Appendix

Appendix-01　Member List of the Study Team

(1) 1st Field Survey

1) JICA Officials

No.	Name	Duty	Occupation
1	Ms. Eriko TAMURA	Team Leader	Director, Water Resources Management Team I, Global Environmental Department, JICA
2	Ms. Momoko OTSUKA	Project Officer (Planning Management)	Water Resources Management Team I, Global Environmental Department, JICA

2) Advisory Officials

No.	Name	Duty	Occupation
1	Mr. Masashi YAYAMA	Chief Advisor/ Upward Flow Biological Contact Filtration(U-BCF) Specialist	International Project Division, International and Regional Project Department, Water and Sewer Bureau, City of Kitakyusyu

3) Consultant Team

No.	Name	Duty	Occupation
1	Mr. Hirofumi SANO	Chief Consultant/ Water Supply Planning Specialist	NJS Consultants Co., Ltd.
2	Mr. Daisuke YASHIRO	Deputy Chief Consultant/ Water Supply System O&M Specialist	NJS Consultants Co., Ltd.
3	Mr. Ryosuke OTA	Cost Estimation/ Procurement/ Construction Planning Specialist	NJS Consultants Co., Ltd.
4	Dr. Kimiko HARAGUCHI	Water Treatment Plant Planning/ Water Quality Management	Water Supply and Sewerage Association of Kitakyushu
5	Mr. Masaji KASA	Water Treatment Plant Design	NJS Consultants Co., Ltd.
6	Dr. Kenji TAKAYANAGI	Environmental/ Social-condition Analysis	NJS Consultants Co., Ltd.
7	Mr. Akira HASEBE	Electrical Equipment Specialist	NJS Consultants Co., Ltd.

(2) 2nd Field Survey (Explanation of Draft Conceptual Design Report)

1) JICA Officials

No.	Name	Duty	Occupation
1	Ms. Eriko TAMURA	Team Leader	Director, Water Resources Management Team I, Global Environmental Department, JICA
2	Ms. Momoko OTSUKA	Project Officer (Planning Management)	Water Resources Management Team I, Global Environmental Department, JICA

2) Advisory Officials

No.	Name	Duty	Occupation
1	Mr. Masashi YAYAMA	Chief Advisor/ Upward Flow Biological Contact Filtration(U-BCF) Specialist	International Project Division, International and Regional Project Department, Water and Sewer Bureau, City of Kitakyusyu

3) Consultant Team

No.	Name	Duty	Occupation
1	Mr. Hirofumi SANO	Chief Consultant/ Water Supply Planning Specialist	NJS Consultants Co., Ltd.
2	Mr. Daisuke YASHIRO	Deputy Chief Consultant/ Water Supply System O&M Specialist	NJS Consultants Co., Ltd.
3	Dr. Kimiko HARAGUCHI	Water Treatment Plant Planning/ Water Quality Management	Water Supply and Sewerage Association of Kitakyushu

Appendix-02　Study Schedule

(1)　1st Field Survey

Date		DoW	JICA Officials		Advisory Officials	Consultant Team						
			Team Leader	Project Officer (Planning Management)	Chief Advisor/U-BCF Specialist	Chief Consultant/ Water Supply Planning Specialist	Deputy Chief Consultant/ Water Supply System O&M Specialist	Construction Planning Specialist/ Cost Estimation/ Procurement	Water Treatment Plant Planning/ Water Quality Management	Water Treatment Design	Environmental/ Social-condition Analysis	Electrical Equipment Specialist
			Ms. Eriko TAMURA	Ms. Momoko OTSUKA	Mr. Masashi YAYAMA	Mr. Hirofumi SANO	Mr. Daisuke YASHIRO	Mr. Ryosuke OTA	Dr. Kimiko HARAGUCHI	Mr. Masaji KASA	Dr. Kenji TAKAYANAGI	Mr. Akira HASEBE
1	7/22	Tue							FUK(Fukuoka)-TPE(Taipei)-HAN(Hanoi)			
2	7/23	Wed	HND(Haneda)－HAN(Hanoi)/Courtesy Call to Vietnam Water Supply and Sewerage Association/Visit JICA Office						Courtesy Call to Vietnam Water Supply and Sewerage Association /Visit JICA Office			
3	7/24	Thu	Field Survey/KOM with Hai Phong People's Committee and Hai Phong Water									
4	7/25	Fri	Field Survey/Minutes Meeting									
5	7/26	Sat	Vin Baoh WTP/Intake Facility/Field Survey									
6	7/27	Sun	Move to Hanoi									
7	7/28	Mon	ADB Meeting/Move to Hai Phong City/Minutes Meeting									
8	7/29	Tue	Team Meeting/Minutes Signing/Move to Hanoi			Team Meeting/Minutes Signing/Data Collection・Field Survey						
9	7/30	Wed	Report to Japanese Embassy/Report to JICA Office/HAN(Hanoi)－HND(Haneda)			Data Collection・Field Survey						
10	7/31	Thu				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey				
11	8/1	Fri				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey	FUK(Fukuoka)-HAN(Hanoi)		
12	8/2	Sat				Report Preparation	Report Preparation	Report Preparation	Data Collection・Field Survey	Report Preparation		
13	8/3	Sun				Report Preparation	Report Preparation	Report Preparation	Data Collection・Field Survey	Report Preparation	HND(Haneda)-HAN(Hanoi)	
14	8/4	Mon				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey	Move to Hanoi	Data Collection・Field Survey	Data Collection・Field Survey	
15	8/5	Tue				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey	HAN(Hanoi)-TPE(Taipei)-FUK(Fukuoka)	Data Collection・Field Survey	Data Collection・Field Survey	
16	8/6	Wed				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey		Data Collection・Field Survey	Data Collection・Field Survey	
17	8/7	Thu				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey		Data Collection・Field Survey	Data Collection・Field Survey	
18	8/8	Fri				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey		Data Collection・Field Survey	Data Collection・Field Survey	
19	8/9	Sat				Report Preparation	Report Preparation	Report Preparation		Report Preparation	Report Preparation	
20	8/10	Sun				Report Preparation	Report Preparation	Report Preparation		Report Preparation	Report Preparation	
21	8/11	Mon				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey		Data Collection・Field Survey	Data Collection・Field Survey	
22	8/12	Tue				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey		Data Collection・Field Survey	Data Collection・Field Survey	HND(Haneda)-HAN(Hanoi)
23	8/13	Wed				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey		Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey
24	8/14	Thu				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey		HAN(Hanoi)-FUK(Fukuoka)	Data Collection・Field Survey	Data Collection・Field Survey
25	8/15	Fri				Data Collection・Field Survey	Data Collection・Field Survey	Data Collection・Field Survey			Data Collection・Field Survey	Data Collection・Field Survey
26	8/16	Sat				Report Preparation	Report Preparation	Report Preparation			Report Preparation	Report Preparation
27	8/17	Sun				Report Preparation	Report Preparation	Report Preparation			Report Preparation	Report Preparation
28	8/18	Mon				T/N Discussion	T/N Discussion	T/N Discussion			T/N Discussion	T/N Discussion
29	8/19	Tue				T/N Signing	T/N Signing	T/N Signing			T/N Signing	T/N Signing
30	8/20	Wed				Report of Survey Result to ADB	Report of Survey Result to ADB	Report of Survey Result to ADB			Data Collection・Field Survey	Data Collection・Field Survey
31	8/21	Thu				Report of Survey Result to JICA HAN(Hanoi)－HND(Haneda)	Report of Survey Result to JICA HAN(Hanoi)－HND(Haneda)	Report of Survey Result to JICA HAN(Hanoi)－HND(Haneda)			Data Collection・Field Survey	Data Collection・Field Survey
32	8/22	Fri									Data Collection・Field Survey	Data Collection・Field Survey
33	8/23	Sat									Report Preparation	Report Preparation
34	8/24	Sun									Report Preparation	Report Preparation
35	8/25	Mon									Stakeholders Meeting	Stakeholders Meeting
36	8/26	Tue									Data Collection・Field Survey	HAN(Hanoi)－HND(Haneda)
37	8/27	Wed									Data Collection・Field Survey	
38	8/28	Thu									Data Collection・Field Survey	
39	8/29	Fri									Data Collection・Field Survey	
40	8/30	Sat									Report Preparation	
41	8/31	Sun									Report Preparation	
42	9/1	Mon									HAN(Hanoi)－HND(Haneda)	

(2) 2nd Field Survey (Explanation of Draft Conceptual Design Report)

Date		DoW	JICA Officials		Advisory Officials	Consultant Team		
			Team Leader	Project Officer (Planning Management)	Advisor/ U-BCF Specialist	Chief Consultant/ Water Supply Planning Specialist	Deputy Chief Consultant/ Water Supply System O&M Specialist	Water Treatment Plant Planning/ Water Quality Management
			Ms.Eriko TAMURA	Ms.Momoko OTSUKA	Mr.Masashi YAYAMA	Mr.Hirofumi SANO	Mr.Daisuke YASHIRO	Dr.Kimiko HARAGUCHI
1	11/29	Sat						KKJ (Kitakyushu) －TPE (Taipei) －HAN (Hanoi)
2	11/30	Sun				HND (Haneda) －HAN (Hanoi) Move to Hai Phong		
3	12/1	Mon		HND (Haneda) －HAN (Hanoi) Move to Hai Phong	FUK (Fukuoka) －HAN (Hanoi) Move to Hai Phong	Meeting with Hai Phong Water to discuss the detailed engineering and construction matters		
4	12/2	Tue	HND (Haneda) －HAN (Hanoi) Move to Hai Phong	(Continued) Meeting with Hai Phong Water to discuss the detailed engineering and construction matters				
5	12/3	Wed	Explanation with Hai Phong People's Committee and Hai Phong Water Discussion with related agencies of HPPC and Hai Phong Water on the original design and M/D					
6	12/4	Thu	Minutes Meeting and Minutes signing Move to Hanoi					
7	12/5	Fri	Courtesy Call to Japanese embassy in Vietnam、Report to JICA office HAN (Hanoi) －HND (Haneda)		Courtesy Call to Japanese embassy in Vietnam、Report to JICA office	Report to JICA office HAN (Hanoi) －HND (Haneda)		Report to JICA office
8	12/6	Sat			HAN (Hanoi) －FUK (Fukuoka)			HAN (Hanoi) －TPE (Taipei) －KKJ (Kitakyushu)

Appendix-03 List of Parties Concerned in the Recipient Country

(1) Hai Phong Peoples Committee

Mr.Duong Anh Dien	Chairman
Dr.Le Thanh Son	Vice Chairman

(2) Hai Phong City Department of Foreign Affairs

Mr.Nguyen Anh Tuan	Director
Ms.Pham Thanh Mai	Deputy Manager, International Cooperation Division

(3) Department of Construction of Hai Phong

Mr.Nguyen Huu Thanh	Vice Director

(4) Department of Planning and Investment of Hai Phong

Mr.Le Anh Quan	Deputy Director

(5) Vietnam Water Supply and Sewerage Association

Mr.Ung Quoc Dzung	Vice Chairman, General Editor

(6) Asian Development Bank

Mr.Hubert Jenny	Principal Urban Development Specialist
Mr.Pham Quang Tien	National Water Supply and Sanitation Specialist Consultant

(7) Hai Phong Water Supply One Member Co.,Ltd

Mr.Vu Hong Duong	Chairman of Company-General Director
Mr.Tran Viet Cuong	Deputy General Director
Mr.Tran Van Duong	Deputy General Director
Mr.Cao Van Quy	Deputy General Director, Manager of An Duong WTP
Mr.Nguyen Van Duc	Deputy Director of PMU

(8) Embassy of Japan in Vietnam

Mr.Yosuke FUKUSHIMA	Second Secretary

(9) Jica Vietnam Office

Mr.Fumihiko OKIURA	Senior Representative
Mr.Kenichi YAMAMOTO	Senior Representative
Mr.Tadashi SUZUKI	Senior Representative
Mr.Taro Katsurai	Senior Project Formulation Advisor
Ms.Nguyen Thanh Ha	Program Coordinator

Appendix-04　Minutes of Discussion (M/D) and Technical Note (T/N)

4-1　Minutes of Discussion (M/D)　in the 1st Field Survey

MINUTES OF DISCUSSIONS

ON

THE PREPARATORY SURVEY

ON

AN DUONG WATER TREATMENT PLANT UPGRADE INVESTMENT PROJECT

IN HAI PHONG CITY

IN SOCIALIST REPUBLIC OF VIET NAM

In response to the request from the Government of Socialist Republic of Viet Nam (hereinafter referred to as "Viet Nam"), the Government of Japan decided to conduct a Preparatory Survey on "The An Duong Water Treatment Plant Upgrading Investment Project" (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA sent to Viet Nam the Preparatory Survey Team (hereinafter referred to as "the Team"), which is headed by Ms. Eriko Tamura, Director, Water Resources Management Division I, Water Resources and Disaster Management Group, Global Environment Department, JICA, and the survey is scheduled to stay in the country from July 23rd to August 31st, 2014.

The Team held discussions with the officials of Hai Phong People's Committee (hereinafter referred to as "HPPC") and Hai Phong Water Supply One Member Co., Ltd (hereinafter referred to as "Hai Phong Water") and conducted a field survey at the survey area.

As a result of the discussions and field survey, both parties confirmed the main items described in the attached sheets. The confirmed items will be preceded accordingly to formal procedures of both parties when the Project is accepted and approved by the both Governments.

Hai Phong, 29th July, 2014

Eriko Tamura
Leader
Preparatory Survey Team
Japan International Cooperation Agency (JICA)

Vu Hong Duong
Chairman and General Director
Hai Phong Water Supply One Member Co., Ltd (Hai Phong Water)

1

ATTACHMENT

1. Objective of the Project

1-1) To manage the rapid contamination of the raw water from Re river by installing Upward Bio Contact Filtration (hereinafter referred to as "U-BCF").

1-2) To increase efficiency of water treatment at An Duong water treatment plant by installing U-BCF

2. Project site

The Project site is An Duong Water Treatment Plant in Hai Phong City as shown in **Annex-1**.

3. Responsible and Implementing Agency

3-1) The Responsible Agency is Hai Phong People's Committee (hereinafter referred to as "HPPC").

3-2) The Implementing Agency is Hai Phong Water Supply One Member Co., Ltd (hereinafter referred to as "Hai Phong Water").

3-3) The organization charts of HPPC and Hai Phong Water are shown in **Annex-2**

4. Items requested by the Vietnamese Side

After field survey and discussions between Hai Phong Water and the Team (hereinafter referred to as "the both sides"), the items described below were requested by Vietnamese side. The both sides confirmed that the appropriateness and detail of the request will be further examined based on the results of the preparatory survey (hereinafter referred to as "the Survey").

4-1) Civil / Mechanical works

a) U-BCF including the following complimentary equipment

b) Installation of U-BCF requires the following items:
Pumps related to U-BCF, Pipes within the An Duong water treatment plant (from the presedimentation basin to U-BCF, from U-BCF to the current mixing tank, and from U-BCF to the current sludge drying bed), Electric facilities (control panel and any related electrical works)

4-2) Consulting Services:

Detailed design, Assistance for tendering, Construction supervision, Technical assistance (soft component)

5. Japan's Grant Aid Scheme

5-1) The Vietnamese side understands the Japan's Grant Aid Scheme explained by the Team, as described in **Annex-3**.

5-2) The Vietnamese side will take the necessary measures, as described in **Attachment 2 of Annex-3**. for smooth implementation of the Project, as a condition for the Japanese Grant Aid to be implemented.

6. Schedule of the Survey

6-1) The consultant team will conduct the Survey in Viet Nam until August 31st 2014.

6-2) JICA will prepare the draft preparatory survey report in English and dispatch a mission in order to explain its contents to the Vietnamese side around the middle of December 2014.

6-3) In case that the contents of the report are accepted in principle by the Vietnamese side, JICA will finalize the report and send it to the Vietnamese side around February 2015.

6-4) The Vietnamese side understands that the execution of the Survey would not necessarily imply the Japanese Government's commitment of the Project implementation.

7. Other Relevant Issues

7-1) Title of the Project

The both sides agreed that title of the Project was changed from "An Duong Water Treatment plant Upgrade Investment Project – Building Filter with capacity of 100,000 m3/day applied biological contact filtering (U-BCF) advance technology" to "An Duong Water Treatment Plant Upgrade Investment Project".

7-2) Confirmation of the current challenges of Hai Phong Water

The both sides confirmed that the raw water has been increasingly polluted, and that with the current facility and the facility to be developed by ADB financed project, Hai Phong Water will have difficulty in managing the raw water pollution. Thus, the treatment of ammonium and organic compounds is one of the most crucial challenges which Hai Phong Water is facing. The other important challenge is the delivery of safe drinking water. Current treatment of ammonium produces harmful bi-products, such as Tri Halo Methanes (hereinafter referred to as "THMs"). In addition, current treatment of ammonium is insufficient and resulted in consumption of chlorine during the distribution.

U-BCF can effectively solve those challenges. Thus, the both sides has decided that the objective of the project is to manage the rapid contamination of the raw water from Re river and to increase efficiency of water treatment at An Duong water treatment plant by installing U-BCF.

7-3) Capacity of U-BCF

Though Hai Water strongly requested U-BCF whose capacity is 140,000 m^3/day, the both sides confirmed that the capacity of U-BCF developed by the Project is 100,000 m^3/day, based on the initial request. The U-BCF installed by the Project will complement the current water treatment plant (100,000 m^3/day).

In addition, the both sides confirmed that ADB's project (Water Sector Investment Program (Tranche 2) - Hai Phong Subproject) will not install U-BCF, and Hai Phong Water will take responsibility to install the U-BCF of appropriate capacity, which will complement ADB's project. The both sides confirmed the following detail of ADB's project.

a) Flow of the water treatment plant: developed by ADB's project
b) Capacity of the water treatment plant: developed by ADB's project
c) Progress and Schedule of ADB's project

7-4) Construction work

The both sides agreed the construction work of U-BCF and the related items must not interrupt the operation of the An Duong water treatment plant and the water supply service to the customers. The detailed method for construction will be suggested by the Team based on the results of Survey.

7-5) Land for U-BCF

The both sides understood that the existing land is not enough to construct the U-BCF of 100,000 m^3/day. The Vietnamese side should fill a part of presedimentation basin for the U-BCF by December 2015. The Team suggested the location as shown in **Annex-1.**

7-6) Measures to be taken by the Vietnamese side

Hai Phong Water agreed to facilitate the Survey by following activities.

a) Provision of necessary data and information related to the Survey
b) Assignment of Hai Phong Water personnel who will support the Survey
c) Coordination of relevant agencies
d) Accompany and coordination for the Team member for site visit
e) Other necessary facilitation for the Team including office space

Hai Phong Water also agreed to "Major Undertakings to be taken by Each Government" shown in **Attachment 2 of Annex-3.** Moreover, Hai Phong Water agreed to secure the necessary budget for the Project and for operation/maintenance of the U-BCF. Detailed information about the necessary amount of budget will be informed by December 2014 during the explanation study of outline design.

7-7) Tax

The taxes including Value Added Tax, custom duty, and any other taxes and levies in Viet Nam which are to be arisen from the Project activities should be exempted by the Vietnamese side. According to Japan's Grant Aid regulations, if there is any taxes and levies imposed on the Project, Hai Phong Water will have to allocate necessary budget for the payment of taxes and levies. Hai Phong Water will take any procedures necessary for the tax exemption with related organizations.

7-8) Technical Assistance ("Soft Component" of the Project)

Following Soft Component programs are to be considered as the Project scope. Detail components will be determined through the Survey, avoiding a duplication of the activities of the previous grass-roots technical cooperation.

a) Daily operation/maintemance of the U-BCF, especially the back washing process
b) Periodical maintenance of the U-BCF
c) Water quality analysis
d) Adjustment of operation/maintenance of the current facilities

7-9) Social and Environmental Considerations

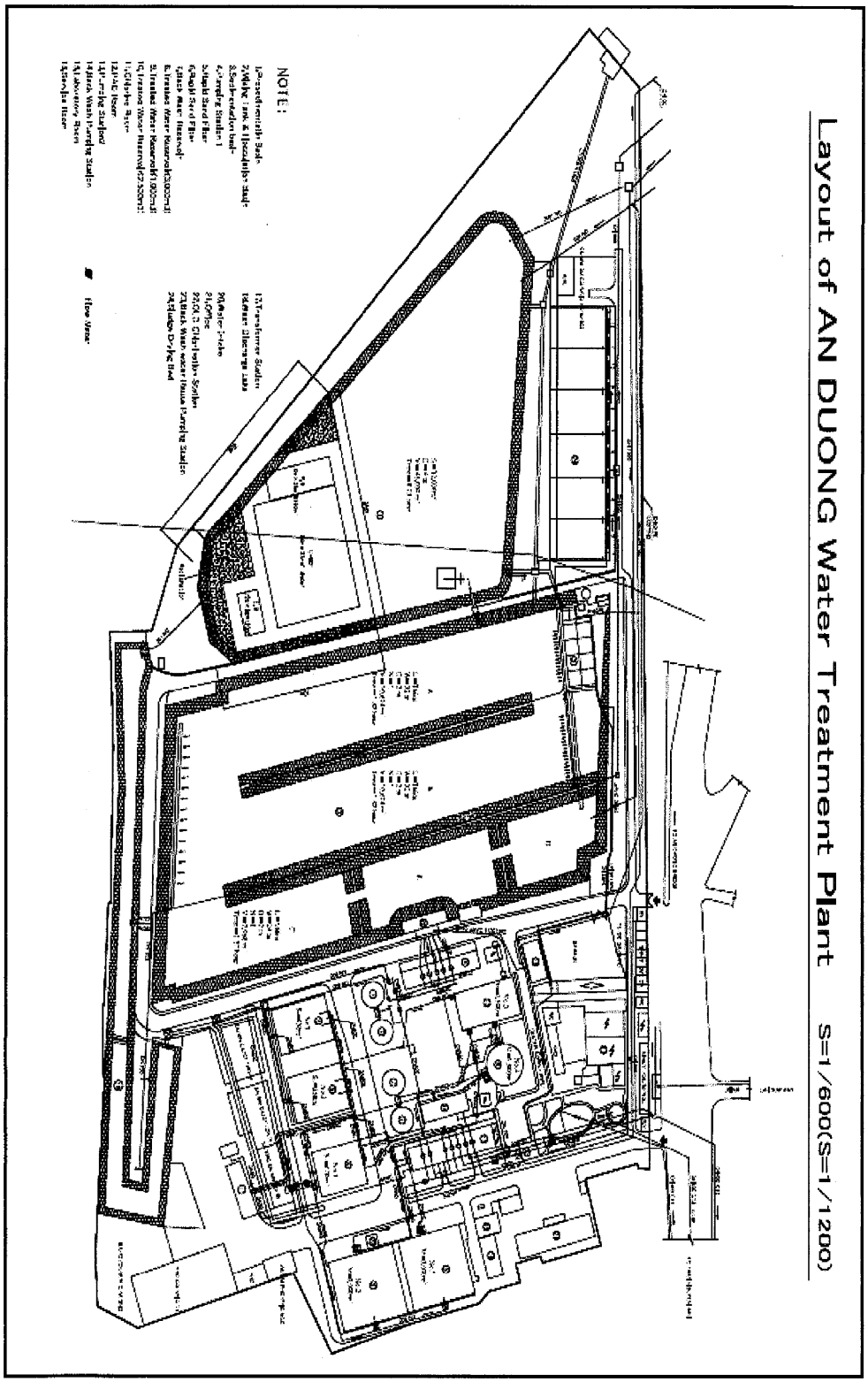
The Team explained that social and environmental considerations studies will be conducted according to "JICA Guidelines for Environmental and Social Considerations" (April 2010). The purposes of the studies are to examine the mitigation measures of impacts and to develop the monitoring plan during/after implementation of the Project.

In addition, the both sides understood that the Team will confirm if Environmental Impact Assessment (hereinafter referred to as EIA) is required for the Project, based on the Vietnamese law and regulations. In case EIA is required, the both sides agreed that Hai Phong Water will take responsibility to conduct the EIA, and that the Team will assist Hai Phong Water.

Annex-1 Project Sites Map
Annex-2 Organization Charts
Annex-3 Japan's Grant Aid Scheme

Annex-1

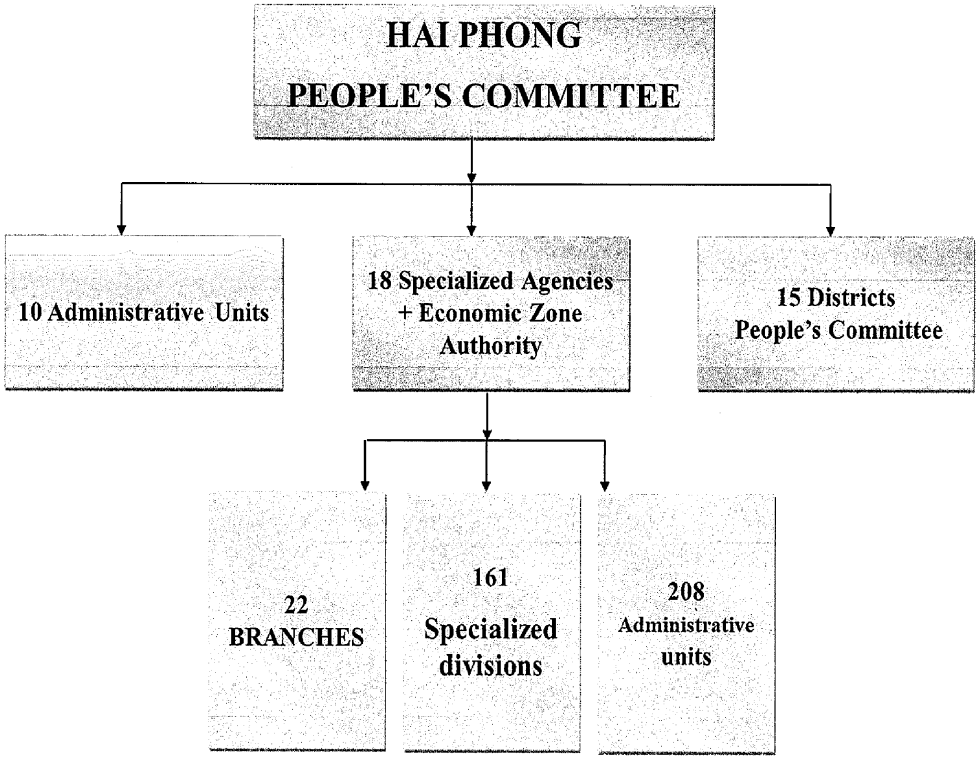
Projects Sites Map



Annex-2

Organization Charts

■ Hai Phong People's Committee (HPPC)

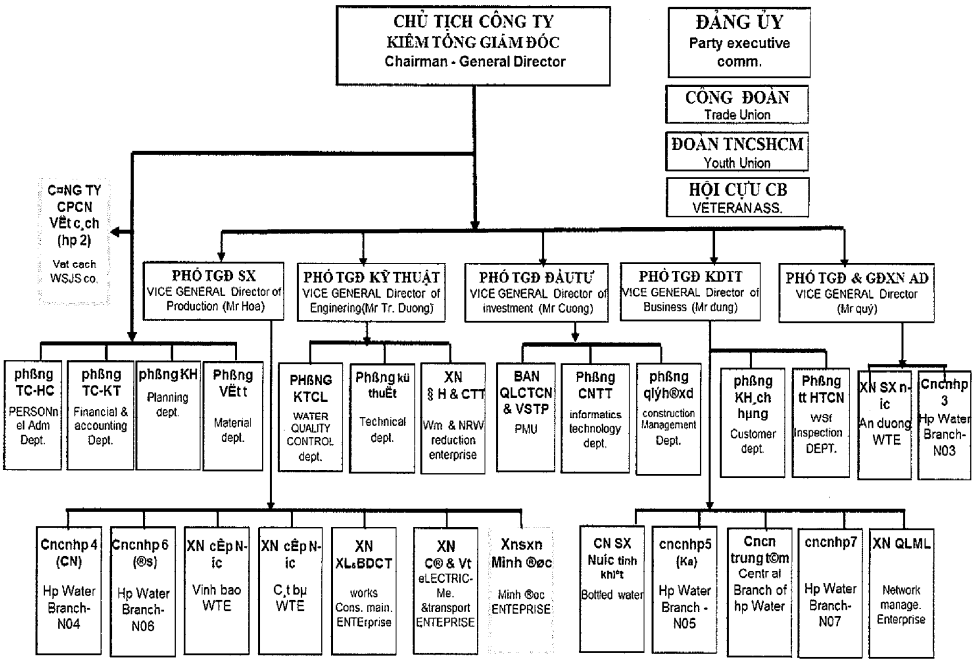


◆ **18 Specialized Agencies of Hai Phong People's Committee**

1. Office of the City People's Committee
2. Department of Home Affairs
3. Department of Planning and Investment
4. Department of Finance
5. Department of Justice
6. Department of Labour, Invalids and Social Affairs
7. Department of Education and Training
8. Department of Health
9. Department of Culture, Sports and Tourism
10. Department of Agriculture and Rural Development
11. Department of Construction
12. Department of Transportation
13. Department of Natural Resources and Environment
14. Department of Trade and Industry
15. Department of Science and Technology
16. Department of Information and Communications
17. Department of Foreign Affairs
18. Inspection of City

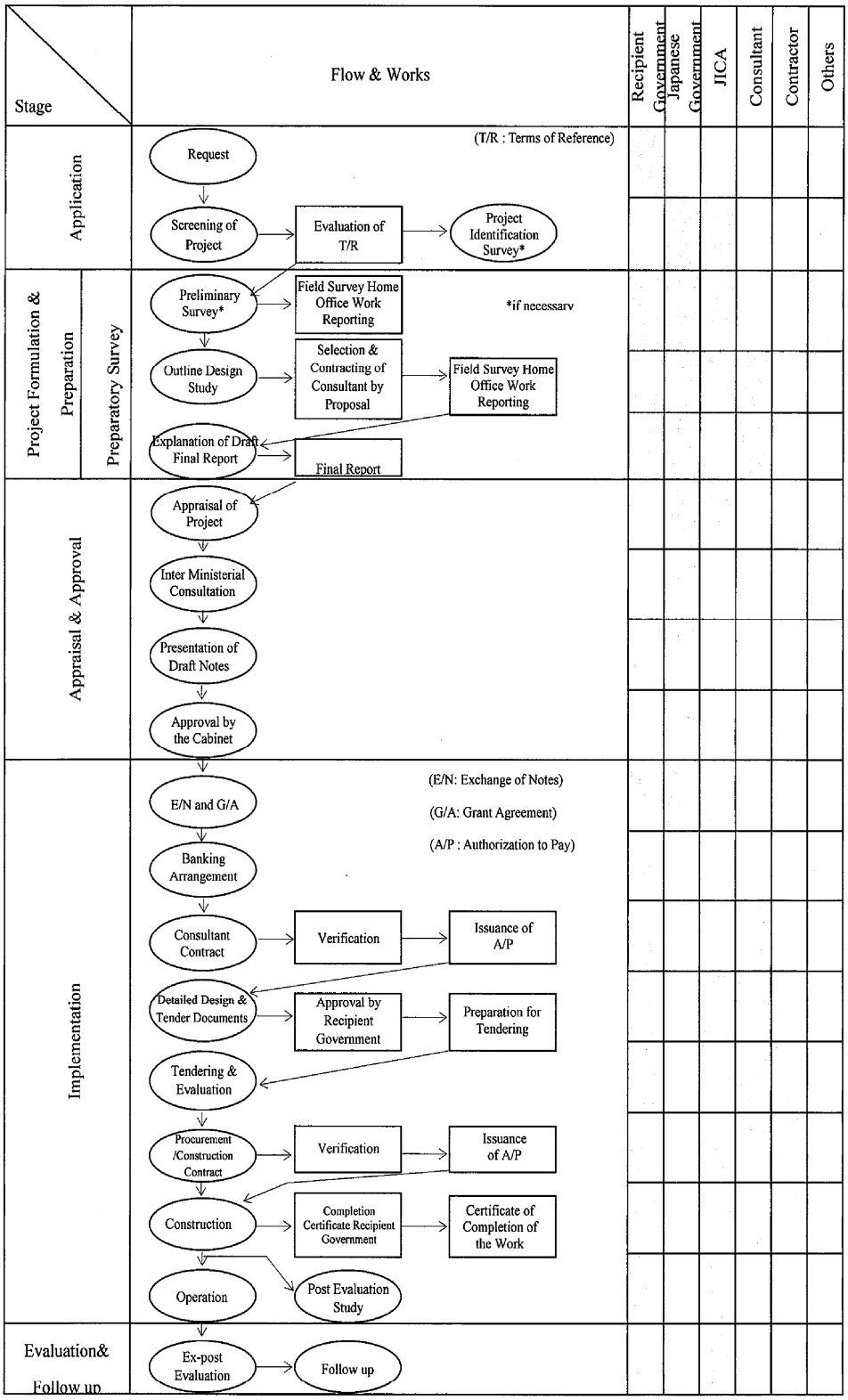
■ Hai Phong Water Supply One Member Co., Ltd (Hai Phong Water)

TỔ CHỨC BỘ MÁY CÔNG TY
Organization Chart of Hai Phong Water



Attachment 1 of Annex-3

Flow Chart of Japan's Grant Aid Procedures



Attachment 2 of Annex-3

Major Undertakings to be taken by Each Government

No.	Items	To be covered by the Grant	To be covered by Recipient
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●

	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) 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 whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●
14	To appoint counterpart personnel to implement the Project		●

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

4-2 Technical Note(T/N） in the Explanation of Conceptual Outline Design

TECHNICAL NOTE

ON THE PREPARATORY SURVEY
ON THE AN DUONG WATER TREATMENT PLANT
UPGRADE INVESTMENT PROJECT IN HAI PHONG CITY
IN SOCIALIST REPUBLIC OF VIET NAM

AGREED UPON

HAI PHONG WATER SUPPLY ONE MEMBER CO., LTD

AND

JICA PREPARATORY SURVEY TEAM

HAI PHONG CITY
19 AUGUST, 2014

佐野博文

Hirofumi SANO
Chief Consultant
JICA Preparatory Survey Team
Japan

Vu Hong Duong
Chairman and General Director
Hai Phong Water Supply One Member Co.,Ltd
Socialist Republic of VietNam

Table of Contents

After a series of discussions during the field survey in Hai Phong City from 23rd July 2014 through 17th August 2014, the following points were agreed between Hai Phong Water Supply One Member Co.,Ltd (hereinafter referred to as "Hai Phong Water") and the JICA Preparatory Survey Team (hereinafter referred to as "the Team"). Based on the agreement as well as the Minutes of Discussion signed on 29th July 2014, the Team will further analyze the results of field survey in consultation with JICA and concerned parties in Japan and will prepare a draft final report which includes the layout and design of the facilities and/or equipment for the Project.

1. Design framework of the project

(1) Target year : 2017
(2) Installation facilities : Upward Bio Contact Filtration (hereinafter referred to as U-BCF)
(3) Design Capacity : 100,000m^3/day

2. Components of the project

2.1 Construction of U-BCF

Though Hai Phong Water requested U-BCF whose capacity is 140,000 m^3/day, Hai Phong Water and the Team (hereinafter referred to as "the both sides") confirmed that the capacity of U-BCF developed by the Project is 100,000 m^3/day, based on the initial request.

The U-BCF installed by the Project will complement the current water treatment plant design capacity (100,000 m^3/day).

2.2 Facilities related to U-BCF

After the field survey and discussions between the both sides, the items described below were agreed.

(1) Civil / Mechanical / Electrical works
① Pumps to lift up raw water to U-BCF **(ANNEX-1)**
② Screen Units for U-BCF
③ Pipes / box culvert within the An Duong water treatment plant (from the pre-sedimentation basin to U-BCF, from U-BCF to the current mixing tank, and from U-BCF to the current sludge drying bed)
④ Electric facilities (control panel, water level meter and any related electrical works)
⑤ Monitoring and controlling system for U-BCF

(2) Consulting Services:
Detailed design, Assistance for tendering, Construction supervision, Technical assistance (soft component)

2.3 Equipment and spare parts

The both sides agreed to submit the following list after consideration about the necessary

equipment and spare parts.

- Laboratory equipment of water quality analysis
- Materials and equipment for spare parts.

3. Outline of proposed facilities

3.1 Location of U-BCF

The Team explained and submitted the drawing of the locations for U-BCF, electrical room and pump station in An Duong WTP (**ANNEX-1**).

The both sides agreed that Option-1 is appropriate plan at the moment.

3.2 Draft plan of U-BCF

The both sides agreed generally the draft plan of U-BCF (**ANNEX-2**).

U-BCF, electrical room and pump station will be constructed at the pre-sedimentation and its surroundings.

3.3 Diagram of water treatment system at An Duong WTP

The both sides agreed generally the schematic diagram of water treatment system including U-BCF at An Duong WTP (**ANNEX-2**).

The both sides agreed to take a more discussion for this matter.

4. Operation and maintenance cost

Estimated O&M cost of U-BCF in every year by installing U-BCF of 100,000m^3/day and 140,000m^3/day is as follows (**ANNEX-3**). As a result, projected O&M cost in every year by installing of U-BCF is 4,763 million VND/year.

On the other hand, O&M cost in every year by installing U-BCF of 140,000m^3/day is 7,437million VND/year.

Annual Operation and Maintenance Cost

Capacity : 100,000m^3/day

Item	Cost (million VND/Year)
Power consumption	3,367
Granular activated carbon replacement	1,764
Mechanical maintenance	730
Chemical consumption	▲1,098
Total	4,763

Capacity : 140,000m^3/day

Item	Cost (million VND/Year)
Power consumption	5,495
Granular activated carbon replacement	2,457
Mechanical maintenance	1,022
Chemical consumption	▲1,537
Total	7,437

5. Preparatory work for construction work

Hai Phong Water agreed to complete the following works by December 2015.

- Reclamation of a part of Pre-sedimentation Basin with compacted soil for development of site for U-BCF. Reclamation area will be approximately 3,570m^2 for the project.
- Installation of a temporary gate 10m width nearby the planned site of U-BCF, on the Southwest side of the site of An Duong Water Treatment Plant.
- Relocation of the overhead electric lines above the planned site of U-BCF and the temporary gate.

6. Outline of soft component (Technical Assistance)

The both sides confirmed that treatment of ammonium and organic matters in the raw water, which has been increasingly polluted, is one of the most crucial challenges which Hai Phong Water is facing. U-BCF can effectively solve those challenges.

Thus, implementation of soft component is planned to support smooth project launching and to secure project benefit sustainability.

Upon preparation of soft component plan, the following two items are extracted:

The both sides agreed that the necessity of following fields of soft component was recognized.

- Operation and maintenance of water treatment facilities
- Training for Water quality analysis of WTP

7. Social and environmental consideration

The both sides agreed the following matters;

- Stakeholder meeting shall be held at the main office building of Hai Phong Water on August 25, 2014 by inviting the representatives of relating agencies and water users. The meeting shall be done by leading of Hai Phong Water, with assistance of JICA Preparatory Survey Team.

- Hai Phong Water sent the official letter to confirm the necessity of EIA procedure for the Project to Department of Natural Resources and Environment (DONRE). The official reply from the DONRE shall be sent by the Hai Phong Water as soon as it is available.

- Construction debris for the Project and sludge from the An Duong Water Treatment Plant shall be disposed to locations which are accepted by the Local Authorities.

- Construction work shall be conducted inside of An Duong Water Treatment Plant. Thus, Hai Phong Water shall supervise and manage carefully the traffic conditions inside An Duong Water Treatment Plant and instruct them to protect any accidents during construction on the basis of cooperation of the Consultant and the Contractor.

8. Tentative implementation schedule of the project

Tentative implementation schedule of the project is shown in **ANNEX-4**.

Major contents period is as follows

- Exchange of Note(E/N) / Grant Agreement(G/A) Mar.2015
- Contract with consultant Apr.2015
- Detail Design May 2015 to Sep 2015
- Tender / Contract with contractor Jan 2016
- Construction work Mar 2016 to May 2017
- Soft component May 2017 to Aug 2017

9. Measures to be taken by the Vietnamese side

- Hai Phong Water agreed "Major Undertakings to be taken by Each Government" shown in **ANNEX-5**.
- Hai Phong Water agreed to secure the necessary budget for the Project and for operation/maintenance of the U-BCF.
- The taxes including Value Added Tax (VAT), custom duty, and any other taxes and levies in Viet Nam which are to be arisen from the Project activities will be exempted by the Vietnamese side.
- Hai Phong Water will take any procedures necessary for the tax exemption with related organizations.
- Banking Arrangement (hereinafter referred to as "B/A") commission will be paid by the Vietnamese side.
- After calculate the construction cost by the Team, required budgets for taxes, VAT, B/A will be informed to Hai Phong Water.

10. Procurement Plan

The both sides agreed the following matter;

(1) Source of Materials and Equipment

Eligible source of materials and equipment to be procured by Japanese grant aid is Japan and recipient country, basically. Materials and equipment needed shall be procured in Viet Nam as much as possible. However, as to goods are not available in local market and those are not stably supplied or not feasible in terms of circulation amount and cost, they shall be imported from Japan, considering cost benefit performance and O&M efficiency. Association of South-East Asian Nations are regarded as eligible third countries.

Material/Equipment Procurement Demarcation

Construction Materials/Equipment		Procurement Source		
Classifications	Items	Local	Japan	Third Country
Civil Materials	Cement	○		
	Reinforcing Bar	○		
	Formwork	○		
	Sand, Gravel, Brick	○		
	Light oil, gasoline	○		

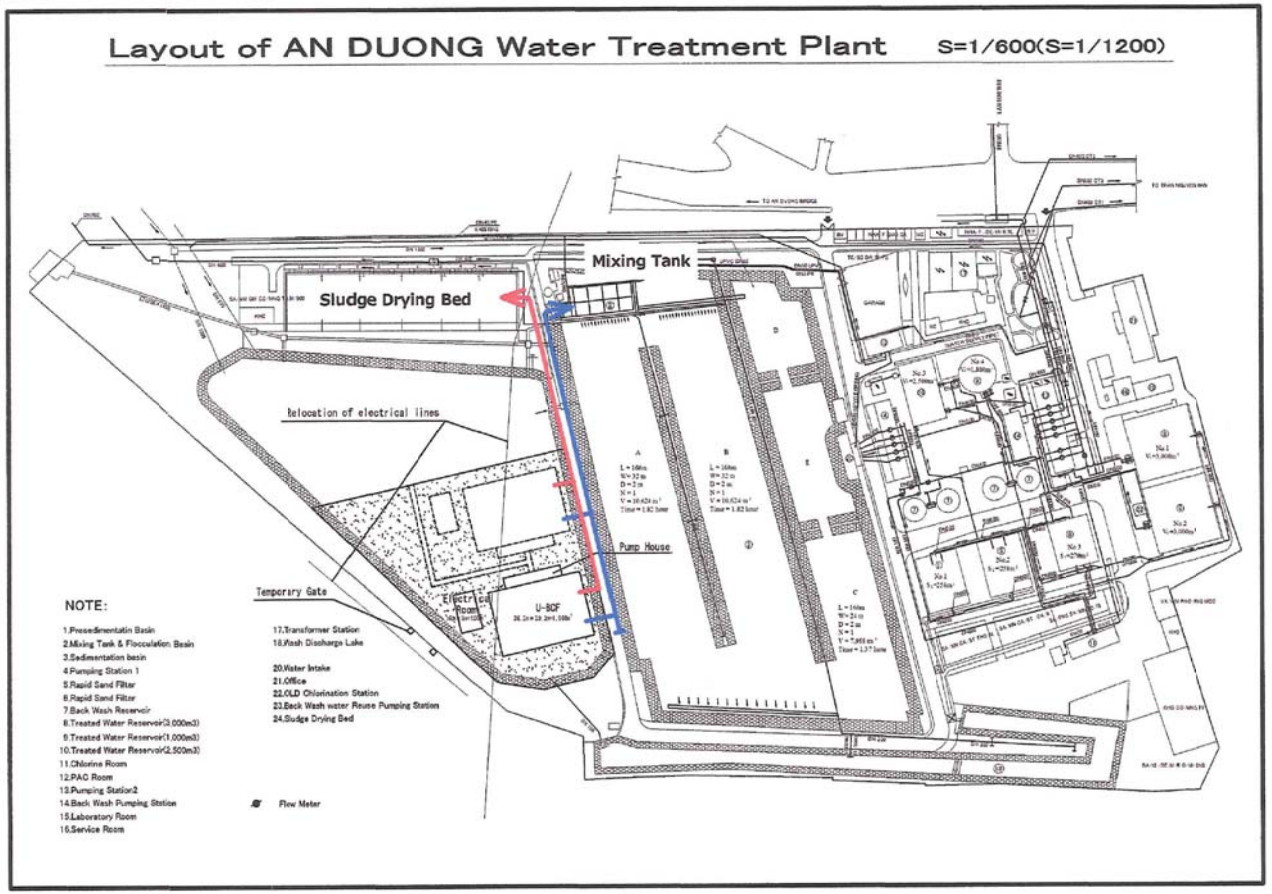
Pipe Materials	DI Pipe		○	(○)
	Steel Pipe	○		
	uPVC Pipe	○		
Mechanical/Electrical Equipment	Pumps		○	
	Activated Carbon	○		
Construction Equipment (Lease)	Construction Equipment	○		

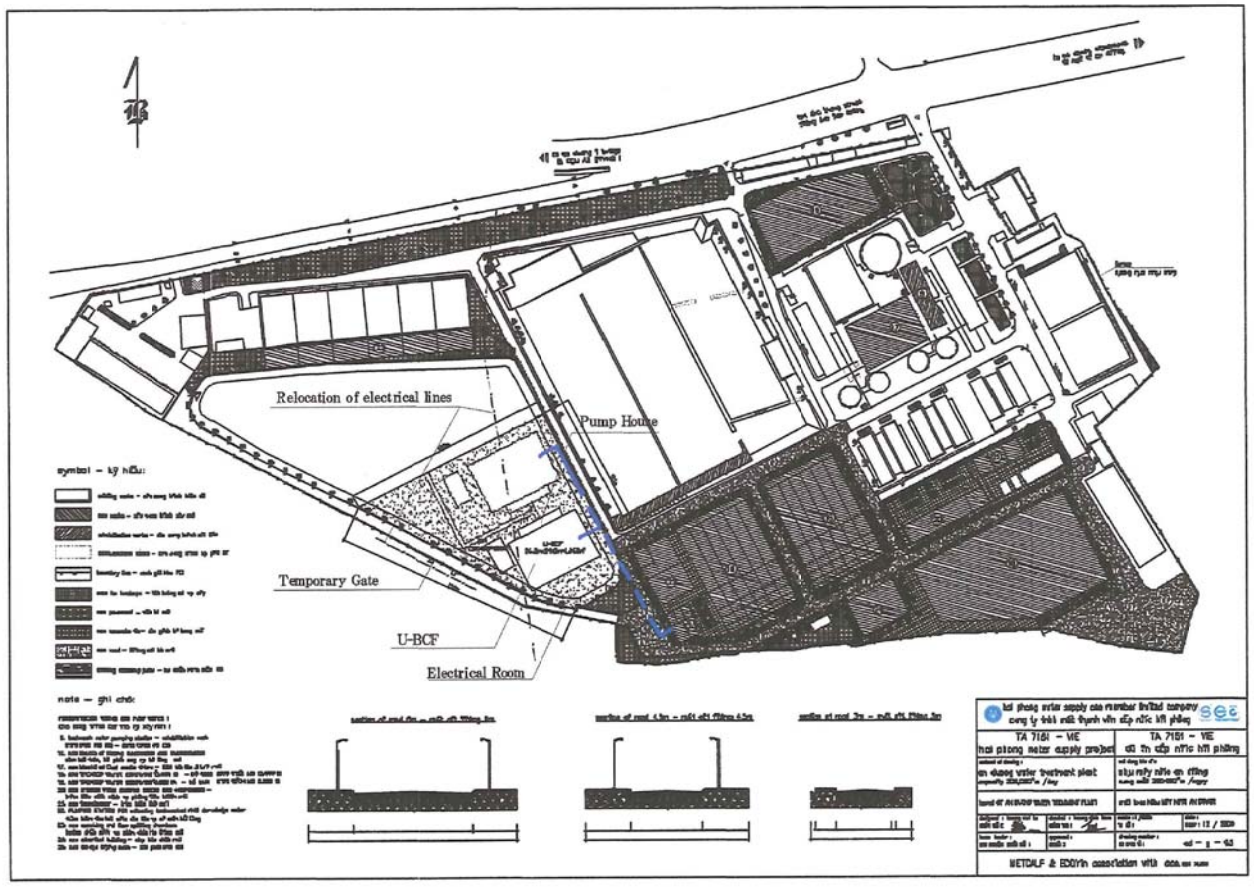
( ): Provided the supply of products from overseas factory of Japanese Manufacturer

(2)Site Delivery and Storage Yard

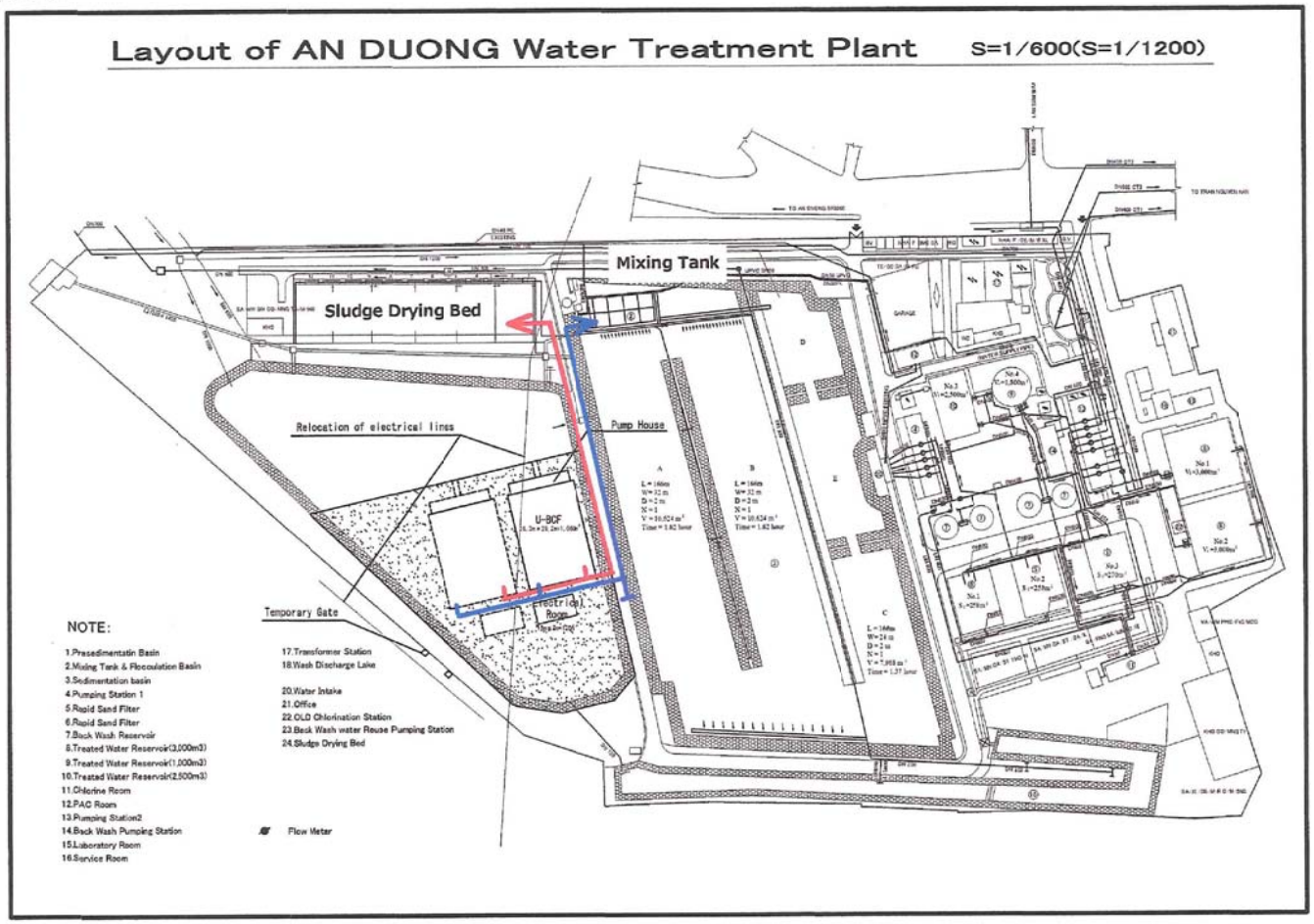
- Basically, delivery site of procured material/equipment shall be a storage yard in Hai Phong City designated by Hai Phong Water, supposed to be within An Duong Water Treatment Plant site or a nearest land.
- Security shall be secured to prevent theft. Therefore, huge volume delivery is unfavorable and especially bulky pipe materials shall be delivered in several batches according to work progress.
- It is not expected that there would be a large enough space to equip a batching plant for exclusive use inside or neighborhood of An Duong Water Treatment Plant. In view of this, procurement of fresh concrete from local batching plants shall be considered preferentially for adoption.

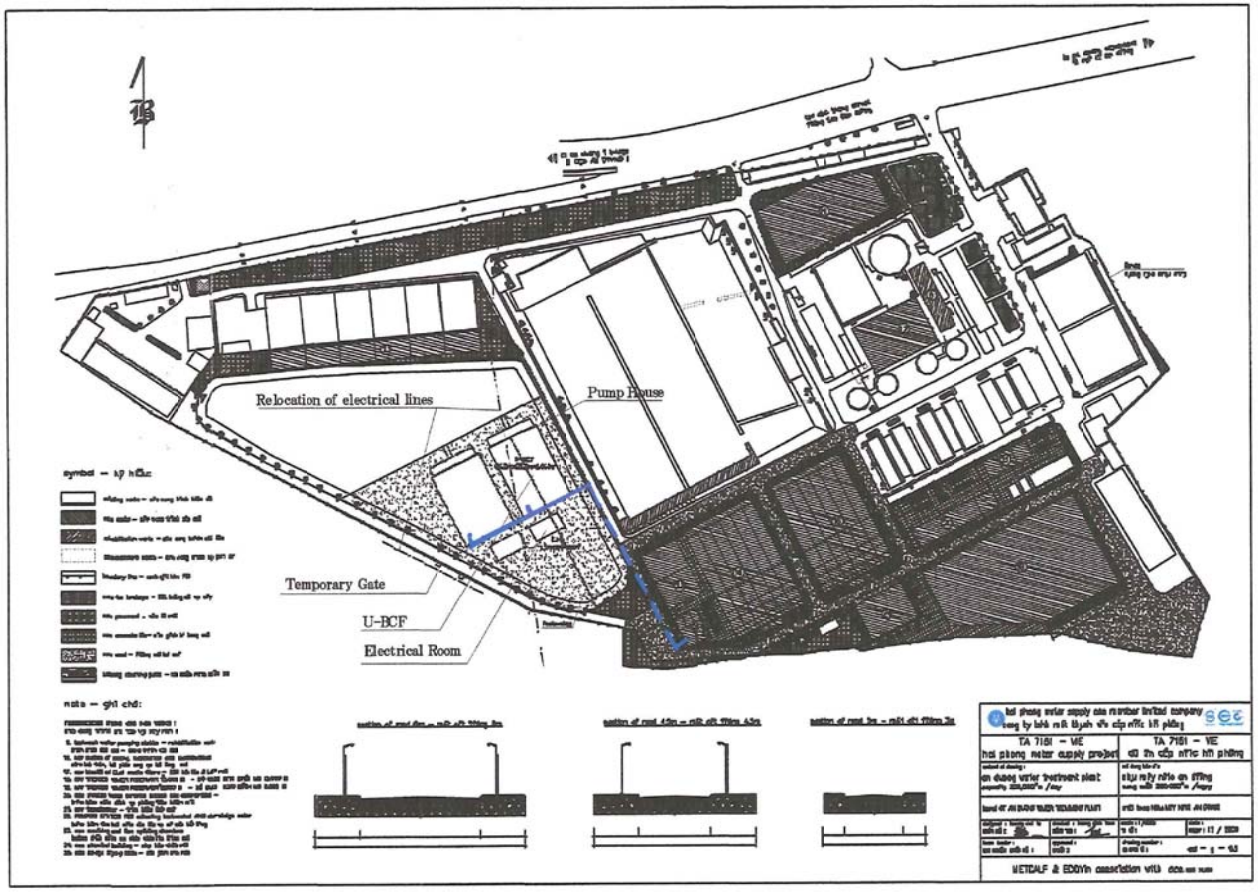
ANNEX-1 Location of U-BCF
Option1



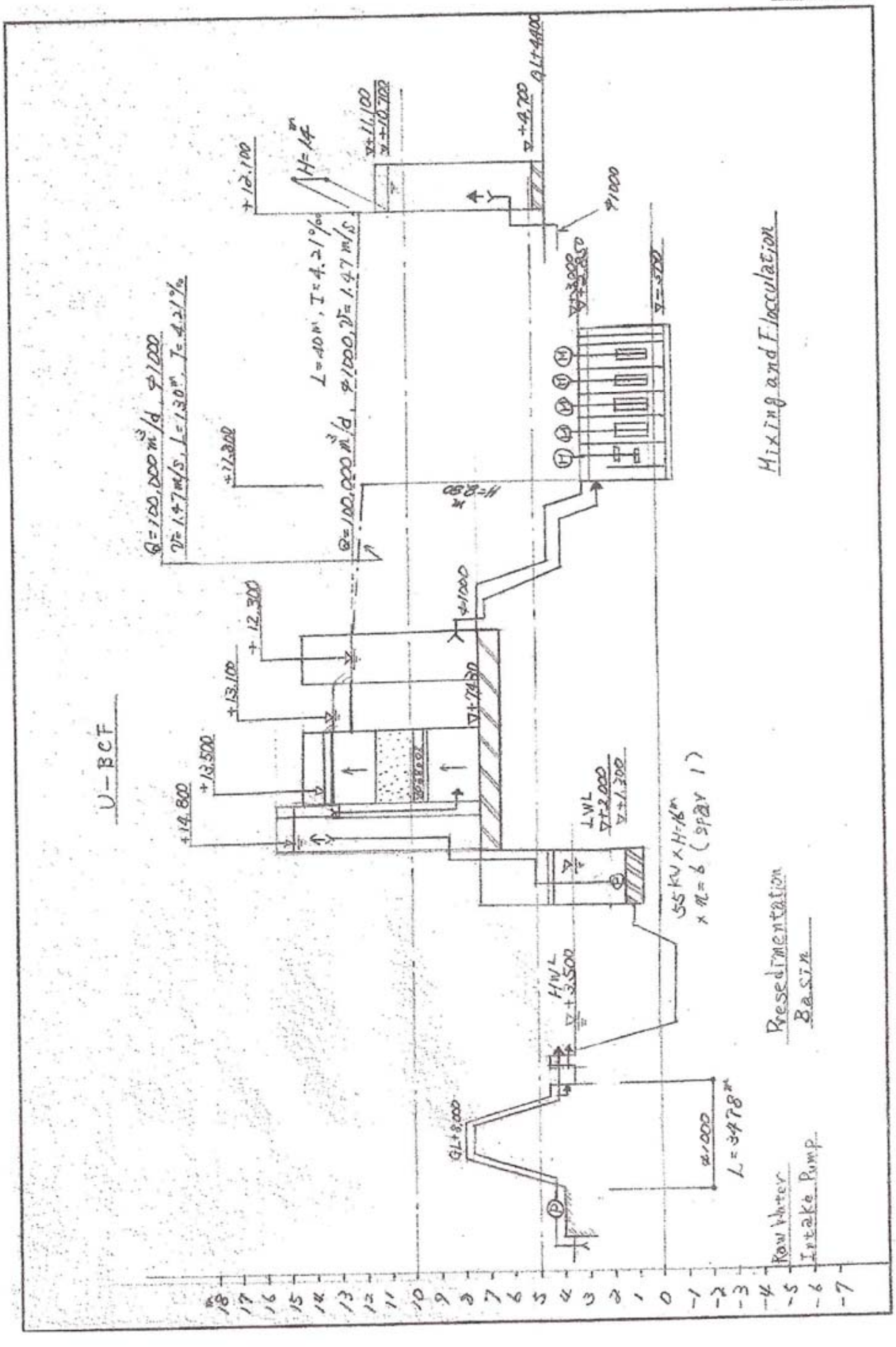

Relocation of electrical lines
Pump House
Temporary Gate
U-BCF
Electrical Room
symbol – ký hiệu:
note – ghi chú:
TA 7181 – VIE
hai phong water supply project
an duong water treatment plant
WETDILF & EDDYin association with

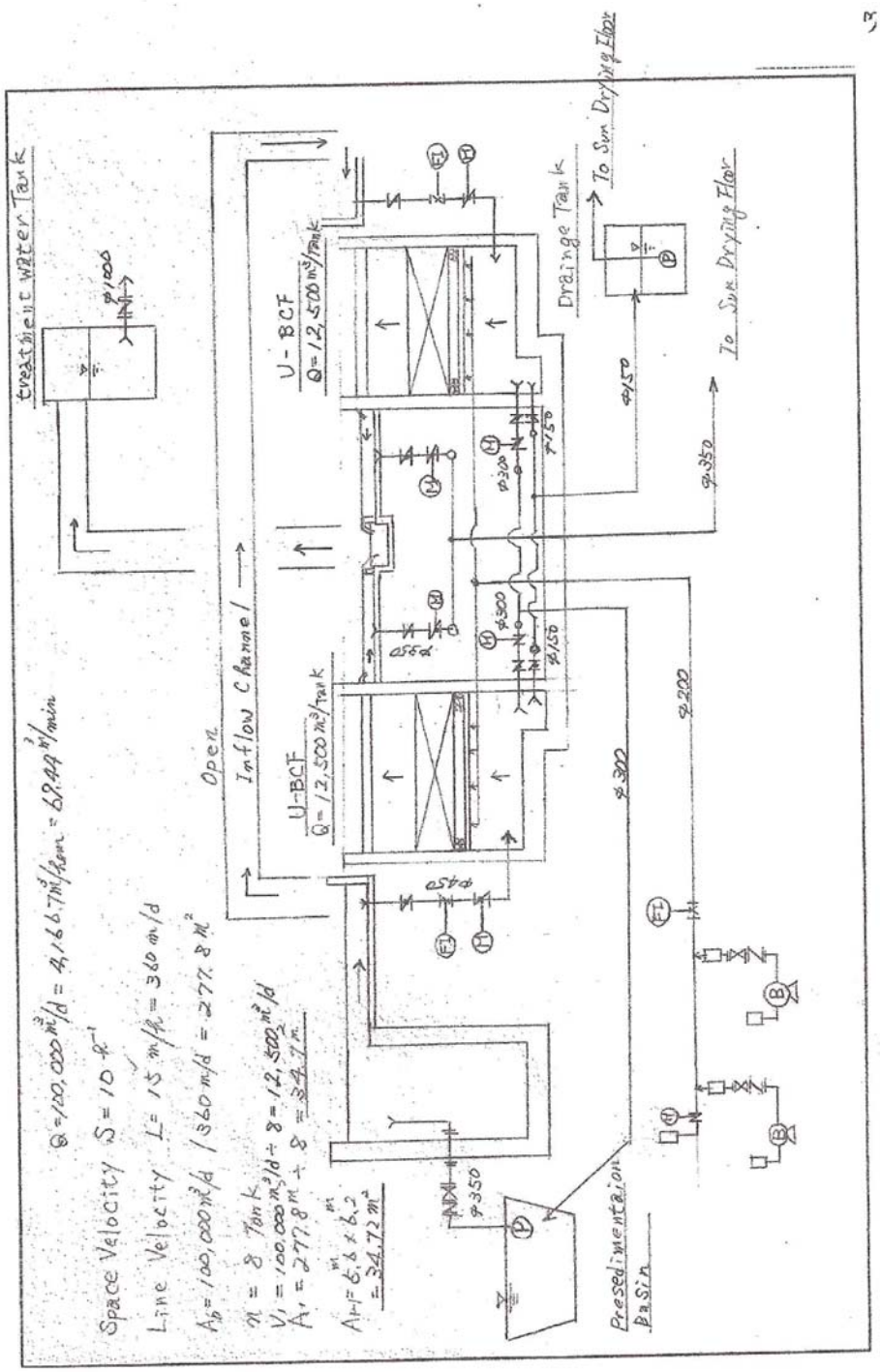
Option2

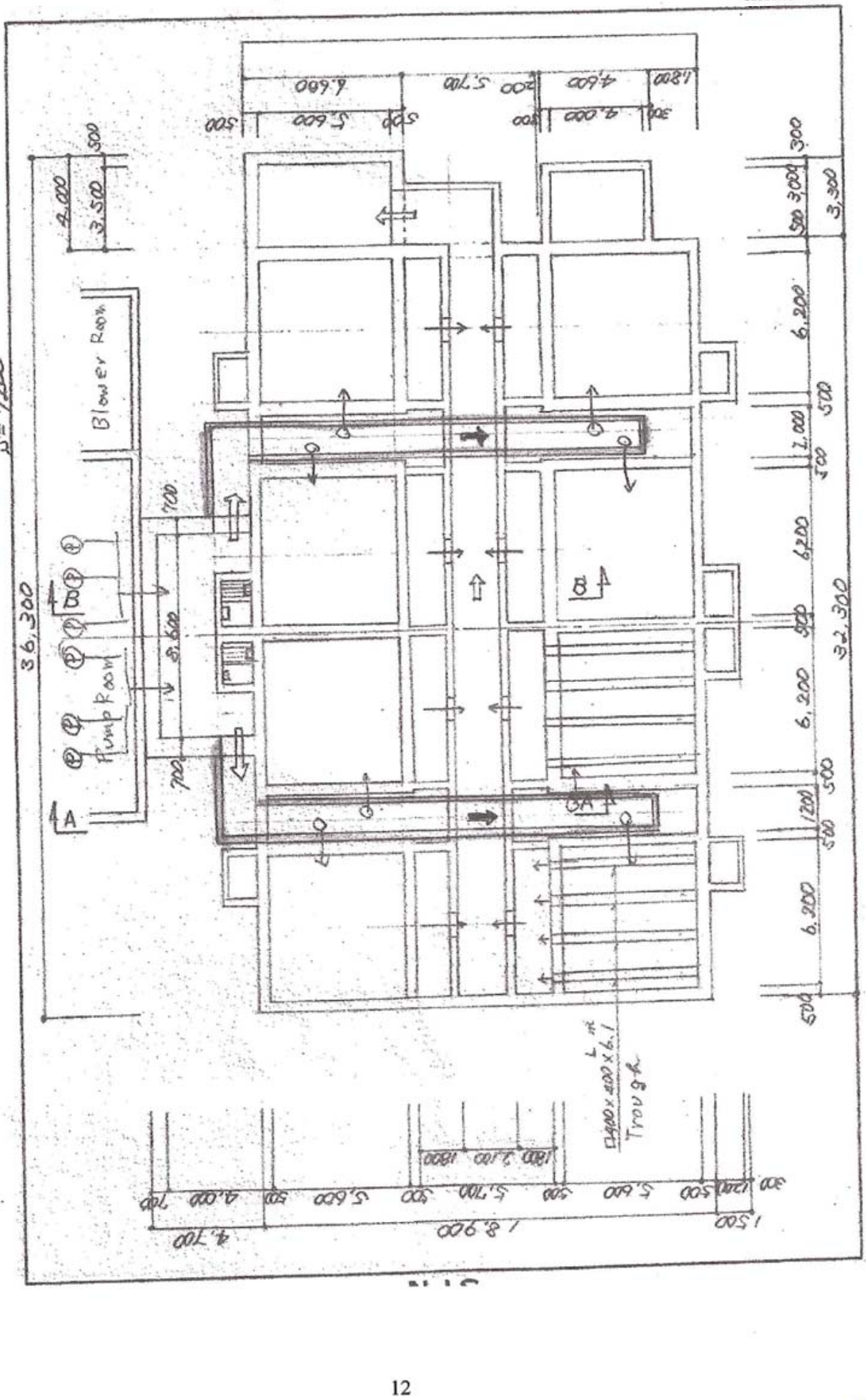

Layout of AN DUONG Water Treatment Plant
S=1/600(S=1/1200)
Mixing Tank
Sludge Drying Bed
Relocation of electrical lines
Pump House
U-BCF
Temporary Gate
Electrical Room
NOTE:
1.Presedimentatin Basin
2.Mixing Tank & Flocculation Basin
3.Sedimentation basin
4.Pumping Station 1
5.Rapid Sand Filter
6.Rapid Sand Filter
7.Back Wash Reservoir
8.Treated Water Reservoir(3,000m3)
9.Treated Water Reservoir(1,000m3)
10.Treated Water Reservoir(2,500m3)
11.Chlorine Room
12.PAC Room
13.Pumping Station2
14.Back Wash Pumping Station
15.Laboratory Room
16.Service Room
17.Transformer Station
18.Wash Discharge Lake
20.Water Intake
21.Office
22.OLD Chlorination Station
23.Back Wash water Reuse Pumping Station
24.Sludge Drying Bed
Flow Meter


Relocation of electrical lines
Pump House
Temporary Gate
U-BCF
Electrical Room
TA 7151 – VIE
TA 7151 – VIE
METCALF & EDDY/in association with

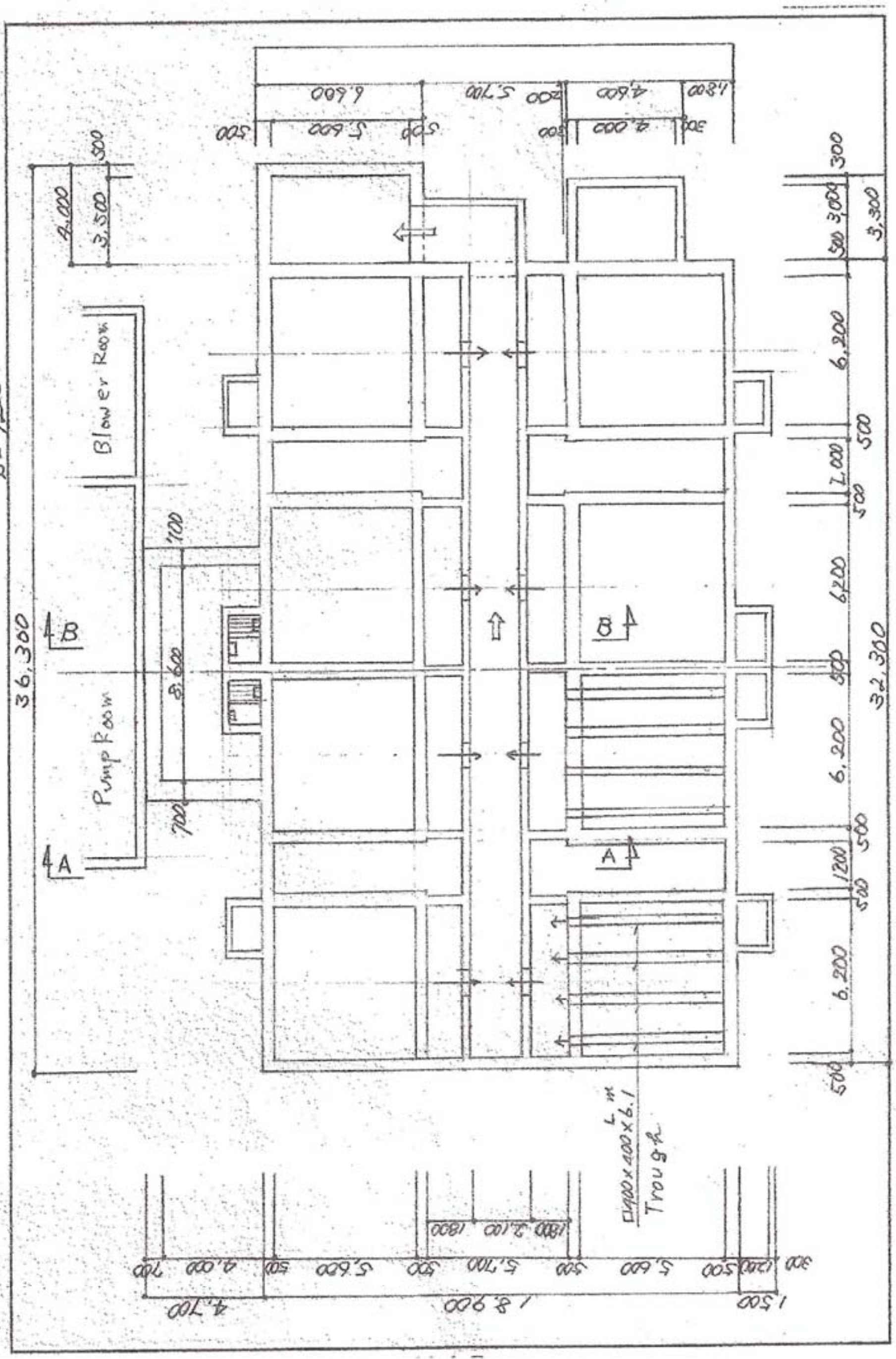
ANNEX-2 Drawing of U-BCF

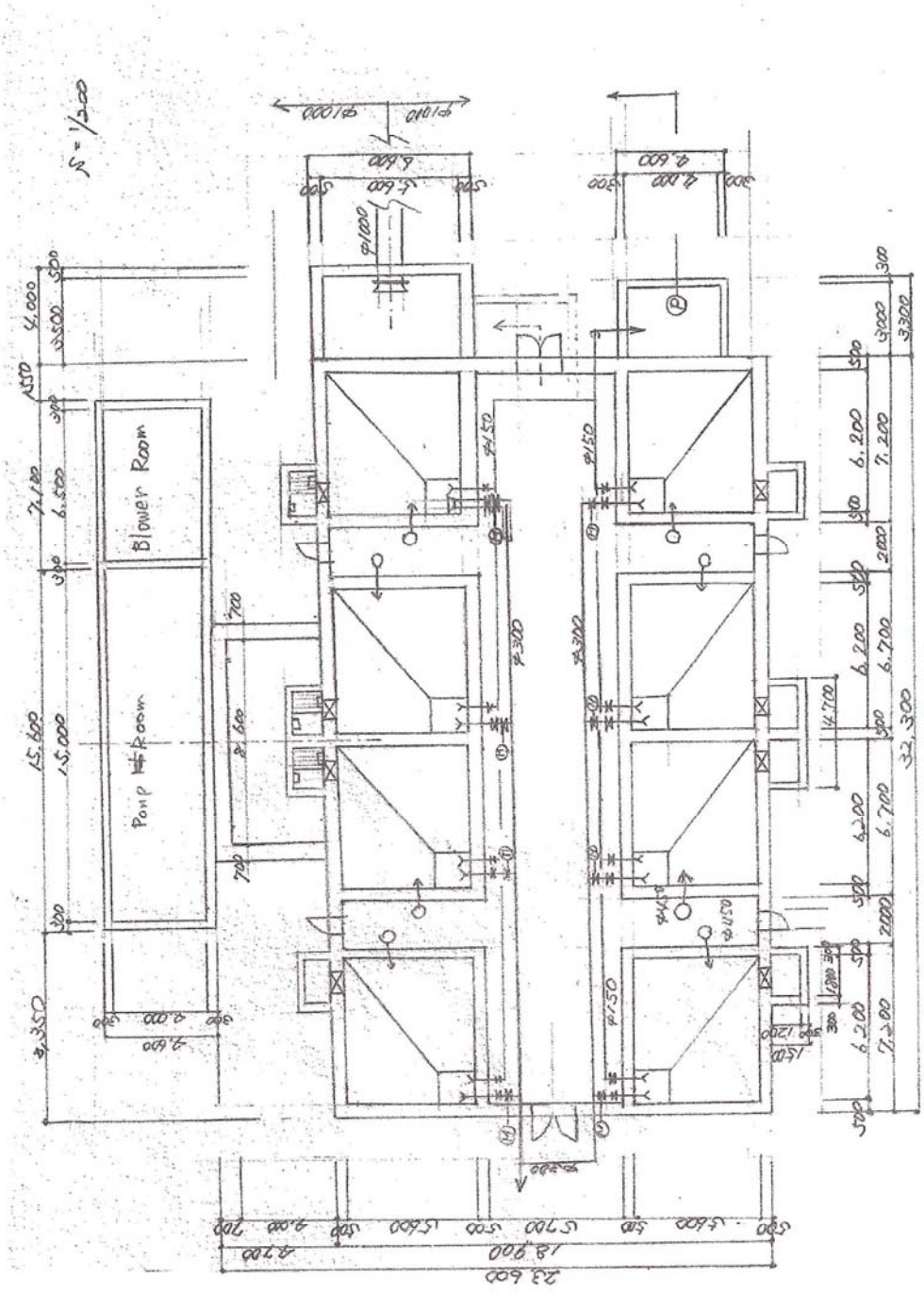


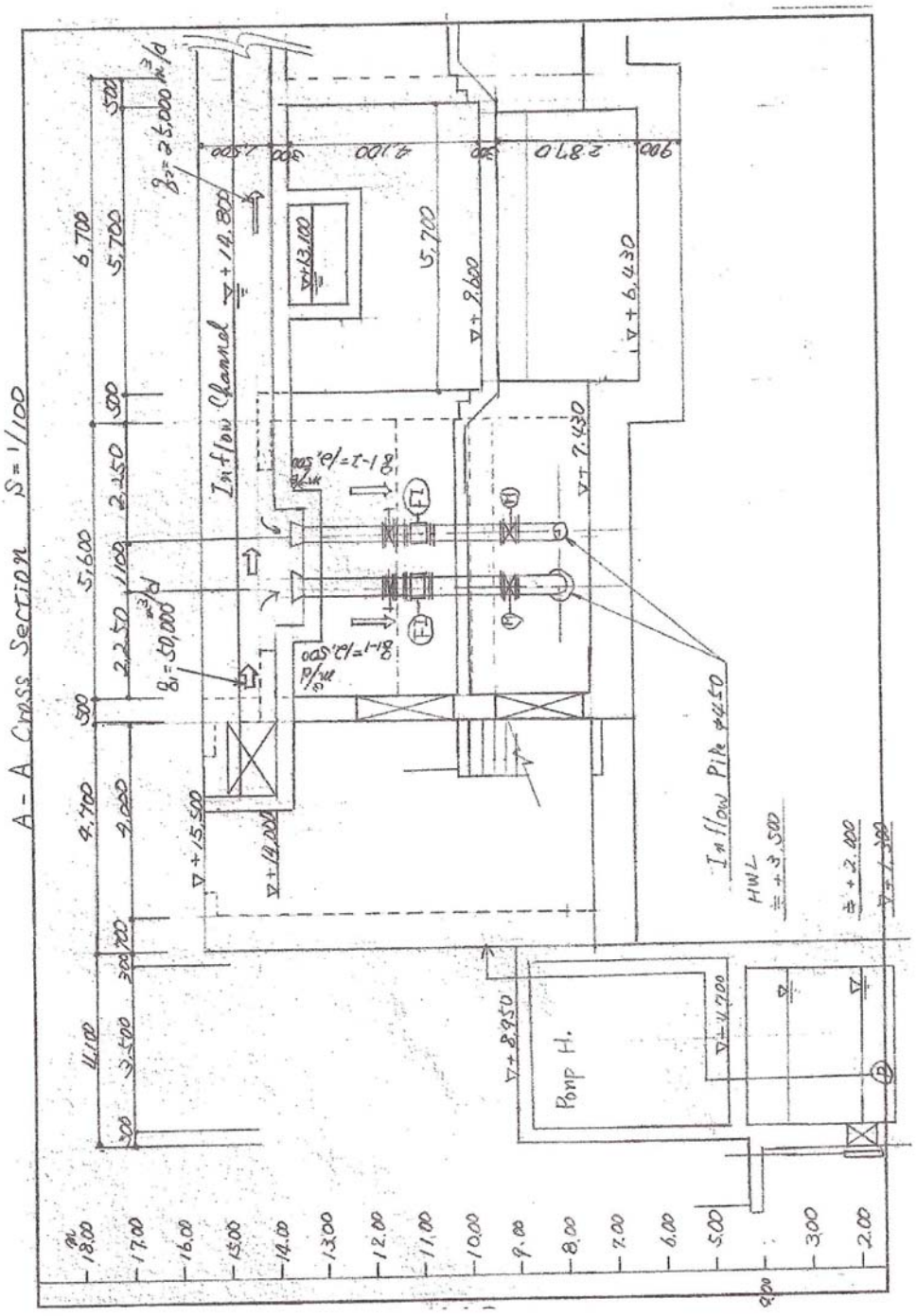

Treatment Water Tank
Open Inflow Channel
U-BCF
Q = 12,500 m³/Tank
U-BCF
Q = 12,500 m³/Tank
Drainge Tank
To Sun Drying Floor
To Sun Drying Floor
Presedimentation Basin
Q = 100,000 m³/d = 4,166.7 m³/hour = 69.44 m³/min
Space Velocity S = 10 h⁻¹
Line Velocity L = 15 m/Hr = 360 m/d
A_b = 100,000 m³/d / 360 m/d = 277.8 m²
n = 8 Tank
V_1 = 100,000 m³/d ÷ 8 = 12,500 m³/d
A_1 = 277.8 m² ÷ 8 = 34.72 m²
A_1 = 6.8 m × 5.2 m = 34.72 m²



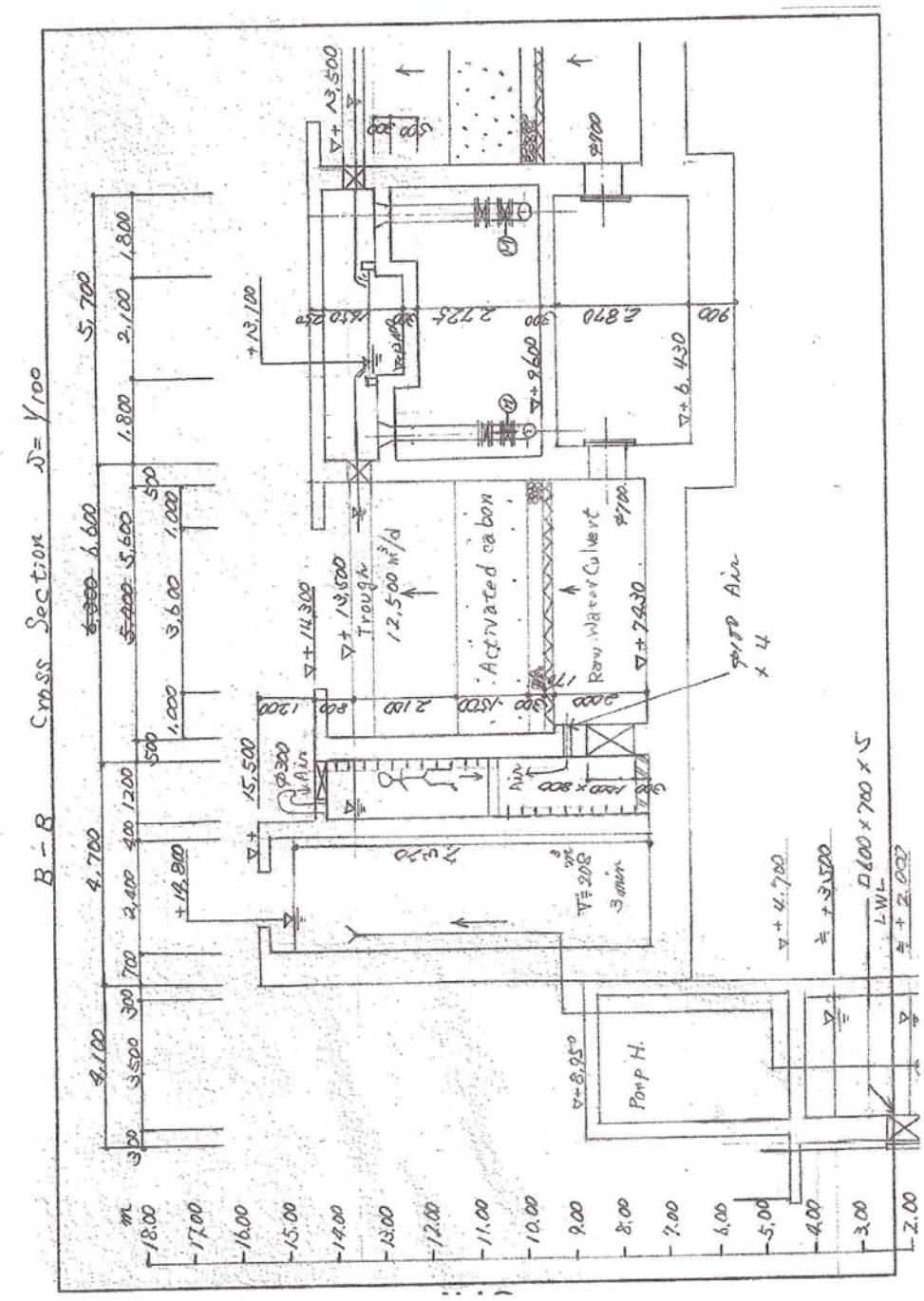
12


S= 1/200
Blower Room
Pump Room
36,300
32,300
Trough


Blower Room
Pump House


A - A Cross Section S = 1/100
Inflow Channel
Inflow Pipe
HWL
Pump H.

15


B - B Cross Section
Activated carbon
Raw Water Culvert
Pump H.
Trough
12,500 m³/d
Air
LWL

ANNEX-3 Operation and maintenance cost breakdown

(AnDuong WTP:100,000m^3/day)

Items	capacity (A) kw	unit number (B) number	operating time (C) min・hour/day	annual power consumption volume 365days (D) (D=A*B*C*365) kwh/year	unit power cost (E) VND/kw	annual power consumption cost(F) (F=D*E) VND/year
1. Brower for washing	45	2	30 minutes	16,425.0	1,388	22,798,000
2. Submersible pump	55	5	24 hour	2,409,000.0	1,388	3,343,692,000
3. Motor operated valve	0.2	3	10 minutes	36.5	1,388	50,700
4. Lighting	0.1	10	2 hour	730.0	1,388	1,013,000
sub-total						**3,367,553,700**

Items	capacity (A) m^3	activated carbon life(B) year	annual activated carbon replacment ratio (C) (C=1/B) %	annual replacement volume (D) (D=A*C) m^3/year	activated carbon unit cost (E) VND/m^3	annual activated carbon consumption cost(F) (F=D*E) VND/year
1. granual activated carbon	420	15	7	29.4	60,000,000	1,764,000,000
sub-total						**1,764,000,000**

Items	volume (A) m^3/day		annual treatment ratio (B) %	annual consumption volume 365day (C) (C=A*B*365) m^3/year	maintenance unit cost (D) VND/m^3	annual maintenance cost (E) (E=C*D) VND/year
1. mechanical maintenance	100,000	—	100	36,500,000	20	730,000,000
sub-total						**730,000,000**

Items	volume (A) m^3/day	average unit consumption (B) g/m^3	reduction ratio (C) %	annual chemical consumption volume 365day (D) (D=A*B*C*365) kg/year	chemical unit cost (D) VND/kg	annual chemical consumption cost (E) (E=C*D) VND/year
1. PAC	100,000	11.54	28.5	▲ 120,045	9,150	▲ 1,098,410,000
2. Chlorine	100,000	2.00	27.1	▲ 19,783	11,200	▲ 221,570,000
sub-total						**▲ 1,098,410,000**
Total(VND)						**4,763,144,000**
Total(YEN)						**23,816,000**

(AnDuong WTP:140,000m^3/day)

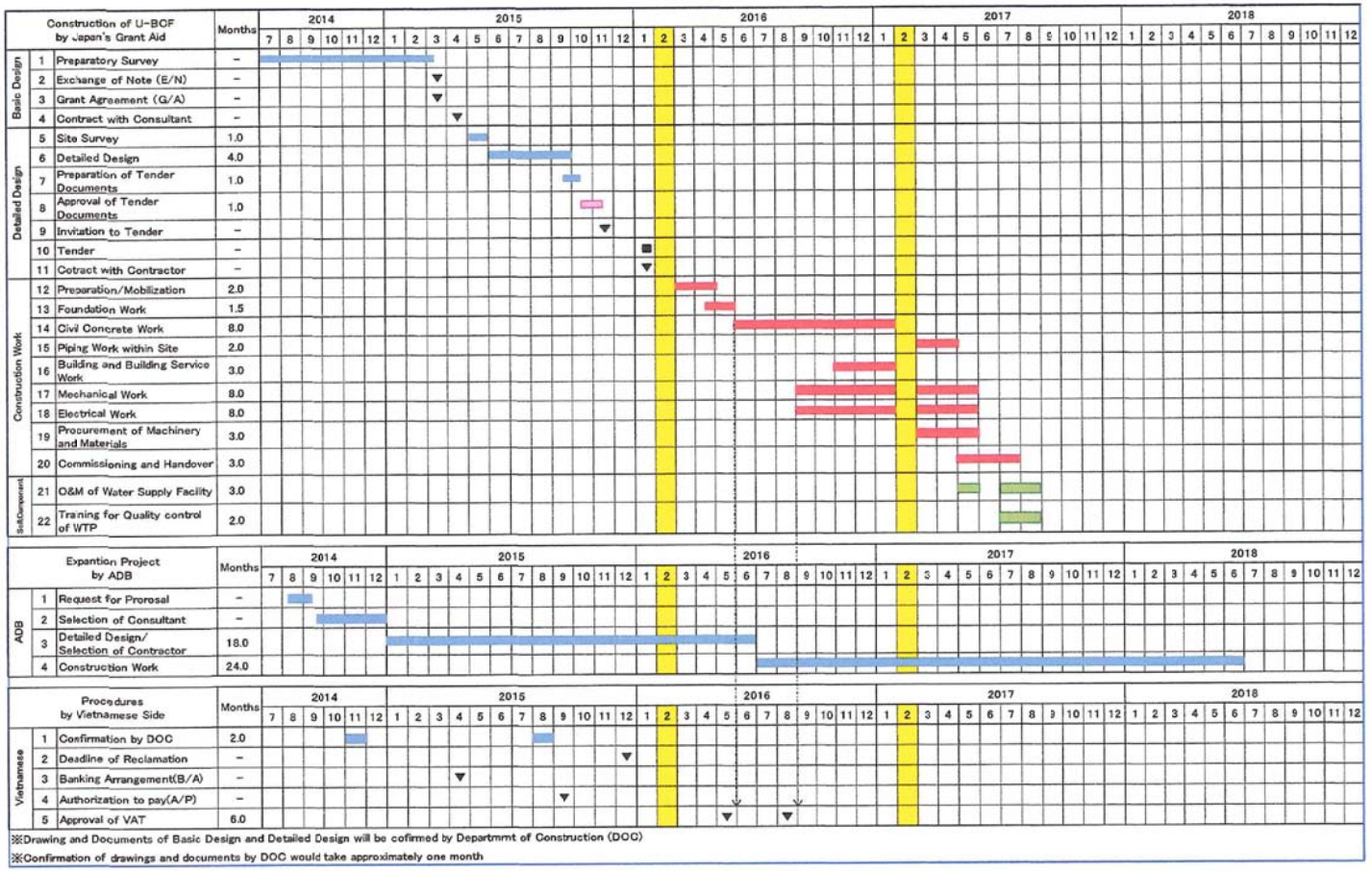
Items	capacity (A) kw	unit number (B) number	operating time (C) min・hour/day	annual power consumption volume 365days (D) (D=A*B*C*365) kwh/year	unit power cost (E) VND/kw	annual power consumption cost(F) (F=D*E) VND/year
1. Brower for washing	45	2	30 minutes	16,425.0	1,388	22,798,000
2. Submersible pump	90	5	24 hour	3,942,000.0	1,388	5,471,496,000
3. Motor operated valve	0.2	3	10 minutes	36.5	1,388	50,700
4. Lighting	0.1	10	2 hour	730.0	1,388	1,013,000
sub-total						**5,495,357,700**

Items	capacity (A) m^3	activated carbon life(B) year	annual activated carbon replacment ratio (C) (C=1/B) %	annual replacement volume (D) (D=A*C) m^3/year	activated carbon unit cost (E) VND/m^3	annual activated carbon consumption cost(F) (F=D*E) VND/year
1. granual activated carbon	585	15	7	40.95	60,000,000	2,457,000,000
sub-total						**2,457,000,000**

Items	volume (A) m^3/day		annual treatment ratio (B) %	annual consumption volume 365day (C) (C=A*B*365) m^3/year	maintenance unit cost (D) VND/m^3	annual maintenance cost (E) (E=C*D) VND/year
1. mechanical maintenance	140,000	—	100	51,100,000	20	1,022,000,000
sub-total						**1,022,000,000**

Items	volume (A) m^3/day	average unit consumption (B) g/m^3	reduction ratio (C) %	annual chemical consumption volume 365day (D) (D=A*B*C*365) kg/year	chemical unit cost (D) VND/kg	annual chemical consumption cost (E) (E=C*D) VND/year
1. PAC	140,000	11.54	28.5	▲ 168,063	9,150	▲ 1,537,775,000
2. Chlorine	140,000	2.00	27.1	▲ 27,696	11,200	▲ 310,197,000
sub-total						**▲ 1,537,775,000**
Total(VND)						**7,436,583,000**
Total(YEN)						**37,183,000**

ANNEX-4 Tentative implementaion Schedule



ANNEX-5 Major Undertakings to be taken by Each Government

No.	Items	To be covered by the Grant	To be covered by Recipient
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●

	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		
	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) 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 whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●
14	To appoint counterpart personnel to implement the Project		●

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

4-3 Minutes of Discussion (M/D) in the 2nd Field Survey

MINUTES OF DISCUSSIONS
ON
THE PREPARATORY SURVEY FOR OUTLINE DESIGN STUDY
ON
AN DUONG WATER TREATMENT PLANT UPGRADE INVESTMENT PROJECT
IN HAI PHONG CITY
IN SOCIALIST REPUBLIC OF VIET NAM
(EXPLANATION OF THE DRAFT FINAL REPORT)

In response to the request from the Government of Socialist Republic of Viet Nam (hereinafter referred to as "the Vietnamese side"), the Government of Japan decided to conduct a Preparatory Survey on "The An Duong Water Treatment Plant Upgrade Investment Project" (hereinafter referred to as "the Project") and entrusted the survey to the Japan International Cooperation Agency (hereinafter referred to as "JICA").

JICA has conducted the Preparatory Survey from July to September 2014. Afterward, JICA prepared a draft final report of the survey, based on discussions, field surveys, and technical examination of the results.

In order to explain and consult with the Vietnamese side on the components of the draft final report, JICA dispatched the Draft Final Report Explanation Team (hereinafter referred to as "the Team"), which is headed by Ms. Eriko Tamura, Director, Water Resources Management Team I, Water Resources and Disaster Management Group, Global Environment Department, JICA, from November 29th to December 5th, 2014.

As a result of discussions, the Vietnamese side and the Team confirmed the main items described in the attached sheets. The confirmed items will be preceded accordingly to formal procedures of the Vietnamese side and the Japanese side when the Project is accepted and approved by the both Governments.

Hai Phong, 4th December, 2014

Eriko Tamura
Leader
Preparatory Survey Team for Outline Design Study
Japan International Cooperation Agency (JICA)

Vu Hong Duong
Chairman and General Director
Hai Phong Water Supply One Member Co., Ltd (Hai Phong Water)

ATTACHMENT

1. Objective of the Project

The Project aims to reduce concentration of ammonium nitrogen by installing Upward Bio Contact Filtration (hereinafter referred to as "U-BCF") and the complimentary facilities, and thus to stabilize the operation of the An Duong water treatment plant and to reduce the chlorination dosing amount. Based on those results, the Project is expected to contribute the distribution of safe water.

2. Responsible and Implementing Agency

2-1) The Responsible Agency is Hai Phong People's Committee (hereinafter referred to as "HPPC").

2-2) The Implementing Agency is Hai Phong Water Supply One Member Co., Ltd (hereinafter referred to as "Hai Phong Water").

3. Components of the Draft Final Report

The Vietnamese side agreed and accepted the components of the draft final report explained by the Team. The components are described below. The Project sites map and components are shown in **Annex-1**.

3-1) Civil / Mechanical works

a) U-BCF of 100,000m^3/day
b) Intake pump facilities: 160kw×27.0m×23.15m^3/min×4(1) unit
c) Transmission pipe: 1,000mm×216m (Ductile iron pipe)
d) Pipes within the An Duong water treatment plant:
    - Bypass pipe: 1,000mm×66 m (Ductile iron pipe)
    - from U-BCF to the current mixing tank: 1,000mm×88 m (Steel pipe)
    - from U-BCF to the current drainage pond: 300-350mm×117 m (Ductile iron pipe)
    - from U-BCF to the branch pipe for Asian Development Bank (hereinafter referred to as "ADB") funding project: 1,000mm×69 m (Ductile iron pipe)
e) Electrical rooms
f) Power receiving facilities
g) Electrical Facilities, including a control panel, water level meters, and related electrical works
h) Monitoring and controlling system for U-BCF

3-2) Consulting services:

a) Detailed design

b) Assistance for tendering

c) Construction supervision

d) Technical assistance (Soft component of the Project)

4. Submission of the Final Report

JICA will complete the final report in accordance with the confirmed items and send it to the Vietnamese side in March, 2015.

5. Japan's Grant Aid Scheme

5-1) The Vietnamese side understands the Japan's Grant Aid Scheme explained by the Team, as described in **Attachment 1 for Annex-2**.

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

6. Other Relevant Issues

6-1) Capacity of U-BCF and the complimentary facilities

The both sides agreed that the capacity of U-BCF would be 100,000m^3/day. The main aim of the Project is to reduce the concentration of ammonium nitrogen to 0.2 mg/L, which is the Vietnamese national technical regulation on surface water (QCVN 08:2008/BTNMT). The Team explained that the mixed water of U-BCF treated water and non-treated water was expected to fulfil the Vietnamese national technical regulation on surface water, based on the results of U-BCF test plant, which was implemented by Kitakyushu Water and Sewer Bureau, and the water quality analysis data of Re river.

As for the transmission to U-BCF, the both sides agreed that the intake pump would be updated instead of installing new pumps at the raw water reservoir, because of the O&M cost. The Team explained that the direct transmission of the raw water to U-BCF will not cause adverse effect on U-BCF. Since the water quality analysis data of raw water indicated the maximum turbidity has been around 55NTU, the turbidity can be managed by careful operation of U-BCF.

6-2) Construction of pipe line within the An Duong water treatment plant

The both sides agreed that several pipeline, which were described in 3. 3-1) d), would be constructed through the Project. Since ADB funding project will construct new water treatment facilities, such as mixing tank, the Vietnamese side need to implement some civil

work for pipe line after ADB funding project completion.

6-3) Electricity facilities

The both sides agreed that new electricity facilities, such as electricity buildings, were required for U-BCF and the updated intake pumps. The Vietnamese side agreed that the construction fee for transformer installation and the related facilities should be burdened by Hai Phong Water.

In addition, the Team explained that Supervisory Control and Data Acquisition (hereinafter referred to as "SCADA") system would be installed at the electricity building in order to monitor the necessary data for U-BCF operation. Thus, the Vietnamese sides understood that operators needed to be assigned to control SCADA system.

6-4) Technical Assistance ("Soft Component" of the Project)

Hai Phong Water has not experienced the operation of U-BCF of 100,000m^3/day, which is far larger than the U-BCF in Vinh Bao water treatment plant, and, after U-BCF installation, adjusted operation of the subsequent water treatment facilities is required. Thus, the Team explained Soft Component for the following components were planned as the Project scope. The Vietnamese side agreed that appropriate staffs needed to be assigned to Soft Component.

a) Technical guidance for O&M of U-BCF
   a-1) To understand the structure/objective of U-BCF
   a-2) To understand the biological treatment method of U-BCF
b) Technical guidance for water quality management
   b-1) To learn appropriate water quality management (chemical feeding etc.) of the subsequent water treatment facilities

6-5) Necessary Undertakings of the Vietnamese Side

The Team explained to the Vietnamese side its undertakings as listed in **Attachment 2 for Annex-2 and Annex-3,** and the Vietnamese side understood and agreed to execute them.

The Team explained necessary cost, which was estimated based on the undertakings shown in **Annex-3**, to be covered by the Vietnamese side. The Vietnamese side agreed to secure necessary budget for the Project. In addition, the Vietnamese side understood the necessity to bear annual operation and maintenance cost for U-BCF.

Moreover, the Vietnamese side explained that they were going to allocate necessary

administrative expenses.

6-6) Quantitative Effectiveness of the Project

The Team explained that the quantitative effectiveness of the Project would be evaluated by the concentration of ammonium nitrogen at U-BCF exit. Thus, the concentration of ammonium nitrogen at U-BCF exit should be monitored periodically. The Vietnamese side agreed to take necessary measures to monitor the concentration of ammonium nitrogen at U-BCF exit after the Project completion.

6-7) ADB Financing Project

The both sides confirmed the tentative schedule for ADB financing project to enhance the capacity of An Duong water treatment plant which was shown in **Annex-4**. The Team explained several coordination, such as management of temporary entrance, temporary stock yard, traffic within the An Duong water treatment plant, etc. would be required during the construction, because construction of the Project and ADB financing project will be overlapped for some months. The Vietnamese side agreed to implement the necessary coordination.

6-8) Social and Environmental Considerations

The both sides confirmed information on environmental and social considerations including major impacts and relevant mitigation measures were summarized in the Environmental Checklist attached as **Annex-5**. Hai Phong Water confirmed they would inform JICA of any major changes which might affect environmental and social considerations made for the Project by revising the Checklist in a timely manner.

The both sides confirmed environmental monitoring would be conducted by Hai Phong Water in accordance with the Environmental Monitoring Plan described in the Draft Final Report.

Hai Phong Water confirmed it would take stipulated procedures for information disclosure in accordance with Article 22, the Government Decree No.29/ND-CP, dated April 18, 2014, "The Assessment of the Strategic Environment, Environmental Impacts, and Commitments on Environmental Protection". In addition, the Team requested Hai Phong Water to disclose the monitoring results to local project stakeholders, and Hai Phong Water agreed to disclose monitoring results in their field offices.

In addition, Hai Phong Water agreed JICA's disclosure of provided monitoring results in the

monitoring form **Annex-6** on its website.

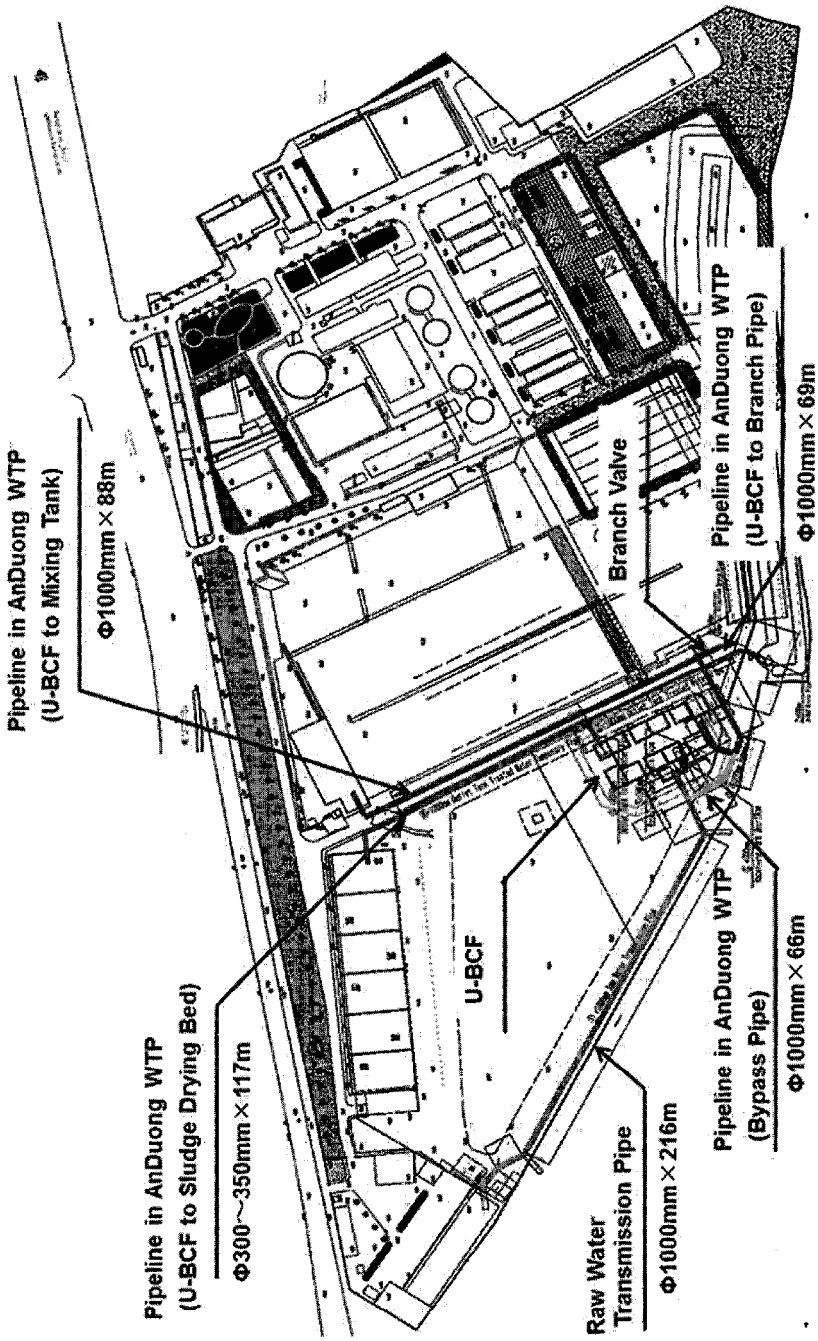
6-9) Study Tour to Kitakyushu

Hai Phong Water finds it will be useful to organize study tour to Kitakyushu to learn further about U-BCF during the implementation of the Project. The tour will be borne by the counterpart fund.

Annex-1 Project Sites Map
Annex-2 Japan's Grant Aid Scheme
Annex-3 Undertakings by the Vietnamese side
Annex-4 Provisional implementation schedule
Annex-5 Environmental Check List
Annex-6 Environmental Monitoring Form

Annex-1

Projects Sites Map



Annex-2

Japan's Grant Aid Scheme

The Government of Japan (hereinafter referred to as "the GOJ") is implementing the organizational reforms to improve the quality of ODA operations, and as part of this realignment, JICA was re-organized on October 1, 2008. After the re-organization of JICA, following the decision of the GOJ, Grant Aid for General Project is extended by JICA.

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

1. Grant Aid Procedures (Attachment 1)

Japanese Grant Aid is conducted as follows:

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

2. Preparatory Survey

(1) Contents of the Survey

The aim of the Survey is to provide a basic document necessary for the appraisal of the Project by JICA and the GOJ. The contents of the Survey are as follows:

- Confirmation of the background, objectives, and benefits of the Project and also institutional capacity of agencies concerned of the recipient country necessary for the

implementation of the Project.

- Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, financial, social and economic point of view.
- Confirmation of items agreed on by both parties concerning the basic concept of the Project.
- Preparation of an outline design of the Project.
- Estimation of costs of the Project.

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

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

(2) Selection of Consultants

For smooth implementation of the Survey, JICA uses (a) registered consulting firm(s). JICA selects (a) firm(s) based on proposals submitted by interested firms.

(3) Result of the Survey

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

3. Japan's Grant Aid Scheme

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

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

procurement conditions.

(2) Selection of Consultants

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

(3) Eligible source country

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

(4) Necessity of "Verification"

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

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

In the implementation of the Grant Aid Project, the recipient country is required to undertake such necessary measures as Attachment 2

(6) Proper Use

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

(7) Export and Re-export

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

(8) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open

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

b) The payments will be made when payment requests are presented by the Bank to JICA under an Authorization to Pay (A/P) issued by the Government of the recipient country or its designated authority.

(9) Authorization to Pay (A/P)

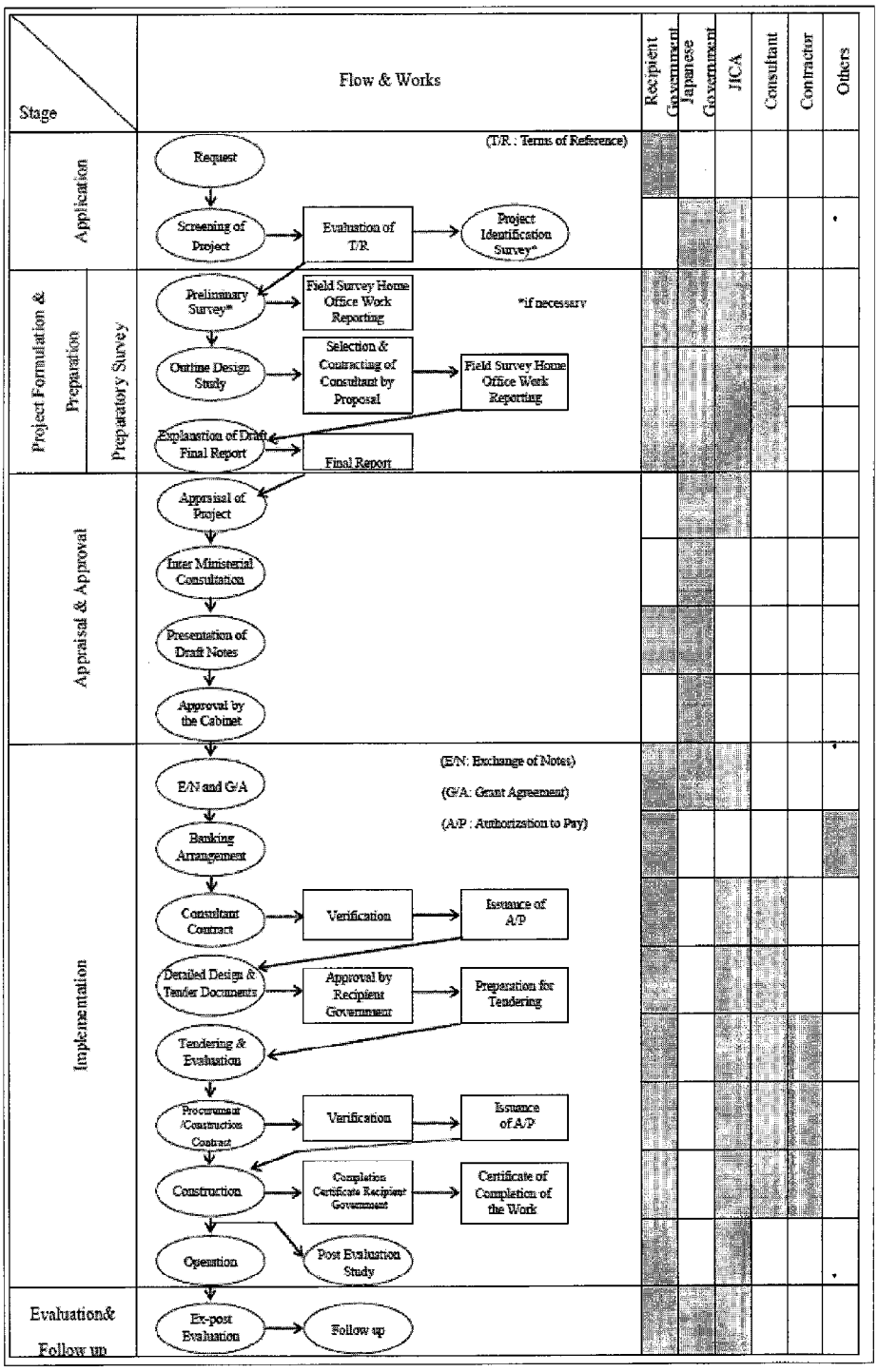
The Government of the recipient country should bear an advising commission of an Authorization to Pay and payment commissions to the Bank.

(10) Social and Environmental Considerations

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

Attachment 1 for Annex- 2

Flow Chart of Japan's Grant Aid Procedures



Attachment 2 of Annex-2

Major Undertakings to be taken by Each Government

No.	Items	To be covered by the Grant	To be covered by Recipient side
1	To secure land		●
2	To clear, level and reclaim the site when needed		●
3	To construct gates and fences in and around the site		●
4	To construct the parking lot	●	
5	To construct roads		
	1) Within the site	●	
	2) Outside the site		●
6	To construct the building	●	
7	To provide facilities for the distribution of electricity, water supply, drainage and other incidental facilities		
	1)Electricity		
	a.The distributing line to the site		●
	b.The drop wiring and internal wiring within the site	●	
	c.The main circuit breaker and transformer	●	
	2)Water Supply		
	a.The city water distribution main to the site		●
	b.The supply system within the site (receiving and/or elevated tanks)	●	
	3)Drainage		
	a.The city drainage main (for storm, sewer and others) to the site		●
	b.The drainage system (for toilet sewer, ordinary waste, storm drainage and others) within the site	●	
	4)Gas Supply		
	a.The city gas main to the site		●
	b.The gas supply system within the site	●	
	5)Telephone System		
	a.The telephone trunk line to the main distribution frame / panel (MDF) of the building		●
	b.The MDF and the extension after the frame / panel	●	
	6)Furniture and Equipment		
	a.General furniture		●
	b.Project equipment	●	
8	To bear the following commissions to a bank of Japan for the banking services based upon the B/A		
	1) Advising commission of A/P		●
	2) Payment commission		●
9	To ensure prompt unloading and customs clearance at the port of disembarkation in recipient country		

	1) Marine(Air) transportation of the products from Japan to the recipient country	●	
	2) 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 whose services may be required in connection with the supply of the products and the services under the verified contract such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work		●
11	To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in the recipient country with respect to the supply of the products and services under the verified contract		●
12	To maintain and use properly and effectively the facilities constructed and equipment provided under the Grant Aid		●
13	To bear all the expenses, other than those to be borne by the Grant Aid, necessary for construction of the facilities as well as for the transportation and installation of the equipment		●
14	To appoint counterpart personnel to implement the Project		●

(B/A: Banking Arrangement, A/P: Authorization to pay, N/A: Not Applicable)

Annex-3

Undertakings by the Vietnamese side

1. Undertakings by the Vietnamese side

Total estimate cost borne by the Vietnamese side: Approximately 542,000 USD (approx. 11,539 million Vietnam Dong). The Vietnamese side committed to bear the cost estimated based on the below tables by their own budget or some other sources. The cost will be change due to the currency exchange rate.

No.	Work Items	Description	Unit	Quantity	Implementation deadline (tentative)	Estimated Cost (Million VND)
1	Construction of construction site gate	New construction of the entrance gate for construction machineries	Gt	1	December 2015	247
2	Relocation of electrical lines	Relocation of electrical lines above the U-BCF proposed construction site and New Gate for Construction Traffic.	Ls	1	December 2015	206
3	Acquisition of permission/approval	1. Construction permission for U-BCF 2. Road usage approval of surrounding roads for large vehicles 3. Approval for environmental impact issues (noise/vibration)	Ls	1	October 2015	206
4	Land Rental	Construction Camp, stock yard etc, 1 year (May 2016 – April 2017)	m^2	1,500	December 2015	3,271
5	Banking Arrangement Commission (B/A)		Ls	1	April 2015	206
6	Commission fee for VAT	5% of total cost for construction material, equipment procurement, subcontract services will be subject to taxation as VAT, hence Hai Phong Water shall implement refund process. 10% of total cost for construction works will be subject to taxation as VAT, hence Hai Phong Water shall implement refund process.	Ls	1	April 2015	4,515
7	Installation of power receiving	Electric poles, high voltage cable, transformer, electric power volume meter, transformer foundation, fence	Ls	1	December 2015	2,887

Note: No.5 and 6 are indicated in the below table, too.

1USD = 103.25JPY (average rate for June to August, 2014)

1Vietnam Dong = 0.00485JPY (average rate for June to August, 2014)

2. Allocation of Counterpart Fund proposed by Hai Phong Water

Hai Phong Water explained that the following budged would be secured mainly for their administration expenses.

No	Work Items	Value
A	Site Clearance Fee / Charge (if any)	
B	Project implementation assistance cost	
1	Project Management Cost	
2	Cost of verifying the effectiveness and feasibility of investment project	
3	Cost of verifying the construction Drawing Design	
4	Cost estimate verification	
5	Contractor selecting cost	
6	Other fees	
6.1	*Mine clearance*	
6.2	*Independent Audit cost*	
6.3	*Audit, capital settlement*	
6.4	*The cost of examination and approval of the settlement*	
6.5	*Cost for monitoring and evaluating the effectiveness of investment project*	
6.6	*Relocation costs, monitoring of underground works (Power cables, telecomunication cable , ...)*	
6.7	*Cost for Project documents translation:design drawing, cost estimate and other documents during project implementation*	
6.8	*Document verification:evaluation of construction drawing design and cost estimates, construction permits, fire, traffic safety, ...*	
6.9	*Construction works insurance costs*	
6.10	*Banking Arangement commission*	
6,11	*Preparing for environmental protection commission and other issues related to regulations on environmental protection*	
6.12	*Other costs under the current regulations*	
C	Contingencies	
D	Tax	
1	*VAT*	
2	*Company Income Tax*	
3	*Personal income tax*	
4	*Other taxes (if any)*	
E	Training program in Japan	
	Total counterpart fund	***500,000USD***

3. Operation and Maintenance

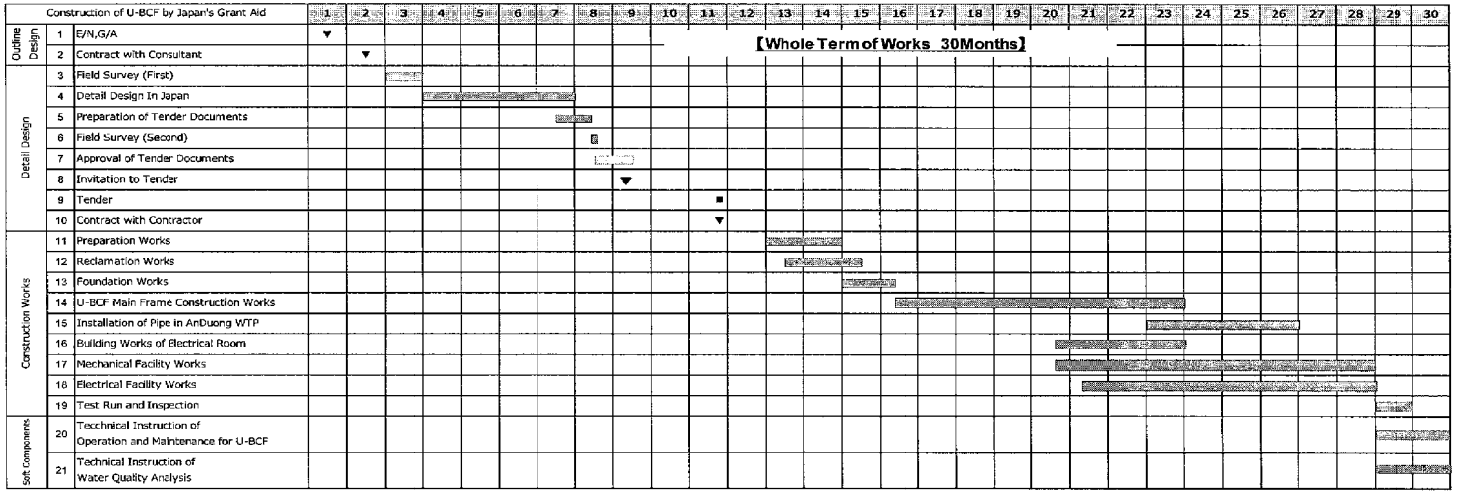
The necessary budget to cover O&M yearly cost is calculated as shown in below table.

Items	Capacity (A) kw	Unit Number (B) Number	Operating Time (C) min· hour/day	Annual Power Consumption Volume 365days (D) (D=A*B*C*365) kwh/year	Unit Power Cost (E) VND/kw	Annual Power Consumption Cost(F) (F=D*E) VND/year
1. Brower for washing	37	1	30 minutes	6,752.5	1,388	9,372,000
2. Intake pump	33	3	24 hour	867,240.0	1,388	1203,729,000
3. Motor operated valve	0.2	3	10 minutes	36.5	1,388	50,700
4. Lighting	0.1	10	2 hour	730.0	1,388	1,013,000
sub-total						**1,214,164,700**
Items	Capacity (A) m^3	Activated Carbon Life(B) year	Annual Activated Carbon Replacement Ratio(C) (C=1/B) %	Annual Replacement Volume (D) (D=A*C) m^3/year	Activated Carbon Unit Cost (E) VND/m^3	Annual Activated Carbon Consumption Cost(F) (F=D*E) VND/year
1. Granual activated carbon	420	15	7	29.4	17,750,150	521,854,410
sub-total						**521,854,410**
Items	Volume (A) m^3/day		Annual Treatment Ratio (B) %	Annual Consumption Volume 365days (C) (C=A*B*365) m^3/year	Maintenance Unit Cost (D) VND/m^3	Annual Maintenance Cost (E) (E=C*D) VND/year
1. Mechanical Maintenance	100,000	—	100	36,500,000	20	730,000,000
sub-total						**730,000,000**
Items	Volume (A) m^3/day	Average Unit Consumption (B) g/m^3	Reduction Ratio (C) %	Annual Chemical Reduction Volume 365days (D) (D=A*B*C*365) kg/year	Chemical Unit Cost (D) VND/kg	Annual Chemical Reduction Cost (E) (E=C*D) VND/year
1. PAC	100,000	11.45	28.5	119,109	9,150	▲ 1,089,844,000
2. Chlorine	100,000	2.00	27.1	19,783	11,200	▲ 221,570,000
sub-total						**▲ 1,311,414,000**
Total(VND)						**1,154,606,000**
Total(YEN)						**5,543,000**

1 Vietnam Dong = 0.00485JPY (average rate for June to August, 2014)

Annex-4

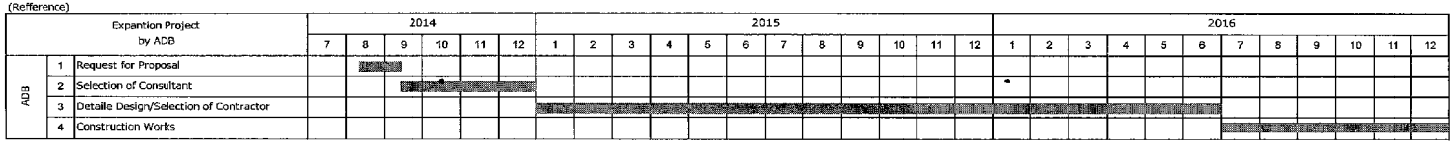
Provisional implementation schedule



※1 Drawings and documents of Outline Design and Detail Design will be confirmed by Department of Construction (DOC)

※2 Confirmation of drawings and documents by DOC would take approximately one month

(Refference)



Annex-5

Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country' government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA report, does the conditions satisfied? (d) Aside from the above EIA report, are the project required to acquire necessary approvals and licenses on the environment from relating authorities?	(a) N/A (b) N/A (c) N/A (d) N/A	(a) EIA report became unnecessary by notice from Hai Phong People's Committee. (b) It is not applicable by the above reason. (c) It is not applicable by the above reason. (d) It is not applicable by the above reason. In addition, there are no another necessary permission on the environment.
	(2)Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the local stakeholders? (b) Have the comment from residents reflected to project contents?	(a) Y (b) Y	(a) Stakeholder meeting was held on August 25, 2014. The project only renews intake pumps in the existing intake pumping station and sets up the pre-treatment U-BCF facility to the existing An Duong WTP. Thus, the environmental impacts are mainly limited to noise generation, traffic control, and disposal of construction debris, waste, and oil and grease. These environmental impacts and mitigation measures were explained to the stakeholder meeting. As the result, the project can obtain the understanding from the local stakeholders. (b) Though relative agencies and water users had opinions for thanking the project implementation in the early-stage, there were no comments which might affect the project contents.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1)Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) (A Plan): Zero option which does not conduct the Project, (B Plan): Construction of U-BCF with booster pumps and two blowers in An Duong WTP, (C Plan): Raw water is directly conveyed to U-BCF by renewed intake pumps at intake pumping station, and blowers are set up to clean up the filters of U-BCF. These 3 Plans were examined on the items concerning to environment and social consideration, including safety of treated water, injection volume of chemicals for water treatment, and Operation and maintenance cost etc. As a result, C Plan was judged to have the most high appropriateness for project implementation, compared with the other plans.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that chlorine from chlorine storage facilities and chlorine injection facilities will cause air pollution? Are any mitigating measures taken? (b) Do chlorine concentrations within the working environments comply with the country's occupational health and safety standards?	(a) N/A (b) N/A	(a) Air pollution by chlorine gas from injection facilities does not relate to the project because the project only sets up the pretreatment facility to the existing WTP. The facility does not use the chlorine for the treatment of raw water. (b) It is not applicable due to the above reasons.
	(2) Water Quality	(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?	(a) N/A	(a) Washing water of the filter of U-BCF facility is discharged to sun drying bed of An Duong WTP and its residual water from the sun drying bed is returned to the pre-sedimentation pond of raw water. It is closed system. Thus, the U-BCF system does not discharge the effluent to the outside world.
	(3) Waste	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?	(a) N/A	(a) Sludge amount generated in the washing process of filters of U-BCF facility is a very little. Though ADB project estimates that existing WTP generates sludge with about 5,900 kg/day in treated water amount 200,000 m^3/day, U-BCF facility only generate sludge of about 3.1 kg/day. The sludge is disposed at disposal sites which are designated by People's Committee, compliance with the Vietnamese regulations.
	(4) Noise & Vibration	(a) Do noise and vibrations generated from the facilities, such aa pumps comply with the country's standards?	(a) Y	(a) Walls and ceilings and windows of Pump rooms of intake pumping station are covered by acoustic boards and furthermore, mount for vibration protection for pumps and motors are prepared. In An Duong WTP, a blower for cleaning of U-BCF filter is operating inside the room and silencers are set to decrease noise level. Calculated results by noise equation showed that it was less than national noise standards (55 dB) at residential area in night time. Thus, noise level generated by the intake pumps and a blower is fitted to national noise standards.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
2 Pollution Control	(5) Land Subsidence	(a) In case of extraction of a large volume of groundwater, is there possibility that the extraction of groundwater will cause land subsidence?	(a) N	(a) Land subsidence does not generate because water supply source for existing WTP is the river water and a large volume of groundwater is not extracted.
3 Natural Environment	(1) Protected Area	(a) Does the project site locate in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project site does not locate in protected areas designated by the Vietnamese laws or international treaties and conventions. Thus, the project will not affect the protected areas.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species of which protection and conservation are need by country's laws and international treaties? (c) In case that significant adverse impacts to ecosystem are apprehend, does the project conduct the countermeasure to reduce the adverse impacts to ecosystem? (d) Does the implementation of the project affect aquatic environment in rivers, etc.? Does the countermeasure to reduce adverse impacts to aquatic organisms etc?	(a) N (b) N (c) N/A (d) N	(a) The project site does not encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats). (b) The project site does not encompass the protected habitats of endangered species of which protection and conservation are need by the Vienamese laws and international treaties. (c) It is not applicable due to the above reasons. (d) The project has no discharge to outside of An Duong WTP. Washing water for the filter of U-BCF facility is discharged to sun drying bed of the WTP and the residual water is discharged to pre-sedimentation pond for raw water. This is a closed system. Thus, the project has no adverse impact to aquatic organisms.
	(3) Hydrology	(a) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect surface water and groundwater flows?	(a) N	(a) The project purpose is not to develop new water source for water supply but to set pretreatment system (U-BCF) to An Duong WTP which is presently operated by Hai Phong Water. Thus, the project does not adversely affect surface water and groundwater flow.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance for rebuilding the livelihood of involuntary resettlement' residents given in advance? (c) Are resettlement plans including recovery of livelihood base after resettlement, compensation by requisition price of lands and houses established with the survey for resettlement? (d) Does the payment of compensation fee conducted prior to resettlement? (e) Are the compensation principals shown in written document? (f) Of involuntary resettlement residents, does the resettlement plans properly consider vulnerable groups, especially, females, children, elderly people, poverty groups, ethnic minorities, and indigenous people etc.? (g) Does the agreement by resettlement people prior to resettlement conducted? (h) Is the implementation system to properly carry out residents' resettlement arranged together with implementation budget and budget measures? (i) Is the monitoring plan for resettlement impact established? (j) Does the complaint handing countermeasures established?	(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a) The project site is inside of intake pumping station and An Duong WTP. There are no inhabitants in the planned construction sites. Thus, implementation of the project does not cause involuntary resettlement. (b) It is not applicable due to the above reasons. (c) It is not applicable due to the above reasons. (d) It is not applicable due to the above reasons. (e) It is not applicable due to the above reasons. (f) It is not applicable due to the above reasons. (g) It is not applicable due to the above reasons. (h) It is not applicable due to the above reasons. (i) It is not applicable due to the above reasons. (j) It is not applicable due to the above reasons.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
	(2) Living & Livelihood	(a) Does project implementation affect adverse impact to living condition of inhabitants by change of land use and of utilization of water bodies? (b) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impact, if necessary.	(a) N (b) N/A	(a) Project implementation has no possibility to affect adverse impact to living condition of inhabitants by change of land use and of utilization of water bodies. Adversely, it will provide positive impact by improvement of quality for water supply. (b) It is not applicable due to the above reason
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) The project areas are only inside of intake pumping station and An Duong WTP. In the project areas, there are no local archeological, historical, cultural, and religious heritages. Thus, its construction activities will not provide them any damage.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) As intake pumping station and An Duong WTP of the planned construction sites are not located at special landscape area, the project will not affect local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous people? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N/A (b) N/A	(a) In Hai Phong city, Hoa people of ethnic minority, Chinese and Kinh people of majority are living in mixing condition. Then, the project does not affect the impact to Hoa people. Then, it is not applicable. (b) It is not applicable due to the above reason.
	(6) Work Environment	(a)Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in hardware side for individuals relating to the project such as the installation of safety equipment to protect labor accidents and the management of toxic substances involved? (c) Are soft side countermeasures such as tangible safety education for labors and the formulation of safety sanitary plans (including traffic control and public health) to interested persons to the project planned and conducted? (d) Are proper countermeasures taken not so as to threaten the safety of inhabitants' peoples and interested persons of the project by guardsmen for the project?	(a) Y (b) Y (c) Y (d) Y	(a) The project proponent has the Personnel and Administration Department including officers which have detailed knowledge on laws and ordinance associated with the working conditions which the project proponent should observe in the project. Thus, the proponent will not be violating any law and ordinance associated with the working condition of the country. (b) The installation of safety equipment and wear of safety shoes and safety hats to protect accidents at works will be planned and conducted at the construction and operation stages by contractor and implementation organization. (c) The formulation of safety sanitary plans (including traffic control and public health) to interested persons to the project and tangible safety education for labors will be planned and conducted by contractor and project proponent. (d) The project will take enough education not so as to be threatened to safety of inhabitants and interested people by guardsmen for the project.

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(1) Impacts during Construction	(a) Are adequate mitigation countermeasures considered to reduce adverse impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) Do construction activities adversely affect the natural environment (ecosystem)? In that case, are adequate mitigation countermeasures prepared? (c) Do construction activities adversely affect to social environment? In that case, are adequate mitigation countermeasures prepared? (d) Do construction activities cause traffic congestion? Are mitigation countermeasures prepared?	(a) Y (b) N (c) N (d) Y	(a) Mitigation countermeasures against adverse impacts (eg., noise and vibrations, traffic control, and waste disposal etc.) during construction is sufficiently considered as described in "Adverse Impacts and Mitigation Measures at Construction stage" of this report, contractor and implementation organization should comply with those descriptions. (b) Since construction works are conducted at intake pumping station and An Duong WTP sites owned by the Haiphong Water, which have no important natural environments (ecosystem), it will not affect adverse impacts to them. (c) Construction activities will not affect social environment. (d) Traffic congestion by construction activities will not be caused because the gate to ordinary road from An Duong WTP is constructed not in the main road but in the branch road in the southwest side of the WTP. In addition, though intake pumping station directly faces ordinary road, several security guards to control the traffic with safety sign etc. at both sites shall be arranged.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) How are the items, methods, and frequencies of the monitoring program planned? (c) Can the proponent establish an adequate monitoring system (organization, personnel, equipment, and budget and their continuity)? (d) Does reporting manners and its frequencies from proponent to concerned agency regulate?	(a) Y (b) Y (c) Y (d) N	(a) Monitoring plan is conducted by contractor and implementing agency. The monitoring plan is showed in Monitoring Plan of the report. The contractor and implementing agency should implement monitoring plan based on Vietnamese regulations in the construction and operation stages. (b) Monitoring parameters and methods were selected by supposing adverse impacts by implementation of the project and their frequencies were determined by the experiences such as past local villages' water supply project and supervising for construction works of water supply systems. (c) Monitoring system will be successfully established because it is carried out in the existing water supply system. In addition, as water charges are almost collected in the existing water supply system, the budget for monitoring system will be also secured. (d) Reporting manners and its frequencies of monitoring results from proponent to the DONRE are not regulated by the Decree No. 29/2011/ND-CP. However, as the DONRE has inspector section, they can occasionally check. Thus, the proponent should make contact with the inspector of the DONRE and occasionally submit monitoring report and report the monitoring results to them.

Category	Environmental Items	Main Check Items	Yes: Y No: N	Confirmation of Environmental Consideration (Reasons, Mitigation Measures)
6Note	Refer to Other Environmental Checklist	(a) Where necessary, pertinent items described in the Dam and River Project checklist should also be checked.	(a) N/A	(a) It is not applicable for the project.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to trans-boundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as trans-boundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) Y	(a) The project does not include factors that may cause problems, such as trans-boundary waste treatment, acid rain, destruction of the ozone layer, except global warming. . There is no positive impact to environmental issues in global scale by implementation of the project. Adversely, the implementation of the project consumes commercial electric charge 480.4 KWh and CO_2 amount 2,226 /tons/year equal to its consumable electric powers is estimated to be released in the atmosphere.

Note

1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from international standards, Appropriate environmental considerations are required to be made.
In case where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of of their countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

Annex-6

Environmental Monitoring Plan

■ The latest results of the below monitoring items shall be submitted to Hai Phong Water as part of Quarterly Progress Report **throughout the construction phases.**

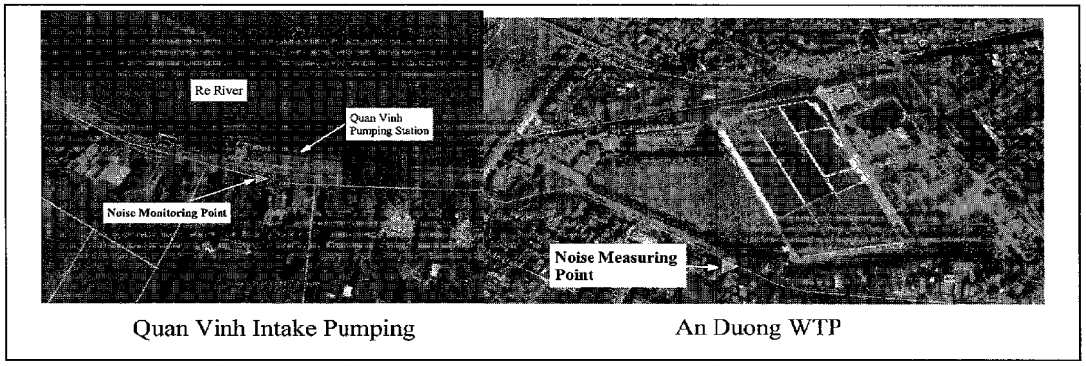
1. Monitoring Plan

No	Monitoring Factor	Monitoring Place	Monitoring Method and Frequency	Monitoring Results	Countermeasure
Construction Stage					
1	Temporary air pollution by operation of construction machines	U-BCF construction area and Installation site of intake pumps	Physical observation Once a day		
2	Clear the clog of side ditch by soil and rubbish including discharge water from construction sites.	U-BCF construction area and Installation site of intake pumps	Physical observation Once a day		
3	Keeping dumping sites in sanitary and safety conditions.	Disposal sites and/or general waste sites	Physical observation Once a week		
4	Soil and water pollution by oil, grease, and fuel	U-BCF construction area and Installation site of intake pumps	Physical observation Once a week		
5	Noise and vibration pollution*	U-BCF construction area and Installation site of intake pumps	Actual noise level measurement* Three times a day		
6	Safety control of construction workers	Safety management rules in construction sites and put safety shoes and safety hat.	Physical observation Once a week		
7	Risk of generation of accidents at entrance and exit for vehicles in intake pumping station and An	At entrance and exit for vehicles in intake pumping station and An Duong WTP and their inside areas	Reviewing traffic accident report and hearing on generation		

	Duong WTP and their inside areas	(Number of traffic accidents)	reasons of the accidents		
8	Smog and dust	U-BCF construction area and Installation site of intake pumps	Physical observation 2 times a week		
9.	Infection diseases of HIV/AIDS	Enforcement of sanitary conditions such as hand washing with soaps after toilet and before eating, and washing of eating utensils etc.	Physical observation During construction		
10.	Road dirtied by tires of construction vehicles and objects that fall from vehicles transporting equipment	All the Construction sites	Physical observation 2 times a week		

(Note) Actual noise measurement* in "5. Noise and vibration pollution" is conducted in the following method:

The noise measurements for equivalent sound level are carried out by using a normal sound level meter at the nearest houses (the fixed noise measuring points: refer to the below figures.) to each site of An Duong WTP and Quan Vinh intake pumping station at the fix time three times a day. The measurements are conducted by the Contractor' s site manager or his business agent and the measuring data is recorded to recording sheets. The measuring method is designated by National Noise Standards (QCVN26/2010/BTNMT). In addition, before commencement of construction works, the Contractor must measure background noise data to get baseline data by conducting noise measurement every two hour during one day (24 hours).



Figures The fixed Noise Measuring Points

■ The latest results of the below items shall be monitored **throughout the operation phases, every six month up to one year.**

Operating Stage After Completion of Facilities					
No	Monitoring Factor	Monitoring Place	Monitoring Method and Frequency	Monitoring Results	Countermeasure
1	Risk of generation of accidents derived from mishandling of operation equipment	U-BCF facility and intake pumping station (Number of accidents)	Reviewing accident reports and hearing on generation causes of accidents. During trial run		
2	Risk of generation of traffic accidents at general roads and inside area of the WTP by transportation of activated carbon, etc.	Number of traffic accidents	Reviewing traffic accident reports and hearing on generation causes of accidents. Operation stage		
3.	Noise generation by equipment operation such as pumps and blowers*	Neighboring houses of An Duong WTP and Quan Vinh intake pumping station	Actual noise measurement* 3 times a day/every 3 month		

(Note) Actual noise measurement* in "5. Noise and vibration pollution" is conducted by the same method as that of construction stage.

Appendix-05 Soft Component (Technical Assistance) Plan

(1) Background of Soft Component Plan

1）Background

An Duong WTP is the largest WTP (supply capacity: 100,000m^3/day) of the seven (7) WTPs in Hai Phong city. However, it has several issues related to the water quality and O&M., such as the large amount of coagulant (PAC) and chlorine used to treat the ammonia nitrogen and organic matters contaminating the water source affected by the inflow of household wastewater.

To improve the circumstances, Kitakyushu City Water and Sewer Bureau proposed the JICA grassroots technical cooperation project (local government type) “Improvement Program for Purification Methods against Organic Matters” which was implemented from August 2010 to August 2012. This project included a test plant of Upward Flow Biological Contract Filtration (hereinafter “U-BCF”).

Said project carried out studies for the water source quality, the treatment process and the treated water quality. As a result of the analysis, the high concentration rate of ammonia nitrogen and organic matters of Re River, which the intake of An Duong WTP is located, is due to the contamination of household and agricultural wastewater.

U-BCF has been adopted by Kitakyusyu City, where water contamination caused by household wastewater due to the poor coverage rate of WWTP had been an issue. The benefits of this system were described and a pilot plant experiment was proposed by the project.

The treatment results after running this pilot plant for one year were favorable: The ammonia nitrogen amount was lower than 0.2mg/L throughout the year, the ammonia nitrogen removal rate at 70 – 100%, the dissolved manganese removal rate at 60 – 70%, and the organic matter removal rate at 30 – 40%.

It was proved that U-BCF is capable of stably removing contaminants which normally require large amounts of chlorine, reducing the chemical cost, reducing the amount of THM generated by the chemical reaction of chlorine and organic matters, and facilitating the WTP O&M. Therefore, it was concluded that U-BCF is highly effective for treating the raw water of An Duong WTP.

The objective of this Project is to introduce U-BCF as a pre-treatment facility to the existing facilities, as a method to solve raw water contaminant issues.

2）Hai Phong Water Technical Level

During the JICA grassroots project conducted by Kitakyusyu, Hai Phong Water had opportunities to send staff to Kitakyusyu City for visiting WTPs including U-BCF facilities, and to undergo trainings of O&M and

water quality testing methods. Therefore, the current An Duong staffs have a certain level of WTP knowledge.

3）Necessity of Soft Component Plan

Training to gain basic knowledge of biological treatment is required because the biological treatment method adopted the U-BCF which is to be introduced by this Project is different from the actual chemical feeding methods of Hai Phong Water. In addition, Hai Phong Water is not rich in experience of operating a 100,000m3/day large-scale capacity U-BCF; therefore the trainings shall be mainly focused on specific matters, such as daily operations and procedures for responding to accidents.

First flush (a temporary rise in turbidity caused by external factors) may occur in Re River due to rainfall. The special O&M methods required for U-BCF in this case will be included in the training.

The introduction of U-BCF shall result in a change of the water quality and required chemical feeding amount, due to the change of treatment methods. Therefore, trainings for determining the chemical feeding amount will be required.

Ammonia is a quantitative measure factor to determine the effectivity of U-BCF for this Project, and it shall be necessary to be able to make correct and accurate measurements.

Under these circumstances, to realize appropriate WTP O&M and water quality control after the Project, soft component is planned to support the smooth operation beginning and to secure persistence of the cooperation achievements.

The two targets of soft component planning are shown in Table 1.

Table 1 Soft Component Target

Target Item	Objective
1. Technical guidance for U-BCF O&M	1.Understanding the biological treatment method of U-BCF 2.Understanding the structure/objective of U-BCF 3.Guidance of O&M abilities 4.Guidance for handling accidents/emergencies
2.Technical guidance for water quality management	1. Learning appropriate water quality management for installing of U-BCF

(2) Objective of Soft Component

The objective of soft component is for Hai Phong Water to be able to apply appropriate O&M to the U-BCF, and to be able to provide drinking water directly from the taps to the residents upon completion of the Project.

(3) Achievements of Soft Component

The expected achievements of soft component are as follows:

1) Technical guidance for U-BCF O&M

The O&M staffs of Hai Phong Water understand the structure/objective of U-BCF, and gain the required abilities for appropriate O&M.

2) Technical guidance for water quality management

The water quality management staffs of Hai Phong Water understand the biological treatment method of U-BCF, and gain the required abilities for appropriate water quality analysis and management.

(4) Confirmation of Soft Component Achievements

The achievements of soft component are to be confirmed at the end of the training period by the below points.

1) "Deliverables" mentioned in the later section.

2) Check the understanding level by trainee evaluation.

The trainee evaluation points are shown in Table 2.

Table 2 Points for Trainee Evaluation

Target Item	Evaluation Points
1. Technical guidance for U-BCF O&M Target Trainee Manager of technical department and O&M staff	・ Basic understanding of space velocity, linear velocity, filter layer ・ Understanding of facility structure, objective, function. ・ Understand of the dissolved oxygen status to prevent the absence of oxygen. ・ Appropriate flow management to prevent loss of activated carbon, and comprehend the flow-out status. ・ Appropriate cleaning to prevent blockage, and comprehend the blockage status. ・ Understanding of replacement timing of granular activated carbon. ・ U-BCF cleaning interval management judging by the condition of the sludge in the drying bed. ・ Maintenance of the screen to prevent foreign substances. ・ Troubleshooting for failures and stops. ・ O&M of water pumps. ・ Preparation of O&M records (checklist, daily/monthly reports). ・ Understanding of routine inspection items/frequency. ・ Management of drawings/records.
2. Technical guidance for water quality management Target Trainee Manager of technical department and water quality technical staff	・ Understanding of the treatment methods of U-BCF ・ Understanding of required chlorine amount, and appropriate feeding for each process. ・ Water quality checks (turbidity, pH, ammonia, residential chlorine, etc.) for intake/treatment facilities and water supply network. ・ Parameter setting, water quality data recording. ・ Understanding of data analysis and water quality monitoring methods. ・ Troubleshooting for water quality problems.

(5) Soft Component Activities (Execution Plan)

The soft component activities for this Project are described below. Details are shown in Table 3.

1) Technical guidance for U-BCF O&M

Classroom trainings using detail design drawings, design documents and training material (textbooks of operation methods and maintenance methods) and OJT using actual facilities for O&M understandings are to be carried out.

The O&M manual of Honjyo WTP (Kitakyusyu City) shall be the base of the training material. During the preparation process of said material, the operation manual of An Duong WTP will also be revised.

Besides of the soft component, the Constructor is to prepare the U-BCF operation manual and to provide operation training to ensure normal facility function as a part of the facility handover process.

This soft component shall focus on providing guidance for understanding the biological activity status, appropriate cleaning operation and operation status suitability of the U-BCF.

2) Technical guidance for water quality management

Classroom training for water quality management using training textbooks, and OJT using actual facilities for water quality analysis/management are to be carried out.

- Training course of setting parameters and frequency for daily/periodical tests of the overall facility.
- Training course of data accumulation, analysis and water quality monitoring methods.
- Training course of troubleshooting for water quality problems.

Table 3 Soft Component Activity Plan

Activity	Trainee/Method/Resource	Achievement	Comment (Conditions)
1. Technical guidance for U-BCF O&M			
・ Lectures for basic knowledge of space velocity, linear velocity, filter layer ・ Lectures of facility structure, objective, function. ・ Lectures to understand/comprehend of the dissolved oxygen status to prevent the absence of oxygen. ・ Lectures to enable appropriate flow management to prevent loss of activated carbon, and comprehend the flow-out status. ・ Lectures of cleaning to prevent blockage, and comprehend the blockage status. ・ Lectures of replacement timing of granular activated carbon. ・ Trainings for U-BCF cleaning interval management judging by the condition of the sludge in the drying bed. ・ Trainings for maintenance of the screen to prevent foreign substances. ・ Lectures of troubleshooting for failures and stops. ・ O&M training of water pumps. ・ Preparation lectures of O&M records (checklist, daily/monthly reports). ・ Lectures for understanding of routine inspection items/frequency. ・ Lectures for management of drawings/records.	<u>Target trainee</u> Manager of technical department and O&M staff <u>Training method</u> • Classroom trainings using detail design drawings, design documents and training material • OJT using actual facilities <u>Training Resource</u> • Water Supply Specialist (Japanese Consultant) Plan/Execute: 1person x 2.0 months	• Training plan • Training material (textbook of operation methods and maintenance methods) • O&M records (checklist, daily/monthly reports) • Trainee evaluation by trainer	• Trainee is to be assigned before the beginning of soft component.
2. Technical guidance for water quality management			
・ Lectures to understand the treatment methods of U-BCF ・ Trainings for understanding of required chlorine amount, and appropriate feeding for each process. ・ Lectures of water quality checks (turbidity, pH, ammonia, residential chlorine, etc.) for intake/treatment facilities and water supply network. ・ Trainings for parameter setting, water quality data recording. ・ Trainings for understanding of data analysis and water quality monitoring methods. ・ Lectures of troubleshooting for water quality problems.	<u>Target trainee</u> Manager of technical department and water quality technical staff <u>Training method</u> • Classroom trainings using training material • OJT using actual facilities <u>Training Resource</u> • Water Quality Specialist (Japanese Consultant) Plan/Execute: 1person x 2.0 months	• Training plan • Training material (textbook of water quality management) • Trainee evaluation by trainer	• Trainee is to be assigned before the beginning of soft component.

(6) Procurement of Resources for Soft Component

The soft component shall be executed by a Japanese Water Supply Engineering Consultant who is well acquainted with U-BCF facilities and water supply system. Trainings shall be provided to Hai Phong Water staffs in forms of classroom learning, exercises and OJT.

The following human resources shall be procured for soft component. Specialists for each activity are required.

1) Technical guidance for U-BCF O&M
Operation and Management Specialist: 1 person

2) Technical guidance for water quality management
Water Quality Specialist: 1 person

It shall be necessary that the specialists are conversant with and have full apprehension of the Project, and also have sufficient knowledge/experience in water supply business operation and management. Therefore, the specialist shall be dispatched directly by the Consultant (Japanese).

The roles for each specialist are as follows:

Operation and Management Specialist
Supervise the overall training and soft component plan.
Preparation of the training material (textbook of operation methods and maintenance methods), technical guidance for U-BCF operation and O&M, and confirmation/evaluation of training achievements are also included in this role.

Water Quality Specialist
Technical guidance for U-BCF water quality analysis, especially for the treatment process management of the facility O&M, and confirmation/evaluation of training achievements are included in this role.

(7) Execution Plan for Soft Component

The soft component execution plan is shown in Figure 1.

Technical guidance for U-BCF O&M is planned for two months, starting one month before test operation/handover, in August 2017.

Technical guidance for water quality is planned for two months, starting one month before test

operation/handover, in August 2017.

The test operation/operation guidance and test operation which are to be provided by the Constructor is planned to start in June 2017. Considering this timing, it shall be required that Hai Phong Water assigns the staff for related departments (the trainees) for the soft component by July 2017.

In addition to the Final Report, an Interim Report shall be prepared and submitted for the training period.

Year/Month Item	2017						M/M
	…	6	7	8	9	10	
Project Schedule							
Facility construction	■	■	■				
Test operation				■			
Handover				■			
1) O&M specialist				◀······	······▶		*2.0×1=2.0*
2) Water quality specialist				◀······	······▶		*2.0×1=2.0*
Report Submission				△ Interim	△ Final		Total 4.0 M/M

Figure 1　Execution Plan of Soft Component

(8) Deliveries of Soft Component

The following deliveries shall be submitted for the soft component.

1) Technical guidance for U-BCF O&M

- Training plan, training material (textbook of operation methods and maintenance methods), trainee evaluation
- O&M records (daily/monthly reports)

2) Technical guidance for water quality management

- Training plan, training material (textbook of water quality management), trainee evaluation

(9) Responsibilities of Vietnamese Implementing Organizations

The Vietnamese side organization, Hai Phong Water Supply One Member Co., Ltd, shall be required to assign the target trainees to the related departments before soft component begins.

To achieve the ultimate objective of the soft component, it shall be necessary for Hai Phong Water to take the center role and continue the activities after the soft component plan of this Project is completed.

Appendix-6

Appendix6-1 The document of Water Rights in Quan Binh Intake

Original

Cộng hoà xã hội chủ nghĩa việt nam
Độc lập - Tự do - Hạnh phúc

HỢP ĐỒNG
CUNG CẤP NƯỚC THÔ CHO SẢN XUẤT NƯỚC SẠCH NĂM 2014

Số: 01 /HĐKT

Căn cứ Bộ luật dân sự số 33/2005/QH11 ngày 14/6/2005 của Quốc hội khoá XI

Căn cứ Nghị định 143/2003/NĐ-CP ngày 28/11/2003 của Chính phủ nước CHXHCH Việt Nam quy định chi tiết một số điều của Pháp lệnh Khai thác và bảo vệ công trình thủy lợi, Nghị định 115/2008/NĐ-CP ngày 14/11/2008 sửa đổi bổ sung một số điều của Nghị định 143/2003/NĐ-CP;

Căn cứ Quyết định 943/QĐ-UBND của UBND Thành phố Hải Phòng về việc quy định chi tiết thi hành một số nội dung thực hiện Nghị định 115/2008/NĐ-CP ngày 14/11/2008 của Chính phủ trên địa bàn Thành phố Hải Phòng và Quyết định 2067/QĐ-UBND ngày 19/12/2011 của UBND thành phố Hải Phòng về việc điều chỉnh giá nước sạch;

Căn cứ Hướng dẫn số 2184/2011/HDLS ngày 22/12/2011 thực hiện quyết định của UBND thành phố Hải Phòng về việc điều chỉnh giá bán nước sạch trên địa bàn Thành phố Hải Phòng của Liên sở Tài chính - Xây dựng;

Căn cứ nhiệm vụ kế hoạch và khả năng của mỗi bên tham gia hợp đồng.

Hôm nay, ngày 04 tháng 01 năm 2014, tại Công ty TNHH một thành viên Cấp nước Hải Phòng.

Chúng tôi gồm có:

1. ĐẠI DIỆN BÊN A:

Ông : **Vũ Hồng Dương** Chức vụ : **Chủ tịch- Tổng giám đốc**

Là đại diện Công ty TNHH một thành viên Cấp nước Hải Phòng.

Địa chỉ: 54 Đinh Tiên Hoàng - Hồng Bàng - Hải Phòng.

Có tài khoản số: 102010000200826 tại Ngân hàng TMCP Công Thương Việt Nam - Chi nhánh Hải Phòng

2. ĐẠI DIỆN BÊN B:

Ông : **Trần Quang Hoạt** Chức vụ: **Chủ tịch- kiêm giám đốc**

Là đại diện Công ty TNHH một thành viên Khai thác công trình thủy lợi An Hải

Địa chỉ: 781 Tôn Đức Thắng - Sở Dầu - Hồng Bàng - Hải Phòng

Có tài khoản số: 3211 0000 588860 tại Ngân hàng Đầu tư và Phát triển Việt Nam chi nhánh thành phố Hải Phòng (Phòng Giao dịch Bến Bính)

Hai bên đã thống nhất ký hợp đồng kinh tế với những điều khoản sau đây:

Điều I. Bên B cung cấp nước thô cho bên A kể từ ngày 1/1/2014 đến 31/12/2014 cho sản xuất nước sạch như sau:

TT	Diễn giải	Lượng nước sử dụng (m^3)	Đơn giá (đồng/m^3)	Thành tiền (đồng)
1	TB Vĩnh Khê	44.000.000	750	33.000.000.000
	Thuế GTGT 5%			1.650.000.000
	Tổng cộng			**34.650.000.000**

Điều II. Giá trị hợp đồng. (Tạm tính)

Bằng số: **34.650.000.000** đồng

Bằng chữ: ***Ba mươi tư tỷ, sáu trăm năm mươi triệu đồng chẵn.***

Đơn giá 1m^3 nước thô được thực hiện theo nghị định 67/2012/NĐ-CP khi Công ty Cấp nước được điều chỉnh đơn giá nước mới.

Điều III. Trách nhiệm mỗi bên.

Bên A:

Kết hợp cùng bên B và đơn vị có liên quan kiểm tra thường xuyên chất lượng nguồn nước thô và cùng có kết luận tổng hợp vào cuối tháng về chất lượng nguồn nước để gửi bên B và các đơn vị liên quan. Kết luận này được dùng làm căn cứ để nghiệm thu chất lượng nguồn nước thô khi bên A thanh toán cho bên B.

Bên B:

- Đảm bảo nguồn nước thô trong hệ thống thủy lợi, cấp đủ số lượng ghi tại điều I trong hợp đồng này.

- Phối kết hợp với địa phương và các đơn vị có liên quan quản lý bảo vệ nguồn nước mặt cung cấp nước thô để sản xuất nước sạch theo quy chế về quản lý bảo vệ nguồn nước được UBND thành phố Hải Phòng ban hành ngày 31/3/2004 kèm theo Quyết định số 781/QĐ-UB ngày 07/7/2005 của UBND thành phố Hải Phòng.

- Có trách nhiệm đầu tư nâng cấp, cải tạo công trình đảm bảo nguồn nước thô dùng sản xuất nước sạch cấp cho sinh hoạt đạt tiêu chuẩn Việt Nam (TCVN 5524-1995): Yêu cầu chung bảo vệ nguồn nước mặt khỏi bị nhiễm bẩn, tiêu chuẩn Việt Nam TCVN 5942-1995 về chất lượng nước mặt và hàm lượng muối mặn NaCl không quá 250mg/l cho vùng nội địa.

Trong trường hợp nguồn nước thô cấp không đạt các yêu cầu theo các tiêu chuẩn đã được nêu ở trên thì hai bên cùng bàn bạc thống nhất để xử lý nguồn nước thô cho đạt tiêu chuẩn nước mặt để sản xuất nước sạch cấp cho sinh hoạt và bên B

sẽ hoàn trả bên A số tiền tương ứng với lượng chi phí hóa chất và các chi phí khác tăng thêm để xử lý nguồn nước và được thể hiện trong thanh lý hợp đồng.

Điều IV. Thanh toán

Bên A thanh toán tiền nước thô cho bên B theo quý kể từ ngày ký hợp đồng.

Khi bên A thanh toán cho bên B, bên B phải có kèm theo xác nhận kết quả nghiệm thu chất lượng nước thô của Trung tâm Y tế dự phòng và Phòng Kiểm tra chất lượng Công ty TNHH một thành viên Cấp nước Hải Phòng hàng tháng.

Điều V. Điều khoản thực hiện

Hai bên cam kết thực hiện đầy đủ những điều khoản đã ký trong hợp đồng.

Khi gặp các khó khăn phát sinh, hai bên sẽ thông báo cho nhau bằng văn bản để cùng giải quyết và tháo gỡ trên tinh thần hợp tác đảm bảo lợi ích của hai bên, nếu trong trường hợp hại bên không tự giải quyết được thì việc giải quyết sẽ được thực hiện tại Toà án Kinh tế thành phố Hải Phòng.

Hợp đồng này có hiệu lực kể từ ngày ký và được lập thành 4 bản (mỗi bên giữ 2 bản) có giá trị như nhau./.

ĐẠI DIỆN BÊN A	ĐẠI DIỆN BÊN B
CHỦ TỊCH - TỔNG GIÁM ĐỐC	CHỦ TỊCH KIÊM GIÁM ĐỐC
Vũ Hồng Dương	Trần Quang Hoạt

Translation

SOCIALIST REPUBLIC OF VIETNAM

Independence - Freedom - Happiness

ECONOMIC CONTRACT

SUPPLY RAW WATER FOR TREATED WATER PRODUCING 2014

Number: 01/HDKT

- *Base on civil law number 33/2005/QH11 date 14/6/2005 of national assembly term XI;*
- *Base on decree number 143/2003/NDCP date 28/11/2003 of government of socialist republic of Vietnam, defines detailedly some articles of the water conservancy work sexploitation and protection Act, decree number 115/2008/NDCP to change and complete some articles of decree 143/2003/NDCP;*
- *Base on Decision number 943/QD-UBND of Haiphong people's committee providing the implement of decree number 115/2008/NDCP date 14/11/2008 in Haiphong city of the Government and decision 2067/QD-UBND date 19/12/2011 of Haiphong people's committee providing the adjustment of clean water price*
- *Base on instructions number 2184/2011/HDLS date 22/12/2011 providing the implement of clean water price adjustment in Haiphong city of Financial and Construction Department*
- *Base on the planning mission and capability of each party.*

Today 04 month 01 year 2014 in Haiphong water supply one member limited company, we are:

1.Party A:

Mr. Vu Hong Duong Position: **Chairman-General director**

Represent Haiphong Water Supply One Member Limited Company.

Address: 54 Dinh Tien Hoang – Hong Bang – Hai Phong.

Account number: 102010000200826 at Haiphong Industrial and Commercial Bank.

2. Party B:

Mr. Tran Quang Hoat Position: **Chairman and director**

Represent An Hai Water Conservancy Works Exploiting Limited Company.

Address: 781 Ton Duc Thang – So Dau – Hong Bang – Hai Phong.

Accountnumber: 32110000588860 at Vietnam Investment and Development Bank. (Ben Binh office transactions)

Two parties agree to make an economic contract with following articles:

Article 1: Party B supply raw water to party A from 1/1/2014 to 31/12/2014 for producing clean water:

Order	Explanation	Volume of water (m^3)	Price (VND/ m^3)	Cost (VND)
1	Vinh Khe pump station	44,000,000	750	33,000,000,000
	VAT (5%)			1,650,000,000
	Total			34,650,000,000

Article II: Contract value (estimate)

Amount in figure: 34,650,000,000 VND

Amount in letter: Thirty four billion, six hundred and fifty million, Vietnam dong.

Price of $1m^3$ raw water implement of Decree 67/2012/NĐ – CP when Water Supply Company are allowed to adjust new water price.

Article III: Responsibility of each party

Party A:

Co-operate with party B and some related divisions to regularly monitor and check the raw water quality, make a final result of raw water quality at the end of each month and send it to party B and related divisions. This result can be referred as a base to check and take over raw water before party A pays for party B.

Party B:

Ensure to supply sufficient volume of raw water indicated in Article I of this contract;

Co-operate with local authorities and related divisions to manage and protect the source of surface water which provide raw water for producing clean water. According to regulation of water source protection which is issued on

31/3/2004 and Decision number 781/QD-UB issued on 7/7/2005 by Haiphong people's committee.

Take responsibility for upgrading, improving water conservancy works in order to ensure quality and volume of raw water for producing clean water (TCVN 5524-1995), prevent surface water of being polluted (TCVN 5942-1995), ensure that the concentration of NaCl is not over 250mg/l for hinterland

If raw water quality does not satisfy above standards, two parties together discuss how to treat water to standards, supply water for producing domestic water and party B must return to party A amount of money correspondence to chemical fee and other potential fees to water source treatment.

Article IV: Payment

Party A pays for raw water to party B quarterly since the date of contract;

When party A pays to party B, party B must present the result of raw water quality test which is confirmed by Hai Phong medical center and water quality testing department of Hai Phong Supply Water One Member Limited monthly.

Article V: Implement

Two parties commit to carry out all provisions in this contract.

Whenever problems rise, two parties inform to each other by means of an official document in order to discuss and solve problems with a friendly spirit, if not problems will be settled at Haiphong economic tribunal.

This contract validates since the date of contract and there are 4 equal copies of this contract (each party keeps 2 copies).

Party A	**Party B**
(Sign and seal)	(Sign and seal)
Mr. Vu Hong Duong	**Mr. Tran Quang Hoat**

Appendix 6-2 The payment certificate for water rights

Original

Cộng hoà xã hội chủ nghĩa việt nam
Độc lập - Tự do - Hạnh phúc

HỢP ĐỒNG
CUNG CẤP NƯỚC THÔ CHO SẢN XUẤT NƯỚC SẠCH NĂM 2014
Số: 01 /HĐKT

Căn cứ Bộ luật dân sự số 33/2005/QH11 ngày 14/6/2005 của Quốc hội khoá XI

Căn cứ Nghị định 143/2003/NĐ-CP ngày 28/11/2003 của Chính phủ nước CHXHCH Việt Nam quy định chi tiết một số điều của Pháp lệnh Khai thác và bảo vệ công trình thủy lợi, Nghị định 115/2008/NĐ-CP ngày 14/11/2008 sửa đổi bổ sung một số điều của Nghị định 143/2003/NĐ-CP;

Căn cứ Quyết định 943/QĐ-UBND của UBND Thành phố Hải Phòng về việc quy định chi tiết thi hành một số nội dung thực hiện Nghị định 115/2008/NĐ-CP ngày 14/11/2008 của Chính phủ trên địa bàn Thành phố Hải Phòng và Quyết định 2067/QĐ-UBND ngày 19/12/2011 của UBND thành phố Hải Phòng về việc điều chỉnh giá nước sạch;

Căn cứ Hướng dẫn số 2184/2011/HDLS ngày 22/12/2011 thực hiện quyết định của UBND thành phố Hải Phòng về việc điều chỉnh giá bán nước sạch trên địa bàn Thành phố Hải Phòng của Liên sở Tài chính - Xây dựng;

Căn cứ nhiệm vụ kế hoạch và khả năng của mỗi bên tham gia hợp đồng.

Hôm nay, ngày 04 tháng 01 năm 2014, tại Công ty TNHH một thành viên Cấp nước Hải Phòng.

Chúng tôi gồm có:

1. ĐẠI DIỆN BÊN A:

Ông : **Vũ Hồng Dương** Chức vụ : **Chủ tịch- Tổng giám đốc**

Là đại diện Công ty TNHH một thành viên Cấp nước Hải Phòng.

Địa chỉ: 54 Đinh Tiên Hoàng - Hồng Bàng - Hải Phòng.

Có tài khoản số: 102010000200826 tại Ngân hàng TMCP Công Thương Việt Nam - Chi nhánh Hải Phòng

2. ĐẠI DIỆN BÊN B:

Ông : **Trần Quang Hoạt** Chức vụ: **Chủ tịch- kiêm giám đốc**

Là đại diện Công ty TNHH một thành viên Khai thác công trình thủy lợi An Hải

Địa chỉ: 781 Tôn Đức Thắng - Sở Dầu - Hồng Bàng - Hải Phòng

Có tài khoản số: 3211 0000 588860 tại Ngân hàng Đầu tư và Phát triển Việt Nam chi nhánh thành phố Hải Phòng (Phòng Giao dịch Bến Bính)

Hai bên đã thống nhất ký hợp đồng kinh tế với những điều khoản sau đây:

Cộng hoà xã hội chủ nghĩa việt nam
Độc lập - Tự do - Hạnh phúc

HỢP ĐỒNG
CUNG CẤP NƯỚC THÔ CHO SẢN XUẤT NƯỚC SẠCH NĂM 2014
Số: 01 /HĐKT

Căn cứ Bộ luật dân sự số 33/2005/QH11 ngày 14/6/2005 của Quốc hội khoá XI

Căn cứ Nghị định 143/2003/NĐ-CP ngày 28/11/2003 của Chính phủ nước CHXHCH Việt Nam quy định chi tiết một số điều của Pháp lệnh Khai thác và bảo vệ công trình thủy lợi, Nghị định 115/2008/NĐ-CP ngày 14/11/2008 sửa đổi bổ sung một số điều của Nghị định 143/2003/NĐ-CP;

Căn cứ Quyết định 943/QĐ-UBND của UBND Thành phố Hải Phòng về việc quy định chi tiết thi hành một số nội dung thực hiện Nghị định 115/2008/NĐ-CP ngày 14/11/2008 của Chính phủ trên địa bàn Thành phố Hải Phòng và Quyết định 2067/QĐ-UBND ngày 19/12/2011 của UBND thành phố Hải Phòng về việc điều chỉnh giá nước sạch;

Căn cứ Hướng dẫn số 2184/2011/HDLS ngày 22/12/2011 thực hiện quyết định của UBND thành phố Hải Phòng về việc điều chỉnh giá bán nước sạch trên địa bàn Thành phố Hải Phòng của Liên sở Tài chính - Xây dựng;

Căn cứ nhiệm vụ kế hoạch và khả năng của mỗi bên tham gia hợp đồng.

Hôm nay, ngày 04 tháng 01 năm 2014, tại Công ty TNHH một thành viên Cấp nước Hải Phòng.

Chúng tôi gồm có:

1. ĐẠI DIỆN BÊN A:

Ông : **Vũ Hồng Dương** Chức vụ : **Chủ tịch- Tổng giám đốc**

Là đại diện Công ty TNHH một thành viên Cấp nước Hải Phòng.

Địa chỉ: 54 Đinh Tiên Hoàng - Hồng Bàng - Hải Phòng.

Có tài khoản số: 102010000200826 tại Ngân hàng TMCP Công Thương Việt Nam - Chi nhánh Hải Phòng

2. ĐẠI DIỆN BÊN B:

Ông : **Trần Quang Hoạt** Chức vụ: **Chủ tịch- kiêm giám đốc**

Là đại diện Công ty TNHH một thành viên Khai thác công trình thủy lợi An Hải

Địa chỉ: 781 Tôn Đức Thắng - Sở Dầu - Hồng Bàng - Hải Phòng

Có tài khoản số: 3211 0000 588860 tại Ngân hàng Đầu tư và Phát triển Việt Nam chi nhánh thành phố Hải Phòng (Phòng Giao dịch Bến Bính)

Hai bên đã thống nhất ký hợp đồng kinh tế với những điều khoản sau đây:

Translation

SOCIALIST REPUBLIC OF VIETNAM

Independence - Freedom - Happiness

APPENDIX No1:ADJUSTMENT AND SUPPLEMENT ECONOMIC CONTRACT

Number: 01/2014/HĐKT date 04/01/2014

Adjustment, amendment price of raw water supply for producing clean water.

- *Base on civil law number 33/2005/QH11 date 14/6/2005 of national assembly term XI of Socialist Republic Of VietNam*
- *Base on decree number 67/NDCP date 10/09/2012 of Government of socialist republic of VietNam, "About amendment and supplement some articles of decree 143/2003/ND-CP date 28/11/2013 of Government providing the implement of some articles of ordinance exploitation and protection irrigation structure"*
- *Base on Decision number 1270/QD-UBND date 19/06/2014 of Haiphong people's committee providing the adjustment of clean water price of Hai Phong Water Supply One Member Co, Ltd (page 2014 – 2016)*
- *Base on economic contract supply raw water for producing clean water year 2014 number 01/2014/HĐKT date 04/01/2014 between An Hai Water Conservancy Works Exploiting Co, Ltd and Hai Phong Water Supply One Member Co, Ltd.*

Today 01 month 07 year 2014 in Haiphong Water Supply One Member Co, Ltd we are:

1. Party A:

Mr. Vu Hong Duong Position: **Chairman-General director**

Represent Haiphong Water Supply One Member Co, Ltd

Address: 54 Dinh Tien Hoang – Hong Bang – Hai Phong.

Account number: 102010000200826 at Haiphong Industrial and Commercial Bank.

2. Party B:

Mr. Tran Quang Hoat Position**: Chairman and director**

Represent An Hai Water Conservancy Works Exploiting Co, Ltd

Address: 781 Ton Duc Thang – So Dau – Hong Bang – Hai Phong.

Account number: 32110000588860 at Vietnam Investment and Development Bank (Ben Binh office transactions)

Two parties agree to adjust economic contract number 01/2014/ HĐKT date 04/01/2014 with following articles:

I. Adjustment and Supplement for article 1 of contract about content and price.

1. From 1/1/2014 – 30/06/2014.

- Amount of raw water in use. = 22.564.000 m^3
- Raw water cost 22.564.000 m^3 x **750 Đ/m^3** = 16.923.000.000 Đồng
- VAT 5 % = 846.150.000 Đồng
- Total = 17.769.150.000 Đồng(1)

2. From 1/7/2014 – 31/12/2014:

- Estimate amount of raw water in use = 21.436.000 m^3
- Raw water cost 21.436.000 m^3 x **900 đ/m^3** = 19.292.400.000 Đồng
- VAT 5% = 964.620.000 Đồng
- Total = 20.257.020.000 Đồng (2)

II. Adjustment and Supplement for article 1 of contract (value of contract)

Value of contract (1) + (2): 38.026.170.000 Đồng

Amount in letter: Thirty eight billion, twenty six million, one hundred and seventy thousand Vietnam đồng.

III. General Article.

- This appendix is a part of Contract number : 01/2014/HĐKT date 04/01/2014 between An Hai Water Conservancy Works Exploiting Co, Ltd and Hai Phong Water Supply One Member Co, Ltd.
- The Articles of Contract number: 01/2014/HĐKT do not change, two parties continue to comply with all articles which is agreed.

There are 4 equal copies of this Appendix (each party keeps 2 copies).

This Appendix validates since the date of Appendix.

Party A	**Party B**
(Sign and seal)	(Sign and seal)
Mr. Vu Hong Duong	**Mr. Tran Quang Hoat**

Appendix 6-3 Stake Holder Meeting

Agenda of meeting(original and translation)

CHƯƠNG TRÌNH HỘI NGHỊ

GIỚI THIỆU DỰ ÁN ĐẦU TƯ NÂNG CẤP NMN AN DƯƠNG

Tại phường Lam Sơn – quận Lê Chân - TP.Hải Phòng

Địa điểm: Phòng họp B – số 54 Đinh Tiên Hoàng – Hồng Bàng – Hải Phòng

Thời gian: Ngày 25 tháng 8 năm 2014

THỜI GIAN ***TIME***	**NỘI DUNG** ***ACTIVITIES***	**THỰC HIỆN** ***IMPLEMENTING***
08h30' ÷ 09h00'	**Đón tiếp Đại biểu.** *Welcome guests and delegates.*	**Lãnh đạo Công ty, Cán bộ được phân công theo đề xuất của BQL.** *Company leaders, Staff as proposed by Project Management Unit.*
09h00' ÷ 09h10'	**Tuyên bố lý do - Giới thiệu Đại biểu.** *Introduction.*	**Ông Nguyễn Văn Đức - PGĐ BQL.** *Mr. Nguyen Van Duc - Deputy Director of PMU.*
09h10' ÷ 09h30'	**Hiện trạng cấp nước thành phố Hải Phòng và những thách thức đặt ra** *Water Supply Condition of Haiphong city (Current Status and Issues)*	**Ông Trần Văn Dương - P.TGĐ công ty.** *Mr. Tran Van Duong - Deputy General Director.*
09h30' ÷ 10h00'	**Giới thiệu chung về Dự án JICA** *Outline of JICA Project*	**Ông Akira HASEBE – Chuyên gia thiết bị điện, Công ty Tư vấn NJS** *Mr. Akira HASEBE - Electrical Equipment Specialist NJS Consultant Co.,Ltd*
10h00' ÷ 10h30'	**Tác động môi trường và các biện pháp giảm thiểu** *Environmental Impact and Mitigation Measures*	**Ông Kenji TAKAYANAGI – Chuyên gia phân tích điều kiện môi trường/xã hội, Công ty Tư vấn NJS** *Mr. Kenji TAKAYANAGI – Environmental/ Social condition Analysis, NJS Consultant Co.,Ltd*
10h30' ÷ 11h00'	**Thảo luận** *Discussion*	**Các đại biểu** *Delegates*
11h00' ÷ 11h05'	**Bế mạc** *Closing*	**Chủ tịch - Tổng Giám đốc Công ty.** *Chairman - General Director.*

List of attendee(original) 1/2

Attendant List
Danh Sách Đại Biểu

Stakeholder Meeting
Hội Thảo Giữa Các Bên

for Preparatory Survey on the Project for An Duong Water Treatment Plant Upgrade Investment in the Socialist Republic of Viet Nam

Về Việc Khảo Sát Bước Đầu Cho Dự Án Đầu Tư Cải Tạo Nhà Máy Nước An Dương Tại Việt Nam

Date: August 25, 2014

Place: Conference Room of Hai PhongWater Supply One Member Co. LTD

No. STT	Participant's Name Tên Đại Biểu	Affiliation Chức vụ (Tư cách đại biểu)	Email/Mobile Phone Number Thư điện tử/Số điện thoại	Signature Chữ ký
1	Bùi Quang Vinh	P. Kế hoạch/CT thoát nước		
2	Vũ Việt Sáu	P. Dự Hàng kênh		
3	Đào Công Bằng	Q. Hải An		
4	Ngô Minh Ngọc	P. TCKT		
5	Trần Thị Minh Hiền	Trưởng Phòng Đầu tư / STC		KT Mai
6	Hoàng Thị Tuyết Mai	P. Đầu tư / STC		
7	Phạm Văn Long	Sở TNMT		
8	Ng Quang Anh	Sở Xây dựng		
9	~~Quốc Hưng~~			
10	Nguyễn Anh Tuấn	Cổ đông sáng lập		
11	Nguyễn Hải Hà	TKT		
12	Phạm Quang Thanh	P. QL HĐXD		
13	Trịnh Anh Tuấn	CNNT		
14	Nguyễn Hồng Anh	HPS		
15	Vũ Xuân Tùng	P. KH		
16	Ngô Quỳnh Hoa	KTCL		
17	Đỗ Hồng Thắng	XNTH5		

List of attendee（original） 2/2

Attendant List
Danh Sách Đại Biểu

Stakeholder Meeting
Hội Thảo Giữa Các Bên

for Preparatory Survey on the Project for An Duong Water Treatment Plant Upgrade Investment in the Socialist Republic of Viet Nam
Về Việc Khảo Sát Bước Đầu Cho Dự Án Đầu Tư Cải Tạo Nhà Máy Nước An Dương Tại Việt Nam

Date: August 25, 2014

Place:Conference Room of Hai PhongWater Supply One Member Co. LTD

No. STT	Participant's Name Tên Đại Biểu	Affiliation Chức vụ (Tư cách đại biểu)	Email/Mobile Phone Number Thư điện tử/Số điện thoại	Signature Chữ ký
16	Phạm Văn Bính	Hách hồng P. Số Dài		
17	Đỗ Quang Minh	phó Chánh văn phòng SNV		
18	Quốc Khánh	Báo Hải Phòng		
19	Duy Tiến			
20	Nguyễn Thị Nga	P. Quyhoạch / Sở Văn hóa		
21	Bùi Thế Hưng	PTC / CTy CN		
22	Vũ Hồng Dương	CT & TGĐ CTy.		
23	Cao Văn Quý	PTGĐ CTy		
24	Vũ Mạnh Hòa	PTGĐ CTy.		
25	Ng Văn Đức	PGĐ BQL		
26	Vũ Hải Hà	PTChức		
27	Phạm Thúy Linh	BQL		
28	Bùi Ngọc Uo	BQL		
29	Ng Thị Thu Thủy	PTChức		
30	Vũ Minh Oanh	PTChức		
31	Phạm Thái Thuỷ	BQL		

List of attendee（translation） 1/2

Attendant List
DanhSáchĐạiBiểu

Stakeholder Meeting
Hội Thảo Giữa Các Bên

For Preparatory Survey on the Project for An Duong Water Treatment Plant Upgrade Investment in the Socialist Republic of Viet Nam

Về Việc Khảo Sát Sơ Bộ Cho Dự Án Đầu Tư Cải Tạo Nhà Máy Nước An Dương Tại Việt Nam

Date: August 25, 2014

Place: Conference Room of Hai Phong Water Supply One Member Co. LTD

No. STT	**Participant's Name TênĐạiBiểu**	**Affiliation Chứcvụ (Tư cách đại biểu)**	**Email/Mobile Phone Number Thưđiệntử/Sốđiệnthoại**	**Signature Chữký**
1	Pham Van Binh	Customer in So Dau ward		
2	Do Quang Minh	Deputy Head of Hai Phong Department of Foreign Affairs Office		
3	Quoc Khanh	Hai Phong Newspaper		
4	Duy Tien	Hai Phong Newspaper		
5	Nguyen Thi Nga	Planning Division, Department of Culture, Sports and Toursim		
6	Bui The Dung	Finance Division, Hai Phong Water		
7	Vu Hong Duong	Chairman, General Director of Hai Phong Water		
8	Cao Van Quy	Deputy General Director of Hai Phong Water		
9	Vu Manh Hoa	Deputy General Director of Hai Phong Water		
10	Nguyen Van Duc	Deputy Director of Project Management Unit of Hai Phong Water		
11	Vu Hai Ha	Organizing Division of Hai Phong Water		

List of attendee（translation） 2/2

No. STT	Participant's Name TênĐạiBiểu	Affiliation Chứcvụ (Tư cách đại biểu)	Email/Mobile Phone Number Thưđiệntử/Sốđiệnthoại	Signature Chữký
12	Pham Thuy Linh	Project Management Unit of Hai Phong Water		
13	Bui Ngoc Ha	Project Management Unit of Hai Phong Water		
14	Nguyen Thi Thu Huong	Organizing Division of Hai Phong Water		
15	Vu Kim Oanh	Organizing Division of Hai Phong Water		
16	Pham Thanh Thao	Project Management Unit of Hai Phong Water		
17	Bui Quang Vinh	Planning Department, Hai Phong Water		
18	Vu Viet Sau	Customer in Du Hang ward		
19	Dao Cong Bang	Customer in Ha An District		
20	Nguyen Minh Ngoc	Organizing Division of Hai Phong Water		
21	Tran Thi Minh Hien	Manager of Investment Division, Department of Finance		
22	Hoang Thi Tuyet Mai	Manager of Investment Division, Department of Finance		
23	Pham Van Lang	Department of Natural Resources and Environment		
24	Nguyen Quang Anh	Department of Construction		
25	Nguyen Anh Tuan	Transportation, Mechanic-electricity Company		
26	Nguyen Huu Hop	Accountancy Division		
27	Pham Quang Thanh	Construction Management Division		
28	Trinh Anh Tuan	Information Technology Division		
29	Nguyen Minh Anh	Hai Phong Water		
30	Vu Xuan Trung	Planning Department		
31	Ngo Quynh Hoa	Hai Phong Water		
32	Do Hung Thang	Hai Phong Water		

Minutes (English)

Minutes of the stakeholders meeting

Date : August 25th, 2014
Venue: Conference Room, Hai Phong Water Supply One Member Limited Company

Min 1: Initiation of Meeting

- Introduction of distinguished guests and reasons of the meeting conducted by Mr. Nguyen Van Duc, Deputy Director of Project Management Unit, Hai Phong Water
- Mr. Duc emphasized the importance of innovation of water treatment method to supply Hai Phong people water with better quality.

Min 2: Water supply situation of Hai Phong City (current issues, status and challenges) presented by Mr. Tran Van Duong, Deputy General Director of Hai Phong Water.

- Brief introduction of water supply in Hai Phong
- Presentation of reasons for pollution of raw water including wastewater, industrial wastewater, fertilizer, wastewater from farms, graves and sea rise.
- Challenges in treating organic matters and amoni in raw water. He stressed the shortcomings of using Chlorine in treating raw water.
- International experience in U-BCF.

Mr. Duong highlighted the advantages of U-BCF.

- Proposals by Hai Phong Water
- Request for JICA's support in An Duong Water Treatment Plant Upgrade Investment Project
- Hai Phong City needs to boost to protect water sources.
- International cooperation promotion.

Min 3: Outline of JICA Project

- Akira Hasebe, Electrical Equipment Specialist of JICA Study Team introduced the outline of JICA project to the stakeholders.

Min 4: Environmental impact and mitigation measures

- Kenji Takayanagi, the Environmental Specialist of the JICA Study Team made a presentation on the environment impact and mitigation measures to be implemented concerning the new water treatment plant.

- He presented the environmental impacts including noise, traffic accidents and construction waste, general waste, oil and grease, and also gave out the solutions to address them.

Min 5: Open Discussion

Chairman and General Director of Hai Phong Water Vu Hong Duong chaired the discussion.

- He briefed the JICA project and environmental impacts.
- Mr. Pham Van Lang, representative of Department of Natural Resources and Environment fully supported the project and proposed some ideas:
- It was vital for Hai Phong City to reduce pollution of raw water. Actually, DONRE planned to protect raw water from Re river and Da Do river.
- He found that there were not many environmental impact of this project.
- He recommended that sludge treatment should be further analyzed.
- He also wondered why not to expand the capacity of the project up to 200.000 m^3/day to meet the increasing demand of clean water of Hai Phong people.

Customer fromHoang Bang District (So Dau ward).

- He sincerely thanked the Japanese Government and JICA for their great interest and support for Hai Phong residents.
- He was very pleased to know that Hai Phong people could enjoy clean water from 2017.
- He hoped that the project would ensure the process and good quality as introduced.
- Finally, he requested Hai Phong Authority needed to have solutions to protect raw water in order to reduce treatment cost.

Customer from Hai An District

- He was very happy to hear about the project and agreed with its outline.
- He posed two questions as follows:
- When the project is under construction phase, especially coincidentally with ADB project, is it possible that the water supply for the residents will be affected?
- Is it possible that Hai Phong people will enjoy cheaper water with this grant aid project by JICA.

Chairman Vu Hong Duong answered the stakeholders:

- For the sludge treatment: after sludge was discharged to the sludge drying bed, it was brought to landfills or to be used to backfill for Hai Phong Water's projects. Additionally, EIA of ADB project was done, so the JICA project may not need EIA

- For the project expansion to 200.000 m^3/day: the budget did not allow to expanse it now.

- For the impact of the project on water supply: Hai Phong Water would ensure the sufficient water supply for Hai Phong people.

- For the water charge: Although water charge in Hai Phong was a little bit higher than the national average, it was still acceptable. In the future, Hai Phong would borrow loan from international organizations to construct 100.000 m^3/day more. At that time, the water charge may be a bit higher than now. Chairman Duong expected that it would not be a big problem for residents because Hai Phong economy was anticipated to go up.

- He also promised to upgrade the sedimentation pond to the concrete made one.

Min 6: Close of meeting

- Chairman of Hai Phong Water gave a vote of thanks to Japanese Government, JICA for their big help and asked the stakeholders to be supportive and ensure the success of the project.

- He promised to try their best to master the water supply network in Hai Phong City to become a leading water supply company in Viet Nam.

Minutes（Japanese）

ステークホルダー協議、議事録

日時：2014 年 8 月 25 日
会場：ハイフォン市水道公社の会議場

議事録１：協議開始

- Mr. Nguyen Van Duc（ハイフォン市水道公社プロジェクト管理部、副部長）による会議開催目的と参加者紹介
- Duc 氏は、ハイフォン市民に良質の水道水を供給するために、水処理方法を革新する重要性を強調した。

議事録２：ハイフォン市の給水状況（現況と問題点）、発表者 Mr. Tran Van Duong（ハイフォン市水道公社、副総裁）

- ハイフォン市水道の説明
- 過程雑排水、工業用水、肥料、農業からの汚染水、海水面上昇を含む原水の汚染理由の説明
- 原水の有機物とアンモニアを処理する技術革新
- U-BCF に係る事業の国際的経験

Mr. Tran Van Duong は、U-BCF の利点を強調した。

- ハイフォン市水道公社による無償援助要請
- アンズオン浄水場改善計画への JICA 支援を要請
- ハイフォン市は水源保全策を強化する必要がある。
- 国際協力促進

議事録３：JICA プロジェクトの概要

- JICA 調査団の電気技術者（長谷部）が JICA プロジェクトの概要を説明した。

議事録４：環境インパクトと緩和手段

- JICA 調査団の環境専門家（高柳）が新しい水処理に関係して実行される環境インパクトと緩和手段を説明した。
- 騒音、交通事故、建設廃材、一般ごみ、油とグリースを含む環境インパクトを説明し、また、それらを処理するための解決方法を示した。

議事録５：質疑応答

ハイフォン市水道公社総裁（Mr. Vu Hong Duong）が質疑応答の司会を行った。

- JICA プロジェクト概要と環境インパクトを簡単にまとめて要約した。

Mr. Pham Van Lang（自然資源環境局の代表者）

- 自然資源環境局はプロジェクトを全面的に支援するとの表明とともに、幾つかのアイ

デアを提示した。

- 原水汚染の減少させることは、ハイフォン市の為に重要である。実際に、自然資源環境局は、Re 川と Da Do 川からの原水保護することを計画している。
- 本プロジェクトでは環境インパクトは多くはないことが分かった。
- ハイフォン市の増大する水需要に見合うように、200,000m^3/日までプロジェクト能力をなぜ拡張しないのかと質問した。

ホングバン県（ソダウ 区）の水道利用者代表

- 日本政府/JICA にハイフォン市民の為に支援をいただいて感謝しています。
- ハイフォン市住民が 2017 年以来清浄な水道水を得ることができることを知って非常にうれしく思います。
- 本プロジェクトが処理ができ、紹介されたような清浄な水道水を担保できることを希望します。
- 最後にハイフォン市水道公社が処理費用を減らすために原水を保護する解決策を持つ必要があると提案した。

ハイアン県の水道利用者代表

- 本プロジェクトの知見を得てよかった。そのプロジェクト概要に賛成します。
  続いて、以下の２つの質問をした。

- 本プロジェクトが建設期になった場合、特に、ADB プロジェクトと時期が一致した場合、住民への給水停止がないようにしてもらいたい。
- ハイフォン市住民が JICA による無償援助でより安価な水道を利用できることは可能ですか。

Mr.Vu Hong Duong（ハイフォン市水道公社総裁）が質問者に回答

- スラッジ処理は、天日乾燥床に排水された後、ごみ処分場に廃棄されるか、又はハイフォン市水道局の新規プロジェクトサイトの埋め立てに利用される。さらに、ADB プロジェクトの EIA が実施された。そのため、JICA プロジェクトは EIA を必要としないかもしれない。
- 200,000 $m^{3/}$日への拡張計画については、財政から今拡張する余裕はない。
- プロジェクト実施中、ハイフォン市水道公社は、ハイフォン市住民に給水を中断することなく十分な水を給水することを保証する。
- ハイフォン市の水道料金はベトナム国の平均よりも多少高いが、まだ、許容範囲である。将来、ハイフォン市が 100,000 m^3/日の浄水施設を建設するために、国際機関からローンを借りる予定である。その時、水道料金は現在より多少高くなるかもしれない。総裁は、ハイフォン市の将来における経済成長により、それが住民にとって大きな問題にならないと期待している。
- 総裁は、沈砂池をコンクリート仕様にすることを約束した。

議事録６：閉会の辞

- ハイフォン市水道公社総裁は、日本政府/JICA の大きな支援に感謝を述べ、ステーク

ホルダーにプロジェクトの支援を、プロジェクト成功を保証することを依頼した。

- Viet Nam での指導的な水道公社となるために、ハイフォン市内に水道管網を完成させるように彼らのベストを尽くすことを約束した。

Appendix 6-4 Notification for the necessity of EIA of this project

HAIPHONG PEOPLE'S COMMITTEE
DEPARTMENT OF NATURAL
RESOURCES AND ENVIRONMENT

SOCIALIST REPUBLIC OF VIETNAM
Independence – Freedom - Happiness

Subject: Guideline on preparation of Environmental Protection Document for Project of Supplemental Upward-Bio Contact Filter Item in Project of Rehabilitating and Upgrading An Duong WTP

Haiphong, September 09, 2014

To : Haiphong Water Supply One Member Limited Company

Department of Natural Resources and Environment did receive Letter No. 674/BQL-CTCN dated 15/08/2014 from Haiphong Water Supply One Member Limited Company requires of guideline on preparation of envionmental protection document for "Supplemental Upward-Bio Contact Filter (U-BCF) into water treatment technology line at An Duong Water Treatment Plant, Department of Natural Resources and Environment would like to response as below:

1. Haiphong Water Supply One Member Limited Company intends to construct Upward-Bio Contact Filter (U-BCF) into existing water treatment technology line at An Duong Water Treatment Plant. Water treatment technology line at An Duong Water Treatment Plant is one of components under Volume 3 – Upgrading An Duong Water Treatment Plant under "Rehabilitating and Upgrading Haiphong Water Supply System - Stage II (from 100,000m3/day to 200,000m3/day)" was approved Environmental Impacts Assessment Report at Decision No.331/QD-UBND dated 05/02/2013 by People's Committee.

2. According to regulations at Ponit c, Clause 2, Article 13, Clause 2 Article 18, Paragraph 53 and 144 Appendix II, Decree No.29/2011/ND-CP issued dated 18/04/2011 on providing strategic environmental assessment, enviromental impact assessment and enviromental protection committement by the Government, Haiphong Water Supply One Member Limited Company must prepare and submit enviromental impact assessment Report (hereinafter referred to as "EIA Report") to People's Committe for appraisal, approval prior to asking the Construction Permit, detail as below:

* The document includes:
- 01 proposal Letter for appraisal, approval of EIA Report (official version);

Appendix 6-5 Memorandom for the unnecessary of EIA

HAIPHONG PEOPLE'S COMMITTEE **DEPARTMENT OF PLANNING AND INVESTMENT**	**THE SOCIALIST REPUBLIC OF VIET NAM** **Independence – Freedom - Happiness**
No: 1639/KHDT-KTDN Subject: environmental protection for Upward-Bio Contact Filter (U-BCF) component at An Duong Water Treatment Plant	*Haiphong, October 16, 2014*

To: Haiphong People's Committee has comments as follow:

Following the direction of People's Committee at Official Letter No. 7227/UBND-MT dated 24.09.2014 regarding environmental protection for Upward – Bio Contact Filter (as reference as "U-BCF") component at An Duong Water Treatment Plant, on October 14/2014 Department of Planning and Investment held a meeting with Departments of Natural Resources and Environment, Construction, Science and technology and Hai Phong Water Supply One Member Limited Company. Based on studying of relating documents and receiving of comments from Departments and units at the meeting, Department of Planning and Investment would like to report to City People's Committee as follows:

1 – .....

2- Proposals

Considering the nature of the addition of U-BCF into Water Treatment Technology at An Duong WTP will not change the size, capacity, without increasing the level of adverse impact on the environment and waste, pursuant to Decree 29/2011/NDCP dated 18/04/2011 of Government regulations on providing strategic environmental impact assessment, environmental impact assessment and environmental protection commitments, simultaneously, to enlist non-refundable aid from the Japanese government in fiscal year 2015, Departments and Agencies respectfully request City People's Committee:

- Agree on the policy of the addition U-BCF into water treatment technology line at An Duong WTP without preparing of environmental impact assessment.

- Require the Hai Phong Water Supply One Member Limited Company to strictly implement the provisions of current laws on environment and Decision No. 331/QD-UBND dated 05/02/2013 of Haiphong People's Committee on approving of Environmental Impact Assessment Volume 3 – Upgrading of An Duong Water Treatment Plant under "Rehabilitating & Upgrading Project of Haiphong Water Supply System Stage II**"**

- To assign Departments of: Natural resources and environment, Department of Construction, Department of Science and Technology, Department of Planning and Investment have responsibility for reviewing, giving guidelines, supervising of construction of Upward-Bio Contact Filter (U-BCF) component into water treatment technology at An Duong Water Treatment Plant.

Department of Planning and Investment report to People's Committee to review and decision.

SIGN FOR DIRECTOR
DEPUTY DIRECTOR

Cc:
- As above;
- Director, Deputy Director T.V. Tuan;
- DONRE, DOST, DOC;
- Haiphong Water Supply Company;
- Archived.

Tran Viet Tuan

Appendix 6-6 Notification for unnecessary of EIA

HAIPHONG PEOPLE'S COMMITTEE	**THE SOCIALIST REPUBLIC OF VIET NAM**
	Independence – Freedom - Happiness
No: 8276/UBND-MT	
Subject: environmental protection for Upward-Bio Contact Filter (U-BCF) component at An Duong Water Treatment Plant	*Haiphong, October 30, 2014*

To:

- Department of natural resources and environment, Department of Construction, Department of Science and Technology, Department of Planning and Investment
- Hai Phong Water One Member Limited Company

Having considered of Department of Planning and Investment at Letter No. 1639/KHDT-KTDN dated 16/10/2014 about environmental protection for Upward-Bio Contact Filter (U-BCF) component at An Duong Water Treatment Plant of Hai Phong Water One Member Limited Company (enclosed Letter).

Haiphong People's Committee has comments as follow:

1 – Agree on the policy as proposed by Department of Planning and Investment in the Letter mentioned above; request Hai Phong Water One Member Limited Company to comply with Vietnamese regulations as well as Decision No. 331/QD-UBND dated 05/-2/2013 of Haiphong People's Committee on approving of Environmental Impact Assessment Volume 3 – Upgrading of An Duong Water Treatment Plant under "Rehabilitating & Upgrading Project of Haiphong Water Supply System Stage II**"**

2- Departments of: Natural resources and environment, Department of Construction, Department of Science and Technology, Department of Planning and Investment have responsibility for reviewing, giving guidelines, supervising of construction of Upward-Bio Contact Filter (U-BCF) component into water treatment technology at An Duong Water Treatment Plant according to regulations.

Office of City People's Committee would like to inform Departments of: Natural resources and environment, Department of Construction, Department of Science and Technology, Department of Planning and Investment and HaiPhong Water One Member Limited Company to implement.

BY ORDER OF HAIPHONG PEOPLE'S COMMITTEE
SIGN FOR CHIEF OF OFFICE
Deputy Chief of Office

Nguyen Van Binh

Cc:
- Vietnam Environment Administration;
- Chairman;
- Vice Chairman Do Trung Thoai;
- As "To";
- Chief Office; Deputy Chief Office;
- Archived.

Appendix6-7 Monitoring Form

The latest results of the below monitoring items shall be submitted in the lenders as part of Quaternary Progress Report throughout the construction phases.

No	Monitoring Factor	Monitoring Place	Monitoring Method and Frequency	Monitoring Results	**Countermeasure**
Construction Stage					
1	Temporary air pollution by operation of construction machines	U-BCF construction area and Installation site of intake pumps	Physical observation once a day		
2	Clear the clog of side ditch by soil and rubbish including discharge water from construction sites.	U-BCF construction area and Installation site of intake pumps	Physical observation Once a day		
3	Keeping dumping sites in sanitary and safety conditions.	Disposal sites and/or general waste sites	Physical observation Once a week		
4	Soil and water pollution by oil, grease, and fuel	U-BCF construction area and Installation site of intake pumps	Physical observation Once a week		
5	Noise and vibration pollution	U-BCF construction area and Installation site of intake pumps	Complaint by citizen During construction		
6	Safety control of construction workers	Safety management rules in construction sites and put safety shoes and safety hat.	Physical observation Once a week		
7	Risk of generation of accidents at entrance and exit for vehicles in intake pumping station and An Duong WTP and their inside areas	at entrance and exit for vehicles in intake pumping station and An Duong WTP and their inside areas	Physical observation Two times per week		
8	Smog and dust	U-BCF construction area and Installation site of intake pumps	Complaint by citizen During construction		

Operating Stage After Completion of Facilities					
1	Risk of generation of accidents derived from mishandling of operation equipment	U-BCF facility and intake pumping station	Physical observation During trial run		
2	Risk of generation of traffic accidents at general roads and inside area of the WTP by transportation of activated carbon, etc.	Adequacy of safety traffic control manner	Physical observation At the time of passage of vehicle		

Appendix6-8 Environment Checklist

(1/7) Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1) EIA and Environmental Permits	(a) Have EIA reports been already prepared in official process? (b) Have EIA reports been approved by authorities of the host country' government? (c) Have EIA reports been unconditionally approved? If conditions are imposed on the approval of EIA report, does the conditions satisfied? (d) Aside from the above EIA report, are the project required to acquire necessary approvals and licenses on the environment from relating authorities?	(a) N/A (b) N/A (c) N/A (d) N/A	(a) EIA report became unnecessary by notice from Hai Phong People's Committee. (b) It is not applicable by the above reason. (c) It is not applicable by the above reason. (d) It is not applicable by the above reason. In addition, there are no another necessary permission on the environment.
	(2)Explanation to the Local Stakeholders	(a) Have contents of the project and the potential impacts been adequately explained to the local stakeholders based on appropriate procedures, including information disclosure? Is understanding obtained from the local stakeholders? (b) Have the comment from residents reflected to project contents?	(a) Y (b) Y	(a) Stakeholder meeting was held on August 25, 2014. The project only renews intake pumps in the existing intake pumping station and sets up the pre-treatment U-BCF facility to the existing An Duong WTP. Thus, the environmental impacts are mainly limited to noise generation, traffic control, and disposal of construction debris, waste, and oil and grease. These environmental impacts and mitigation measures were explained to the stakeholder meeting. As the result, the project can obtain the understanding from the local stakeholders. (b) Though relative agencies and water users had opinions for thanking the project implementation in the early-stage, there were no comments which might affect the project contents.

(2/7) Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
1 Permits and Explanation	(1)Examination of Alternatives	(a) Have alternative plans of the project been examined with social and environmental considerations?	(a) Y	(a) (A Plan): Zero option which does not conduct the Project, (B Plan): Construction of U-BCF with booster pumps and two blowers in An Duong WTP, (C Plan): Raw water is directly conveyed to U-BCF by renewed intake pumps at intake pumping station, and blowers are set up to clean up the filters of U-BCF. These 3 Plans were examined on the items concerning to environment and social consideration, including safety of treated water, injection volume of chemicals for water treatment, and Operation and maintenance cost etc. As a result, C Plan was judged to have the most high appropriateness for project implementation, compared with the other plans.
2 Pollution Control	(1) Air Quality	(a) Is there a possibility that chlorine from chlorine storage facilities and chlorine injection facilities will cause air pollution? Are any mitigating measures taken? (b) Do chlorine concentrations within the working environments comply with the country's occupational health and safety standards?	(a) N/A (b) N/A	(a) Air pollution by chlorine gas from injection facilities does not relate to the project because the project only sets up the pretreatment facility to the existing WTP. The facility does not use the chlorine for the treatment of raw water. (b) It is not applicable due to the above reasons.
	(2) Water Quality	(a) Do pollutants, such as SS, BOD, COD contained in effluents discharged by the facility operations comply with the country's effluent standards?	(a) N/A	(a) Washing water of the filter of U-BCF facility is discharged to sun drying bed of An Duong WTP and its residual water from the sun drying bed is returned to the pre-sedimentation pond of raw water. It is closed system. Thus, the U-BCF system does not discharge the effluent to the outside world.
	(3) Waste	(a) Are wastes, such as sludge generated by the facility operations properly treated and disposed in accordance with the country's regulations?	(a) N/A	(a) Sludge amount generated in the washing process of filters of U-BCF facility is a very little. Though ADB project estimates that existing WTP generates sludge with about 5,900 kg/day in treated water amount 200,000 m^3/day, U-BCF facility only generate sludge of about 3.1 kg/day. The sludge is disposed at disposal sites which is designated by People's Committee, compliance with Viet Nam regulations.
	(4) Noise & Vibration	(a) Do noise and vibrations generated from the facilities, such aa pumps comply with the country's standards?	(a) Y	(a) Walls and ceilings and windows of Pump rooms of intake pumping station are covered by acoustic boards and furthermore, mount for vibration protection for pumps and motors are prepared. In An Duong WTP, a blower for cleaning of U-BCF filter is operating inside the room and silencers are set to decrease noise level. Calculated results by noise equation showed that it was less than national noise standards (55 dB) at residential area in night time. Thus, noise level generated by the intake pumps and a blower is fitted to national noise standards.

(3/7) Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
2 Pollution Control	(5) Land Subsidence	(a) In case of extraction of a large volume of groundwater, is there possibility that the extraction of groundwater will cause land subsidence?	(a) N	(a) Land subsidence does not generate because water supply source for existing WTP is the river water and a large volume of groundwater is not extracted.
3 Natural Environment	(1) Protected Area	(a) Does the project site locate in protected areas designated by the country's laws or international treaties and conventions? Is there a possibility that the project will affect the protected areas?	(a) N	(a) The project site does not locate in protected areas designated by the Viet Nam's laws or international treaties and conventions. Thus, the project will not affect the protected areas.
	(2) Ecosystem	(a) Does the project site encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats)? (b) Does the project site encompass the protected habitats of endangered species of which protection and conservation are need by country's laws and international treaties? (c) In case that significant adverse impacts to ecosystem are apprehend, does the project conduct the countermeasure to reduce the adverse impacts to ecosystem? (d) Does the implementation of the project affect aquatic environment in rivers, etc.? Does the countermeasure to reduce adverse impacts to aquatic organisms etc?	(a) N (b) N (c) N/A (d) N	(a) The project site does not encompass primeval forests, tropical rain forests, ecologically valuable habitats (e.g., coral reefs, mangroves, or tidal flats). (b) The project site does not encompass the protected habitats of endangered species of which protection and conservation are need by Viet Nam's laws and international treaties. (c) It is not applicable due to the above reasons. (d) The project has no discharge to outside of An Duong WTP. Washing water for the filter of U-BCF facility is discharged to sun drying bed of the WTP and the residual water is discharged to pre-sedimentation pond for raw water. This is a closed system. Thus, the project has no adverse impact to aquatic organisms.
	(3) Hydrology	(a) Is there a possibility that the amount of water used (e.g., surface water, groundwater) by the project will adversely affect surface water and groundwater flows?	(a) N	(a) The project purpose is not to develop new water source for water supply but to set pretreatment system (U-BCF) to An Duong WTP which is presently operated by HPWSCo. Thus, the project does not adversely affect surface water and groundwater flow.

(4/7) Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(1) Resettlement	(a) Is involuntary resettlement caused by project implementation? If involuntary resettlement is caused, are efforts made to minimize the impacts caused by the resettlement? (b) Is adequate explanation on compensation and resettlement assistance for rebuilding the livelihood of involuntary resettlement' residents given in advance? (c) Are resettlement plans including recovery of livelihood base after resettlement, compensation by requisition price of lands and houses established with the survey for resettlement? (d) Does the payment of compensation fee conducted prior to resettlement? (e) Are the compensation principals shown in written document? (f) Of involuntary resettlement residents, does the resettlement plans properly consider vulnerable groups, especially, females, children, elderly people, poverty groups, ethnic minorities, and indigenous people etc.? (g) Does the agreement by resettlement people prior to resettlement conducted? (h) Is the implementation system to properly carry out residents' resettlement arranged together with implementation budget and budget measures? (i) Is the monitoring plan for resettlement impact established? (j) Does the complaint handing countermeasures established?	(a) N (b) N/A (c) N/A (d) N/A (e) N/A (f) N/A (g) N/A (h) N/A (i) N/A (j) N/A	(a) The project site is inside of intake pumping station and An Duong WTP. There are no inhabitants in the planned construction sites. Thus, implementation of the project does not cause involuntary resettlement. (b) It is not applicable due to the above reasons. (c) It is not applicable due to the above reasons. (d) It is not applicable due to the above reasons. (e) It is not applicable due to the above reasons. (f) It is not applicable due to the above reasons. (g) It is not applicable due to the above reasons. (h) It is not applicable due to the above reasons. (i) It is not applicable due to the above reasons. (j) It is not applicable due to the above reasons.
	(2) Living & Livelihood	(a) Does project implementation affect adverse impact to living condition of inhabitants by change of land use and of utilization of water bodies? (b) Is there a possibility that the project will adversely affect the living conditions of inhabitants? Are adequate measures considered to reduce the impact, if necessary.	(a) N (b) N/A	(a) Project implementation has no possibility to affect adverse impact to living condition of inhabitants by change of land use and of utilization of water bodies. Adversely, it will provide positive impact by improvement of quality for water supply. (b) It is not applicable due to the above reason
	(3) Heritage	(a) Is there a possibility that the project will damage the local archeological, historical, cultural, and religious heritage? Are adequate measures considered to protect these sites in accordance with the country's laws?	(a) N	(a) The project areas are only inside of intake pumping station and An Duong WTP. In the project areas, there are no local archeological, historical, cultural, and religious heritages. Thus, its construction activities will not provide them any damage.

(5/7) Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
4 Social Environment	(4) Landscape	(a) Is there a possibility that the project will adversely affect the local landscape? Are necessary measures taken?	(a) N	(a) As intake pumping station and An Duong WTP of the planned construction sites are not located at special landscape area, the project will not affect local landscape.
	(5) Ethnic Minorities and Indigenous Peoples	(a) Are considerations given to reduce impacts on the culture and lifestyle of ethnic minorities and indigenous people? (b) Are all of the rights of ethnic minorities and indigenous peoples in relation to land and resources respected?	(a) N/A (b) N/A	(a) In Hai Phong city, Hoa people of ethnic minority, Chinese and Kinh people of majority are living in mixing condition. Then, the project does not affect the impact to Hoa people. Then, it is not applicable. (b) It is not applicable due to the above reason.
	(6) Work Environment	(a)Is the project proponent not violating any laws and ordinances associated with the working conditions of the country which the project proponent should observe in the project? (b) Are tangible safety considerations in hardware side for individuals relating to the project such as the installation of safety equipment to protect labor accidents and the management of toxic substances involved? (c) Are soft side countermeasures such as tangible safety education for labors and the formulation of safety sanitary plans (including traffic control and public health) to interested persons to the project planned and conducted? (d) Are proper countermeasures taken not so as to threaten the safety of inhabitants' peoples and interested persons of the project by guardsmen for the project?	(a) Y (b) Y (c) Y (d) Y	(a) The project proponent has the Personnel and Administration Department including officers which have detailed knowledge on laws and ordinance associated with the working conditions which the project proponent should observe in the project. Thus, the proponent will not be violating any law and ordinance associated with the working condition of the country. (b) The installation of safety equipment and wear of safety shoes and safety hats to protect accidents at works will be planned and conducted at the construction and operation stages by contractor and implementation organization. (c) The formulation of safety sanitary plans (including traffic control and public health) to interested persons to the project and tangible safety education for labours will be planned and conducted by contractor and project proponent. (d) The project will take enough education not so as to be threatened to safety of inhabitants and interested people by guardsmen for the project.

(6/7) Environmental Check List

Category	Environmental Item	Main Check Items	Yes: Y No: N	Confirmation of Environmental Considerations (Reasons, Mitigation Measures)
5 Others	(1) Impacts during Construction	(a) Are adequate mitigation countermeasures considered to reduce adverse impacts during construction (e.g., noise, vibrations, turbid water, dust, exhaust gases, and wastes)? (b) Do construction activities adversely affect the natural environment (ecosystem)? In that case, are adequate mitigation countermeasures prepared? (c) Do construction activities adversely affect to social environment? In that case, are adequate mitigation countermeasures prepared? (d) Do construction activities cause traffic congestion? Are mitigation countermeasures prepared?	(a) Y (b) N (c) N (d) Y	(a) Mitigation countermeasures against adverse impacts (eg., noise and vibrations, traffic control, and waste disposal etc.) during construction is sufficiently considered as described in "Adverse Impacts and Mitigation Measures at Construction stage" of this report, contractor and implementation organization should comply with those descriptions. (b) Since construction works are conducted at intake pumping station and An Duong WTP sites owned by the HPWSCo, which have no important natural environments (ecosystem), it will not affect adverse impacts to them. (c) Construction activities will not affect social environment. (d) Traffic congestion by construction activities will not be caused because the gate to ordinary road from An Duong WTP is constructed not in the main road but in the branch road in the southwest side of the WTP. In addition, though intake pumping station directly faces ordinary road, several security guards to control the traffic with safety sign etc. at both sites shall be arranged.
	(2) Monitoring	(a) Does the proponent develop and implement monitoring program for the environmental items that are considered to have potential impacts? (b) How are the items, methods, and frequencies of the monitoring program planned? (c) Can the proponent establish an adequate monitoring system (organization, personnel, equipment, and budget and their continuity)? (d) Do reporting manners and its frequencies from proponent to concerned agency regulate?	(a) Y (b) Y (c) Y (d) N	(a) Monitoring plan is conducted by contractor and implementation organization. The monitoring plan is showed in Monitoring Plan of the report. The contractor and implementation agency should implement monitoring plan based on Viet Nam regulations in the construction and operation stages. (b) Monitoring parameters and methods were selected by supposing adverse impacts by implementation of the project and their frequencies were determined by the experiences such as past local villages' water supply project and supervising for construction works of water supply systems. (c) Monitoring system will be successfully established because it is carried out in the existing water supply system. In addition, as water charges are almost collected in the existing water supply system, the budget for monitoring system will be also secured. (d) reporting manners and its frequencies of monitoring results from proponent to the DONRE are not regulated by the Decree No. 29/2011/ND-CP. However, as the DONRE has inspector section, they can occasionally check. Thus, the proponent should make contact with the inspector of the DONRE and occasionally submit monitoring report and report the monitoring results to them.

(7/7) Environmental Check List

Category	Environmental Items	Main Check Items	Yes: Y No: N	Confirmation of Environmental Consideration (Reasons, Mitigation Measures)
6Note	Refer to Other Environmental Checklist	(a) Where necessary, pertinent items described in the Dam and River Project checklist should also be checked.	(a) N/A	(a) It is not applicable for the project.
	Note on Using Environmental Checklist	(a) If necessary, the impacts to trans-boundary or global issues should be confirmed (e.g., the project includes factors that may cause problems, such as trans-boundary waste treatment, acid rain, destruction of the ozone layer, or global warming).	(a) Y	(a) The project does not includes factors that may cause problems, such as trans-boundary waste treatment, acid rain, destruction of the ozone layer, except global warming. . There is no positive impact to environmental issues in global scale by implementation of the project. Adversely, the implementation of the project consumes commercial electric charge 480.4 KWh and CO_2 amount 2,226 /tons/year equal to its consumable electric powers is estimated to be released in the atmosphere.

Note 1) Regarding the term "Country's Standards" mentioned in the above table, in the event that environmental standards in the country where the project is located diverge significantly from internationa standards, Appropriate environmental considerations are required to be made.
In case where local environmental regulations are yet to be established in some areas, considerations should be made based on comparisons with appropriate standards of other countries (including Japan's experience).

2) Environmental checklist provides general environmental items to be checked. It may be necessary to add or delete an item taking into account the characteristics of the project and the particular circumstances of the country and locality in which the project is located.

Appendix6-9 Result of Topographic Survey

1. Purpose

Topographic Survey was conducted in order to design the parameter of the plant such as floor planning, water level, and height of the structures. The detail of the survey is shown in Table 1.

Table 1 Specification

Site	Number	Contents of survey
planned construction site （in An Duong treatment plant）	0.13 ha (1,300m^2)	[plane table survey]：Around Boundary Cross section; every 0.5 meter orthogonal directions Scale; 1/500. [profile and cross survey]：Length and width ;20m×4line Scale; 1/100
Existing facility in An Duong	32 poitns	[Leveling]：reference point, main facility（levee crown / bottom slab, overflow weir、and water level）and height of road in plant

2. Survey points

Survey points in An Duong treatment plant are shown in Figure 1. The levels of 1~32 leveling points in this figure are determined by referring to the reference points AD-01 and AD-02.

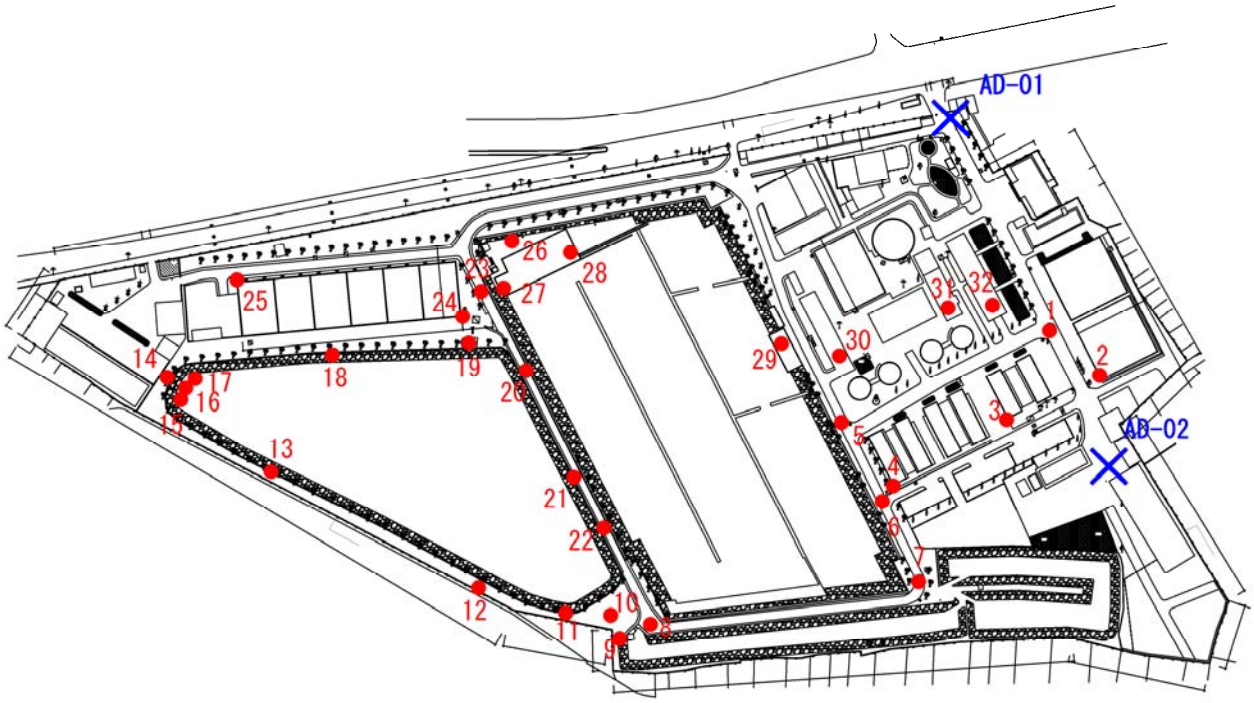


Figure 1　Survey points

3. Condition and detail information

3.1 Detail information of survey points

① An Duong WTP

-Survey points: 32points

- plane table surveying: Area : 1,300m^2

scale : 1/500, contour were lined every 0.5m.

-Cross survey: Length should be 2,000m x 4 line (there lines were included under water sauce.)

scale : 1/100

② Reference point

Detail of reference points are shown in Table 2.

Table 2 Reference Point

Name	X(m)	Y(m)	Altitude(m)	Elevation(m)
AD-01	2306379.752	594997.807	2.365	4.320
AD-02	2306223.470	595068.848	2.548	4.503

3.2 Result

According to the result which is shown in , Water level drawing could be drawn up under considered ground levels and difference of elevation, Layout plan drawing of U-BCF can be drawn up, and Preliminary Design can be drawn by the result.

Table 3 Results of survey

Point No.	altitude (m)	elevation(m)
1	2.362	4.317
2	4.200	6.155
3	5.731	7.686
4	6.791	8.746
5	2.309	4.264
6	2.401	4.356
7	2.727	4.682
8	2.703	4.658
9	2.586	4.541
10	2.672	4.627
11	3.086	5.041
12	2.690	4.645
13	2.975	4.930
14	3.590	5.545
15	2.492	4.447
16	2.436	4.391
17	2.845	4.800
18	2.531	4.486
19	2.651	4.606
20	2.740	4.695
21	2.978	4.933
22	2.821	4.776
23	2.470	4.425
24	3.848	5.803
25	3.840	5.795
26	2.777	4.732
27	1.230	3.185
28	1.045	3.000
29	2.319	4.274
30	2.509	4.464
31	2.638	4.593
32	2.521	4.476

Appendix 6-10 Result of excavation survey

1. Explorations purpose

To obtain the reference for plant design and cost estimation, the pit excavation survey on the embedded pipes was implemented in An Duong treatment plant area.

The five points of embedded pipes which should be identified were determined according to the existing references and the hearing survey with employees of Haiphong City Water Service Corporation and then the pit excavation was conducted on these five points. Explorations detail is shown in Table 1.

Table 1 Specification

Explorations Point	The number of point	Detail
Along with the route of existing pipe.	5 points	Pit Excavation size 0.5m×3.0m、Depth1～2m

2. Explorations points

The five points which excavation survey were conducted are shown in Figure 1

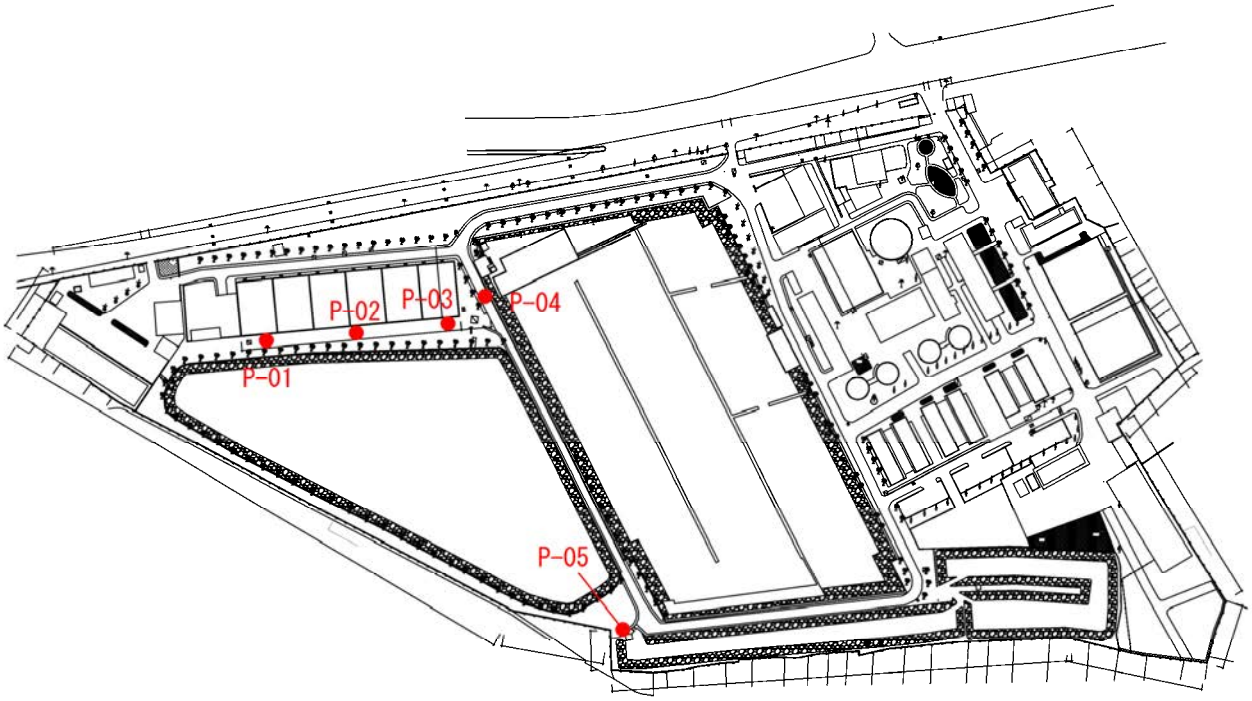


Figure 1 Explorations points

3. The detail information and the condition

The detail information and the condition of each point is shown in Table 2.

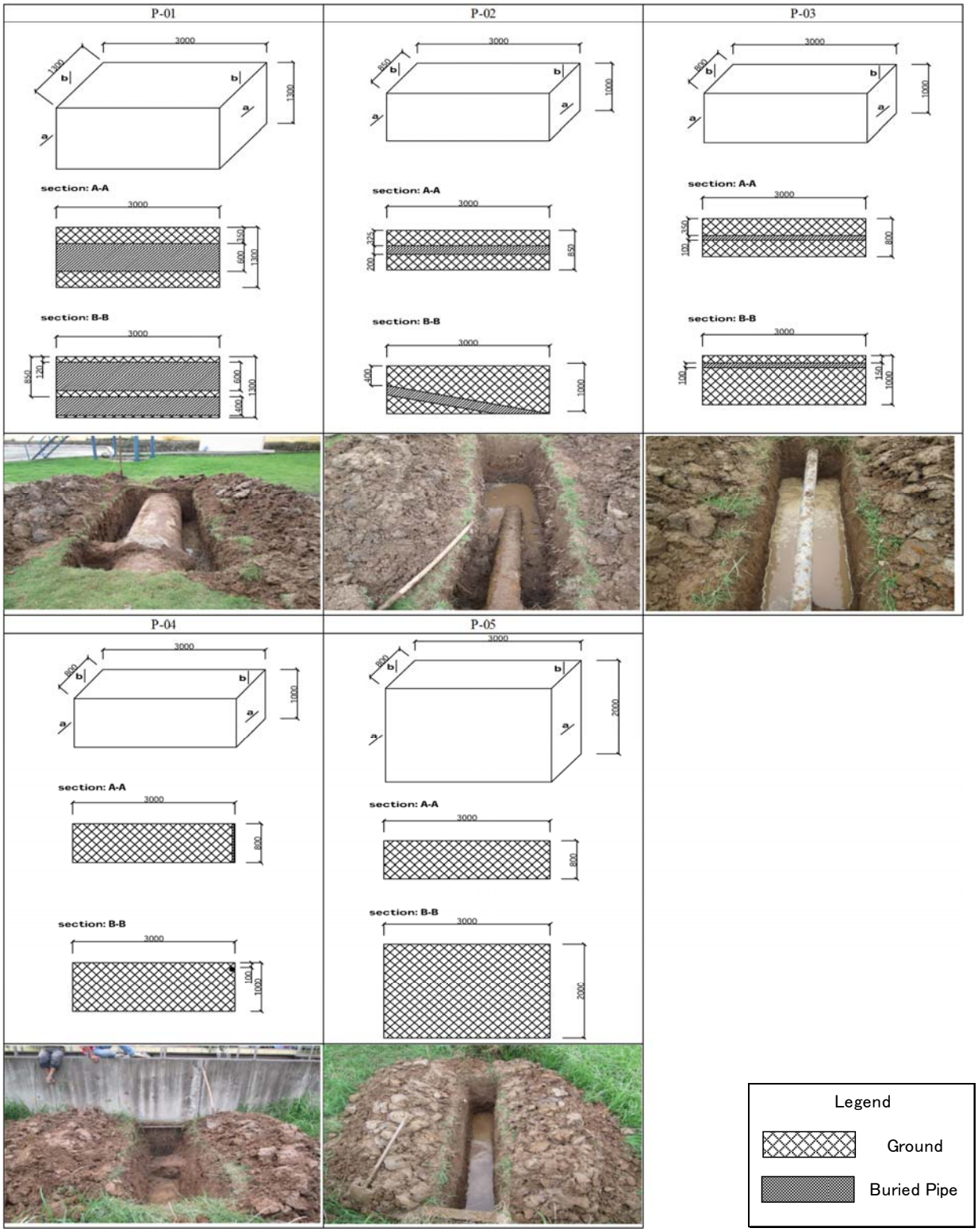
Table 2 The detail information and the condition

	P-01	P-02	P-03	P-04	P-05
Size(m)	1.30 x 3.00 x 1.30	0.85 x 3.00 x 1.00	0.80 x 3.00 x 1.00	0.80 x 3.00 x 1.00	0.80 x 3.00 x 1.00
High level(m)	2.57	2.57	2.57	2.57	2.57
Horizontal coordinate X (m)	2306157.58	2306294.55	2306287.46	2306284.33	2306281.55
Vertical coordinate Y (m)	594855.81	594781.93	594762.7	594730.71	594697.18
Start day	19/8/2014	19/8/2014	19/8/2014	19/8/2014	19/8/2014
Finish day	19/8/2014	19/8/2014	19/8/2014	19/8/2014	19/8/2014
Procedure	Manual	Manual	Manual	Manual	Manual

4. Result

The result are shown in Table 3.

Table 3 Excavation Result



Appendix6-11 Soil survey

1. Purpose

To obtain the reference for the plant design and its cost estimation, geological survey was conducted about the soil properties such as stability and allowable bearing power. The survey detail is shown in .

Table 1 Detail of geological survey

Site	Number &Depth of Boring	Contents of survey
planned construction site	3numbers × 15m（plan）	Standard penetration tests In situ test（plate bearing test, grandwater-level measuring,undisturbed sampling） laboratory tests（specific gravity / moisture content, density tests、liquid and plastic limit, determination of particle size, unconfined compression test）

2. Survey point

Geological survey was conducted with employing local staff. The survey point are shown in figure○.

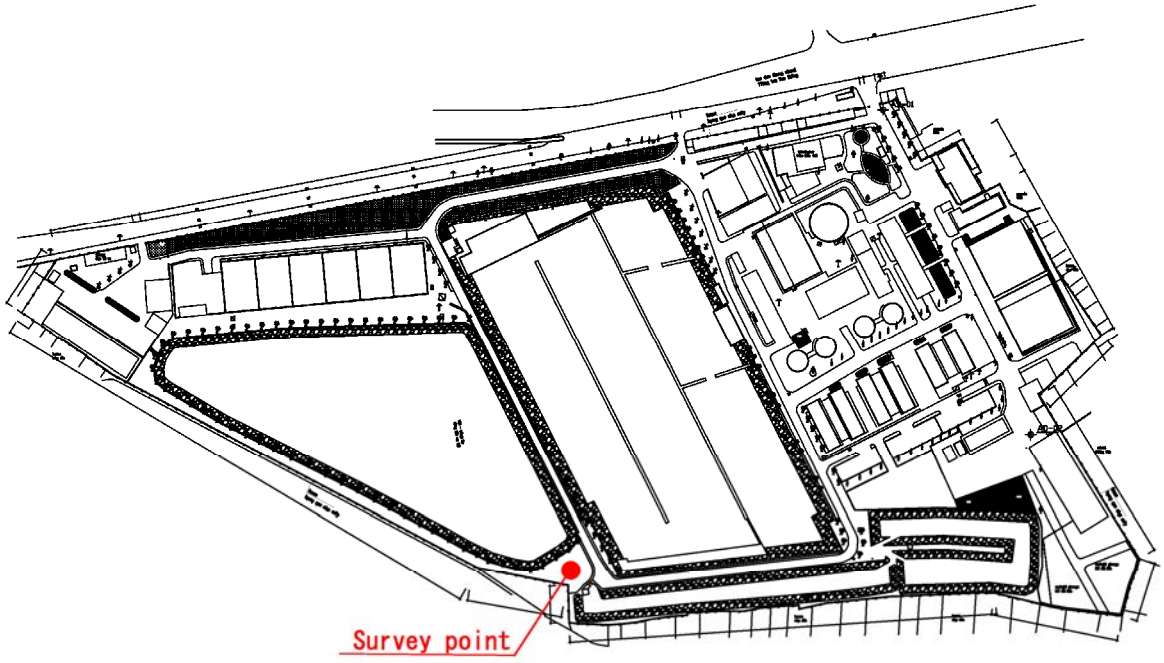


Figure 1 Survey point

3. Condition

Planned construction site of U-BCF : 45m depth at 1 point Boring Survey.

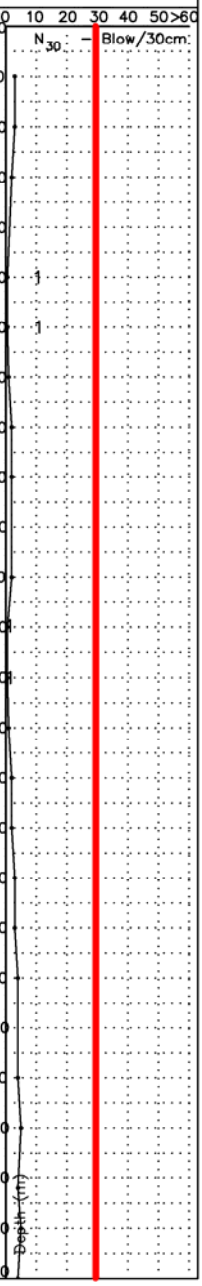
4. Result

As the result of the survey, the following matters became clear.

1. A soft and cohesive soil layer continue to the depth of 40m from the surface ground.
2. From the depth of 40m, there is a soil layer whose N-value is about 40. Since this layer could be a bearing stratum pile foundation shall be constructed to have it reach this soil layer.

Depth (m)	High level (m)	Thick. (m)	Stratum log	Soil, Rock Description	Depth of Undisturbed Sample (m)	SPT Test (N_{30}) Depth (m)	Blow/15cm 15	15	15	N_{30}
0.00	+2.57									
1.00		2.80		Backfill: Consists of clay, sandy-clay; greyish brown; with root, pebble and broken rock.		1.00 – 1.45	1	1	2	3
2.00						2.00 – 2.45	1	1	2	3
	−0.23		2.80							
3.00						3.00 – 3.45	0	1	1	2
4.00					4.00 – 5.00					
5.00		6.20		Low plastic clay (CL): Greyish black, liquid condition. With shell and organic decomposition.		5.00 – 5.45	0	<		N
6.00						6.00 – 6.45	0	<		N
7.00					6.80 −7.00	7.00 – 7.45	0	0	1	1
8.00						8.00 – 8.45	0	1	1	2
9.00	−6.43		9.00			9.00 – 9.45	0	1	1	2
10.00										
11.00					10.00–11.00	11.00–11.45	0	1	1	2
12.00						12.00–12.45	0	<		N
13.00		7.80		High plastic clay (CH): Grey, greyish brown, light grey; liquid condition. With shell and organic decomposition.	12.80–13.00	13.00–13.45	0	<		N
14.00						14.00–14.45	0	0	1	1
15.00					14.80–15.00	15.00–15.45	0	1	1	2
16.00						16.00–16.45	0	1	1	2
17.00	−14.23		16.80		16.80–17.00	17.00–17.45	1	1	2	3
18.00						18.00–18.45	0	1	2	3
19.00					18.80–19.00	19.00–19.45	1	2	2	4
20.00		8.20		Low plastic clay (CL): Greyish blue, light grey; liquid-plastic condition. With shell and organic decomposition. Liquid condition at some depth.						
21.00					20.00–21.00	21.00–21.45	1	2	2	4
22.00						22.00–22.45	1	2	3	5
23.00					23.00–23.20	23.20–23.65	1	2	2	4
24.00						24.00–24.45	1	2	3	5
25.00	−22.43		25.00		24.80–25.00	25.00–25.45	1	2	2	4

SPT Test Diagram



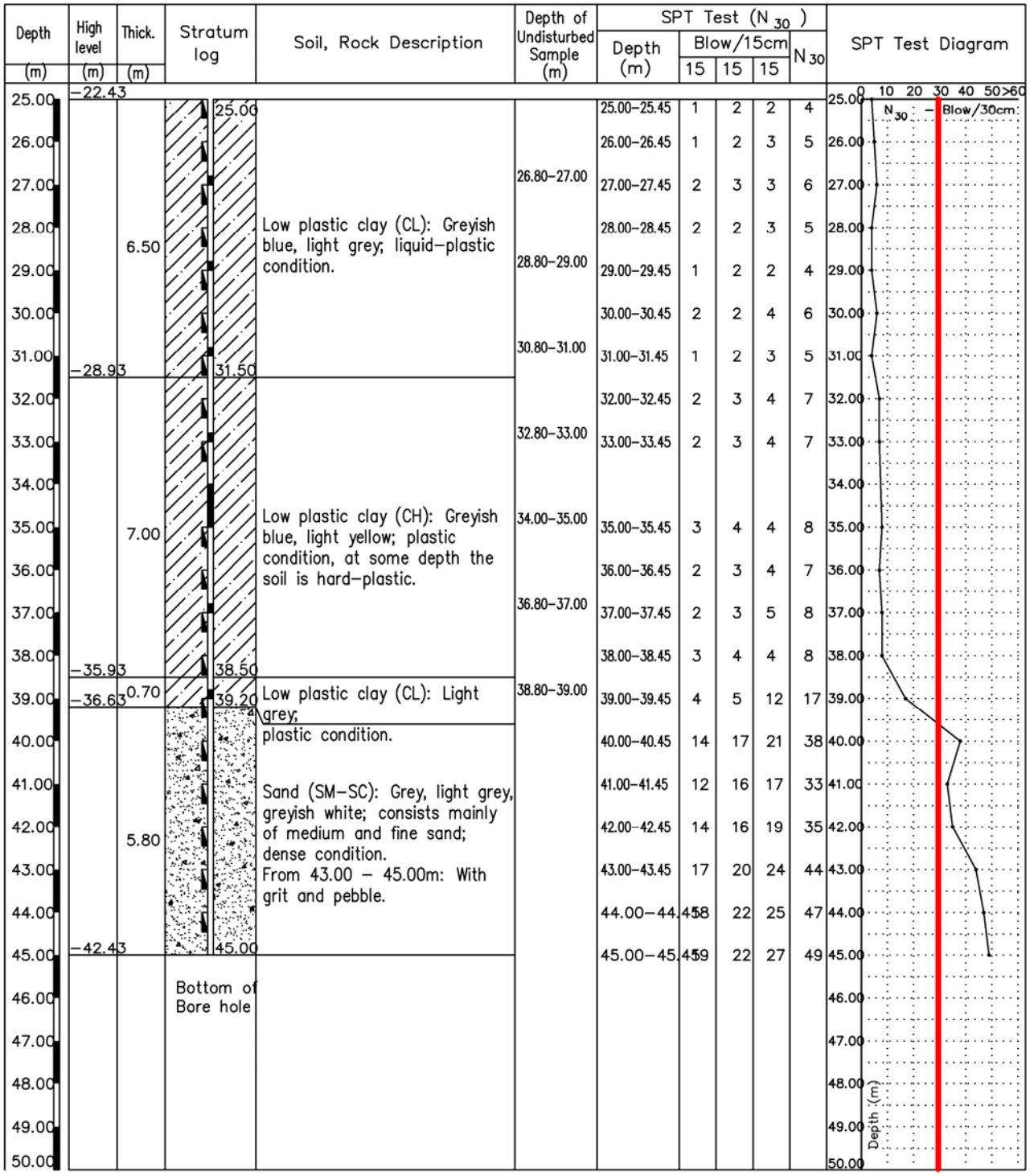
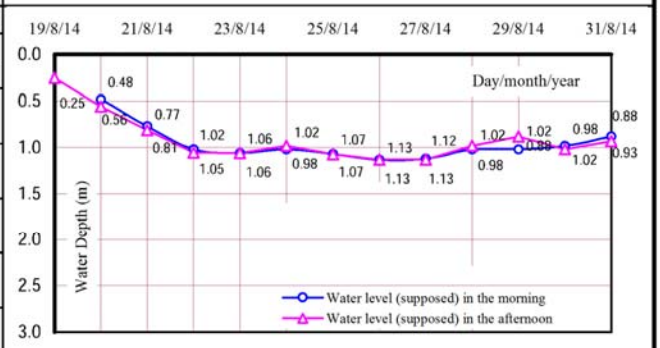


Figure 2 Boring Survey result

RECORDING TABLE					DIAGRAM OF WATER LEVEL (MORNING & AFTERNOON)
No	Date	Time	Depth of water level		
			Morning / Afternoon	Average	
1	19/8/2014			0.25	
		16h00	0.25		
2	20/8/2014	08h00	0.48	0.52	
		16h00	0.56		
3	21/8/2014	08h15	0.77	0.79	
		16h10	0.81		
4	22/8/2014	07h55	1.02	1.04	
		15h52	1.05		
5	23/8/2014	08h10	1.06	1.06	
		16h05	1.06		
6	24/8/2014	08h15	1.02	1.00	DIAGRAM OF WATER LEVEL (AVERAGE VALUE)
		16h10	0.98		
7	25/8/2014	08h02	1.07	1.07	
		16h00	1.07		
8	26/8/2014	08h00	1.13	1.13	
		16h05	1.13		
9	27/8/2014	08h15	1.12	1.13	
		16h00	1.13		
10	28/8/2014	08h15	1.02	1.00	
		16h10	0.98		
11	29/8/2014	07h58	1.02	0.95	
		16h00	0.88		
12	30/8/2014	08h10	0.98	1.00	
		16h05	1.02		
13	31/8/2014	08h05	0.88	0.91	
		16h00	0.93		



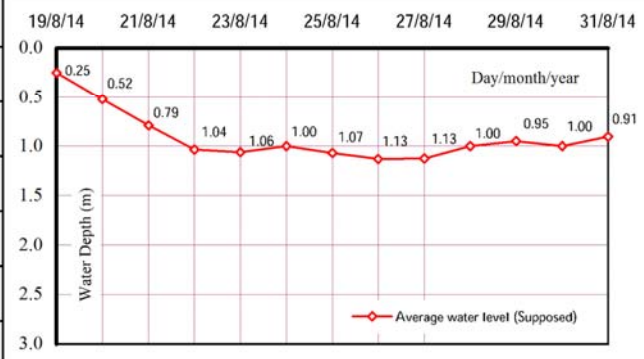


Figure 3 Under ground water level

Appendix6-12 Result of Water Quality Survey

Detail of Water quality survey is shown below. There are written the survey site, date, and measurement list.

In addition, the survey result is shown at Table 1.

- Sampling site：Existing Intake site：Two times
  Sampling date：First……August 3, 2014
  Second……September 7, 2014
  Measurement list：Pesticides, a chemical substance, and heavy metals

- Sampling site：In existing treatment plant at entrance of raw water reservoir, exit of raw water reservoir, sedimentation and filter)：each for 1 time
  Sampling date：First……August 3, 2014
  Measurement list：THM

- Sampling site：Treated water：Two times
  Sampling date：First……August 3, 2014
  Second……September 8, 2014
  Third……November 12, 2014
  Measurement list：Pesticides, a chemical substance, heavy metals(First,Second) and THM(First,Second,Third)

- Sampling site：Water tap：Three times
  Sampling date：First(15 sites)……August 3,August 4, 2014
  Second(11 sites)……September 7, 2014
  Third(15 sites)……November 12, 2014
  Measurement list：THM

Unit : heavy Metal mg/L

Pesticides and others: μ g/L

Table 1 The water quality analysis result by re-entrustment

Items 項目		Standard Vietnam ベトナム基準	Standard Japan 日本基準	Detection limit 検出限界	Intake 原水	Treated water 浄水	Intake 原水	Treated water 浄水	Remarks 備考
Sampling date 採水日					3rd Aug. 8月3日		7th Sep. 9月7日		
Heavy metals 重金属類	Cd カドミウム	0.003	0.003	0.001	ND	ND	ND	ND	
	Pb 鉛	0.01	0.01	0.001	0.006	0.004	ND	ND	
	As ヒ素	0.01	0.01	0.0001	0.001	ND	ND	ND	
	Cr クロム	0.05	0.05	0.001	ND	ND	ND	ND	
	Al アルミニウム	0.2	0.2	0.001	0.09	0.06	0.018	0.028	
	Fe 鉄	0.3	0.3	0.05	0.34	0.15	ND	ND	
	Mn マンガン	0.3	0.05	0.001	0.18	0.11	ND	ND	
	Sb アンチモン	0.005	0.02	0.001	ND	ND	ND	ND	
	Ni ニッケル	0.02	0.02	0.001	0.002	0.002	ND	ND	
	Mg マグネシウム	-	-	0.001	3.36	3.41	2.58	2.57	2)
	Hg 水銀	0.001	0.0005	0.0005	ND	ND	ND	ND	
Pesticides 農薬類	Aldrin + Dieldrin アルドリン+ディルドリン	0.03	1)	0.01	ND	ND	ND	ND	Insecticide 殺虫剤
	Atrazine アトラジン	2	0.01	0.01	ND	ND	ND	ND	Herbicide 除草剤
	Bentazone ベンタゾン	30	0.2	0.01	ND	ND	ND	ND	Herbicide 除草剤
	Carbofuran カルボフラン	5	0.005	0.01	ND	ND	ND	ND	Herbicide 除草剤
	Chlodane クロルデン	0.2	1)	0.01	ND	ND	ND	ND	Insecticide 殺虫剤
	DDT DDT	2	1)	0.01	ND	ND	ND	ND	Insecticide 殺虫剤
	Hexachlorobenzene ヘキサクロロベンゼン	1	1)	0.01	ND	ND	ND	ND	Fungicide 殺菌剤
	Lindane リンデン	2	1)	0.01	ND	ND	ND	ND	Insecticide 殺虫剤
	Methoxychlor メトキシクロル	20	-	0.01	ND	ND	ND	ND	Insecticide 殺虫剤
	Methachlor メトラクロール	10	-	0.01	ND	ND	ND	ND	Herbicide 除草剤
	Molinate モリネート	6	0.005	0.01	ND	ND	ND	ND	Herbicide 除草剤
	Pentachlorophenol ペンタクロロフェノール	9	-	0.01	ND	ND	ND	ND	Fungicide 殺菌剤
	Propanil プロパニル	20	-	0.01	ND	ND	ND	ND	Herbicide 除草剤
	Simazine シマジン	20	0.003	0.01	ND	ND	ND	ND	Herbicide 除草剤
	Aldoxycarb (deg) アルドキシカルブ	10	-	0.01	ND	ND	ND	ND	Insecticide 殺虫剤
Other Organic Compounds その他有機物	Squalane スクワラン	-	-	0.01	ND	ND	ND	ND	Feedstock Cosmetics 化粧品用剤
	Diethylphthalate フタル酸ジエチル	-	-	0.01	ND	ND	0.06	ND	Plasticizer 可塑剤
	Di-n-butylphthalate フタル酸ジブチル	-	0.2	0.01	ND	ND	ND	ND	Plasticizer 可塑剤
	Bis(2-ethylhexyl)phthalate フタル酸2-エチルヘキシル	8	-	0.01	0.01	0.01	0.01	0.012	Plasticizer 可塑剤
	Methylpalmitate パルミチン酸メチル	-	-	0.01	ND	ND	ND	ND	Anti-inflammatory 消炎剤
	Stearic acid methyl ester ステアリン酸メチル	-	-	0.01	ND	ND	ND	ND	Feedstock Nonionic Surfactant 非イオン界面活性剤
	Octanol オクタノール	-	-	0.01	ND	ND	ND	ND	Feedstock Ester エステル剤
	1-Nonanol 1-ノナノール	-	-	0.01	ND	ND	ND	ND	Feedstock Aroma 芳香剤
	3,5-di-tert-Butyl-4-hydroxybenzaldehyde 3,5-ジ-tert-ブチル-4-ヒドロキシベンズアルデヒド	-	-	0.01	ND	ND	ND	ND	Feedstock 原料油
	Bis(2-ethylhexyl) sebacate セバシン酸ビス(2-エチルヘキシル)	-	-	0.01	ND	ND	ND	ND	Plasticizer 可塑剤
	Dibutylamine ジブチルアミン	-	-	0.01	ND	ND	ND	ND	Corrosion inhibitor 防腐剤
	2,6-Dimethylnaphthalene 2, 6-ジメチルナフタレン	-	-	0.01	ND	ND	ND	ND	Feedstock 原料油
	1,3-Dimethylnaphthalene 1, 3-ジメチルナフタレン	-	-	0.01	ND	ND	ND	ND	Feedstock 原料油
	Acenaphthene アセナフテン	-	-	0.01	ND	ND	ND	ND	Feedstock fluorescence agent 蛍光剤

ND:Detection limit　ND : 検出限界　1) 使用禁止　2) Hardness 硬度 基準値:Ca+Mg;300mg/L (Vietnam), 100mg/L (Japan)

Table 2 Water quality analysis result about treatment process

Sampling date 採取日			Standard		3rd Aug. 8月3日					
Items 項目		Unit 単位	Standard Vietnam ベトナム基準	Standard Japan 日本基準	Intake 取水	Raw Water Reservoir In 原水調整池入口	Raw Water Reservoir Out 原水調整池出口	After Sedimentation 凝集沈澱池後	After Filtration 急速ろ過池後	Treated water 浄水処理水
Others その他	Temp 水温	^{o}C			33.8	32.3	32.9	32.5	32.8	32.9
	pH		6.5-8.5	5.8-8.6	7.77	7.48	7.47	7.43	7.41	7.38
	DO 溶存酸素	mg/L			7.36	7.12	5.83	6.40	5.03	5.21
	Turbidity 濁度	NTU	2	2(Degree)	13.00	17.10	18.80	4.55	0.48	0.26
	R-CL 遊離残留塩素	mg/L	0.3-0.5	>0.1[a)]		0.06	0.04	0.04	0.00	1.05
Organic compounds 有機物質類	E_{260}	Abs			0.094	0.089	0.087	0.055	0.048	0.037
	COD_{Mn} 化学的酸素要求量	mg/L	2	5 (TOC)[b)]	4.64	4.88	4.62	2.86	2.15	1.55
	$CHCL_3$ クロロホルム	µg/L	200	60	-	8.27	9.43	11.83	10.73	27.57
	$CHCL_2Br$ ﾌﾞﾛﾓｼﾞｸﾛﾛﾒﾀﾝ		60	30	-	0.49	0.83	1.66	1.15	5.97
	$CHCLBr_2$ ｼﾞﾌﾞﾛﾓｸﾛﾛﾒﾀﾝ		100	100	-	<0.2	0.27	0.45	0.21	2.33
	$CHBr_3$ ﾌﾞﾛﾓﾎﾙﾑ		100	90	-	<0.3	<0.3	<0.3	<0.3	<0.3
	T-THM 総ﾄﾘﾊﾛﾒﾀﾝ			100	-	8.76	10.53	13.94	12.09	35.87
N compounds 窒素化合物類	NH_4-N アンモニア態窒素	mg/L	3		0.31	0.25	0.31	0.23	0.08	0.03
	NO_2-N 亜硝酸態窒素	mg/L	3	10 (NO_2+NO_3)	0.086	0.025	0.034	0.004	0.003	<0.002
	NO_3-N 硝酸態窒素	mg/L	50		0.76	0.73	0.90	0.90	0.90	1.43
Heavy metals 重金属類	D-Mn 溶存ﾏﾝｶﾞﾝ	mg/L	T-Mn 0.3	T-Mn 0.05	0.012	0.022	0.043	0.049	0.013	0.011
	D-Fe 溶存鉄	mg/L	T-Fe 0.3	T-Fe 0.3	0.06	0.02	0.02	<0.02	<0.02	<0.02

a) Residual chlorine is not included in standard item in Japan. At water tap must be kept Residual chlorine more than 0.1mg/L. It is duty by no.17 of Water supply Act.
The water quality management targeted value set Residual chlorine less than 1mg/L. Good-tasting water is Residual chlorine less than 0.4mg/L.

b) In Japan, Potassium permanganate is set to consume 10mg/L until 2003. TOC is set to consume 5mg/L after 2005. Furthermore, TOC is set to consume 3mg/L after 2009

Table 3 The result of water quality analysis about water tap

Sampling date 採取日					4th Aug. 8月4日				3rd Aug. 8月3日						4th Aug. 8月4日				
Items 項目		Unit 単位	Standard Vietnam	Standard Japan	Tap water 給水栓														
					T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15
Others その他	Temp 水温	°C			32.6	32.0	32.7	32.4	33.1	32.0	32.2	31.6	32.4	32.1	32.6	32.0	33.0	32.5	32.0
	pH		6.5-8.5	5.8-8.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DO 溶存酸素	mg/L			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Turbidity 濁度	NTU	2	2 (Degree)	0.24	0.25	0.25	0.24	0.25	0.25	0.35	0.29	0.50	0.26	0.29	0.39	0.17	0.54	0.34
	R-CL 遊離残留塩素	mg/L	0.3-0.5	1[a)]	0.50	0.76	0.34	0.24	0.44	0.54	0.64	0.40	0.04	0.10	0.24	0.02	0.04	0.14	0.74
Organic compounds 有機物質類	E_{260}	Abs			0.037	0.037	0.036	0.035	0.038	0.037	0.037	0.036	0.038	0.038	0.037	0.036	0.036	0.037	0.039
	COD_{Mn} 化学的酸素要求量	mg/L	2	5 (TOC)[b)]	1.55	1.42	1.48	1.48	1.42	1.48	1.42	1.42	1.42	1.61	1.48	1.55	1.42	1.55	1.42
	$CHCL_3$ クロロホルム	µg/L	200	60	22.80	35.38	37.44	38.26	26.17	25.88	29.88	39.01	33.05	52.30	43.86	36.01	29.92	30.24	38.64
	$CHCL_2Br$ ブロモジクロロメタン		60	30	8.64	7.81	9.13	9.07	6.69	7.09	7.92	10.50	12.34	13.59	10.58	14.90	12.54	10.73	8.81
	$CHCLBr_2$ ジブロモクロロメタン		100	100	2.76	2.73	3.04	3.11	2.54	2.87	3.23	3.90	4.82	4.96	3.43	5.93	5.38	3.77	3.47
	$CHBr_3$ ブロモホルム		100	90	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
	T-THM 総トリハロメタン			100	34.20	45.92	49.61	50.44	35.40	35.84	41.03	53.41	50.21	70.85	57.87	56.84	47.84	44.74	50.92
N compounds 窒素化合物類	NH_4-N アンモニア態窒素	mg/L	3		0.03	0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02
	NO_2-N 亜硝酸態窒素	mg/L	3	10 (NO_2+NO_3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	NO_3-N 硝酸態窒素	mg/L	50		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heavy metals 重金属類	D-Mn 溶存マンガン	mg/L	T-Mn 0.3	T-Mn 0.05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	D-Fe 溶存鉄	mg/L	T-Fe 0.3	T-Fe 0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

a) Residual chlorine is not included in standard item in Japan. At water tap must be kept Residual chlorine more than 0.1mg/L. It is duty by no.17 of Water supply Act.

The water quality management targeted value set Residual chlorine less than 1mg/L. Good-tasting water is Residual chlorine less than 0.4mg/L.

b) In Japan, Potassium permanganate is set to consume 10mg/L until 2003. TOC is set to consume 5mg/L after 2005. Furthermore, TOC is set to consume 3mg/L after 2009

Table 4 The result of water quality analysis about the THM of WTP

					第1回目					第2回目		第3回目	
Sample date			Standard		3rd Aug. 8月3日					7th Sep. 9月7日	8th Sep. 9月8日	12nd Nov. 11月12日	12th Nov. 11月12日
Items 項目		Unit 単位	Standard Vietnam ベトナム基準	Standard Japan 日本基準	Raw water reservoir in 原水調整池入口	Raw water reservoir out 原水調整池出口	After Sedimentation 凝集沈澱池後	After Filtration 急速ろ過池後	Treated water 浄水	Raw water 原水調整池	Treated water 浄水	Raw water 原水調整池	Treated water 浄水
THM ﾄﾘﾊﾛﾒﾀﾝ	$CHCl_3$ ｸﾛﾛﾎﾙﾑ	µg/L	200	60	8.3	9.4	11.8	10.7	27.6		76.4		49.0
	$CHCl_2Br$ ｼﾞｸﾛﾛﾌﾞﾛﾓﾒﾀﾝ		60	30	0.5	0.8	1.7	1.2	6.0		20.2		71.1
	$CHCLBr_2$ ｸﾛﾛｼﾞﾌﾞﾛﾓﾒﾀﾝ		100	100	<0.2	0.3	0.5	0.2	2.3		3.5		17.4
	$CHBr_3$ ﾌﾞﾛﾓﾎﾙﾑ		100	90	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3		<0.3
	T-THM 総ﾄﾘﾊﾛﾒﾀﾝ			100	8.8	10.5	13.9	12.1	35.9		100.1		137.5

Table 5 The result of water quality analysis about the THM of water tap

Sampling date 採水日		1回目 (8/3～8/4)					2回目(9/7)					3回目(11/12)				
Sampling Station		$CHCl_3$ クロロホルム	$CHCl_2Br$ ブロモジクロロメタン	$CHCLBr_2$ ジブロモクロロメタン	$CHBr_3$ ブロモホルム	T-THM 総トリハロメタン	$CHCl_3$ クロロホルム	$CHCl_2Br$ ブロモジクロロメタン	$CHClBr_2$ ジブロモクロロメタン	$CHBr_3$ ブロモホルム	T-THM 総トリハロメタン	$CHCl_3$ クロロホルム	$CHCl_2Br$ ブロモジクロロメタン	$CHClBr_2$ ジブロモクロロメタン	$CHBr_3$ ブロモホルム	T-THM 総トリハロメタン
Treated Water 浄水		27.57	6.0	2.3	<0.3	35.9	76.4	20.2	3.5	<0.3	100.1	49.0	71.1	17.4	<0.3	137.5
Tap water 給水栓	T1	22.80	8.6	2.8	<0.3	34.2	-	-	-	-	-	63.1	55.2	14.1	<0.3	132.4
	T2	35.38	7.8	2.7	<0.3	45.9	99.7	20.3	3.3	<0.3	123.3	60.5	92.6	21.4	<0.3	174.5
	T3	37.44	9.1	3.0	<0.3	49.6	81.3	13.3	2.1	<0.3	96.7	65.4	77.1	10.8	<0.3	153.3
	T4	38.26	9.1	3.1	<0.3	50.4	56.3	11.5	2.2	<0.3	70.0	69.4	102.6	24.8	<0.3	196.8
	T5	26.17	6.7	2.5	<0.3	35.4	64.4	15.1	2.2	<0.3	81.8	65.7	78.4	21.9	<0.3	166.0
	T6	25.88	7.1	2.9	<0.3	35.8	-	-	-	-	-	65.5	118.8	24.1	<0.3	208.4
	T7	29.88	7.9	3.2	<0.3	41.0	73.5	15.8	2.3	<0.3	91.5	73.6	94.6	23.2	<0.3	191.4
	T8	39.01	10.5	3.9	<0.3	53.4	85.7	15.3	2.3	<0.3	103.3	87.2	107.5	36.9	<0.3	231.6
	T9	33.05	12.3	4.8	<0.3	50.2	138.1	23.1	3.0	<0.3	164.2	74.6	91.8	21.1	<0.3	187.5
	T10	52.30	13.6	5.0	<0.3	70.9	126.4	21.4	3.0	<0.3	150.8	84.3	101.7	34.6	<0.3	220.6
	T11	43.86	10.6	3.4	<0.3	57.9	88.0	18.5	2.7	<0.3	109.2	70.1	90.5	20.2	<0.3	180.8
	T12	36.01	14.9	5.9	<0.3	56.8	-	-	-	-	-	59.3	88.8	21.6	<0.3	169.7
	T13	29.92	12.5	5.4	<0.3	47.8	87.1	16.2	2.3	<0.3	105.6	58.2	62.2	11.5	<0.3	131.9
	T14	30.24	10.7	3.8	<0.3	44.7	-	-	-	-	-	63.1	70.9	17.1	<0.3	151.1
	T15	38.64	8.8	3.5	<0.3	50.9	89.7	15.7	2.9	<0.3	108.2	49.0	71.1	17.4	<0.3	137.5
Standard Vietnam ベトナム基準		200	60	100	100		200	60	100	100		200	60	100	100	
Standard Japan 日本基準		60	30	100	90	100	60	30	100	90	100	60	30	100	90	100

【Quality control test for THM measurement】

THM is measured by gas chromatograph and mass spectrometer with Head-space. Generally, measurement error of GC/MS is allow ±20%. Organic measurement can be influenced by test run, so laboratory ability of consignee was tried for quality control test. Quality control test was conducted recovery test and reproducibility test. Recovery test did that standard solution of measuring object add 10μg/L to each water sample, and it would figure out recovery rate. Quality control test was conducted 6 times, so the results are shown at table 4. According to the results, coefficient of variation is 5.6% to 11.6%, and it is in error range. Reproducibility test did that standard solution were made for each target density between 0.5μg/L and 50μg/L, and it would figure out error when these were measured 5times. According to the results, Chloroform is 10μg, Bromo-dichloromethane is 5μg/L, Di-bromo chlomethene and bromoform are 2.5μg/L, the results showed coefficient of variation less than 20%, so these results set L as detection limit of each sampling figure.

Table 6 Quality control test

・Recovery Test (10ppb addition)

	Compound	Run-1	Run-2	Run-3	Run-4	Run-5	Run-6	Ave.	RSD
1	Chloroform クロロホルム	12.5	10.0	13.2	12.9	10.3	12.4	11.9	1.38
2	Bromodichloromethane ブロモジクロロメタン	8.7	7.7	7.9	7.8	10.1	9.2	8.6	0.96
3	Dibromochloromethane ジブロモクロロメタン	14.4	12.0	11.5	11.1	11.7	13.1	12.3	1.24
4	Bromoform ブロモホルム	9.4	8.5	8.5	8.2	8.8	9.4	8.8	0.49
IS	Fluorobenzene フルホロベンゼン	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
IS	1- Bromo-3-fluorobenzene 1−3ブロモフルオロベンゼン	20.0	20.0	20.0	20.0	20.0	20.0	20.0	

・Reprodicibility Test

	st	0.5	2.5	5	10	20	50
Chloroform クロロホルム	1	0	0.01	0.06	0.14	0.28	0.7
DL=10μg/L	2	0	0.02	0.08	0.13	0.27	0.63
	3	0	0.02	0.05	0.15	0.3	0.73
	4	0	0.02	0.09	0.13	0.28	0.5
	5	0	0.02	0.09	0.12	0.27	0.68
Average			0.018	0.074	0.134	0.28	0.648
Standard Deviation			0.0045	0.0182	0.0114	0.0122	0.0904
cv %			24.8	24.5	8.5	4.4	13.9
Bromodichloromethane ブロモジクロロメタン	1		0.03	0.06	0.12	0.27	0.59
DL==5μg/L	2	0	0.03	0.09	0.12	0.27	0.6
	3	0	0.03	0.06	0.12	0.28	0.65
	4	0	0.02	0.08	0.12	0.28	0.58
	5	0	0.02	0.09	0.12	0.27	0.68
Average			0.026	0.076	0.12	0.274	0.62
Standard Deviation			0.0055	0.0152	0.0000	0.0055	0.0430
cv %			21.1	20.0	0.0	2.0	6.9
Dibromochloromethane ジブロモクロロメタン	1	0	0.04	0.08	0.15	0.35	0.88
DL==2.5μg/L	2	0	0.04	0.1	0.16	0.36	0.9
	3	0	0.03	0.09	0.17	0.38	0.91
	4	0	0.04	0.11	0.18		0.88
	5	0	0.04	0.11	0.15	0.36	0.93
Average			0.038	0.098	0.162	0.3625	0.9
Standard Deviation			0.0045	0.0130	0.0130	0.0126	0.0212
cv %			11.8	13.3	8.0	3.5	2.4
Bromoform ブロモホルム	1	0.01	0.03	0.06	0.14	0.26	0.52
DL==2.5μg/L	2	0.01	0.03	0.08	0.13	0.26	0.55
	3	0.01	0.03	0.06	0.15	0.27	0.55
	4	0.01	0.03	0.07	0.12	0.27	0.52
	5	0.00	0.03	0.08	0.12	0.25	0.58
Average		0.008	0.030	0.070	0.132	0.262	0.544
Standard Deviation		0.0045	0.0000	0.0100	0.0130	0.0084	0.0251
cv %		55.9	0.0	14.3	9.9	3.2	4.6

【Water quality test at Kitakyushu City Water and Sewer Bureau laboratory】

Table 6 show that Kitakyushu City Water and Sewer Bureau laboratory measured to bring sample from Vietnam.

Table 7 Water quality analysis result of Intake and Treated water

Unit 単位 :mg/L

Items 項目		Detection limit 検出限界	Standard Vietnam ベトナム基準	Standard Japan 日本基準	Intake 取水	Treated water 浄水処理水
Heavy metals 重金属類	Cd カドミウム	0.0003	0.003	0.003	ND	ND
	Se セレン	0.001	0.01	0.01	ND	ND
	Pb 鉛	0.001	0.01	0.01	0.001	ND
	As ヒ素	0.001	0.01	0.01	0.003	0.001
	Cr^{6+} 6価クロム	0.001	0.05	0.05	ND	ND
	Zn 亜鉛	0.004	3	1.0	ND	ND
	Al アルミニウム	0.004	0.2	0.2	0.33	0.042
	Fe 鉄	0.01	0.3	0.3	0.5	ND
	Cu 銅	0.001	1	1.0	0.002	0.002
	Na ナトリウム	1	200	200	12	12
	Mn マンガン	0.001	0.3	0.05	0.075	ND
	Sb	0.001	0.005	0.02	ND	ND
	Ni ニッケル	0.001	0.02	0.02	0.001	ND
Ions イオン類	F フッ素	0.05	1.5	0.8	0.27	0.26
	B ホウ素	0.004	0.3	1.0	0.02	0.024
	CL^- 塩化物イオン	1	250	200	16	24
	SO_4^{2-} 硫酸イオン	1	―	―	23	24
	Hardness 硬度	7	300	10-100	97	102
	Ca^{2+} カルシウムイオン	1			29	31
	Mg^{2+} マグネシウムイオン	1			6	6
Organic compound 有機物質	TOC 総有機炭素	0.3		3	4.7	2.4

ND : not Detect 検出限界以下

Appendix 6-13. Decision for U-BCF capacity and hydraulic accounting

1. Capacity of Inflow Well（Receiving well）

Inflow Well capacity shall be 385m^3, and retension time shall be 5.5 minutes

It is necessary to take more retension time for the Inflow Well to reduce inflow water-level fluctuation, because flowing to Upward Biological Contact filter (hereinafter U-BCF) from Inflow Well is planned by a open channel. Therefore retension time of Inflow Well for this project take retension time more than five minutes.

The size of Inflow Well is lenght 9.1m＊width 5.5m＊height 8.4m＊ (effective depth 7.7m) due to the figure considered from construction of whole filter. Thus, the capacity of Inflow Well is 385m^3 （=9.1m＊5.5m＊7.7m）

Retension time is as follows ;

385m^3÷69.4m^3/min*^{1}＝5.5(minutes)

Note.＊1：100,000m^3/day＝69.4m^3/min

2. Calculation of Area and Numbers of U-BCF

Filter bed area of U-BCF shall be 309m^2. The unit of it shall be 8. Each area of it shall be 38.7m^2.

Filter bed area of U-BCF is determined by the filtered water and linar velocity. The fomula is as below.

A＝Q/V

Where. A：The total area of filter bed（m^2）

Q：Required filtered water（100,000m^3/day）

V：Filtering velocity（LV＝10h^{-1}×1.35m＝13.5m/h＝324m/day）

So that A＝100,000m^3/day÷324m/day＝308.9m^2 ≒ 309m^2

【Filter bed area for a unit of U-BCF】

・Filtered water 90,000～120,000m^3/day

① Filtering velocity is 120m/day

- Filter bed area for a unit of U-BCF＝（90,000～120,000m^3/day）
  ÷120m/day÷（14－2）unit＝（750～1,000m^2）÷12 unit
  ＝62.5～83.3m^2

② Filtering velocity is 320m/day .

- The number＝（14－2）unit÷（324/120）m/day＝4.4≒5 unit → 6 unit
- Generally,an even number is better (preferable) for the unit of U-BCF, because it becomes advantageous in structure and for equipment installation.
- Calculation for filter bed area of a unit of U-BCF＝（90,000～120,000m^3/day）
  ÷324m/day÷6 unit＝（277.8～370.4m^2）÷6 unit
  ＝46.3～61.7m^2

More than 6 units are necessary because the linear velocity of U-BCF spare unit rises during the backwashing. The calculation below show the comparison of differrent units of U-BCF 6, 8, and 10.

Flow of U-BCF Q＝100,000m^3/day, filtering velocity 324m/day the numbers of unit are finally decided as eight(8).

Each filter bed area is calculated as shown below.

309m^2÷8 unit＝38.6m^2/unit

L×W＝6.8m×5.7m≒38.7m^2

3. Characteristic and thickness of granular activated carbon

Granular activated carbon shall be effective size 0.5mm, uniformity coefficient 1.4, specific gravity 2.0, and thickness of filter bed is 1.35m.

This project choice the granular activated carbon which have equipped in Kitakyushu and other cities.

4. Arrangement of supporting gravel bed

Gravel bed thikness shall be 300mm.

The following gravel layer arrangement (see Table 1) is used for this study, which is evaluated by Kitakyushu city by the actual experiment.

Table 1 Arrangement of supporting gravel thickness

Practicle	filter layer thickness	
ϕ 2～4mm	75mm	Total 300mm
4～7mm	〃	
7～12mm	〃	
12～20mm	〃	

5. Study of trough position

The height shall be 2.25m between Surface of filter bed and upper trough edge.

The position of trough shall be required to set that air backwashing works effectively and suspended solid peeled off from filter media can be discharged promptly. Therefore, trough position is set as required space for air-backwashing{0.9m(actual experiment)} plus thickness required for discharging backwash water(1.35m).

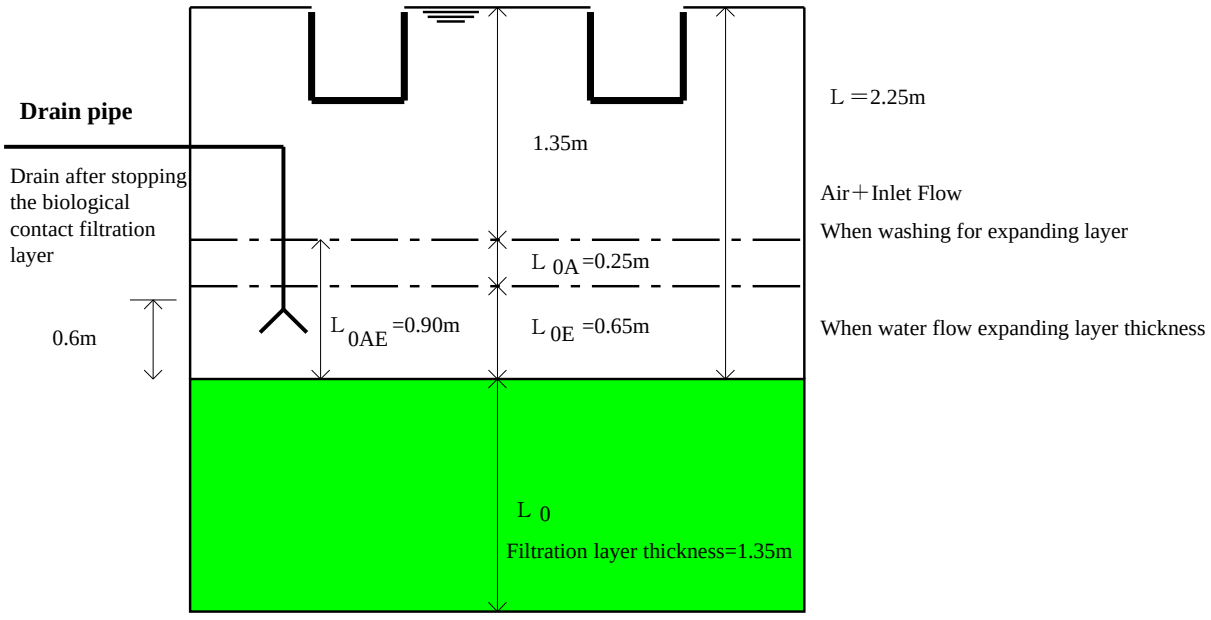


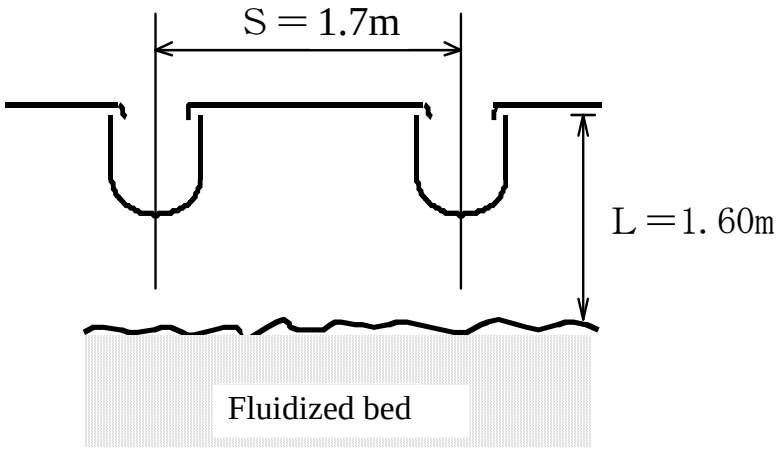
Figure 1 Washing drain pipe and when washingexpandinglayersurface

6. Interval of each trough

Interval of each trough shall be 1.7m.

In this project, the number of trough is 4, and the unit width is 6.8m. Thus, Interval of Trough shall be "S=6.8m ÷4=1.7m". The expansion rate of activated carbon is 48%, so fluidized bed is "h=1.35m× 1.48m=2.00". Thus,the top of Biological Contact Filtration layershall be "h＝2.00m－1.35m＝0.65m".

The length from the top of fluidized bed to the top of trough is "Lw＝2.25m－0.65m＝1.6m". and "S/L＝ 1.7/1.6＝1.06＜ π". This arrangement will be Ok because S/L< π .



7. Size of trough

Size of trough shall be length 4.7m ×width 40cm×height 40cm.

Decision of size of trough result from maximal flow and more additional 10% of maximal flow.
In this project set 4 trough in the filter bed area, discharge of 1 trough is as below

- Quantity of treated water ＝100,000m^3/day
- Quantity of treated water for a series of U-BCF＝100,000m^3/day÷8unit＝12,500m^3/unit
- Designed treated water ＝12,500m^3/day×1.2（additional of 10%）＝13,750m^3/day＝9.55m^3/ min
- 1 trough's designed quantity of treated water＝9.55m^3/min÷4 trough＝2.4m^3/min＝0.04m^3/ s

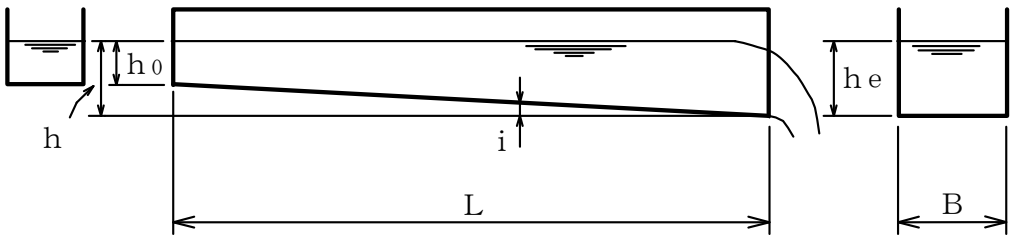


Figure 2 Schematic chart of trough

Trough width, length and slope conditon is as shown below before caluculation h_0.

Width: 0.4m
Length: L=6.2m(=5.7m + 0.5m)
Slope: i=0 (0 is conidered for safety.)

According to this condition, h_0 is calculated as shown below.

① Millor's Formula

$h_0 = \{0.04/(1.05 \times 0.4)\}^{2/3} = 0.1^{2/3} = 0.215 \fallingdotseq \underline{0.22m}$

② Camp's Formula

$$h_C = \sqrt{3}\left(\frac{1.1 \times 0.04^2}{9.8 \times 0.4^2}\right)^{1/3}$$

$= 1.732 \times 0.00122^{1/3} = 0.185 \fallingdotseq \underline{0.19m}$

③ Nakagawa's Formula

$$h_C = \sqrt{1.6}\left(\frac{1.1 \times 0.04^2}{9.8 \times 0.4^2}\right)^{1/3}$$

$= 1.6 \times 0.00122^{1/3} = 0.171 \fallingdotseq \underline{0.18m}$

Result is width 0.4m, height 0.4m. Width result from 0.22m of trough water depth which is calculated by Millor's Formula

8. Study of inflow pipe diameter from raw water

Inflow pipe diameter from raw water shall be ϕ 400mm, and shall be to set up flow meter and motor-operated valve.

Inflowing entrance channel of Inflow well to channel from raw water control discharge with flow meter and motor-operated valve because it must keep same filtering velocity, so it takes pipe arrangement in inflow.

Table 2 **Velocity of each pipe size**

Conditiion	Diameter	Numer of unit	Inflow for a unit		sectional area of pipe	Inflow velocity	Evaluation
	(mm)	(unit)	(m^3/day)	(m^3/s)	(m^2)	(m/s)	
generally	ϕ 350	8	12,500	0.1447	0.096	1.51	
	ϕ 400	8	12,500	0.1447	0.126	1.15	○
	ϕ 450	8	12,500	0.1447	0.159	0.91	
	ϕ 500	8	12,500	0.1447	0.196	0.74	
Washing for a unit	ϕ 350	7	14,285	0.1653	0.096	1.72	
	ϕ 400	7	14,285	0.1653	0.126	1.31	○
	ϕ 450	7	14,285	0.1653	0.159	1.04	
	ϕ 500	7	14,285	0.1653	0.196	0.84	

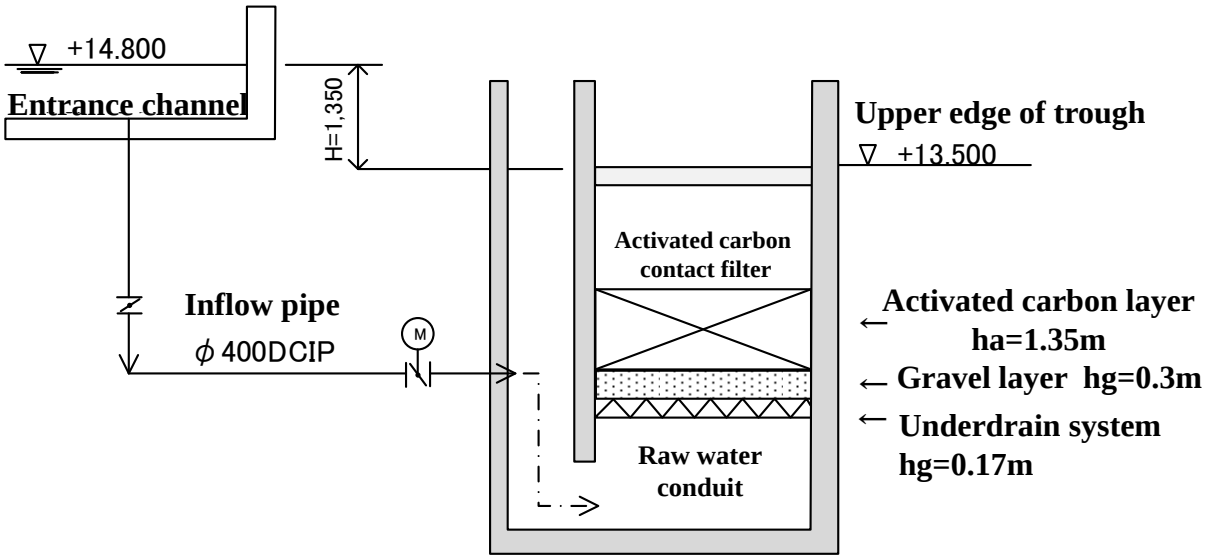


Figure 3 Arrangement plan of inflow pipe from raw water

9. Calculation of U-BCF's discharge pipe diameter of channel from raw water

U-BCF's discharge pipe diameter of channel from raw water shall be φ350mm, and shall be to set up manual valve and motor-operated valve.

＜Calculation for capacity of contact filter＞

Trough : $11.9m^3$ ＝6.8m×5.7m×0.4m[height]
－0.4m×0.4m×5.7m×4unit [trough]

Between trough and activated carbon : $71.7m^3$＝6.8m×5.7m×(2.25m－0.4m)

Activated carbon : $31.4m^3$ ＝6.8m×5.7m×1.35m×0.6[porosity]

Gravel distribution equipment : $7.3m^3$＝6.8m×5.7m×0.47m×0.4[porosity]

Pressureconduit : $83.5m^3$ ＝6.4m×5.6m×2.33m[Pressure conduit height]

Total $206m^3$

In this project adopt φ350mm because this project care about economical efficiency and space of pipe gallery.

Table 3 Discharge time of each diameter of contact filter drain pipe

Discharge area			Discharge time（min）			
			φ300mm	φ350mm	φ400mm	φ450mm
Upper trough edge	～	Down trough edge	2.5	1.8	1.3	1.0
Down trough edge	～	Upper activated carbon edge	17.1	11.8	8.5	6.5
Subtotal			**19.6**	**13.6**	**9.8**	**7.5**
Upper activated carbon edge	～	Down activated carbon edge	8.2	5.7	4.1	3.1
Down activated carbon edge	～	Grvel and down device edge	2.0	1.4	1.0	0.8
Grvel and down device edge	～	Inside pressure conduit	29.0	20.2	14.6	11.0
Total			**58.8**	**40.9**	**29.5**	**22.4**
Evaluation				○		

10. Consideration of weep drain pipe diameter of U-BCF's upper activated carbon

U-BCF's weep drain pipe diameter shall be ϕ 300mm, and shall be to set up manual valve and motor-operated valve.

Weep drain pipe diameter shall be used ϕ 300mm that velocity is a little bit more slowly, and Discharge time of ϕ 300mm is longer than others.

Table 4 Show discharge time of each diameter of contact filter weep drain pipe diameter

Discharge area	Discharge time (min)			
	ϕ 300mm	ϕ 350mm	ϕ 400mm	ϕ 450mm
Upper trough edge ～ Down trough edge	2.5	1.8	1.3	1.0
Down trough edge ～ Upper activated carbon edge	8.4	5.8	4.2	3.2
Total	**10.9**	**7.6**	**5.5**	**4.2**
Evaluation	○			

11. Consideration of washing discharge pipe diameter of U-BCF

U-BCF's washing discharge diameter shall be ϕ 350mm, and shall be to set up manual valve and motor-operated valve.

Washing discharged water shall be 12,500m^3/day (0.145m^3/s) per filter, this figure is as same as quantity of treated water. Washing discharged pipe is used at washing filter bed.

Diameter of washing discharged shall be ϕ 350mm by hydraulic accounting.

Flow velocity: $V = 0.145m^3/s \div (3.14 \times 0.35^2/4) = 1.51m/s$

Discharging is to existing drain of filter washing.

12. Consideration of chemical feeding drain pipe diameter of contact filter.

Chemical feeding drain pipe diameter shall be ϕ 150mm, and shall be to set up manual valve.

Drain pipe must set ϕ 350mm and for chemical feeding. Chemical feeding drain pipe is for wastewater after cleaning by chemical (hypochlorous acid) in U-BCF.

When diameter is ϕ 150mm, drain time is calculated about 12 minutes. The figure is appropriate drain time, so diameter shall be ϕ 150mm.

Discharging is to existing drain of filter washing.

13. Inflet conduit specifications

Inflet conduit specifications is as shown below.

The first: Q＝50,000m^3/day, width 1.8m, depth 0.5m, height 1.2m

The second Q＝25,000m^3/day, width 1.3m, depth 0.5m, height 1.2m

Inlet conduit between Inflow Well and contact filter set two systems. One system shall be 5,000m^3/day, it is desigend flow distriblusion atFigure 4.

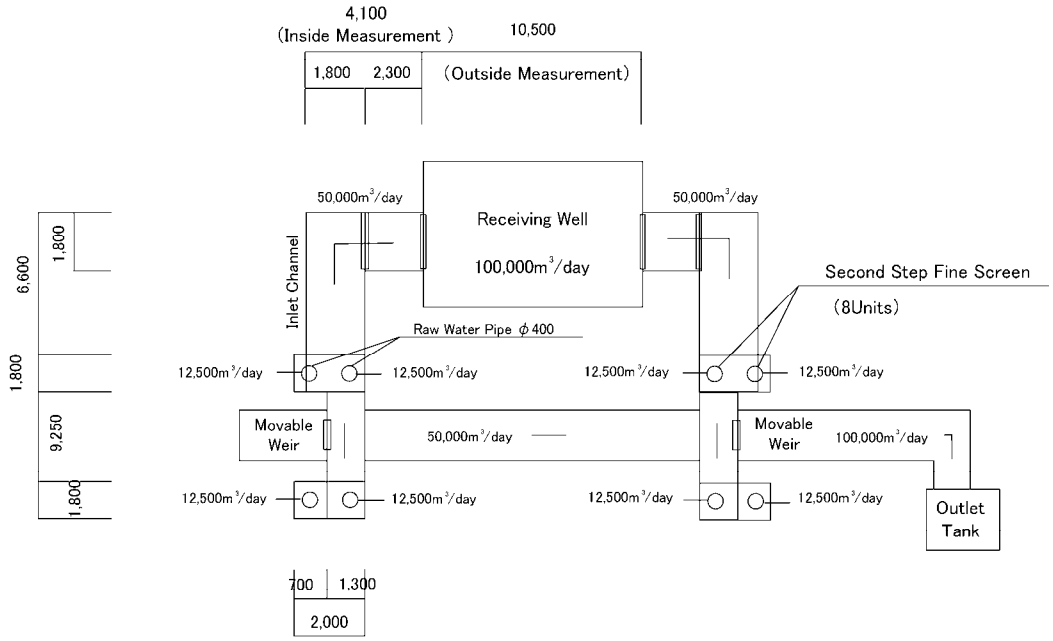


Figure 4 Arrangement plan of inflet conduit

1) Hydraulic accounting for the first Entrance channel

Condition: Inflow $Q0 = 100{,}000 m^3/day = 69.4 m^3/min$

1/2 of Q_0 $Q1 = 50{,}000 m^3/day = 34.7 m^3/min$

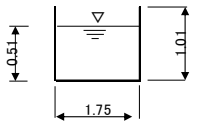
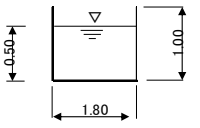
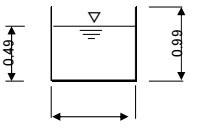
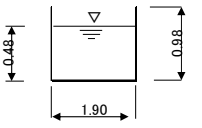
Width of channel B＝1.75m 1.80m 1.85m 1.90m

Coefficient of roughness of asphalt gutter n＝0.013

Hydraulic accounting is conducted with fixing hydraulic gradeline at 1/3,000, changing width of channel 1.75m, 1.80m, 1.85m, and 1.90m. As the result, depth which is able to flow $50{,}000 m^3/day$ is calculated as shown in table 22.

In this project adopt 1.8m(depth 0.5m).

Table 5 Hydraulic accounting of each the water cross section of the first entrance channel of U-BCF

Condition of width of channel			1.75 m			1.80 m			1.85 m			1.90 m		
Water cross section														
Water flow	Q(m^3/day)		50,000			50,000			50,000			50,000		
Coefficient of roughness	n		0.013			0.013			0.013			0.013		
Channel width	B(m)		1.75			1.80			1.85			1.90		
Depth	h(m)		0.51			0.50			0.49			0.48		
Flow area	A(m^2)		0.893			0.900			0.907			0.91		
Side length	s(m)		2.8			2.8			2.8			2.9		
Hydraulic mean depth	R=A/s		0.322			0.321			0.320			0.319		
Hydraulic gradient	R^0.5		0.567			0.567			0.566			0.565		
(1/x)	N	D	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)
600	4.117	0.3111	1.509	1.347	116,381	1.506	1.355	117,072	1.503	1.362	117,677	1.499	1.367	118,109
1,000	3.209	0.3192	1.165	1.040	89,856	1.163	1.047	90,461	1.16	1.052	90,893	1.158	1.056	91,238
1,500	2.64	0.3292	0.948	0.846	73,094	0.946	0.851	73,526	0.944	0.856	73,958	0.942	0.859	74,218
2,000	2.304	0.3393	0.818	0.73	63,072	0.816	0.734	63,418	0.815	0.739	63,850	0.813	0.741	64,022
2,500	2.076	0.3494	0.729	0.651	56,246	0.728	0.655	56,592	0.726	0.658	56,851	0.724	0.66	57,024
3,000	1.909	0.3595	0.663	0.592	51,149	0.662	0.596	51,494	0.66	0.598	51,667	0.659	0.601	51,926
3,500	1.781	0.3695	0.612	0.546	47,174	0.611	0.55	47,520	0.609	0.552	47,693	0.608	0.554	47,866
Evaluation						◎								

2) hydraulic accounting for the second Entrance channel

Condition Infolow Q0＝100,000m^3/day＝69.4m^3/min

1/4 of Q0 Q2＝25,000m^3/day＝17.36m^3/min

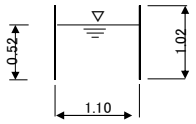
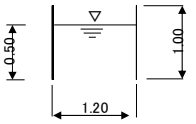
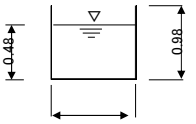
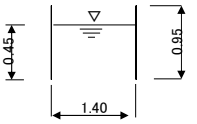
Width of channel B＝1.1m 1.2m 1.3m 1.4m

Coefficient of roughness of asphalt gutter n＝0.013

Hydraulic accounting is conducted with fixing hydraulic gradeline at 1/3,000, changing width of channel 1.1m, 1.2m, 1.3m, and 1.4m. As the result, depth which is able to flow 25,000m^3/day is calculated as shown inTable 6.

In this project adopt 1.3m(depth 0.48≒0.5m).

Table 6 Hydraulic accounting of each the water cross section of the second entrance channel of U-BCF

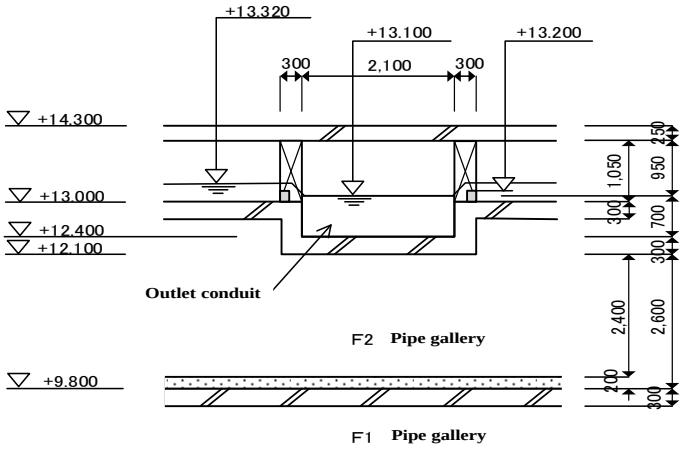
Condition of width of channel			1.10 m			1.20 m			1.30 m			1.40 m		
Water cross section														
Water flow		Q(m^3/日)	25,000			25,000			25,000			25,000		
Coefficient of roughness		n	0.013			0.013			0.013			0.013		
Channel width		B(m)	1.10			1.20			1.30			1.40		
Depth		h(m)	0.52			0.50			0.48			0.45		
Flow area		A(m^2)	0.572			0.600			0.624			0.63		
Side length		s(m)	2.1			2.2			2.3			2.3		
Hydraulic mean depth		R=A/s	0.267			0.273			0.276			0.274		
Hydraulic gradient	R^0.5		0.517			0.522			0.525			0.523		
(1/x)	N	D	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)
600	4.117	0.3111	1.328	0.76	65,664	1.348	0.809	69,898	1.358	0.847	73,181	1.352	0.852	73,613
1,000	3.209	0.3192	1.025	0.586	50,630	1.041	0.625	54,000	1.049	0.655	56,592	1.043	0.657	56,765
1,500	2.64	0.3292	0.833	0.476	41,126	0.846	0.508	43,891	0.853	0.532	45,965	0.848	0.534	46,138
2,000	2.304	0.3393	0.719	0.411	35,510	0.73	0.438	37,843	0.735	0.459	39,658	0.732	0.461	39,830
2,500	2.076	0.3494	0.64	0.366	31,622	0.65	0.39	33,696	0.655	0.409	35,338	0.652	0.411	35,510
3,000	1.909	0.3595	0.582	0.333	28,771	0.591	0.355	30,672	0.595	0.371	32,054	0.592	0.373	32,227
3,500	1.781	0.3695	0.537	0.307	26,525	0.545	0.327	28,253	0.549	0.343	29,635	0.546	0.344	29,722
Evaluation									◎					

14. Size of outlet conduit

Outlet conduit is width 2.1m, depth 0.7m.

Hydraulic accounting is conducted with amount of inflow at 100,000m^3/day(＝12,500m^3/day×8point), changing width of channel 1.9m, 2.0m, 2.1m, and 2.2m. The result is as shown in table 24.

In this project care about height of pipe gallerty and pipe arrangement, so outlet conduit shall be 2.1m, depth 0.7m.



1) Hydraulic accounting of U-BCF's channel

Condition Inflow Q0＝100,000m^3/day＝69.4m^3/min

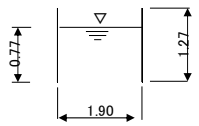
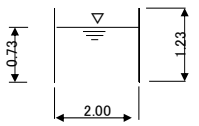
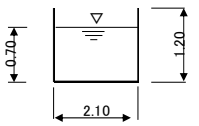
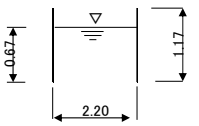
Width B＝1.9m 2.0m 2.1m 2.2m

Coefficient of roughness of asphalt gutter n＝0.013

Hydraulic accounting is conducted with fixing hydraulic gradeline at 1/3,000, changing width of channel 1.9m, 2.0m, 2.1m, and 2.2m. As the result, depth which is able to flow 25,000m^3/day is calculated as shown in table 24.

In this project adopt 2.1m(depth 0.7m).

Table 7 Hydraulic accounting of each the water cross section of the effluent channel of U-BCF

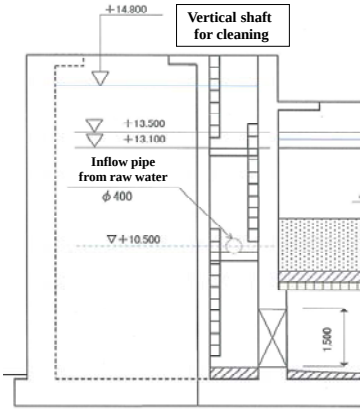
Condition of width of channel			1.90 m			2.00 m			2.10 m			2.20 m		
Water cross section														
Water flow	Q(m^3/日)		100,000			100,000			100,000			100,000		
Coefficient of roughness	n		0.013			0.013			0.013			0.013		
Channel width	B(m)		1.90			2.00			2.10			2.20		
Depth	h(m)		0.77			0.73			0.70			0.67		
Flow area	A(m^2)		1.463			1.460			1.470			1.47		
Side length	s(m)		3.4			3.5			3.5			3.5		
Hydraulic mean depth	R=A/s		0.425			0.422			0.420			0.416		
Hydraulic gradient	R^0.5		0.652			0.650			0.648			0.645		
(1/x)	N	D	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)	v	Q(m^3/S)	Q(m^3/day)
600	4.117	0.3111	1.817	2.658	229,651	1.808	2.64	228,096	1.803	2.650	228,960	1.791	2.64	228,096
1,000	3.209	0.3192	1.404	2.054	177,466	1.398	2.041	176,342	1.393	2.048	176,947	1.385	2.041	176,342
1,500	2.64	0.3292	1.144	1.674	144,634	1.138	1.661	143,510	1.135	1.668	144,115	1.127	1.661	143,510
2,000	2.304	0.3393	0.988	1.445	124,848	0.983	1.435	123,984	0.98	1.441	124,502	0.974	1.436	124,070
2,500	2.076	0.3494	0.881	1.289	111,370	0.877	1.28	110,592	0.874	1.285	111,024	0.868	1.279	110,506
3,000	1.909	0.3595	0.802	1.173	101,347	0.798	1.165	100,656	0.796	1.170	101,088	0.791	1.166	100,742
3,500	1.781	0.3695	0.741	1.084	93,658	0.737	1.076	92,966	0.735	1.080	93,312	0.73	1.076	92,966
Evaluation										◎				

15. Consideration of air vent pipe diameter at channel from raw water

Channel from raw water of U-BCF is not installed

In this project, this vertical shaft is not only for cleaning but also for air extubation because it will construct in contact with filter the filter for directly to enter the channel from raw water. In this way, Channel from raw water do not need air vent pipe.

16. Consideration of adjustment for air backwashing volume



Adjustment for air backwashing volume control rotation rate of brower.

Performing condition of air backwashing brower different blow volume from backwashing by air and backwashing by air and water. In addition, necessary discharge pressure of blower is different for each time because the water level in the activated carbon adsorption tank rises in the backwashing by air and water.

Washing process	Air volume	Water level in the activated carbon
Air washing	$40m^3/min$ （$0.7m^3/min/m^2$）	No fluctuation
Air and water washing	$28m^3/min$ （$057m^3/min/m^2$）	Rising

17. Consideration of biological activated carbon blower for washing and diffuser pipe

Biological activated carbon blower for washing specification shall be $28m^3/min \times 5mAq(49kPa) \times 37kW \times 2$ （one is for spare）, and it shall be Roots Brower. diffuser pipe shall be ϕ 200mm of SUS pipe.

・If pipe diameter is ϕ 200mm, pipe length is 50m, blow volume is $28m^3/min$, and temperature is 40℃, these calculation is shown as below.

$$V = \frac{4Q}{60\pi d^2} = \frac{4 \times 28}{60 \times \pi \times 0.2^2} = 14.86m/s$$

$$H1 = 1.293 \times \frac{273}{T} \times 4 \cdot f \cdot \frac{l}{d} \cdot \frac{V^2}{2g}$$

$$= 1.293 \times \frac{273}{313} \times 4 \times 0.0059 \times \frac{50}{0.2} \times \frac{14.86^2}{2g}$$

$$= 113mmAq = 0.113mAq$$

$$H2 = 400mmAq = 0.4mAq$$

Total losses $H = H0 + H1 + H2$

$= 4.07 + 0.113 + 0.4 = 4.583mAq$

From the above、when discharge pressure of shall be 5.0mAq（$9.7914 \times 5 = 49kPa$）within allowance, shaft power should be 37kW by from manufacturer's material (Chapter 6）, and sound level should be about 86dB.

18. Capacity of outflow well

Capacity of outflow well shall be $133m^3$, and retention time shall be 1.9 minutes.

Retention time in the outflow well is more than 1.5 minutes.

If size of the outflow shall be length 5.7m×width 4.5m×height 7.2m（effective depth is 5.2m）, the capacity should be $133m^3$（$=5.7m \times 4.5m \times 5.2m$）.

retention time shall be $133m^3 \div 69.4m^3/min^{*1} = 1.9$ minutes.

＊1：$100,000m^3/day = 69.4m^3/min$

Appendix6-14. Initial cost of the removal methods for ammonia nitrogen

It shall indicate the calculation basis of the initial cost for Biological activated carbon contact filtration, Honeycomb type contact aeriation and Rotaring disk biological contactor of the removal methods for ammonia nitrogen.

Table 1 Comparison table of the initial cost for the removal methods for ammonia nitrogen

Unit : thousand yen

Demacation for construction work	Activated carbon contact prcess	Honeycomb type contact aeration process	Rotating disk biological contactor process
	100,000m^3/d	100,000m^3/d	100,000m^3/d
Condition of Detention time in contact reactor	8minutes	2hours	2hours
Biological contact pond construction work	–	1,042,000	758,000
Biological contact filter construction work	421,000	–	–
Advanced treatment facilities equipement construction work	817,000	856,000	898,000
Pipe installation	28,000	28,000	28,000
Electric works	300,000	250,000	200,000
Total	1,566,000	2,176,000	1,884,000
Expense(40%)	626,000	870,000	754,000
Total cost	2,192,000	3,046,000	2,638,000

Appendix 6-15. Cost estimation for comparison of the water transmission methods

Regarding the water transmission methods to the U-BCF, for Plan1（Installation the pump beside U-BCF）and Plan2（Replacement the pump in the intake pumping station）, the comparison result of the cost estimation shall be shown as follows.

Table 1　Cost estimation table for comparison of the water transmission methods

Unit：thousand yen

Demacation for construction work	lifting pump plan	Intake pump plan
	100,000m^3/d	100,000m^3/d
Intake pump facilities construction	－	251,000
Lifting Pump facilities construction	232,000	－
Contact filter tank	359,000	359,000
Construction for advanced water treatment facilities	817,000	817,000
Pipe installation	28,000	28,000
Electrical work	434,000	539,000
Total	1,736,000	1,780,000
Expense(40%)	694,000	712,000
Total	2,430,000	2,492,000

Appendix06-16. Calculation basis of Operation and Mainteanance cost

Calculation of Operation and Maintenance cost for 1,In case the Project is not implemented. 2,In case the 本 Project is implemented (Before and after ADB-loan facility expansion).

1.In case of the Project is not implemented

Table 1 Bill of quantities for Operation and Maintenance

		Volume	Unit	Operating time	Quantity
		kwh/year		Hour	kwh/year
Intake pump		130.0	3.00	24.0	3,416,400
Intermediate pump		195.6	1.67	24.0	2,858,504
Distribution pump		253.9	2.94	24.0	6,541,320
		Treatment amount	Average injection	Reduction rate	Quantity
		m^3/day	g/m^3	%	kg/year
Chemical injection	PAC	125,000	11.54	0.0	526,513
	Clorine	125,000	2.00	0.0	91,250

- The daily treatment amount average is assumed as 125,000m^3/day, based on the 2013 record.
- Existing pump capacity was carried out the calculation as shown in Table 2.
- Chemical injection rate used the records of the past ten years of An Duong WTP.
- Existing intermediate pump and distribution pump unit was calculated by the ratio of the water flow.

Table 2 Operation and Maintenance Cost without Project Implementation

Items		unit	Quantity	Unit Cost	Cost	
				VND	million VND	JPY
Intake Pump		kwh/year	3,416,400	1,388	4,742	22,998,522
Chemical Injection	PAC	kg/year	526,513	9,150	4,818	23,365,308
	Chlorine	kg/year	91,250	11,200	1,022	4,956,700
Raw Water Pump		kwh/year	2,858,504	1,388	3,968	19,242,878
Distribution Pump		kwh/year	6,541,320	1,388	9,079	44,034,858
Water Treatment Cost in An Duong WTP					23,629	114,598,266

2.In case the Project is implemented

Table 3 Bill of quantities for Operation and Maintenance

		Volume	Unit	Operating time	Quantity
		kwh/year		Hour	kwh/year
Intake pump		170.0	3.00	24.0	4,467,600
Intermediate pump		195.6	1.67	24.0	2,858,504
Distribution pump		253.9	2.94	24.0	6,541,320
		Treatment amount	Average injection	Reduction rate	Quantity
		m^3/day	g/m^3	%	kg/year
Chemical injection	PAC	100,000	11.54	28.50	406,468
	Clorine	100,000	2.00	27.10	71,467

- The daily treatment amount average is assumed as 125,000m^3/day, based on the 2013 record. The daily treatment amount average for U-BCF is assumed as 100,000m^3/day.
- Intake pump capacity is calculated by the total of the existing pump capacity and the replaced pump capacity as shown in Table 5.
- Chemical injection ratio used the record of the past ten years of An Duong WTP.
- Chemical reduction ratio uded the record of Vinh Bao WTP.
- Existing intermediate pump and distribution pump unit was calculated by the ratio of the water flow.

Table 4 In case the Project is Implemented(Before ADB-loan facility expansion)

Items		unit	Quantity	Unit Cost	Cost	
				VND	million VND	JPY
Intake Pump		kwh/year	4,467,600	1,388	6,201	30,074,990
U-BCF	Electrical	kwh/year	23,579	1,388	33	158,729
	Acivated Carbon Supplementation	m^3/year	29.4	17,750,150	522	2,530,994
	Mechanical Maintenance	m^3	36,500,000	20	730	3,540,500
Chemical Injection	PAC	kg/year	406,468	9,150	3,719	18,038,018
	Chlorine	kg/year	71,467	11,200	800	3,882,087
Raw Water Pump		kwh/year	2,858,504	1,388	3,968	19,242,878
Distribution Pump		kwh/year	6,541,320	1,388	9,079	44,034,858
Water Treatment Cost in An Duong WTP					25,052	121,503,054

Table 5 In case the Project is Implemented(After ADB-loan facility expansion)

Items		unit	Quantity	Unit Cost	Cost	
				VND	million VND	JPY
Intake Pump		kwh/year	4,467,600	1,388	6,201	30,074,990
U-BCF	Electrical	kwh/year	23,579	1,388	33	158,729
	Acivated Carbon Supplementation	m^3/year	29.4	17,750,150	522	2,530,994
	Mechanical Maintenance	m^3	36,500,000	20	730	3,540,500
Chemical Injection	PAC	kg/year	406,468	9,150	3,719	18,038,018
	Chlorine	kg/year	71,467	11,200	800	3,882,087
Distribution Pump		kwh/year	6,541,320	1,388	9,079	44,034,858
Water Treatment Cost in An Duong WTP					21,085	102,260,176

Appendix-7 References

Appendix 7-1 List of collected Data

Data No.	Title of Data	Detailed Contents	Forms of Data				Agents where data was collected
Data 1	Application for Japanese Grant Aid Assistance	Documents submitted to Japanese Government	1	booklet	A-4	Copy	Hai Phong Water
Data 2	Haiphong Statistical Yearbook 2013	Data related to population, industry and agricuture etc	1	booklet	A-4	Binded Book	Haiphong Publishing House
Data 3	Daily water supply demand in An Duong	Covers 2012 to 2014	1	File	Data File	Copy	Hai Phong Water
Data 4	Chemical consumption of PAC and Clorine at Vinh Bao WTP	Covers 2013 to 2014	1	File	Data File	Copy	Hai Phong Water
Data 5	Chemical consumption of PAC and Clorine at An Duong WTP	Covers 2004 to 2014	1	File	Data File	Copy	Hai Phong Water
Data 6	Power Tariff	Power Tariff Table	1	File	Data File	Copy	Hai Phong Water
Data 7	Electrical power consumption at An Duong WTP	Covers 2012 to 2014	1	File	Data File	Copy	Hai Phong Water
Data 8	Water supply area map	An Duong WTP	1	File	Data File	Copy	Hai Phong Water
Data 9	Water supply pipe line map	An Duong WTP	1	File	Data File	Copy	Hai Phong Water
Data 10	Master plan of urban development	An Duong District	1	File	Data File	Copy	Hai Phong Water
Data 11	Facility summary of Quan Vinh Intake and An Duong WTP		1	File	Data File	Copy	Hai Phong Water
Data 12	Budget Documents	Covers 2014 to 2015	1	File	Data File	Copy	Hai Phong Water
Data 13	Daily maximum watar supply demand	An Duong WTP Covers 2009 to 2014	1	File	Data File	Copy	Hai Phong Water
Data 14	O&M cost	An Duong WTP and Vinh Bao WTP Covers 2009 to 2013	1	File	Data File	Copy	Hai Phong Water
Data 15	Personel expense	An Duong WTP Covers 2009 to 2013	1	File	Data File	Copy	Hai Phong Water
Data 16	Non revenue water ratio	An Duong WTP Covers 2009 to 2013	1	File	Data File	Copy	Hai Phong Water
Data 17	Manthly water supply demand and revenue water demand	An Duong WTP Covers 2009 to 2013	1	File	Data File	Copy	Hai Phong Water
Data 18	Organization chart at An Duong	An Duong WTP	1	File	Data File	Copy	Hai Phong Water
Data 19	Organization chart at Hai Phong Water		1	File	Data File	Copy	Hai Phong Water
Data 20	Capacity, watre supply population and water supply house at each WTP		1	File	Data File	Copy	Hai Phong Water
Data 21	Water Tariff	Covers 2014 to 2016	1	File	A-4	Copy	Hai Phong Water
Data 22	Operation manual at An Duong WTP		1	File	A-4	Copy	Hai Phong Water