate), 9 hours per day, conduction rate 50%
- Electricity tariff: 21.03 N/kWh

The Nigerian side also explained to the Team that their ownership will be transferred to FCTWB from FMOP immediately after commissioning officially.

8. Procurement Process of the Project

Both sides reconfirmed that procurement process would be supervised by the Procurement Agent (hereinafter referred to as "the Agent") who is recommended by the government of Japan Both sides also reconfirmed the roles of the Agent as follows:

- (1) The Agent will render the services stipulated in the provisions of the Grand Agreement (G/A) as well as the Exchange of Notes (E/N) for the Project;
- (2) The Agent will undertake the procurement procedure necessary for the Project according to the provisions of the G/A and E/N and any other concerned guidelines;
- (3) JICA will provide the Draft Final Report and Final Report to the Agent; and
- (4) The Agent will undertake the procurement according to the contents of the Final Report of the Preparatory Survey.

9. Project Cost

The Nigerian side agreed that the Project cost should not exceed the upper limit of amount agreed in E/N and G/A. Both sides confirmed that the Project cost contains procurement cost of equipment, the cost for transportation up to the Project Site, installation cost, the Procurement Agent fee, and the consultant fee that includes the cost for soft component for the technical assistance of operation and maintenance of the equipment and PV system as a whole.

The Nigerian side understood that the Project Cost Estimation attached as Annex-8 is not final and

is subject to change by discussion results among related parties of the Government of Japan.

10. Confidentiality of the Project

(1) Detailed specifications of the Facilities and Equipment

Both sides confirmed that all the information related to the Project should not be released to any outside parties before conclusion of all the contract(s) for the Project because they are confidential document that contains information related to the tender.

Such information includes the followings:

- a) detailed drawings, specifications of the facilities and equipment, and other technical information of the facilities and equipment;
- b) the Draft Final Report; and
- c) the Final Report.

(2) Confidentiality of the Cost estimation

The Team explained the estimated cost of the Project as described in Annex-8. The Nigerian side agreed that the estimated cost of the Project should never duplicated or disclosed to any outside parties (i.e. outside of JICA, the Nigerian side and the Agent) before tender for the project.

11. The Consultative Committee

The Nigerian side agreed that the FMOP would chair the Committee in order to facilitate consultation and procurement process. The Terms of Reference of the Committee was settled in Annex-9.

The members of the Committee are as follows:

- (1) Representative of FMOP (Chair)
- (2) Representative of National Planning Commission (NPC);
- (3) Representative of FCTA ;
- (4) Representative of FCTWB ;
- (5) Representative of the Embassy of Japan; and
- (6) Representative of JICA Nigeria Office.

The meeting of the Committee shall be held immediately after the signing of the consulting service contract between the Agent and the Consultant.

Further meetings shall be held upon request of either the Nigerian side or the Japanese side. The Agent may advise JICA and the Nigerian side on the necessity to call a meeting of the Committee.

12. Undertakings required by the Recipient Country

The Team requested the Nigerian side to abide by the following undertakings by the Nigerian side in addition to major undertakings described in the previous M/D. The Nigerian side agreed to do so.

(1) Allocation of land/space for installation of PV system

The owner of the land where the following equipment and materials for PV system will be

installed is FCTWB. FCTWB had already agreed to offer their land and space for the installation of the system. It does not require any procedure concerning the agreement to use necessary land and space for the following facilities within the Lower Usama Dam Water Treatment Plant for the implementation of the Project:

- 1) PV Modules;
- 2) Cables between Equipment;
- 3) Power Conditioners;
- 4) Electric Substation;
- 5) Data Management System and Meteorological Devices; and
- 6) Temporary Stockyard.

(2) Preparation for the Site

FCTWB shall clear and level the space for Temporary Stockyard as the preparation of the site by July 2014.

(3) Assignment of Counterpart Personnel

1) Overall project management

The Nigerian side agreed to assign the focal point for overall project management and coordination in each of FMOP, FCTA and FCTWB.

2) Soft Component

The Nigerian side agreed to assign necessary personnel in accordance with the soft component implementation plan proposed by the Team.

The Nigerian side shall inform to JICA of the name of the focal Counterpart Personnel for the soft component from the following organizations at the first Consultative Committee meeting:

- FMOP;
- FCTWB; and
- Abuja DISCO.

Other personnel will be assigned from each organization as required at the time of installation.

(4) Customs and Tax Exemption

As stipulated in the Exchange of Note (E/N) and Grant Agreement (G/A), the necessary measures shall be taken by the Nigerian side to ensure that customs duties are exempted. FMOP shall deal with these measures as the Implementing Agency of the Project with obtaining support from the Federal Ministry of Finance and/or other related parties of the Nigerian side in timely manners.

As also stipulated in E/N and G/A, the Nigerian side shall bear all expenses including demurrage costs due to delay of custom clearance, other than those covered by the Grant and its accrued interest, necessary for the implementation of the Project.

(5) Environmental and Social Considerations

Handwritten signatures and initials, including a large signature that appears to be 'MM' and another signature above it.

The Team explained the outline of JICA Environmental and Social Considerations Guideline (hereinafter referred to as "the JICA Guideline") to the Nigerian side. The Nigerian side agreed to take the JICA Guideline into consideration, and shall complete the necessary procedures.

The Nigerian side shall obtain an official statement from the Federal Ministry of Environment that EIA and IEE are not required for the project.

(6) Guarantee of design and construction of the existing No.3 and No.4 water tanks

Japanese side shall be responsible for design and construction of the PV system in accordance with the provisions in the Draft Final Report.

FCTWB shall be responsible for design and construction of the existing No.3 and No.4 water tanks before installation of the PV system by Japanese side.

FCTWB shall also be responsible for rearrangement of the contract if required with the contractor for construction work of the existing No.3 and No.4 water tanks, in terms of guarantee of their original design and construction of these facilities.

(7) Countermeasure against vandalism

As the public can come close to the PV arrays of the Project, which are installed on the top surface of No.3 and No.4 water tanks, countermeasures against vandalism such as stone throwing shall be considered carefully. FCTWB explained to the Team that FCTWB will procure and install a fence with sufficient height on the north-western side of the PV arrays of the Project alongside of the existing internal road as the countermeasures against vandalism. FCTWB explained to the Team that they will secure enough budget for the procurement and installation and complete it before commencement of installation of the PV arrays of the Project by the Japanese side.

(8) Regulatory requirements in Nigeria for operation and maintenance of the grid-connected PV system of the Project

FMOP agreed properly to deal with the Regulatory requirements in Nigeria required for operation and maintenance of the grid-connected PV system of the Project such as acquisition of a license in timely manner.

<List of Annex>

Annex-1 Program Grant Aid for Environment and Climate Change

Annex-2 General Flow of Program Grant Aid for Environment and Climate Change

Annex-3 Flow of Funds for Project Implementation

Annex-4 Project Implementation System

Annex-5 Major Undertakings to be taken by Each Government

Annex-6 Location of Project Site

Annex-7 Layout of Photovoltaic System at the Lower Usuma Dam Water Treatment Plant

Annex-8 Project Cost Estimation

Annex-9 Terms of References of the Consultative Committee

**Program Grant Aid for Environment and Climate Change
of the Government of Japan**

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

Based on “Cool Earth Partnership” initiative of the Government of Japan, the Program Grant Aid for Environment and Climate Change (hereafter referred to as “GAEC”) aims to mitigate effects of global warming by reducing GHGs emission (mitigation; e.g. improvement of energy efficiency) and to take adaptive measures (adaptation; e.g. measures against disasters related to climate change, including disaster prevention such as enhancing disaster risk management). GAEC may contain multiple components that can be combined to effectively meet these needs.

1. Procedures for GAEC

GAEC is executed through the following procedures.

Preparatory Survey 1	Preparatory Survey for project identification conducted by Japan International Cooperation Agency (JICA)
Application	Request made by a recipient country
Appraisal & Approval	Appraisal by the Government of Japan and Approval by the Cabinet
Determination of Implementation	The Notes exchanged between the Government of Japan and the Recipient Country
Grant Agreement (hereinafter referred to as the “G/A”)	Agreement concluded between JICA and the Recipient
Preparatory Survey 2	Preparatory Survey for design conducted by JICA
Implementation	Procurement through the Procurement Agency by the Recipient

Firstly, if the candidate project for a GAEC is identified by the Recipient and the Government of Japan, the Government of Japan (the Ministry of Foreign Affairs) examines it whether it is eligible for GAEC. When the request is deemed appropriate, JICA, in consultation with the Government of Japan, conducts the Preparatory Survey (hereafter referred to as “the Survey”) on the candidate project as Phase 1 of the Survey with Japanese consulting firms.

Secondly, the Recipient submits the official request to the Government of Japan, while the appropriateness, necessity and the basic components of the project are examined in the course of Phase 1 of the Survey,

Thirdly, the Government of Japan appraises the project to see whether it is suitable for Japan's GAEC, based on the Survey report prepared by JICA, and the results are then submitted to the Cabinet for approval.

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

Fifthly, JICA engages Grant Agreement (G/A) with the Recipient and executes the Grant by making payments of the amount agreed in the E/N and strictly monitors that the funds of the Grant are properly and effectively used.

Procurement Management Agent is designated to conduct the procurement services of products and services (including fund management, preparing tenders, contracts) for GAEC on behalf of the Recipient. The Agent is an impartial and specialized organization that will render services according to the Employment Contract with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the Agreed Minutes ("A/M").

2 Preparatory Survey

1) Contents of the Survey

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

- Confirmation of background, objectives, and benefits of the Project and institutional capacity of agencies and communities concerned of the Recipient necessary for project implementation.
- Evaluation of relevance of the Project to be implemented under the Grant Aid Scheme for Environment and Climate Change from a technical, social, and economic point of view.
- Confirmation of items agreed upon by both parties concerning the basic concept of the Project.
- Preparation of the design of the Project and reference document for tender.
- Estimation of cost for the Project.

The contents of the original request will be modified, as found necessary, in the design of the Project according to the guidelines of Japan's Grant Aid scheme.

The Government of Japan requests the Government of the Recipient to take whatever measures necessary to ensure its responsibility in implementing the Project. Such measures must be guaranteed even if they may fall outside the jurisdiction of the implementing organization of the Recipient. This has been confirmed by all relevant organizations of the Recipient through the Minutes of Discussions.

2) Selection of consulting firms

For the smooth implementation of the Survey, JICA will conduct the Survey with registered consulting firms. JICA selects the firms based on proposals submitted by firms with interest in implementing the Survey. The firms selected will carry out the Preparatory Survey and prepare a report, based on the terms of reference set by JICA.

3. Implementation of GAEC after the E/N

1) Exchange of Notes (E/N)

The content of GAEC will be determined in accordance with the Notes exchanged by the two

Governments concerned, in which items including, objectives of the project, period of execution, conditions and amount of the Grant Aid are confirmed.

2) Details of Procedures

Details of procedures on procurement and services under GAEC will be agreed between the authorities of the two governments concerned at the time of the signing of the G/A.

Essential points to be agreed are outlined as follows:

- a) JICA will supervise the implementation of the Project.
 - b) Products and services will be procured and provided in accordance with JICA's "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change (Type I-E)."
 - c) The Recipient will conclude a contract with the Agent.
 - d) The Agent is the representative acting in the name of the Recipient concerning all transfers of funds to the Agent.
- 3) Focal points of "Procurement Guidelines for the Program Grant Aid for Environment and Climate Change (Type I-E)"

a) The Agent

The Agent is the organization, which provides procurement of products and services on behalf of the Recipient according to the Agent Agreement with the Recipient. The Agent is recommended to the Recipient by the Government of Japan and agreed between the two Governments in the A/M.

b) Employment Contract

The Recipient shall conclude an Employment Contract with independent and competent agent, in principle, within two months after the date of entry into force of the G/A, in accordance with the A/M. The scope of the Agent's services will be clearly specified in the Employment Contract.

c) Approval of the Employment Contract

The Agent Agreement is prepared as two identical documents and the copy of the Agent Agreement will be submitted to JICA by the Recipient through the Agent. JICA confirms whether the Agent Agreement is concluded in conformity with the E/N, A/M, and G/A and the Procurement Guidelines for the Program Grant Aid for Environment and Climate Change then approves the Agent Agreement.

The Employment Contract concluded between the Recipient and the Agent shall become effective upon the approval by JICA in a written form to be eligible for the Grant and accrued interest.

d) Payment Methods

The Employment Contract will stipulate that "Regarding all transfers of the fund to the Agent, the Recipient will designate the Agent to act on behalf of the Recipient and issue a Blanket Disbursement Authorization ("the BDA") to conduct the transfer of the fund (hereinafter referred to as "the Advances") to the Procurement Account from the Recipient Account.

The Employment Contract will clearly state that the payment to the Agent will be made in Japanese yen from the Advances and that the final payment to the Agent will be made when the total remaining amount become less than three percent (3%) of the Grant and its accrued interests excluding the Agent's fees.

e) Products and Services Eligible for Procurement

Products and services to be procured will be selected from those defined in the G/A.

Handwritten signature and initials, possibly 'JMA' and 'AMM', located at the bottom right of the page.

f) Firm and Consultant

The firm and consultant who would contract with the Agent shall be Japanese Nationals.

The consultants that will be employed to do detail design and supervise the work for the Project, however will be in principle, Japanese nationals recommended by JICA for the purpose of maintaining technical consistency with the Study.

g) Method of Procurement

When conducting the procurement, sufficient attention will be paid to transparency in selecting the firms and for this purpose, competitive tendering will be employed in principle.

h) Tender Documents

The tender documents should contain all information necessary to enable tenderers to prepare valid offers for the products and services to be procured by GAEC.

The rights and obligations of the Recipient, the Agent and the firms supplying products and services should be stipulated in the tender documents to be prepared by the Agent. Aside from this, the tender documents will be prepared in consultation with the Recipient.

i) Pre-qualification Examination of Tenderers

The Agent may conduct a pre-qualification examination of tenderers in advance of the tender so that the invitation to the tender can be extended only to eligible firms. The pre-qualification examination should be performed only with respect to whether the prospective tenderers have the capability of concluding the contracts.

For this, the following points should be taken into consideration:

- (1) Experience and past performance in contracts of similar kind
- (2) Financial credibility (including assets such as real estate)
- (3) Existence of offices and other items to be specified in the tender documents.
- (4) Their potentialities to use necessary personnel and facilities.

j) Tender Evaluation

The tender evaluation should be implemented on the basis of the conditions specified in the tender documents.

Those tenderers which substantially conform to the technical specifications and other stipulations of the tender documents, will be judged in principle on the basis of the submitted price, and the tenderer who offers the lowest price will be designated as the successful tenderer.

The Agent will submit a detailed evaluation report of tenders to JICA for its information, while the notification of the results to the tenderers will not be premised on the confirmation by JICA.

k) Additional procurement

If there is any remaining balance after the competitive and/or selective tendering and/or direct negotiation for a contract, and if the Recipient would like to procure additional items, the Agent is allowed to conduct this additional procurement, following the points mentioned below:

(1) Procurement of same products and services

When the products and services to be additionally procured are identical with the initial tender and a competitive tendering is judged not efficient, additional procurement can be

conducted by a negotiated contract with the successful tenderer of the initial tender.

(2) Other procurements

When products and services other than those mentioned above in (1) are to be procured, the procurement should be conducted through competitive tendering. In this case, the products and services for additional procurement will be selected from among those in accordance with the G/A.

l) Conclusion of the Contracts

In order to procure products and services in accordance with the guideline, the Agent will conclude contracts with firms selected by tendering or other methods.

m) Terms of Payment

The contract will clearly state the terms of payment. The Agent will make payment from the "advances," against the submission of the necessary documents from the firm on the basis of the conditions specified in the contract. When the services are the object of procurement, the Agent may pay certain portion of the contract amount in advance to the firms on the conditions that such firms submit the advance payment guarantee worth the amount of the advance payment to the Agent.

4) Undertakings required by the Government of the Recipient Country

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

- a) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the Project.
- b) To provide facilities for distributing electricity, water supply and drainage and other incidental facilities in and around the sites.
- c) To ensure all the expense and prompt execution for unloading, customs clearing at the port of disembarkation and domestic transportation of products purchased under the Grant Aid,
- d) To ensure that customs duty, internal taxes and other fiscal levies that may be imposed in the Recipient with respect to the purchase of the Components and the Agent's services will be exempted by the Government of the Recipient.
- e) To accord all the concerned parties, whose services may be required in connection with supply of the products and services under the contracts, such facilities as may be necessary for their entry into the Recipient and stay therein for the performance of their work.

5) "Proper use of funds"

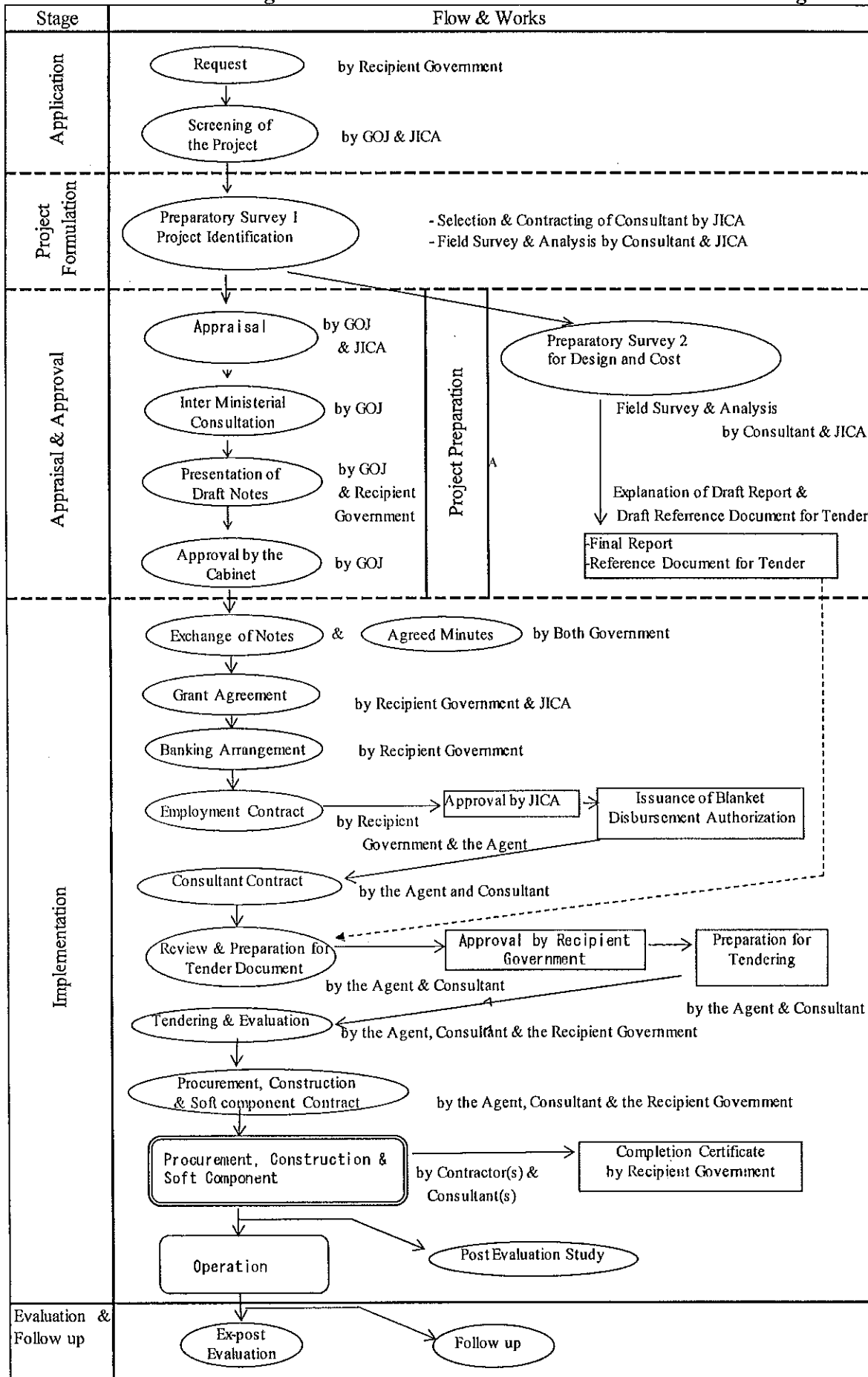
The Recipient is required to operate and maintain the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign personnel necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

6) "Export and Re-export" of products

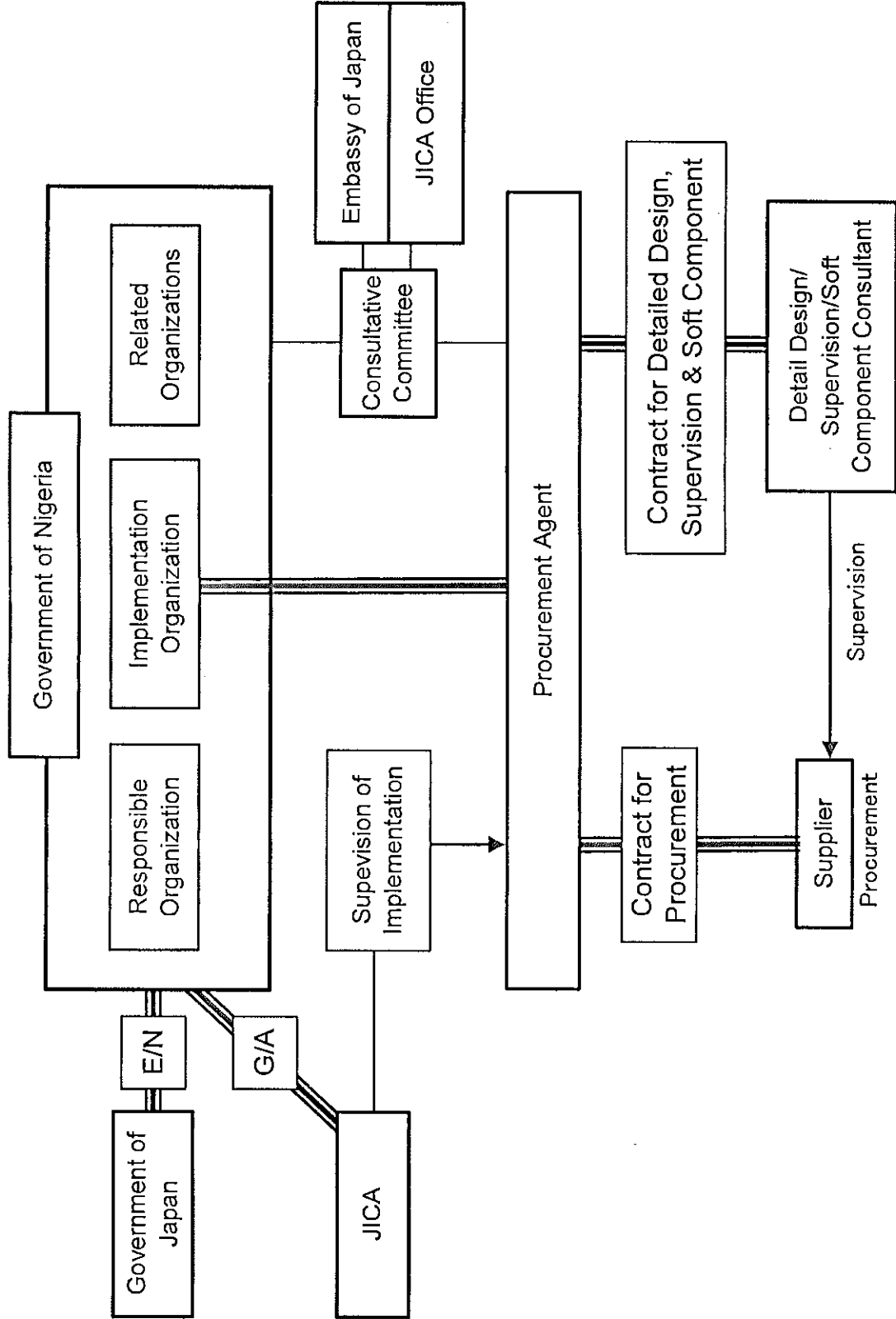
The products purchased under the Grant and its accrued interest will not be exported or re-exported from the Recipient.

Handwritten signature and initials in the bottom right corner of the page.

General Flow of Program Grant Aid for Environment and Climate Change

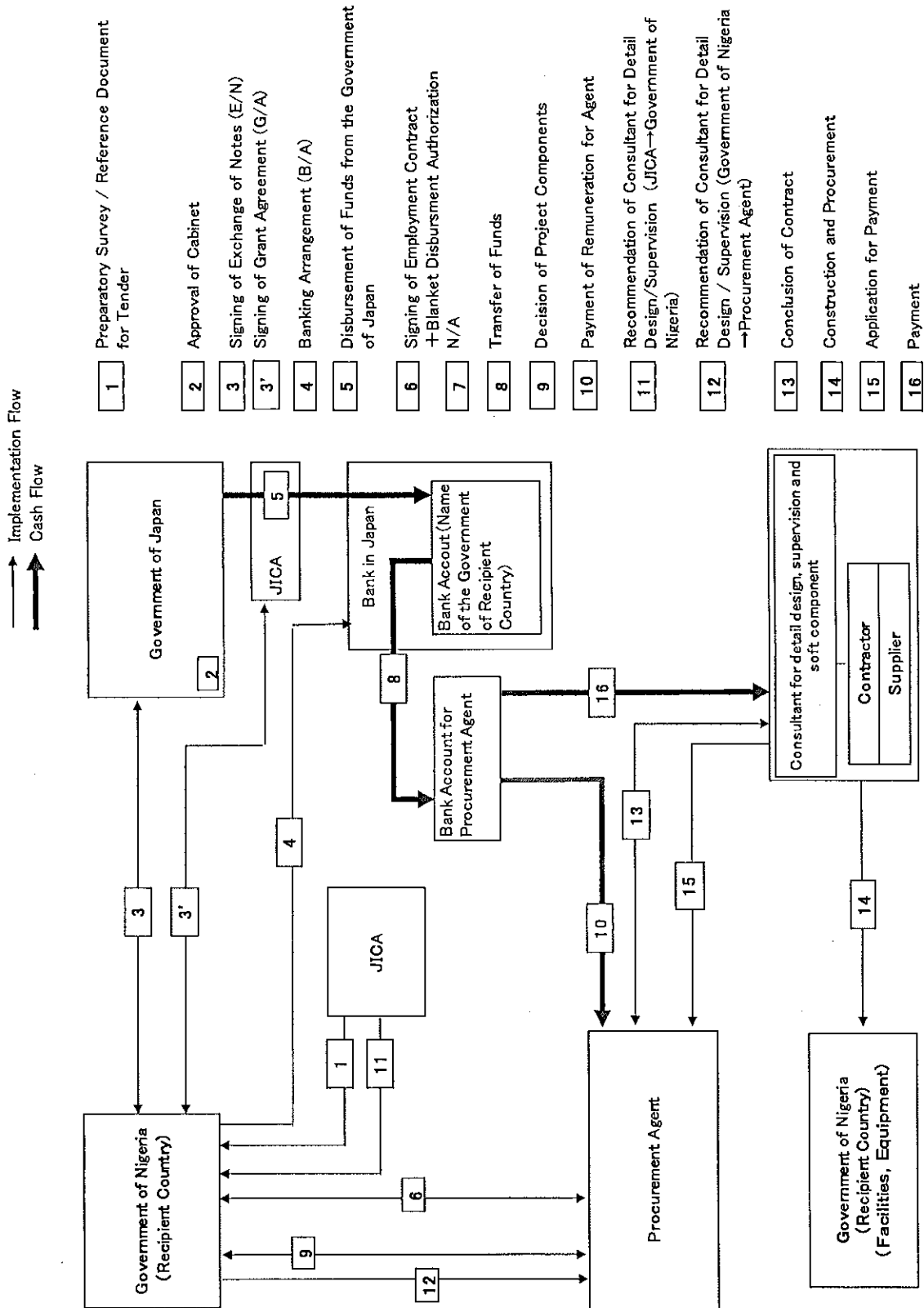


Project Implementation System



[Handwritten signatures and initials]

Flow of Funds for Project Implementation



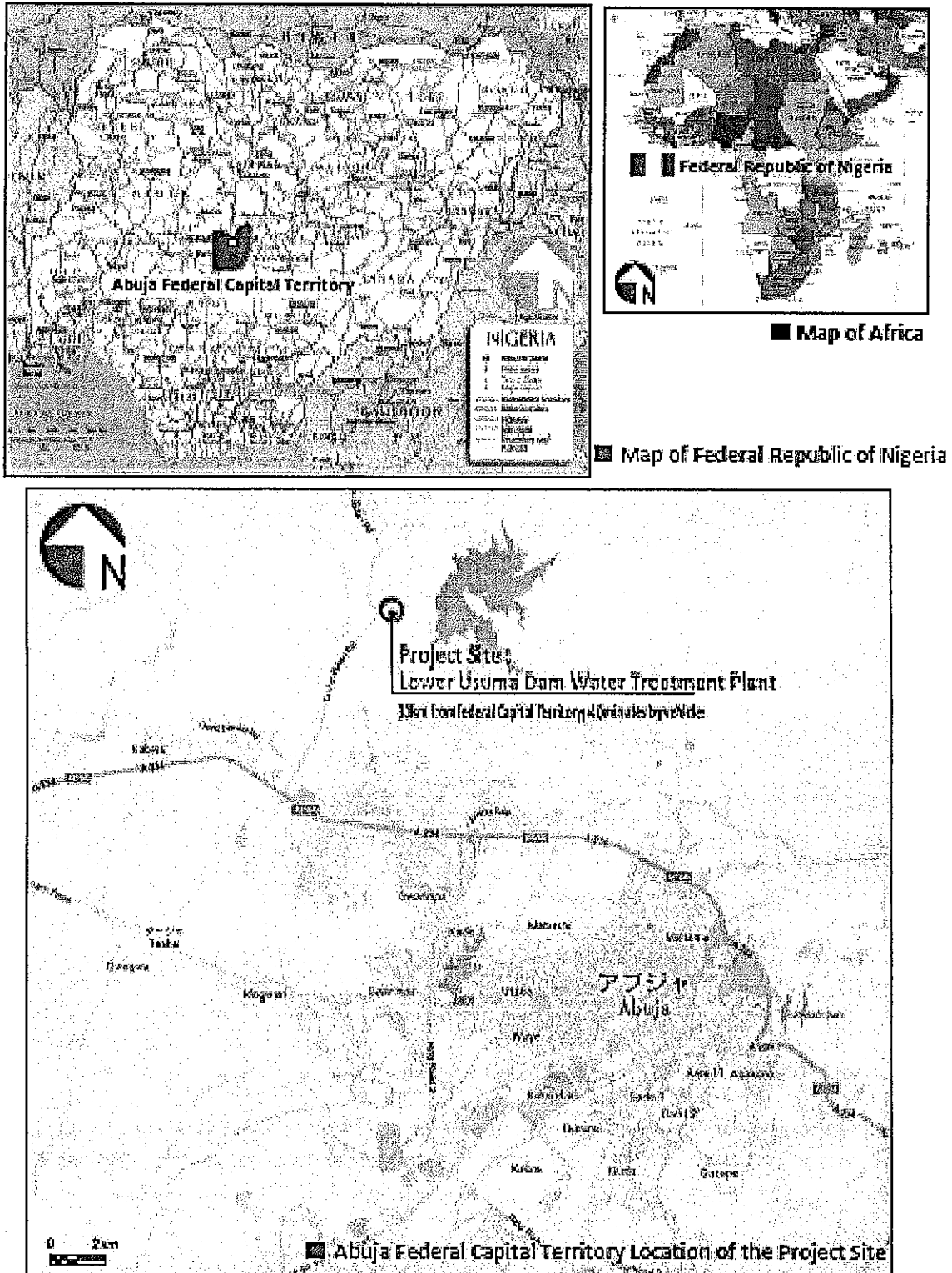
[Handwritten signatures and initials]

Major undertakings to be taken by each Government

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side	
			FMOP	FCTWB
1	to secure [a lot] /[lots] of land necessary for the implementation of the Project and to clear the [site]/[sites];		● Arrangement	● Securement
2	To construct the following facilities			
	1) The Power Conditioner Building	●		
	2) The gates and fences in and around the site		●	
	3) The parking lot (if necessary)		●	●
	4) The road within the site	N/A		
3	5) The road outside the site (if necessary)		●	●
	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the [site]/[sites]			
	1)Electricity			
	a. The distributing power line to the site (Securement of interconnection point of the PV system)		● Arrangement	● Securement
	b. The drop wiring and internal wiring within the site (Wiring of the equipment of the Project after the interconnection point)	●		
	c. The main circuit breaker and transformer (The main circuit breaker and transformer for the interconnection)	●		
	d. The connection point of electricity for the installation and construction works beside the Project site		● Arrangement	● Securement
	2) Water Supply			
	a. The city water distribution main to the site (Securement of connection point of the water system of the Project)		● Arrangement	● Securement
	b. The supply system within the site (Water line and taps for maintenance of the PV arrays)	●		
	c. The connection point of water for the installation and construction work beside the Project site		● Arrangement	● Securement
	3) Drainage			
	a. The city drainage main (for storm sewer and others to the site)		● Arrangement	● Securement
	b. The drainage system (for toilet sewer, common waste, storm drainage and others) within the site	N/A		
	4) Gas Supply			
	a. The city gas main to the site		N/A	N/A
	b. The gas supply system within the site	N/A		
	5) Telephone System			
	a. The telephone trunk line to the main distribution frame/panel (MDF) of the building		N/A	N/A
	b. The MDF and the extension after the frame/panel	N/A		
	6) Furniture and Equipment			
	a. General furniture		●	
	b. Project equipment (Procurement and installation of the equipment of the Project)	●		
c. Procurement of materials for final connection of the equipment of the Project to the 11kV system at the interconnection point	●			
d. Implementation of scheduled outage of the 11kV system, and final connection work of the equipment of the Project to the 11kV system		● Arrangement	● Implementation	
4	To bear the following commissions applied by the Japanese bank for banking services based upon the B/A:			
	1) Payment of bank commission		●	

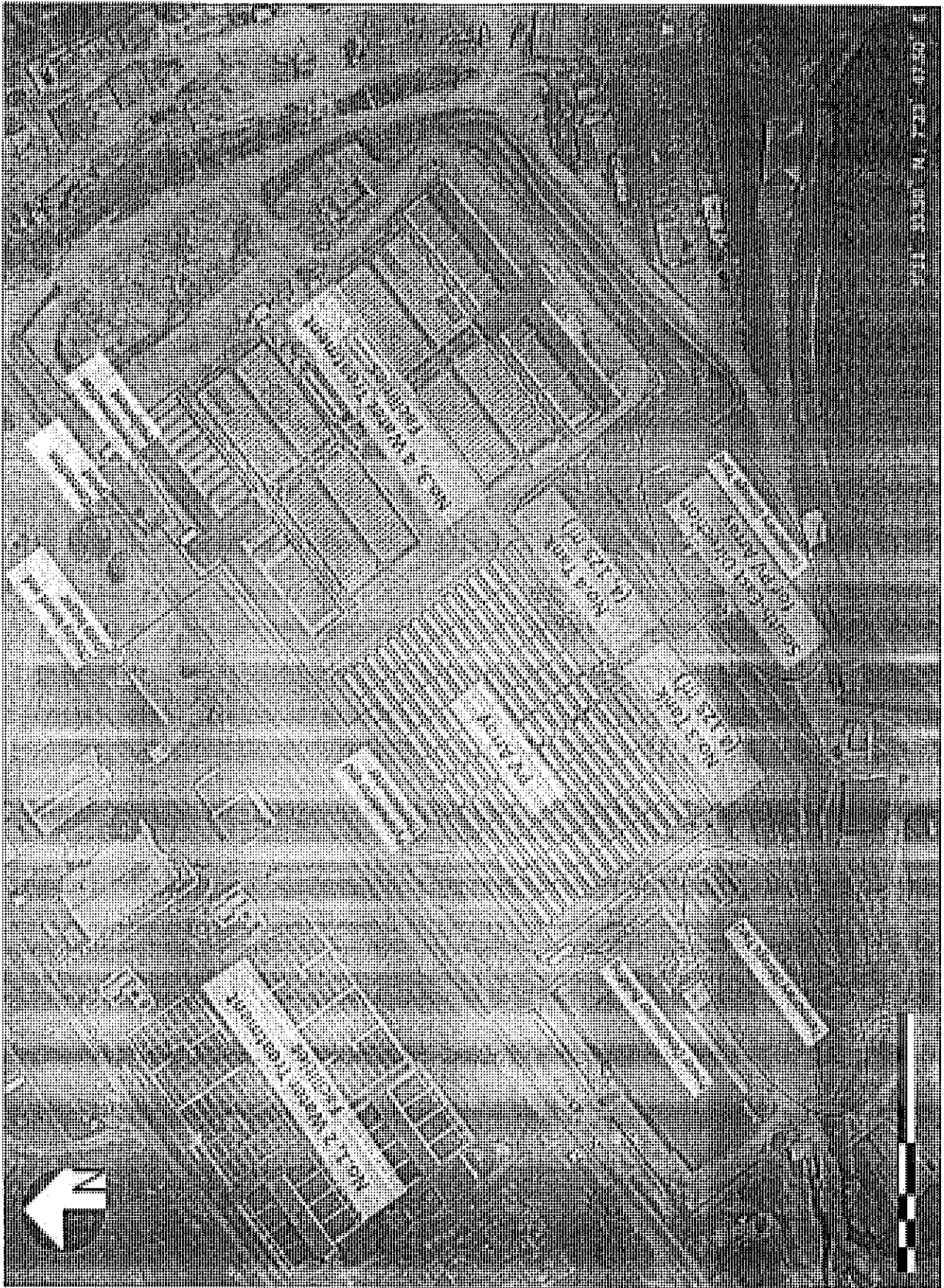
No.	Items	To be covered by Grant Aid	To be covered by Recipient Side	
			FMOP	FCTWB
5	To ensure prompt unloading and customs clearance of the products at ports of disembarkation in the recipient country and to assist internal transportation of the products			
	1) Marine (Air) transportation of the Products from Japan to the recipient country	●		
	2) Tax exemption and custom clearance of the Products at the port of disembarkation		●	
	3) Internal transportation from the port of disembarkation to the project site	●		
6	Securement of area for temporary storage and offices		● Arrangement	● Securement
7	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		● Arrangement	● Support
9	To maintain and use properly and effectively for the facilities that are constructed and the equipment that is provided under the Grant		● Monitoring	● Implementation
10	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		●	●
11	To give due environmental and social consideration in the implementation of the Project.		●	
12	Countermeasures against vandalism		●	●

Location of Project Site



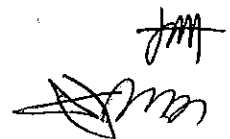
JMA
mm

Layout of Photovoltaic System at the Lower Usuma Dam Water Treatment Plant



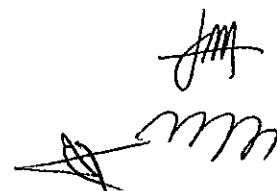
Handwritten signatures and initials.

This page is closed due to the confidentiality.

Handwritten signature in black ink, consisting of several stylized, overlapping loops and lines.

Terms of Reference of the Consultative Committee (Provisional)

1. To confirm an implementation schedule of the Project for the speedy and effective utilization of the Grant and its accrued interest.
2. To discuss the modifications of the Project, including modification of the design of the facility.
3. To exchange views on allocations of the Grant and its accrued interest as well as on potential end-users.
4. To monitor the progress of implementation of the undertakings required by the Recipient Country and to take proactive and effective actions to complete the undertakings in accordance with the targeted schedule in case any delay would be expected or observed.
5. To identify problems which may delay the utilization of the Grant and its accrued interest, and to explore solutions to such problems.
6. To exchange views on publicity related to the utilization of the Grant and its accrued interest.
7. To discuss any other matters that may arise from or in connection with the G/A.

Handwritten signatures and initials in the bottom right corner, including a signature that appears to be 'JMM' and another set of initials 'mm' with a large 'A' or similar mark to the left.

**PREPARATORY SURVEY
ON
THE PROJECT FOR
INTRODUCTION OF CLEAN ENERGY
BY SOLAR ELECTRICITY GENERATION
SYSTEM
IN THE FEDERAL REPUBLIC OF NIGERIA**

Soft Component Plan

March 2014

YACHIYO ENGINEERING CO., LTD.

Contents

1. Background to Planning the Soft Component	1
2. Goals of the Soft Component.....	1
3. Outputs of the Soft Component.....	2
4. Method for Confirming the Degree of Attainment of Outputs.....	3
5. Soft Component Activities (Input Implementation Plan)	4
5-1 Contents and Activities of the Soft Component.....	4
5-2 Input Implementation Plan	7
6. Procurement of Implementation Resources for the Soft Component	9
7. Soft Component Implementation Schedule.....	10
8. Outputs	11
9. Soft Component Cost Estimation	11
10. Obligations of the Implementing Agencies in Nigeria	11

1. Background to Planning the Soft Component

The goal of the Project for Clean Energy Promotion Using Solar Photovoltaic System in the Federal Republic of Nigeria (the Project) is to procure and install electric equipment, such as transformer for the grid-connected photovoltaic system at Lower Usama Dam Water Treatment Plant (the Plant). Within the scheme of the Program Grant Aid for Environment and Climate Change, the amount for the project implementation is required to fall within 3 percent of the Grant Amount. Therefore, it is possible that the total installed capacity of the Project will reach 1 MWp.

Mechanical and Electricity Section under the Distribution Department, has 2 mechanical technicians 9 electrical technicians, 5 operators, and 1 plumber; in total, a personnel of 17 members is in charge of the operation and maintenance of overall facilities. This Section will owe the responsibility of the operation and maintenance of the photovoltaic system. The Plant receives 33 kV distribution line from the national grid and the power is transmitted within the Plant with 11 kV. Thus, the Mechanical and Electricity Section has the knowledge and experience of general electrical facilities. However, they hardly have the knowledge and techniques specifically for the photovoltaic system. In addition, since PHCN and FMOP have scarce experience on the operation of grid-connected power system, they do not have rigid knowledge on the system and relevant regulations have not been established yet.

The soft component aims to support the smooth operation and maintenance of the system after the completion of the Project. The main targeted participants will be Mechanical and Electricity Section of the Plant, and the soft component will aim at the technology transfer on the operation and maintenance of the grid-connected photovoltaic system. Also, since the agency responsible of the national grid is required to obtain principle of the grid-connected photovoltaic system, participants will be dispatched from Power Holding Company of Nigeria (PHCN). In addition, participants from Federal Ministry of Power (FMOP), the regulatory agency on the energy sector, is expected to participate in the soft component for the knowledge transfer on the technical requirement for the operation of the grid-connected photovoltaic system.

2. Goals of the Soft Component

Goals of the soft component are as follows:

- (1) Establishment of the operation and maintenance setup for the grid-connected photovoltaic system
- (2) Technology transfer on the operation and maintenance of the grid-connected photovoltaic system
- (3) Steadily operating the distribution network connected to the photovoltaic system

3. Outputs of the Soft Component

Anticipated output of the soft component is shown in Table 3-1.

Table 3-1 Outputs of the soft component

Goal	Output of the soft component	Targets
1. Establishment of the operation and maintenance setup for the grid-connected photovoltaic system	1-1 Establishment of the operation and maintenance organization for the grid-connected photovoltaic system	<ul style="list-style-type: none"> • Mechanical and Electricity Section, the Plant
	1-2 The outline and characteristics (including reverse power flows) of the grid-connected photovoltaic system are understood.	<ul style="list-style-type: none"> • Mechanical and Electricity Section, the Plant • PHCN • FMOP
2. Technology transfer on the operation and maintenance of the grid-connected photovoltaic system	2-1 Operation and maintenance method on the grid-connected photovoltaic system will be acquired.	<ul style="list-style-type: none"> • Mechanical and Electricity Section, the Plant
	2-2 Establishment of the operation and maintenance system of the grid-connected photovoltaic system	
	2-3 Methods of troubleshooting on the grid-connected photovoltaic system will be acquired.	<ul style="list-style-type: none"> • Mechanical and Electricity Section, the Plant • Administration of the Plant
3. Steadily operating the distribution network connected to the photovoltaic system	3-1 Monitoring system will be established and the methods will be acquired.	<ul style="list-style-type: none"> • Mechanical and Electricity Section, the Plant • PHCN • FMOP
	3-2 Preparation of the operation and maintenance manual	<ul style="list-style-type: none"> • Mechanical and Electricity Section, the Plant

Following items will be instructed by the Contractor as components of Initial Operation Training and Maintenance Training.

- Inspections, checks and measurements on completion of the grid-connected photovoltaic system and at the start of the operations
- Trial operation methods
- Routine inspections following the start of operation

As indicated above, under the Initial Operation Training and Maintenance Training, the Contractor will instruct the applied techniques based on the basic operation and maintenance methods such as operation and inspection with the consideration to the specification. On the other hand, the purpose of this soft component will instruct the

basic technology transfer which will be required such as the formulation of the operation and maintenance of the grid-connected photovoltaic system, principle of photovoltaic system, techniques on the grid-connection. Hence, the contents of the Soft Component will complement with the Initial Operation Training and Maintenance Training.

4. Method for Confirming the Degree of Attainment of Outputs

The outputs of the soft component will be gauged through confirming the prepared operation and maintenance manual and reports of the participants. Table 4-1 shows the method for confirming outputs by activity and contents. In the manual, it will be confirmed that all necessary items concerning operation and maintenance organization and roles, daily operation, periodic inspections and troubleshooting, etc. are covered, and the technical contents are stated without error, while advice and guidance will be offered where needed. In reports, trainees will be asked to state the contents of technology transfer as they understand them by theme, and their level of understanding of the lecture contents will be evaluated. Moreover, concerning items for which understanding is found to be inadequate, supplementary lectures will be given.

Table 4-1 Method for confirming the soft component outputs

Targets	Outputs of the soft component	Method for confirming the degree of attainment
Mechanical and Electricity Section, the Plant	<ul style="list-style-type: none"> • The operation and maintenance organization for the grid-connected photovoltaic system is established. • The outline and characteristics (including reverse power flows) of the grid-connected photovoltaic system are understood. • Operation and maintenance methods on the grid-connected photovoltaic system will be acquired. • The operation and maintenance system of the grid-connected photovoltaic system will be established • Troubleshooting methods on the grid-connected photovoltaic system will be acquired. • Monitoring system will be established and the methods will be acquired. • The operation and maintenance manual will be prepared. 	<ul style="list-style-type: none"> • Report • Manual
Administration of the Plant	<ul style="list-style-type: none"> • Troubleshooting methods for the grid-connected photovoltaic system are established 	<ul style="list-style-type: none"> • Report

Targets	Outputs of the soft component	Method for confirming the degree of attainment
PHCN	<ul style="list-style-type: none"> • The outline and characteristics (including reverse power flows) of the grid-connected photovoltaic system are understood. • Monitoring system will be established and the methods will be acquired. 	<ul style="list-style-type: none"> • Report
FMOP	<ul style="list-style-type: none"> • The outline and characteristics (including reverse power flows) of the grid-connected photovoltaic system will be understood. • Monitoring system will be established and the methods will be acquired. 	<ul style="list-style-type: none"> • Report

5. Soft Component Activities (Input Implementation Plan)

5-1 Contents and Activities of the Soft Component

As is shown in Table 5-1, the activities of the soft component extend from the basics of solar photovoltaic cells to operation, maintenance and monitoring. The techniques for transferring technology will be classroom lecture, drill (manual preparation by trainees) and practical training using equipment. The solar photovoltaic modules, measuring instruments and tools scheduled to be procured under the Project will be used in the practical training.

Although it is presumed that the reverse power flow from the Plant to the national grid is not going to occur, the contents of the reverse power flow will be a part of soft component, considering that the grid-connected photovoltaic system with reverse power flows will be installed to Nigeria in the future.

Table 5-1 Contents of soft component activities and method of technology transfer

Goal	Soft component output	Contents of activities	Technology transfer method	Targets
1. Establishment of the operation and maintenance setup for the grid-connected photovoltaic system	1-1 The operation and maintenance organization for the grid-connected photovoltaic system is established.	<ul style="list-style-type: none"> Clarification of the responsibilities of operation and maintenance personnel 	<ul style="list-style-type: none"> Classroom lecture Classroom lecture, group training 	<ul style="list-style-type: none"> Mechanical and Electricity Section, the Plant
	1-2 The outline and characteristics of the grid-connected photovoltaic system are understood.	<ul style="list-style-type: none"> The principles and basic knowledge of the photovoltaic system will be acquired. Features and protective functions (including reverse power flows) of the grid-connected photovoltaic system will be understood. Examination items when installing the grid-connected photovoltaic system will be acquired. 	<ul style="list-style-type: none"> Classroom lecture Group training 	<ul style="list-style-type: none"> Mechanical and Electricity Section, the Plant PHCN FMOP
2. Technology transfer on the operation and maintenance of the grid-connected photovoltaic system	2-1 Operation and maintenance personnel acquire the technologies to operate and maintain the grid-connected photovoltaic system.	<ul style="list-style-type: none"> Operation methods of the grid-connected photovoltaic system will be established. Maintenance methods of the grid-connected photovoltaic system will be established. 	<ul style="list-style-type: none"> Classroom lecture Practical training (Operation control with equipment) Practical training (Preparation of inspection list) Practical training (Meggering, open voltage measuring) 	<ul style="list-style-type: none"> Mechanical and Electricity Section, the Plant
	2-2 The operation and maintenance system of the grid-connected	<ul style="list-style-type: none"> Evaluation and revision of the operation and maintenance system 	<ul style="list-style-type: none"> Classroom training 	<ul style="list-style-type: none"> Mechanical and Electricity Section, the Plant

	photovoltaic system will be established				
3. The distribution network connected to the photovoltaic system will be steadily operated.	2-3 Troubleshooting methods for the grid-connected photovoltaic system are established	<ul style="list-style-type: none"> Troubleshooting methods on the grid-connected photovoltaic system will be established. 	<ul style="list-style-type: none"> Classroom lecture, group training Practical training (Operation and countermeasures against accidents based on the manual) 	<ul style="list-style-type: none"> Mechanical and Electricity Section, the Plant Administration of the Plant 	
	3-1 Monitoring system will be established and the methods will be acquired.	<ul style="list-style-type: none"> Monitoring method will be established. Periodical inspection and its methods will be acquired. Inspection items and evaluation methods for the monitoring will be acquired. Methods of preparing the monitoring report will be understood. 	<ul style="list-style-type: none"> Classroom training Practical training (operation record and evaluation, monitoring of equipment) 	<ul style="list-style-type: none"> Mechanical and Electricity Section, the Plant PHCN FMOP 	
	3-2 Preparation of operation and maintenance manual	<ul style="list-style-type: none"> Operation and maintenance manual will be prepared by Nigeria side. 	<ul style="list-style-type: none"> Classroom training, practical training (Preparation of manual) 	<ul style="list-style-type: none"> Mechanical and Electricity Section, the Plant 	

5-2 Input Implementation Plan

(1) Input Implementation Plan on the Japanese Side

Through implementing the activities shown in Table 5-1, the necessary technology will be transferred to enable the Plant of Federal Capital Territory Water Board (FCTWB) (operation and maintenance agency) to concretely understand and practice operation and maintenance of the grid-connected photovoltaic system. Moreover, technology transfer concerning outline of the grid-connected photovoltaic system and important points to consider in operation will be carried out with respect to PHCN (operator of the power distribution network), and FMOP (monitoring and regulatory agency for the power system). The contracted consultant will dispatch two engineers (one in charge of the photovoltaic system and the other in charge of grid connection) to Nigeria to carry out the technology transfer (Soft Component) over the period indicated in Table 5-2.

Table 5-2 Input plan concerning the soft component

Name	Rank	Dispatch period	Number of trips	Work contents
1. Construction of the operation and maintenance setup				
Instructing engineer 1 (Photovoltaic system)	3	0.5 months (12 days)	1	<ul style="list-style-type: none"> · Formulation of operation and maintenance setup · Confirmation of the rules of each section and department in the operation and maintenance setup · Technology transfer on the outline and characteristics of the photovoltaic system
Instructing engineer 2 (Grid connection)	3	0.5 months (12 days)	1	<ul style="list-style-type: none"> · Formulation of the operation and maintenance system with the FMOP and PHCN · Confirmation of the rules of each agencies in the operation and maintenance setup · Technology transfer on the outline and characteristics of the photovoltaic system
2. Technical training				
Instructing engineer 1 (Photovoltaic system)	3	0.5 months (12 days)	1	<ul style="list-style-type: none"> · Technology transfer on the principle of photovoltaic system · Practical training with the actual system (measurement of open voltage and short circuit current, understanding of the graph of I-V curve) · Preparation of inspection checklist for the operation and maintenance
Instructing engineer 2 (Grid connection)	3	0.5 months (12 days)	1	<ul style="list-style-type: none"> · Trouble shooting and countermeasures against grid accident and in-plant accident · Problems occurring when the grid-connected photovoltaic system · Technology transfer on the grid-interconnection code
3. Monitoring				
Instructing engineer 1 (Photovoltaic system)	3	0.5 months (12 days)	1	<ul style="list-style-type: none"> · Technology transfer on the monitoring of photovoltaic system to the operation and maintenance agency · Preparation of the operation and maintenance manual
Instructing engineer 2 (Grid connection)	3	0.5 months (12 days)	1	<ul style="list-style-type: none"> · Technology transfer on the monitoring of photovoltaic system to the FMOP and PHCN · Preparation of the operation and maintenance manual

(2) Input implementation plan on the Nigerian side

Inputs on the Nigerian side include the appointment and dispatch of trainees to take part in the soft component, launch of the operation and maintenance organization, establishment of the operating organization for ensuring the smooth implementation of the soft component, and so on. Specific contents are as described below.

1) Photovoltaic System Operating Committee (Provisional name)

Before the start of the soft component, the Federal Ministry of Power will establish the Photovoltaic System Operating Committee (provisional title) with the objectives of securing the smooth implementation of the soft component and sustained operation after the soft component is finished. As the de facto receiving agency for the soft component, as well as the forum for gauging achievement of the soft component, exchanging opinions and discussing issues, this committee will hold regular meetings during the Project to ensure that the Project equipment is operated and maintained smoothly. At the same time, Photovoltaic System Working Group, comprised of staffs of the Plant who will have the direct responsibility of the operation and maintenance of the system, will be established. Following completion of the soft component, the Photovoltaic System Operating Committee will guide the Photovoltaic System Working Group to ensure that the Project equipment is operated and maintained smoothly. The Photovoltaic System Working Group will report on the operation and maintenance conditions of the photovoltaic system to the Photovoltaic System Operating Committee and receive guidance and advise when needed.

The Photovoltaic System Operating Committee will have its office inside the Lower Usuma Dam Water Treatment Plant. FMOP will be the head of this Committee and FCTWB and PHCN will be the member. Each agency will contribute one or two members from relevant departments. Figure 5-1 shows the organization chart of the Photovoltaic System Operating Committee.

The Photovoltaic System Operating Committee and the Photovoltaic System Working Group will work according to the implementation setup indicated in Table 5-3 and will discuss the following matters in readiness for the dissemination of the grid-connected photovoltaic system:

- Issues concerning operation and maintenance of the grid-connected photovoltaic system
- Impact of the grid-connected photovoltaic system on operation of the power company's distribution system and the quality of electricity
- Impediments to disseminating the grid-connected photovoltaic system in Nigeria
- Legal controls for disseminating the grid-connected photovoltaic system in Nigeria
- Technical standards for disseminating the grid-connected photovoltaic system in Nigeria (includes reverse power flows).

2) Photovoltaic System Working Group plan

Established as a subordinate organization to the Photovoltaic System Operating Committee, the Photovoltaic System Working Group will implement the operation and maintenance of the grid-connected photovoltaic system under the committee's guidance and supervision.

Table 5-3 shows the implementation setup of the Photovoltaic System Operating Committee and the Photovoltaic System Working Group.

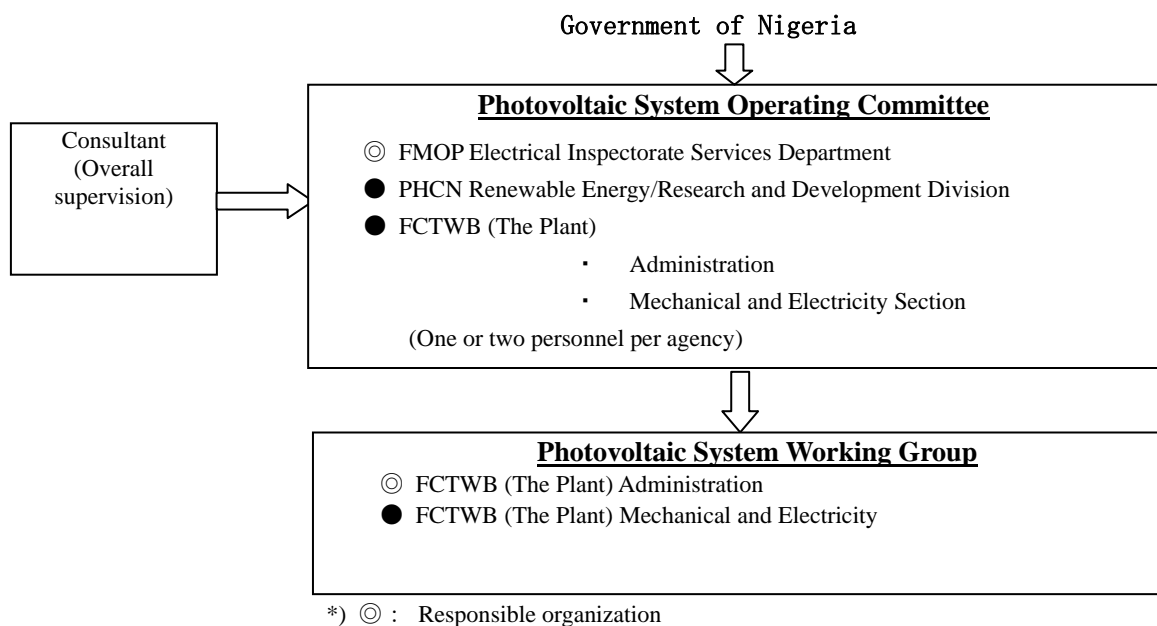


Figure 5-1 Photovoltaic System Operating Committee implementation setup (Plan)

Table 5-3 Photovoltaic System Operating Committee implementation setup (Plan)

	Japanese Consultant	Photovoltaic System Operating Committee	Photovoltaic System Working Group
Project organization	2 members	5 – 10 members	3 – 5 members
Project operation method	Management of overall progress	Overall work management	Actual maintenance
Orientation on the Project contents	Explanation	Hosting	Hosting and participation
Operation and maintenance manual	Advice	Draft check	Draft preparation
Operation and maintenance follow-up	Management and guidance	Report of the operation and maintenance	Report of the operation and maintenance
Report destination (s)	Embassy of Japan in Nigeria and JICA	Japanese consultant	Photovoltaic System Operating Committee

6. Procurement of Implementation Resources for the Soft Component

The supplier of photovoltaic equipment and main equipment in the Project shall be from Japan, based on the intent of the Program Grant Aid for Environment and Climate Change. Therefore, it will be

necessary for the engineers dispatched in the soft component to be well-versed in Japanese products and systems. There are engineers that carry out photovoltaic system installation in Nigeria; however, they have only handled European and Chinese products and do not possess ample experience concerning grid-connected systems. Therefore, regarding the implementation resources for the soft component, a scheme of direct support by a consultant that is well-versed in Japanese photovoltaic systems and grid-connected systems will be adopted.

7. Soft Component Implementation Schedule

Table 7-1 shows the soft component implementation schedule.

The engineers dispatched from Japan will implement the soft component according to the categories indicated in that table. The timing of each category will be as follows:

➤ **Construction of the operation and maintenance setup**

This will be implemented to support construction of the maintenance setup. As clarifying the maintenance setup before installing the equipment will stimulate the awareness of concerned parties during installation, this will be implemented before the equipment is installed.

➤ **Technical training**

Training on installation, inspection and operation will be conducted using actual equipment. In order to prepare the maintenance manual required before the start of equipment operation, the training will be conducted during the period of photovoltaic arrays installation.

➤ **Monitoring**

As monitoring will be implemented with the emphasis on confirming that the Nigerian side is autonomously conducting maintenance, it will be implemented after the commissioning and handing over of the system.

Table 7-1 Soft component implementation schedule

		2015												2016				
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
Preparation work		■																
Foundation and installation works for mounting structure			■	■	■	■	■	■										
Module inspection					■	■												
Photovoltaic arrays installation work							■	■	■									
Testing and adjustment																	■	
Initial Operation Training and Maintenance Training																	■	
Acceptance Test and handing over																	▼	
Soft component	1. Operation and Maintenance System				■													
	2. Technical training							■										
	3. Monitoring																■	
Document	Operation and Maintenance Manual				→													
	Report of implementation status							→										
	Report of completion																	→

8. Outputs

As is stated in Table 7-1, the outputs of the soft component will consist of the operation and maintenance manual (including troubleshooting), implementation status report (progress report in English), completion report (final report in English) and the teaching materials used in the technology transfer.

9. Soft Component Cost Estimation

The estimated cost of the soft component is 11,757,000 yen, and Table 9-1 shows the breakdown of this.

Table 9-1 Soft component cost estimation

Item	Cost (Unit: 1000 yen)
Direct personnel expenses	2,334
Direct costs	6,436
Indirect costs	2,987
Total	11,757

10. Obligations of the Implementing Agencies in Nigeria

The followings are responsibilities on the Nigerian side related to the soft component:

- The Plant will organize the Photovoltaic System Operating Committee
- The Plant will provide the conference rooms, etc. needed for implementing the soft component.
- The Plant will provide necessary personnel for the soft component
- Photovoltaic System Operating Committee will prepare the operation and maintenance manual in close cooperation with the Japanese consultant
- The Plant will operate and maintain the grid-connected photovoltaic system properly in line with the operation and maintenance manual
- The Plant will submit performance reports to the Japanese consultant for a certain period based on the operation and maintenance manual


**PREPARATORY SURVEY
ON
THE PROJECT FOR
INTRODUCTION OF CLEAN ENERGY
BY SOLAR ELECTRICITY GENERATION SYSTEM
IN THE FEDERAL REPUBLIC OF NIGERIA**

THE FIRST FIELD SURVEY

FIELD REPORT

27TH SEPTEMBER, 2013


Mr. Kazunari Nogami
Chief Consultant for the Project
Yachyo Engineering Co., Ltd.


Engr. A. Adebisi
Acting Director
Electrical Inspectorate and Services Department
Federal Ministry of Power


Engr. J.B. Anto
Director
Federal Capital Territory Water Board

Table of Contents

1. Introduction	1
2. Project site location	1
3. Components of the Project	3
3.1 Final requested components	3
3.2 Drawings	4
3.3 Technical issues discussed and confirmed in the first field survey	4
3.4 Terminal Points with the existing equipment and facilities	7
4. Environmental and Social Considerations	9
4.1 Procedures for environmental and social considerations in Nigeria	9
4.2 Land acquisition	10
5. Work Demarcations between the Nigerian and Japanese Side	10
6. Project Implementation Schedule	12

Drawings

G-01	General layout of the Project site
G-02	Layout of the PV arrays
E-01	Single line diagram of the Lower Usuma Dam Water Treatment Plant
E-02	Single line diagram of the PV system of 800 kWp
E-03	Connection arrangement with the existing electrical equipment
A-01	Mounting Structure Foundation (1) Typical Section on Reservoir
A-02	Mounting Structure Foundation (2) Typical Section at Central Passage
A-03	Power Conditioner Building (1) Location, Section
A-04	Power Conditioner Building (2) Plan, Elevation, Section
A-05	Power Conditioner Building (3) Finishing Schedule, Fitting List
A-06	Power Conditioner Building (4) Facilities Plan

ANNEX

ANNEX 1	Members of the Team
ANNEX 2	Minutes of Discussions signed on 19 th September, 2013
ANNEX 3	Plan of Internal Traffic Route and Stockyards for Construction Materials /Equipment
ANNEX 4	Specifications of the Equipment



The Project is composed of procurement and installation of Approx. 800 to 900 kWp of PV system.

The layout of the components of the Project at the Plant is shown in Figure 2. FMOP, FCTWB and the Team agreed that the PV arrays of the Project will be located on the top surface of No.3 and No.4 Tanks, and over the part between No.3 and No.4 Tanks at the Plant (Approx. 8,800m²) as shown in Figure 2. FMOP, FCTWB and the Team also agreed that the power conditioner building of the Project will be located at the north western corner of No.3 Tanks as shown in Figure 2.

In addition, the Team explained that areas of at least 2,500m² for temporary use such as construction of project site offices and workshops, and storage of materials and equipment are also necessary during the period of execution of the Project and shall be provided by the Plant and FCTWB free of charge to Japanese side. The tentative locations of such areas proposed by the Team are shown in Figure 2.

Also, FCTWB agreed to permit the usage of above mentioned land and facilities for installation of the equipment.

However, the area is dependent on capacity of the PV system of the Project. More definite size will be considered by the Team based on the Outline Design and cost estimation in Japan, discussed between the Ministry of Foreign Affairs, JICA and the Team and explained to the Nigerian side in the second field survey.



Source: JICA Study Team using Google Earth

Figure 2 Layout of the components of the Project at Lower Usama Dam Water Treatment Plant

Handwritten signatures and initials.

1. Introduction

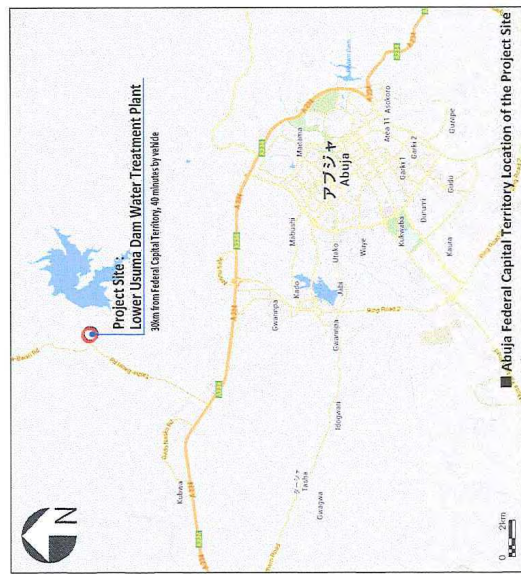
Japan International Cooperation Agency (JICA) dispatched a survey team to the Federal Republic of Nigeria to appraise the Project for Introduction of Clean Energy by Solar Electricity Generation System in the Federal Republic of Nigeria (the Project) which was requested by the Government of Nigeria in a new scheme of Japan's Grant Aid, "Program Grant Aid for Environment and Climate Change". The Project is aimed at introducing large scale of on-grid photovoltaic (PV) system.

The Federal Ministry of Power (FMOP), Federal Capital Territory Water Board (FCTWB) and JICA Preparatory Survey Team for the Project (the Team) had series of technical discussions to form a mutual understanding of the contents and the scope, and preconditions for the Outline Design of the Project at the stage of the first survey and three parties agreed to record the following points as a conclusion of the discussions.

Components of the Project will be further examined and may be modified through the consultation with the Ministry of Foreign Affairs and JICA headquarters. It is important for both sides to understand that the Preparatory Survey is not a commitment for the future implementation of the Project.

2. Project site location

The Project site is located at the Lower Usama Dam Water Treatment Plant (the Plant), Abuja.



Source: JICA Study Team using Google Map

Figure 1 Project Site Location

Handwritten signatures and initials.

3. Components for the Project

3.1 Final Requested Components

The Nigerian and Japanese sides agreed on the final requested components in conformity with the Minutes of Meetings on 19th September, 2013 in the first field survey as shown below.

Table 1 Outline of the Project

Components	Quantity or Capacity
1. PV system 1.1 Micro-grid control system (1) Solar PV arrays (Crystalline Silicon Type) (2) Junction box (3) Collecting box (4) Power conditioners (5) Low voltage main circuit breakers panel (6) Transformer for interconnection (7) High voltage circuit breaker panel 1.2 Data management system (1) Data logger including UPS system (2) Display system (3) Weather monitor instruments (Pyranometer, Temperature meter) 2. Cables and fitting materials	800 to 900 kWp 1 lot 1 lot Total capacity of the connected photovoltaic modules or more 1 unit 1 unit 1 set 1 set 1 set 1 lot
1. Spare parts 2. Maintenance tools (including high pressure washing machines)	1 lot 1 lot
a. Mounting Structures for the PV arrays b. Foundations for the PV arrays c. Power Conditioner Building	for the PV arrays of 800 to 900 kWp for the PV arrays of 800 to 900 kWp Gross floor area: Approx. 77.5 m ²

Source: JICA Study Team

In addition to the components mentioned above, soft component to improve knowledge and techniques for operation and maintenance of the PV system will be included in the Project.

The Exchange of Notes (E/N) and Grant Agreement (G/A) for the Project were already concluded in 2012 between the Nigerian side and Japanese side. According to the E/N and G/A, the grant amount is nine hundred and eighty million Japanese Yen (¥980,000,000).

After discussions with the Team considering this, the installation of the on-grid power generating system using PV without power storage system including following equipment was requested by the Nigerian side in the Minutes of Discussions signed on 19th September, 2013. However, the Nigerian side and the Team confirmed that the capacity of PV arrays of the Project might be changed as the result of detail analysis in Japan including system design and cost estimation based on the data and information collected in the first field survey in Nigeria.

3.2 Drawings

The following drawings are attached to this field report.

- G-01 General layout of the Project site
- G-02 Layout of the PV arrays
- E-01 Single line diagram of the Lower Usama Dam Water Treatment Plant
- E-02 Single line diagram of the PV system of 800 kWp
- E-03 Connection arrangement with the existing electrical equipment
- A-01 Mounting Structure Foundation (1) Typical Section on Reservoir
- A-02 Mounting Structure Foundation (2) Typical Section at Central Passage
- A-03 Power Conditioner Building (1) Location, Section
- A-04 Power Conditioner Building (2) Plan, Elevation, Section
- A-05 Power Conditioner Building (3) Finishing Schedule, Fitting List
- A-06 Power Conditioner Building (4) Facilities Plan

3.3 Technical issues discussed in the first field survey

(1) Location of the PV arrays

FMOP, FCTWB and the Team agreed that the PV arrays of the Project will be located on the top surface of No.3 and No.4 Tanks, and over the part between No.3 and No.4 Tanks at the Plant (Approx. 8,800m²) as shown in Drawing No. G-02. FMOP, FCTWB and the Team also agreed that the power conditioner building will be located as shown in Drawing No. G-02.

FMOP, FCTWB and the Team also agreed that the detail layout of the PV arrays on the top surface of No.3 and No.4 Tanks, and over the part between No.3 and No.4 Tanks may be changed in accordance with the Outline Design conducted by the Team in the analysis in Japan with paying attention to discussions in the first field survey.

(2) Operational conditions of the water treatment plants at the Plant and reverse power to the commercial grid from the PV system

The Team confirmed the demand of each 11 kV trunks (total 3 feeders) from 1st of November, 2012 to 17th September, 2013 at the Plant. As the result, it is assumed that introduction of PV system of Approx. 900 kWp at the Plant could cause reverse power from the PV system to the commercial grid of the distribution company.

However, it is explained by FCTWB that such reverse power to the commercial grid of the distribution company will not happen at the time of commissioning of the PV system of the Project in consideration of the followings.

- Though No.3 and No.4 Plants have been constructed in respond to remarkable increase of water demand in the Federal Capital Territory, these plants are still in condition of test

operation currently. When the PV system of the Project is commissioned, No.3 and No.4 Plants will have been operated in full load in addition to No.1 and No.2 Plants currently operating in full load.

- Through the plants at the Plant are currently operated in accordance with demand, they will be operated so that energy from the PV system can be consumed in the Plant fully with adjusting tank balance after the PV system of the Project is commissioned.

(3) Maintenance of the PV arrays

As Nigeria has harmattan season, cleaning of the PV arrays shall be carried out frequently to apply the PV system effectively in the season. However, cleaning of the PV system after harmattan is too heavy labor to carry out only in human power in consideration of such huge scale of the PV system of the Project as 800 to 900 kWp. FMOP, FCTWB and the Team agreed that it is required to procure equipment to clean the PV arrays efficiently in the Project such as high pressure washing machines. The Team agreed to suggest the components as the scope of the Japanese side to the Japanese related organization in the analysis in Japan after the first field survey.

To use such high pressure washing machines on the top surface of No.3 and No.4 Tanks, electric sockets and water taps shall be provided in interval of Approx. 20 m along the catwalks procured and installed in the Project for maintenance of the PV arrays. The Team also agreed to suggest the components as the scope of the Japanese side to the Japanese related organization in the analysis in Japan after the first field survey, in case that high pressure washing machines will include the components.

FCTWB agreed that the electric sockets and water taps will be installed on the top surface of No.3 and No.4 Tanks by the Japanese side, in case that high pressure washing machines will include the components. FCTWB also agreed that the booster pump to supply enough pressure to the water lines to use high pressure washing machines properly will be installed at the branch point from the existing water utility line at the Plant as the scope of the Japanese side, if necessary.

However, the branch point with a valve for the water supply line to the Project site shall be prepared near the PV arrays by FCTWB.

(4) Countermeasures against vandalism

Based on the scheme of the Program Grant Aid of Japan, the projects for Introduction of Clean Energy by Solar Electricity Generation System have been carried out all over the world by JICA. Through these experiences, it is revealed that countermeasures against vandalism such as stone-throwing to the PV arrays or stealing of the PV modules shall be considered properly before implementation of the Project. Especially, in case of the Project, as the public can come

close to the PV arrays which are located on the top surface of No.3 and No.4 Tanks, countermeasures against vandalism shall be considered carefully. FMOP and FCTWB agreed to consider countermeasures against vandalism before the second field survey and suggest to the Team in the second field survey.

(5) Mounting structures and foundations for the PV arrays

The PV arrays for the Project will be installed on top of the roof slab of No.3 and No.4 Tanks as shown on Drawing G-02

The Team proposed and Nigerian side agreed that the design concept of the installation of the arrays is as follows:

- 1) Design loads to be considered for installation of the arrays including their mounting structures and foundations shall be less than those considered for the design of the existing tanks, such as precast roof units, beams, columns, walls and base slabs.
- 2) The mounting structures will be made of steel shapes and the foundations will be of reinforced concrete.
- 3) To achieve the above policy, the loads of 5 cm thick of gravel laid on top of the roof slab shall be offset with the loads of the arrays including their mounting structures and foundations by removing the gravel in 5 cm thick from the top of the roof slab. The Team confirmed from FCTWB as well as the Plant that the purpose of installation of gravel is to protect the top surface of roof slab against damages to be caused by direct sunshine and growth of grasses, and is also for ease of rainwater drainage on top of the roof, while such protection can be maintained after installation of the arrays together with remaining 5 cm thick of gravel left on top of the roof slab.
- 4) The Team shall design the layout of arrays, mounting structures and foundations in order to assure the access to the openings for inspection of inside of the tanks and the avoidance of interference with the air vents installed on top of the roof slab. The Team shall also provide corridors 1.3m wide made of expanded metal between the arrays for inspection and cleaning of arrays installed on top of the roof slab.
- 5) The Team shall also provide the different types of supporting structures and foundations for the arrays to be installed between No.3 and No.4 Tanks. The sufficient clearance between the ground surface and lower face of the supporting beams of the arrays between No.3 and No.4 Tanks shall be secured for easy passage and work required for the operation and maintenance of the tanks and the arrays by the staffs of the Plant.
- 6) Nigerian side shall ensure that such modification of the structural design of the tanks can be made by the Team, while the Team shall ensure that the design concept mentioned above

can be assured.

- 7) Nigerian side shall also settle whatever rearrangement of the contract with the Contractor, Bivwater International Limited, in terms of guarantee of their design and construction of the said tanks.

3.4 Terminal Points with the existing equipment and facilities

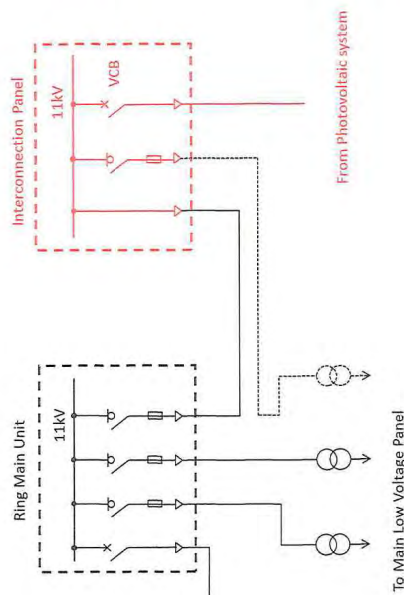
(1) Interconnection point with the existing electrical system

FMOP, FCTWB and the Team agreed that the PV system of the Project will be connected to the 11 kV system at No.3 and No.4 Plants in consideration of two points below.

- As the bus composition of the main low voltage panel of No.3 and No.4 Plants is complex, and complex interlock-logic exists. If the PV system of the Project is connected to the low voltage system at No.3 and No.4 Plants, mishandling is concerned.
- As the scale of the PV system of the Project is assumed as 800 to 900 kWp and length from power conditioners to the interconnection point is more than 200 m, voltage drop between the parts is severe in case of application of cables whose size are general in the market.

(2) Interconnection method with the existing electrical system

FMOP, FCTWB and the Team agreed that the interconnection method of the PV system will be arranged as shown in Figure.3 in consideration of the followings.



Source: JICA Study Team

Figure.3 Interconnection Method

- An empty feeder exists in the 11 kV system at No.3 and No.4 Plants in addition to two

[Handwritten signature]

occupied feeders for the existing transformer banks of 1,000 kVA each. This empty feeder is for the future expansion of a transformer bank to respond to the assumed growth of water demand in the Federal Capital Territory. If the PV system, which does not hold load following function and operates as supplemental power source, is connected to the feeder, it will obstruct the original designing philosophy of No.3 and No.4 Plants. Therefore, the interconnection method as shown in Figure.3 will be applied to secure the feeder for the future expansion of a transformer bank even if the PV system is connected to the feeder.

- The Project site, the Plant is the critical infrastructures operated and maintained as water source of the Federal Capital Territory. The interconnection method shall carefully be designed so that troubles and failures of the PV system will not affect to the other electric system of the Plant and the PV system will be isolated immediately after detection of such troubles and failures. Therefore, a circuit breaker at the interconnection point shall be procured and installed as the scope of the Japanese side to isolate the PV system immediately after detection of a short circuit or ground fault on the line between the interconnection point and the interconnection transformer of the Project.

(3) Protection system for interconnection

It is confirmed in the operational records of the Plant that the quality of supplied power around the Plant is not as stable as it is in Japan. Therefore, FMOP, FCTWB and the Team agreed that protection system for interconnection of the power conditioners shall have wider set value and time with paying attention to general specifications of the power conditioners in the market.

(4) Connection with the existing drainage system

The Team proposed and Nigerian side agreed that the design policy and concept of the drainage system after installation of the arrays are as follows:

- 1) Since the arrays for the Project will be installed on top of the roof slab of No.3 and No.4 tanks, no additional drainage system will be required.
- 2) The existing drainage pipes installed through the parapets in the south side of the tanks can still be served for rainwater drainage on top of the roof slab after installation of arrays.
- 3) Amount of rainfall on top of roof slab after installation of the arrays is the same as that of the original design.
- 4) The amount of water after cleaning of top surface of arrays is smaller than that of rainfall considered in the original design. It shall also be noted that no cleaning work of top surface of arrays will be required while raining.
- 5) No eaves and gutters shall be provided for drainage of rainwater on top of the roof of the power conditioner building. Amount of such rainwater remains the same as those fallen on

[Handwritten signature]

the surface of ground in the proposed area for construction of the building. The ground surface surrounding the building shall also covered with the gravel, thus no special protection of raindrops from the roof of the building against erosion or scouring of the ground surface will be required.

- 6) Therefore, there is no need to use the existing surface rainwater drainage ditch as a result of change in the circumstances caused by the installation of the arrays on top of the tanks.

4. Environmental and Social Considerations

4.1 Procedures for environmental and social considerations in Nigeria

FMOP, FCTWB and the Team agreed that the procedures for environmental and social considerations will be carried out in accordance with the followings.

- (1) FMOP will prepare and submit the Project Proposal, required in the "Environmental Impact Assessment Act No.86" (1992) to the Federal Ministry of Environment (FMOE). The Project Proposal shall contain the items as shown in the Table 2 as stipulated in the "Environmental Impact Assessment Act No.86" (1992).

Table 2 Items to be included to the Project Proposal

Project title	The Project for Introduction of Clean Energy by Solar Electricity Generation System
Implementing organization	FMOP
Project site	Lower Usuna Dam Water Treatment Plant
Outline	Procurement and installation of PV system of Approx. 1,000 kWp
Sector	Renewable Energy
Life time of the Project	Assumed as 25 years
Origin of procured materials and equipment	Main equipment procured from Japan
Implementing agency of the EIA	(To be specified)

- (2) FMOP will confirm notice of the classification of the Project for environmental and social assessment from FMOE after his evaluation of the Project Proposal.
- (3) FMOP will prepare and submit the Terms of Reference (TOR) for environmental and social assessment to FMOE in accordance with the classification, if necessary.
- (4) FMOP will obtain the approval of the TOR from FMOE, if necessary.
- (5) FMOP will carry out partial environmental and social assessment, if necessary.

FMOP also agreed to take it into consideration in proceeding the procedures and discussion with FMOE that the FMOE stated that there was no need to implement either a full-scale EIA or partial EIA when FMOP and JICA implemented a pilot project under the Master Plan Survey for Solar Energy Utilization in Nigeria in 2007. Because, it is considered that the PV system creates no

[Handwritten signature]

major environmental impacts.

4.2 Land acquisition

As shown in Figure 2, the PV system of the Project will be installed on the property of FCTWB. FCTWB agreed to use the area for the Project in the Minutes of Discussions of the first field survey signed between FMOP, FCTWB and the Team on 19th September, 2013.

5. Work Demarcations between the Nigerian and Japanese Side

The Nigerian and Japanese sides agreed on the following work demarcations for the Project.

Table 3 Major undertakings to be taken by each party

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side	
			FMOP	FCTWB
1	to secure [a lot] / [lots] of land necessary for the implementation of the Project and to clear the [site] / [sites];		●	●
2	To construct the following facilities: 1) The power conditioner building 2) The gates and fences in and around the site 3) The parking lot (if necessary) 4) The road within the site 5) The road outside the site (if necessary)	●	●	●
3	To provide facilities for distribution of electricity, water supply and drainage and other incidental facilities necessary for the implementation of the Project outside the [site] / [sites] 1) Electricity a. The distributing power line to the site (Securement of interconnection point of the PV system) b. The drop wiring and internal wiring within the site (Wiring of the equipment of the Project after the interconnection point) c. The main circuit breaker and transformer (The main circuit breaker and transformer for the interconnection) d. The connection point of electricity for the installation and construction work beside the Project site 2) Water Supply a. The city water distribution main to the site (Securement of connection point of the water system of the Project) b. The supply system within the site (Water line and taps for maintenance of the PV arrays) c. The connection point of electricity for the installation and construction work beside the Project site 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 5) Telephone System a. The telephone trunk line to the main distribution frame/panel (MDF) of the building b. The MDF and the extension after the frame/panel 6) Furniture and Equipment a. General furniture	N/A	●	●

[Handwritten signature]

No.	Items	To be covered by Grant Aid	To be covered by Recipient Side	
			FMOP	FCTWB
	b. Project equipment (Procurement and installation of the equipment of the Project)	•		
	c. Procurement of materials for final connection of the equipment of the Project to the 11kV system at the interconnection point	•		
	d. Implementation of scheduled outage of the 11kV system, and final connection work of the equipment of the Project to the 11kV system		•	•
4	To bear the following commissions applied by the Japanese bank for banking services based upon the B/A: 1) Payment of bank commission		•	
5	To ensure prompt unloading and customs clearance of the products at ports 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 3) Internal transportation from the port of disembarkation to the project site	•	•	
6	Securement of area for temporary storage and offices	•	•	•
7	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] / [be borne by the Authority without using the Grant]		•	
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 maintain and use properly and effectively for the facilities that are constructed and the equipment that is provided under the Grant		•	•
10	To bear all the expenses, other than those covered by the Grant, necessary for the implementation of the Project		•	•
11	To give due environmental and social consideration in the implementation of the Project.		•	•

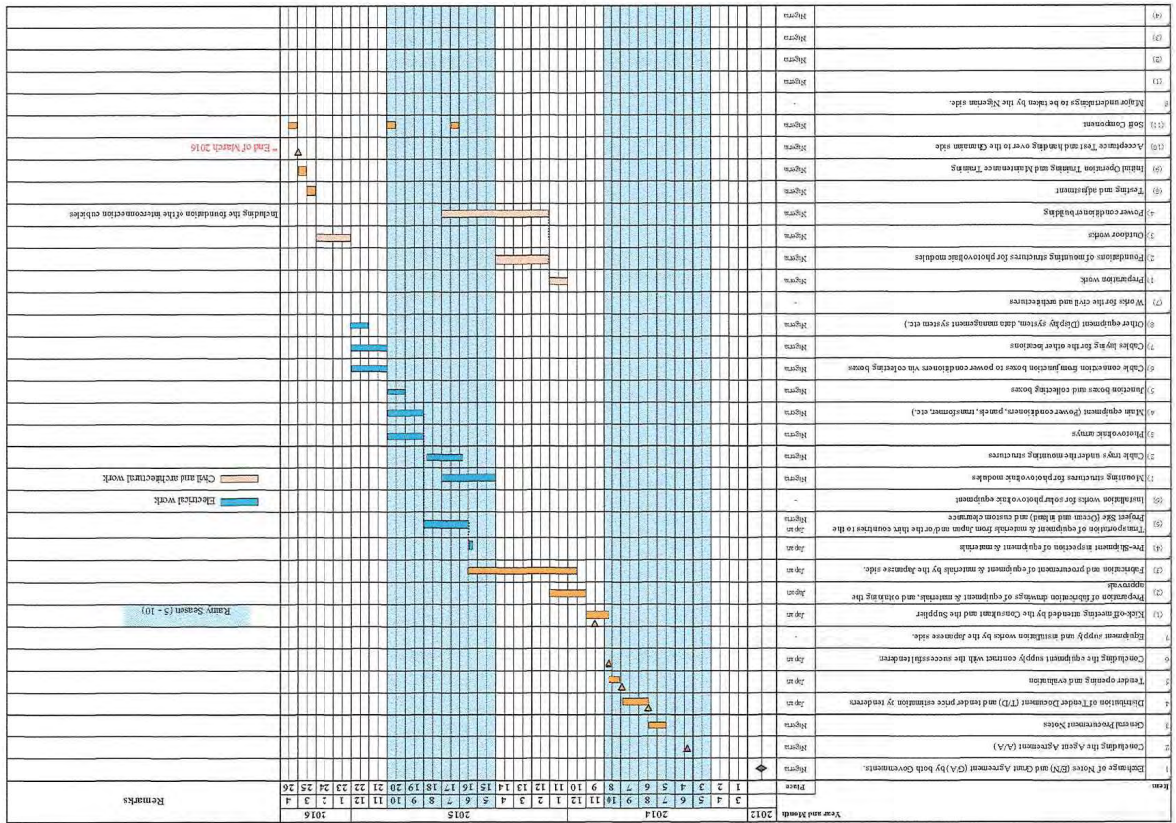
[Notes] B/A: Banking Arrangement, N/A: Not Applicable

Though each work to be covered by the Nigerian side shall be carried out by each authority mentioned above with independence, other related parties in Nigeria support the authority for smooth implementation of the Project.

Handwritten signature and initials.

6. Project Implementation Schedule

The tentative Project Implementation Schedule is shown as the following table.



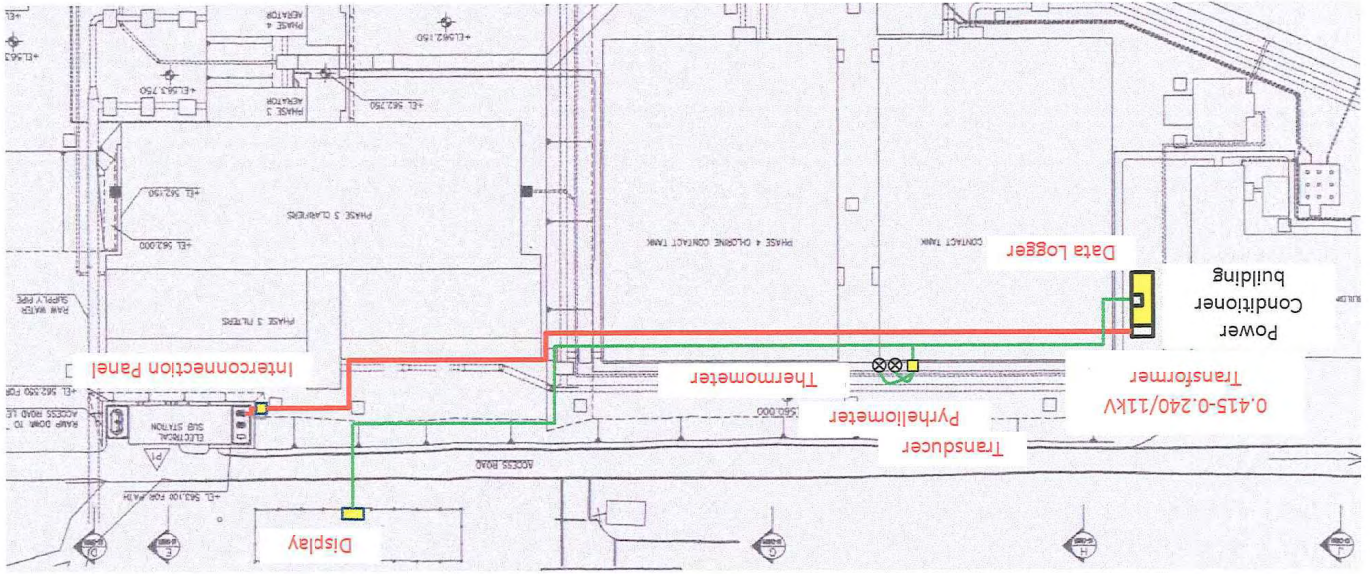
Tentative Project Implementation Schedule for the Project for Introduction of Clean Energy by Solar Electricity Generation System in the Federal Republic of Nigeria

Handwritten signature and initials.

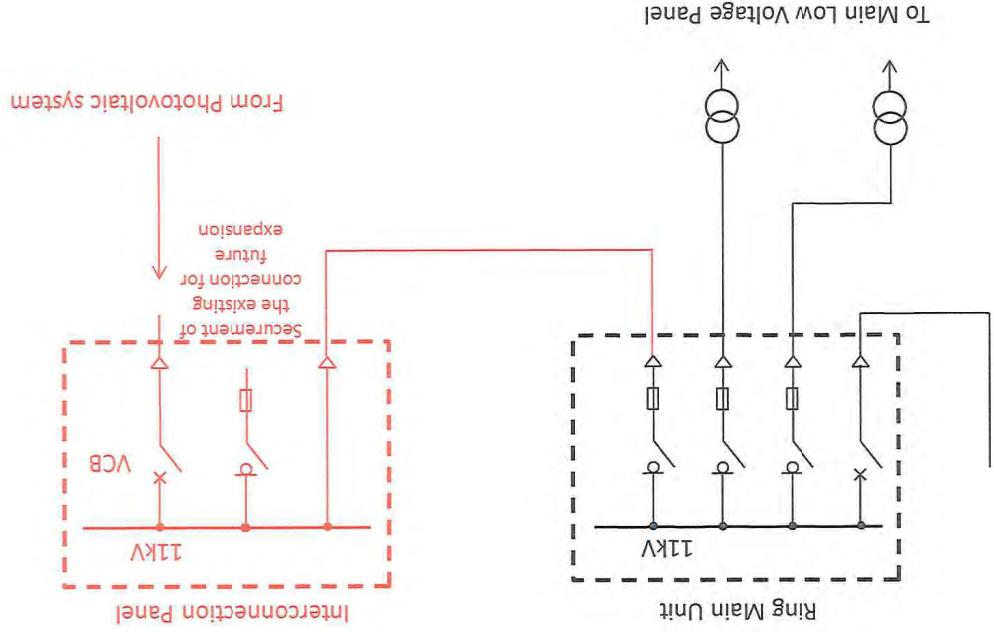
Drawings

- G-01 General layout of the Project site
- G-02 Layout of the photovoltaic arrays
- E-01 Single line diagram of the Lower Usuma Dam Water Treatment Plant
- E-02 Single line diagram of the photovoltaic system of 800 kWp
- E-03 Connection arrangement with the existing electrical equipment
- A-01 Mounting Structure Foundation (1) Typical Section at Reservoir
- A-02 Mounting Structure Foundation (2) Typical Section at Central Passage
- A-03 Power Conditioner Building (1) Location, Section
- A-04 Power Conditioner Building (2) Plan, Elevation, Section
- A-05 Power Conditioner Building (3) Finishing Schedule, Fitting List
- A-06 Power Conditioner Building (4) Facilities Plan

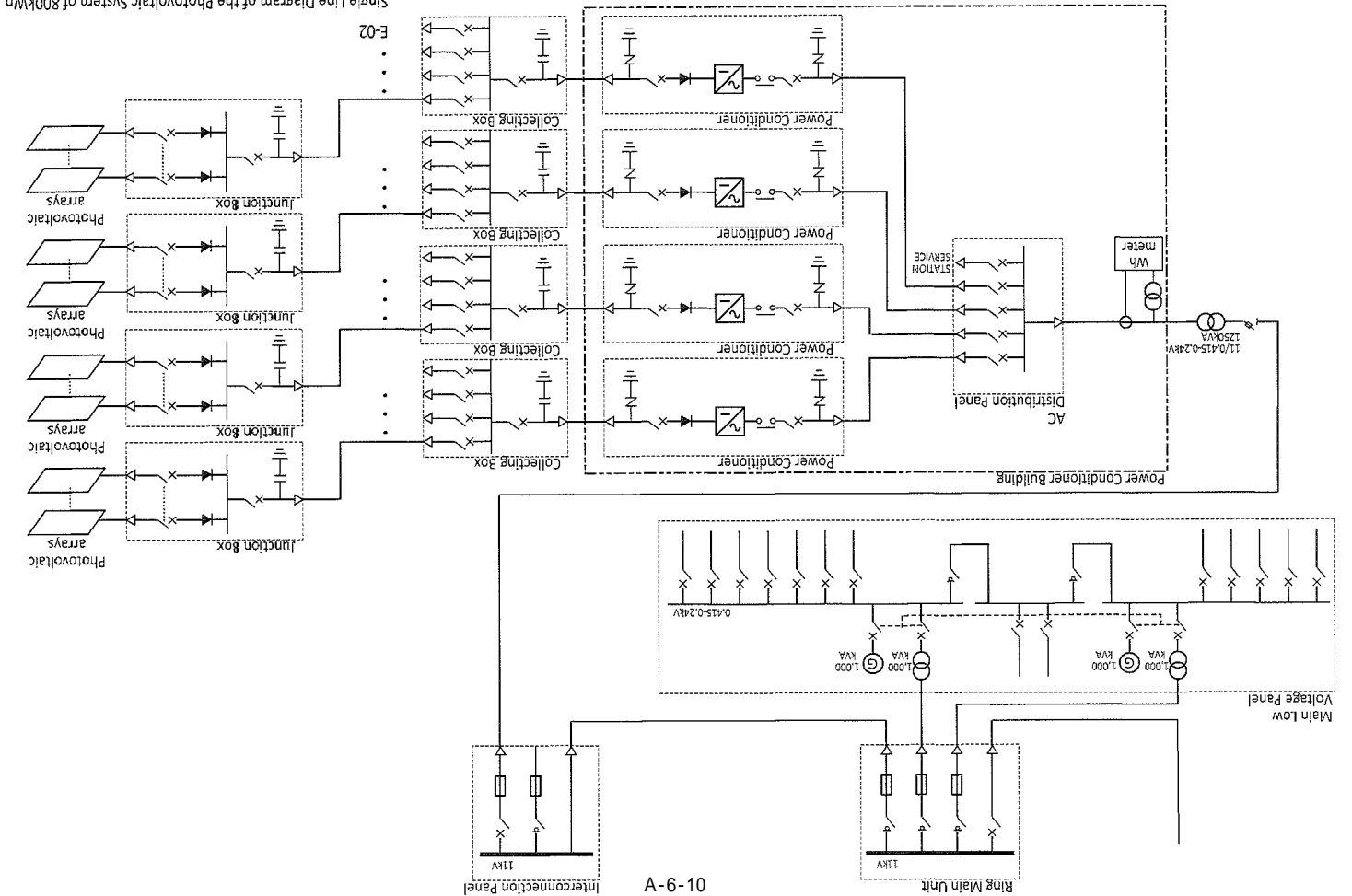
G-01
General layout of the Project site

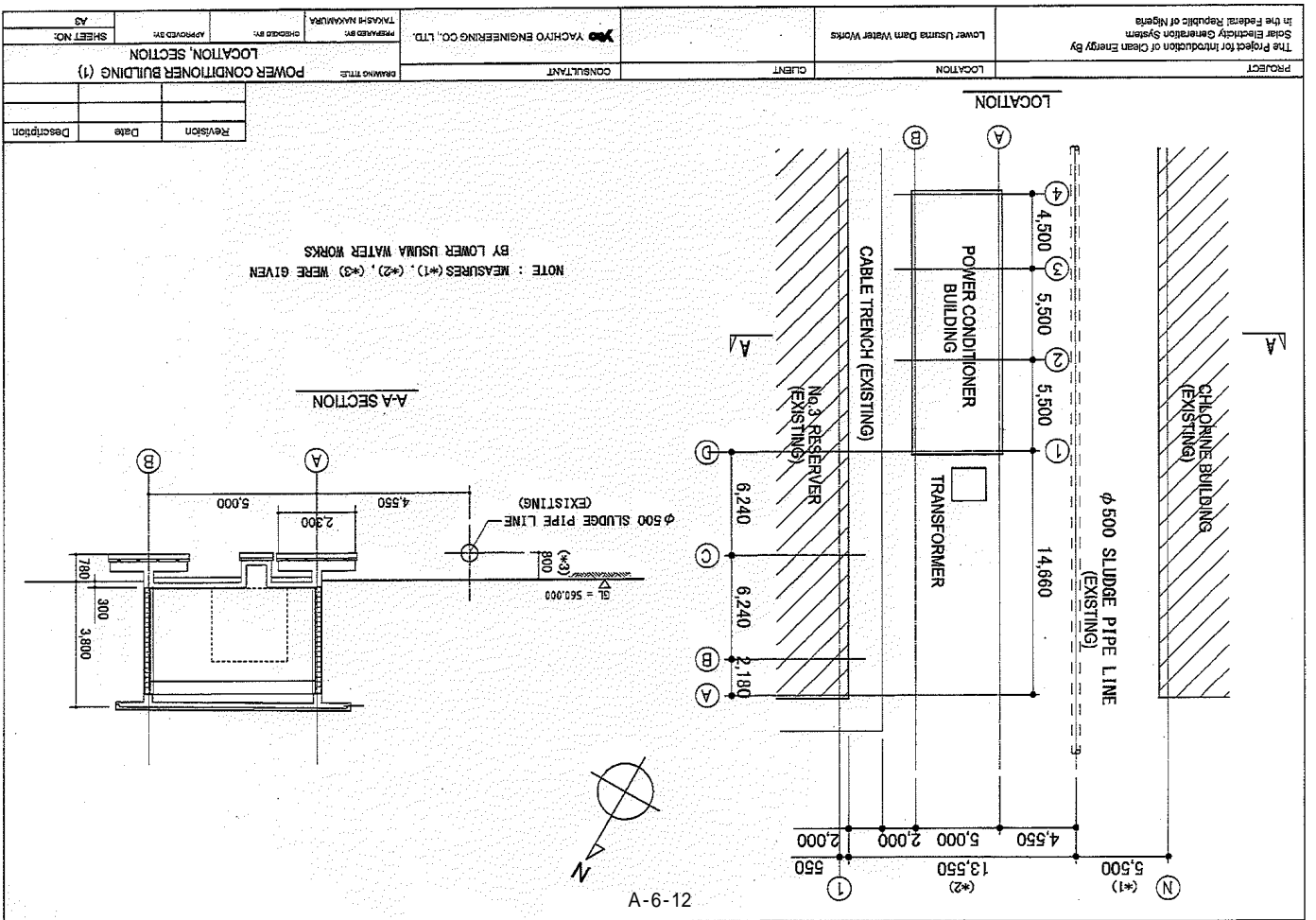
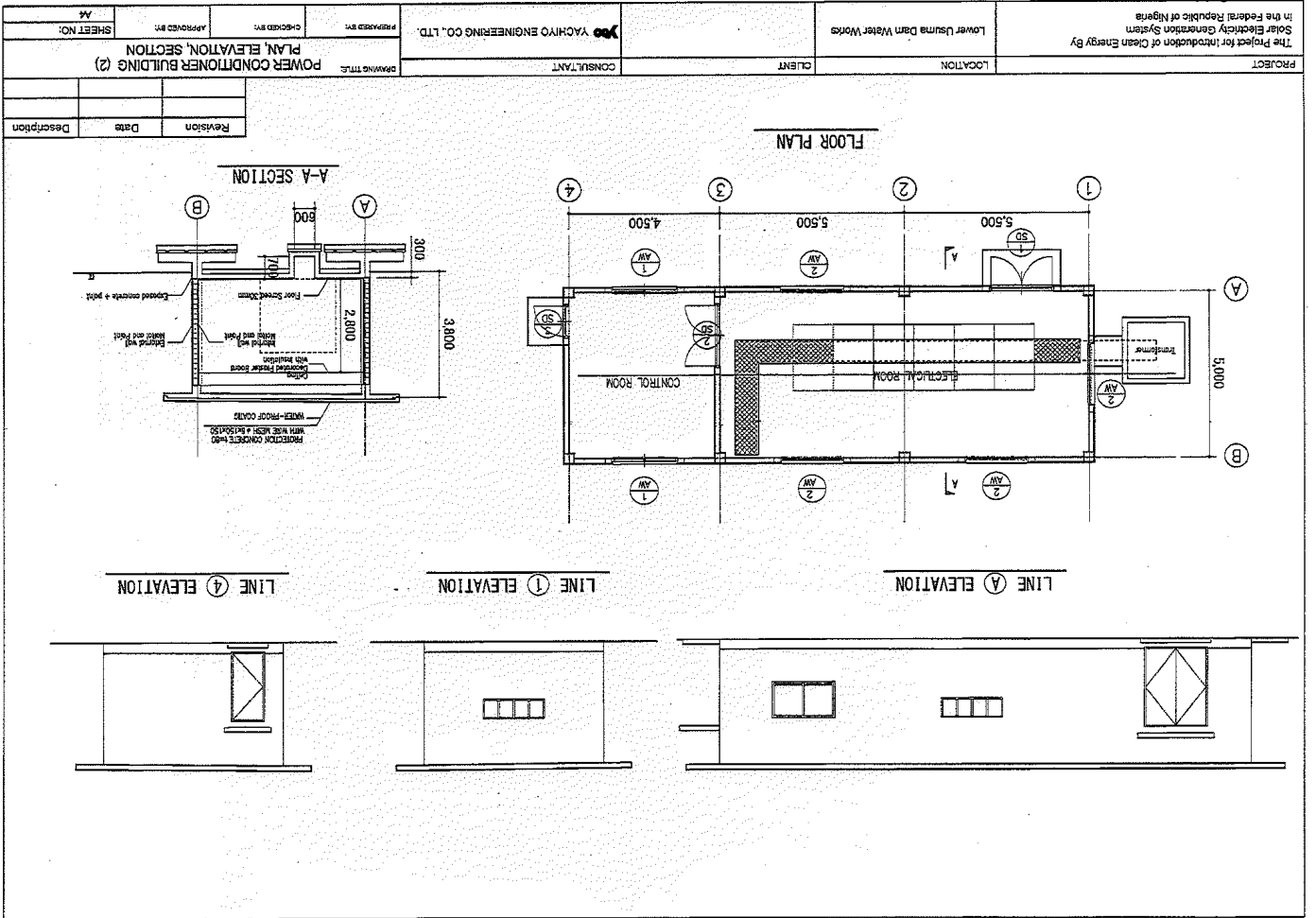


E-03 Connection arrangement with the existing electrical equipment



Single Line Diagram of the Photovoltaic System of 800kWp





PROJECT	The Project for Introduction of Clean Energy By Solar Electricity Generation System in the Federal Republic of Nigeria		
LOCATION	Lower Usama Dam Water Works		
CLIENT	YACHYO ENGINEERING CO. LTD.		
CONSULTANT	YACHYO ENGINEERING CO. LTD.		
DRAWING TITLE	POWER CONDITIONER BUILDING (4) FACILITIES PLAN		
SHEET NO.	AS		

SYMBOL	DESCRIPTION	QTY	SPECIFICATION	LOCATION
ACF-1	WALL MOUNTED TYPE HEAT-PUMP SYSTEM AIR CONDITIONER	1	COOLING CAPACITY : 10.0 KW COMPRESSOR POWER : 4.1 KW INDOOR FAN POWER : 250 W OUTDOOR FAN POWER : 100 W POWER : 1 PHASE - 240 V - 50 HZ	CONTROL ROOM
FE-1	WALL MOUNTED TYPE PROPELLER SUPPLY FAN	2	CAPACITY : 2000L X 510 m ³ /H X 40Pa X 25W POWER : 1 PHASE - 240 V - 50 HZ ASSEMBLY : MOTORIZED TYPE SHUTTER	ELECTRICAL ROOM
FS-1	WALL MOUNTED TYPE PROPELLER SUPPLY FAN	2	CAPACITY : 2000L X 552m ³ /H X 50Pa X 25W POWER : 1 PHASE - 240 V - 50 HZ ASSEMBLY : MOTORIZED TYPE SHUTTER	ELECTRICAL ROOM

FLOOR PLAN

LEGEND

- RATED VOLTAGE : 16 240V-50HZ
- STARTER (FLUORESCENT LAMP) : GLOW STARTER
- POWER FACTOR : HIGH POWER FACTOR
- SOCKET OUTLET 2P+E 250V / 2-GANG
- SWITCH 1P10A2(W/PLATE)

PROJECT	The Project for Introduction of Clean Energy By Solar Electricity Generation System in the Federal Republic of Nigeria		
LOCATION	Lower Usama Dam Water Works		
CLIENT	YACHYO ENGINEERING CO. LTD.		
CONSULTANT	YACHYO ENGINEERING CO. LTD.		
DRAWING TITLE	POWER CONDITIONER BUILDING (3) FINISHING SCHEDULE, FITTING LIST		
SHEET NO.	AS		

MARK NO.	ELEVATION	TYPE	MATERIAL - FINISH	GLASS	HARDWARE	REMARK
21		DOUBLE SWING DOOR	STEEL - OIL PAINT	---	HINGE LEVER HANDLE DOOR CLOSER, KEYS LOCK	REMARK
22		SINGLE SWING DOOR	STEEL - OIL PAINT	---	HINGE LEVER HANDLE DOOR CLOSER, KEYS LOCK	REMARK
23		SLIDING WINDOW	ALUMINUM - ELECTRO COLOR	FLAOT GLASS t=5mm	CHESONT, READY-MADE HARDWARE	ALUMI GRILL, MOSQUITO NET WINDOW
24		FIXED WINDOW	STEEL - OIL PAINT	FLAOT GLASS t=5mm	READY-MADE HARDWARE	---

INTERIOR FINISHING SCHEDULE

ROOM NAME	FLOOR	BASEBOARD	WALL	CEILING	REMARKS
ELECTRICAL ROOM	FLOOR	MORTAR STEEL TROWEL DUSTPROOF PAINT FINISH	MORTAR STEEL TROWEL EP PAINT FINISH	DECORATED PLASTERBOARD LIGHT IRON SUSPENDED FRAME CEILING SYSTEM CH=3000	VENTILATION FAN 100THK GLASSWOL INSULATION ON CEILING
CONTROL ROOM	FLOOR	MORTAR STEEL TROWEL DUSTPROOF PAINT FINISH	MORTAR STEEL TROWEL EP PAINT FINISH	DECORATED PLASTERBOARD LIGHT IRON SUSPENDED FRAME CEILING SYSTEM CH=3000	AIR-CONDITION VENTILATION FAN 100THK GLASSWOL INSULATION ON CEILING

EXTERIOR FINISHING SCHEDULE

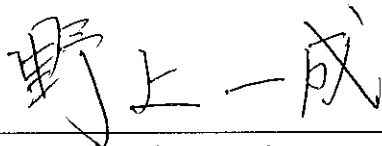
LOCATION	SPECIFICATION
BUILDING AREA	77.5 m ²
TOTAL FLOOR AREA	77.5 m ²
UNDER GROUND STRUCTURE	REINFORCED CONCRETE CONSTRUCTION
UPPER GROUND STRUCTURE	REINFORCED CONCRETE CONSTRUCTION
ROOF	PROTECTION CONCRETE t=80mm WITH WIRE MESH #6X150X150 WATER-PROOF COATING
WALL	150THK CONCRETE BLOCK WITH MORTAR EP PAINT FINISH
BASEBOARD	EXPOSED CONCRETE EP PAINT FINISH
CANOPY	TOP : MORTAR STEEL TROWEL EP PAINT FINISH UNDER : EXPOSED CONCRETE EP PAINT FINISH

**PREPARATORY SURVEY
ON
THE PROJECT FOR
INTRODUCTION OF CLEAN ENERGY
BY SOLAR ELECTRICITY GENERATION SYSTEM
IN THE FEDERAL REPUBLIC OF NIGERIA**

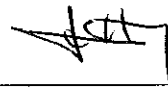
THE FIRST FIELD SURVEY

TECHNICAL MEMORANDUM

4TH OCTOBER, 2013



Mr. Kazunari Nogami
Chief Consultant for the Project
Yachiyo Engineering Co., Ltd.



Engr. J.B. Anto
Director
Federal Capital Territory Water Board

1. Introduction

The Federal Ministry of Power (FMOP), Federal Capital Territory Water Board (FCTWB) and the Preparatory Survey Team, Japan International Cooperation Agency (the Team) agreed and concluded the Minutes of Discussions on the Project for Introduction of Clean Energy by Solar Electricity Generation System in the Federal Republic of Nigeria (the Project) on 19th September, 2013.

FMOP, FCTWB and the Team also agreed and signed on the field report, prepared by the Consultant headed by Mr. Kazunari Nogami and describing the basic policy on the Outline Design of the Project, on 27th September, 2013.

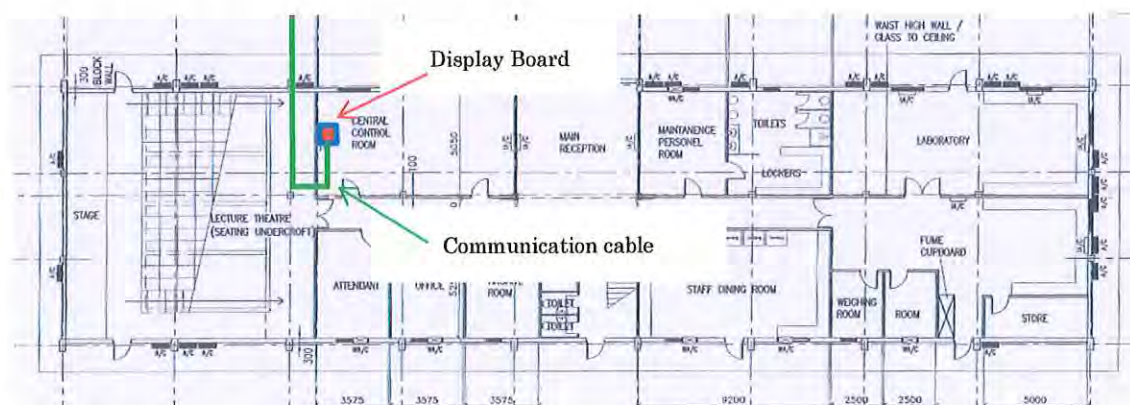
This technical memorandum is prepared to agree more detail technical items so that the Consultant can conduct the cost estimation of the Project in the analysis in Japan after the first field survey.

2. Location of the display board and the communication cable

FCTWB and the Team agreed that a display board to indicate energy and power of the photovoltaic (PV) system of the Project and a data logger will be located at the existing SCADA room of the administration building for No.3 and No.4 Plants as shown in Figure 1.

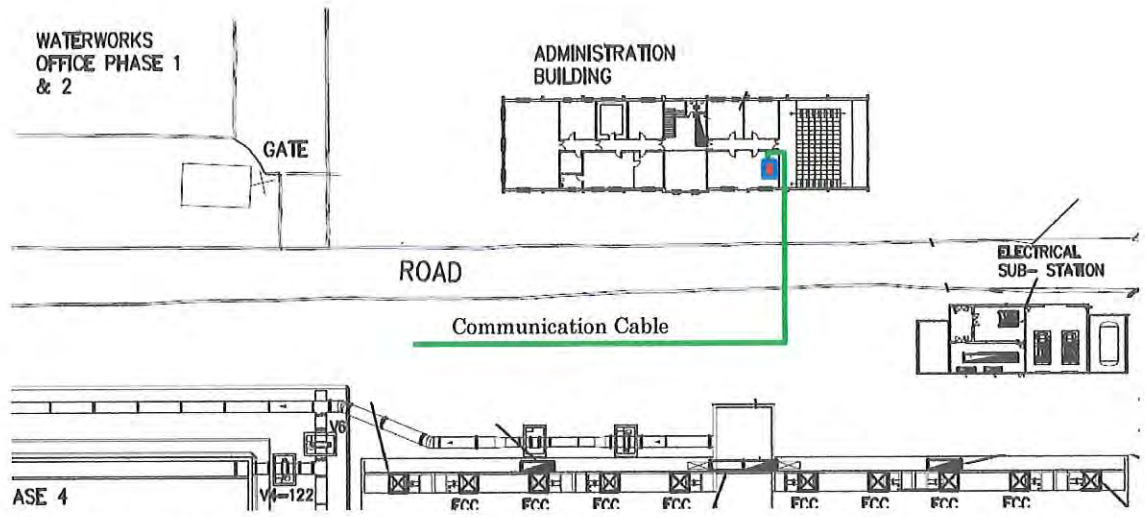
FCTWB explained to the Team that conduits have been provided from the room to the other side of the in-plant road of the Lower Usama Dam Water Treatment Plant as shown in Figure 2.

Therefore, the conduits will be used for the Project and it is not necessary to damage the wall of the building or the in-plant road.



[Source] Preparatory Survey Team

Figure 1 Location of the display board in the administration building

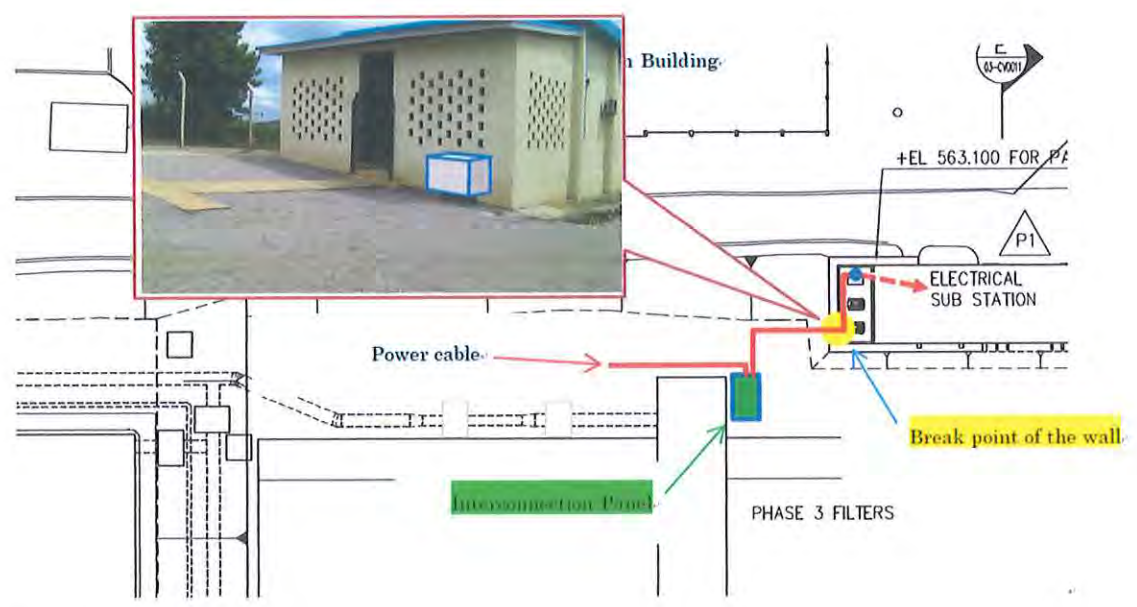


[Source] Preparatory Survey Team

Figure 2 Location of the communication cable

3. Layout of the Interconnection Panel and the Power Cable

FCTWB and the Team agreed that interconnection panels of the Project will be located at the part shown in Figure 3. The condition around the part is shown in Picture 1. FCTWB and the Team agreed that a cable duct shall be provided at the part where cables rise over the ground level and go into the existing electrical substation as the scope of the Japanese side to avoid exposure of the cables as shown in Figure 3. FCTWB allowed that the Contractor will make conduits on the existing wall after making holes.



[Source] Preparatory Survey Team

Figure 3 Location of the interconnection panel and power cables

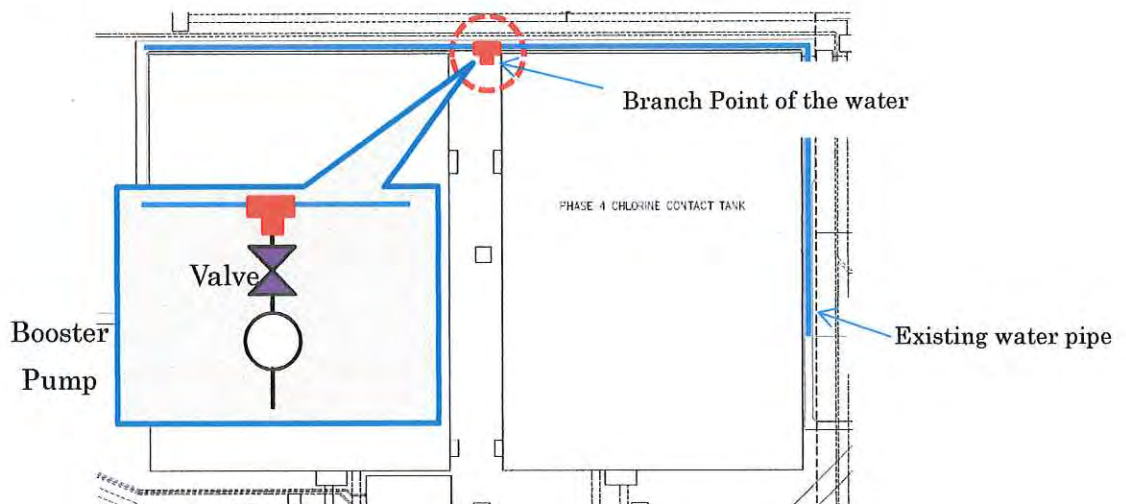


[Source] Preparatory Survey Team

Picture 1 Location of the interconnection panel

4. Layout of the water source for cleaning of the PV Arrays

FCTWB explained to the Team that a branch point with a valve for the water supply will be provided by FCTWB before the Project at the location shown in Figure 4. FCTWB and the Team agreed that a booster pump for the water lines for cleaning of the PV arrays will be installed near the branch point as the scope of the Japanese side, if necessary.



[Source] Preparatory Survey Team

Figure 4 Layout of the water source for cleaning of the PV Arrays

5. Supervisors of the Consultant and the Contractor during implementation of the Project

FCTWB requested the Team to arrange the Project as Japanese supervisors of the Consultant and the Contractor will be dispatched to Nigeria not for parts of the period of the Project implementation but for all the period in consideration that The Project site, the Lower Usuma Dam Water Treatment Plant is such critical infrastructures as water source of the Federal Capital Territory and the Project implementation shall carefully be managed not to interfere operation of the plant.

6. Countermeasures against vandalism

Based on the scheme of the Program Grant Aid of Japan, the projects for Introduction of Clean Energy by Solar Electricity Generation System have been carried out all over the world by JICA. Through these experiences, it is revealed that countermeasures against vandalism such as stone-throwing to the PV arrays or stealing of the PV modules shall be considered properly before implementation of the Project. Especially, in case of the Project, as the public can come close to the PV arrays which are located on the top surface of No.3 and No.4 Tanks, countermeasures against vandalism shall be considered carefully. FMOP and FCTWB agreed to consider countermeasures against vandalism before the second field survey and suggest to the Team in the second field survey.

