

**THE SOCIALIST REPUBLIC  
OF VIETNAM  
MINISTRY OF CONSTRUCTION**

**THE PROJECT FOR ENHANCING  
MANAGEMENT CAPACITY OF  
SEWERAGE WORKS  
(IMPLEMENTATION PHASE)**

**PROJECT COMPLETION REPORT**

**January, 2020**

**JAPAN INTERNATIONAL COOPERATION AGENCY  
(JICA)**

**NIPPON KOEI CO., LTD.  
SEWERAGE BUSINESS MANAGEMENT CENTRE**

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## ABBREVIATION

ADB	Asian Development Bank
ATI	Administration of Technical Infrastructure
BOD	Biochemical Oxygen Demand
CAS	Conventional Activated Sludge Process
CIRD	Center for Infrastructure Research and Development
CNEE	Training Center of Water and Environment
C/P	Counterpart
CPC	City People's Committee
CUWC	College of Urban Works Construction
DOC	Department of Construction
DONRE	Department of Natural Resources and Environment
DPI	Department of Planning and Investment
F/S	Feasibility Study
GCUS	Japan Global Center for Urban Sanitation
GI	General Information
GIZ	<i>Deutsche Gesellschaft für Internationale Zusammenarbeit</i>
JICA	Japan International Cooperation Agency
JS	Japan Sewage Works Agency
JSWA	Japan Sewage Works Association
MABUTIP	Management Board of Urban Technical Infrastructure Development Project
M/D	Minutes of Discussion
MOC	Ministry of Construction
MLIT	Ministry of Land, Infrastructure, Transport and Tourism of Japan
M/P	Master Plan
ODA	Official Development Assistance
O&M	Operation and Maintenance
PIS	Project Implementation Support
PMB	Project Management Board
PMU	Project Management Unit
PPC	Provincial People's Committee
R&D	Research and Development
TOT	Training of Trainer
VSC	Vietnam Sewerage Center
VWSA	Vietnam Water Supply and Sewerage Association
WB	World Bank
WWTP	Wastewater Treatment Plant

## **CHAPTER 1 OUTLINE OF THE PROJECT**

### **1.1 Background of the Project**

The water environment of urban cities in Vietnam has been deteriorating severely because of the rapid economic growth and urbanization since the 1990s. Water pollution of urban streams and canals is significant and prompt improvement is required. Accordingly, the Government of Vietnam has considered the development of a sewerage system as an urgent social issue. This has established the goal of development to achieve the treatment of 50% of the generated wastewater by 2025, and 100% of the generated wastewater by 2050 in the five biggest cities and in the central areas of cities controlled directly by the provinces (No.589/QD-TTg, Decision by the Prime Minister in April 2016).

Currently, the 36 existing wastewater treatment plants (hereinafter called as WWTP) in 23 cities are working, which were developed with the official development assistance (ODA) funds from Japan together with other donors and private funds. However, 73% of the total wastewater treatment capacity (2,886,170 m<sup>3</sup>/day) is held in Hanoi City and Ho Chi Minh City. The ratio of covered population of wastewater treatment is only around 20% even in Hai-phong City and Can-tho City, which are a part of the five biggest cities. Therefore, a significant amount of time is required to achieve the goal of “50%”.

As above stated, it is necessary to develop a new sewerage system in Vietnam, however, it is evident that the number of capable engineers/managers is currently limited. This causes problems in the development of a sewerage system in Vietnam. Against this background, the Ministry of Construction (hereinafter referred to as MOC) and the Government of Vietnam (hereinafter referred to as GOV) has requested the Government of Japan (hereinafter called GOJ) to support and assist with “the Project for Enhancing Management Capacity of Sewerage Works” (hereinafter called “the Project”).

Based on this request, the Japan International Cooperation Agency (hereinafter referred to as JICA) implemented the preliminary survey to prepare the basic plan of the Project in October 2015 and agreed to the Record of Discussion (hereinafter referred to as R/D) about the basic plan of the Project with MOC on October 16, 2016. The Detailed Planning Phase of the Project was conducted and the framework of the Implementation Phase of the Project was agreed based on the Minutes of the Meeting (hereinafter referred to as M/M) held on February 28, 2017. After that the Implementation Phase started in April 2017.

### **1.2 Objective of the Project**

The objective of this project as stated below was set in April 2017, when the Implementation Phase started.

The Project aims to enhance the planning, implementation, and management capacity by clarifying the necessity of human resource development of the sewerage sector in Vietnam; proposing the organization structure and business plan of the Vietnam Sewerage Center (hereinafter called VSC); and formulating the plan to build VSC through the implementation of pilot activities of the staff training, the project implementation support, and the research and development (R&D) of the sewerage sector.

However, as stated in 1.3, both Japan and Vietnam agreed to the following three items in the 4<sup>th</sup> Joint Coordination Committee (hereinafter called JCC) in June 2018.

- 1) MOC would not establish VSC for the time being.
- 2) The contents of project implementation support program in the 2<sup>nd</sup> year would be changed.
- 3) The R&D of sewerage would be removed from the project.

Based on this agreement, the purpose of this project was changed as below in July, 2018.

The Project is to enhance the planning, implementation, and management capacity of the sewerage sector in Vietnam by clarifying the necessity of human resource development, proposing the organization structure, business plan, and building plan of the sewerage staff training implementation center. This also involves building their capacity through the pilot activities of the staff training.

### **1.3 Progress of the Project**

The progresses of this project are described in Table 1.3.1.

**Table 1.3.1 Progresses of the Project**

<b>Date</b>	<b>Issue</b>
Jan. 2016	Detailed planning phase started.
Feb.2016	1 <sup>st</sup> JCC was organized. Activities and schedule of detailed planning phase were confirmed.
June.2016	2 <sup>nd</sup> JCC was organized. Current progress was confirmed.
Feb.2017	3 <sup>rd</sup> JCC was organized. Activities to be executed in the Implementation Phase (Phase-2) and input from the Japanese side and Vietnamese side were confirmed.
Apr. 2017	1 <sup>st</sup> year of the implementation phase was started.
Sept. 2017	VSC was not listed in the decision of the Minister of Construction related to ATI's function, duty, right, and organization structure (No. 986/QD-BXD) and VSC cannot be established.
June. 2018	4 <sup>th</sup> JCC, RD and PDM were amended; The contents of the project implementation support in 2 <sup>nd</sup> year were changed and the RD was removed from the project.
July. 2018	2 <sup>nd</sup> year of the implementation phase (Phase-2) was started.
Dec. 2018	5 <sup>th</sup> JCC was organized. Current progress, output and action plan for remaining period were confirmed.
May.	The Japanese side and Vietnamese side agreed that the project duration would be

2019	extended for half a year.
June. 2019	3 <sup>rd</sup> year of the implementation phase (Phase-2) was started.
Nov. 2019	6 <sup>th</sup> JCC was organized. Outcomes of project activities were reviewed, and tasks and expected activities to sustain the training function of sewerage field were confirmed by the Japanese and Vietnamese side.

Source: JICA Consultant Team

The detailed planning phase of this project had been started from January 2016. The activity in the detailed planning phase and the input from Japan and Vietnam were confirmed in the third JCC in February 2017.

The implementation phase had been started from April 2017, the pilot activity of three functions, training course, project implementation support and R&D, had been implemented as preparation of establishing VSC. However, it turned to be difficult to establish VSC because of the decision by Minister in September 2017. Therefore, it was decided in the fourth JCC in June 2018 that the two function; project implementation support and R&D were cut off, and the activity focuses on the training function of sewerage field.

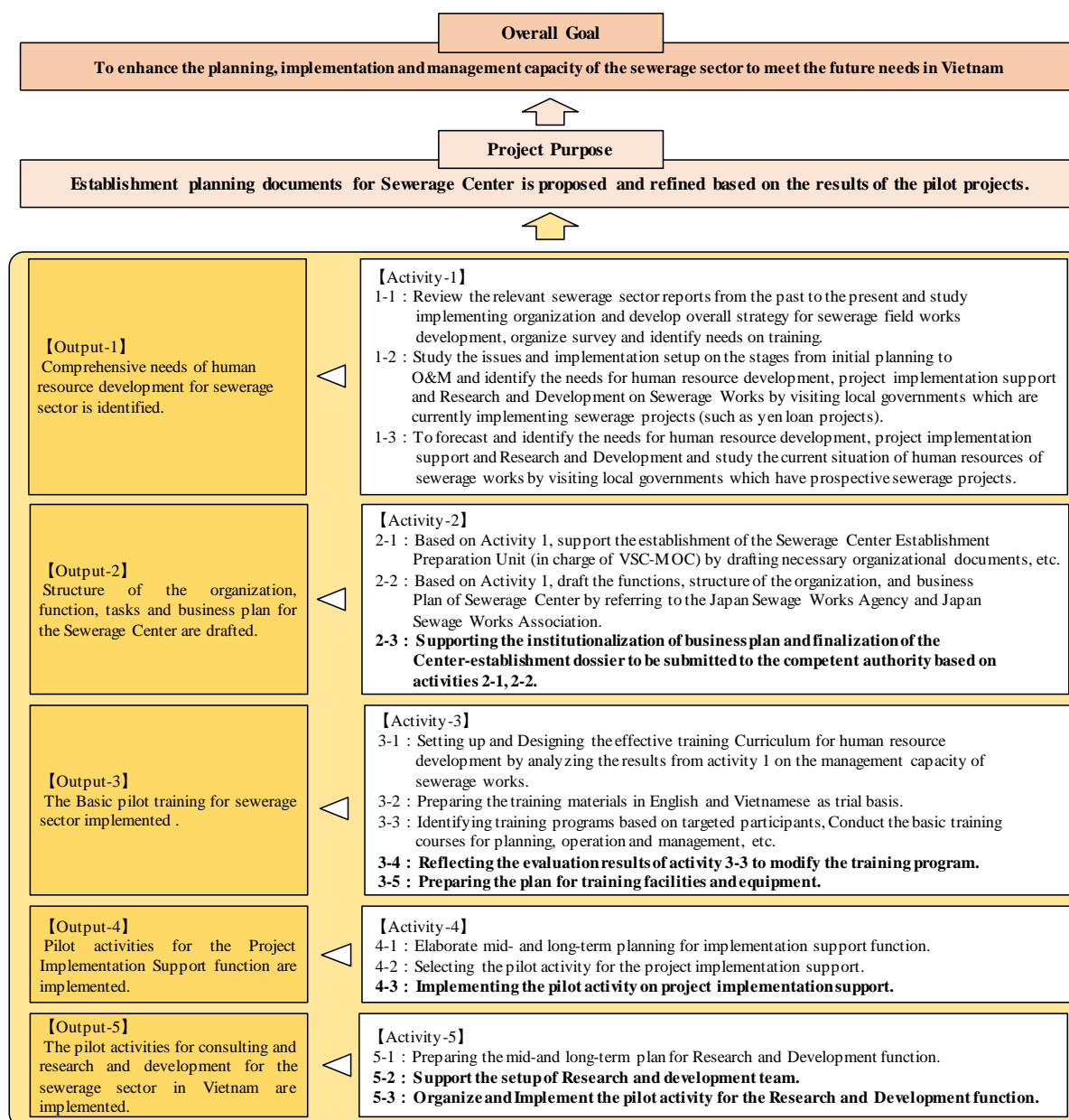
The implementation phase was supposed to finish in May 2019, but it was decided to be extended for half year as strong request by Vietnamize side. It was completed in November 2019 with the sixth JCC.

#### **1.4 Project Design and Scope of the Implementation Phase (Phase-2)**

The initial goal, output, and activities of the Project are described in Figure 1.4.1.

Initially, the goal of this project was to enhance the planning, implementation and management capacity of sewerage sector to accelerate the development of sewerage system in Vietnam, and the project the purpose was settle as follows; establishment planning documents for sewerage center is proposed and refined based on the result of the pilot project. As shown in the lower part of the figure below, the activity regarding output 1 was already implemented in the detailed planning phase, and the activities regarding output 2~5 were partly conducted.

Also, the scope of the implementation phase is to conduct the activities regarding output 2~5 to reach the goal stated in clause 1.2, which was taken over from the detailed planning phase.

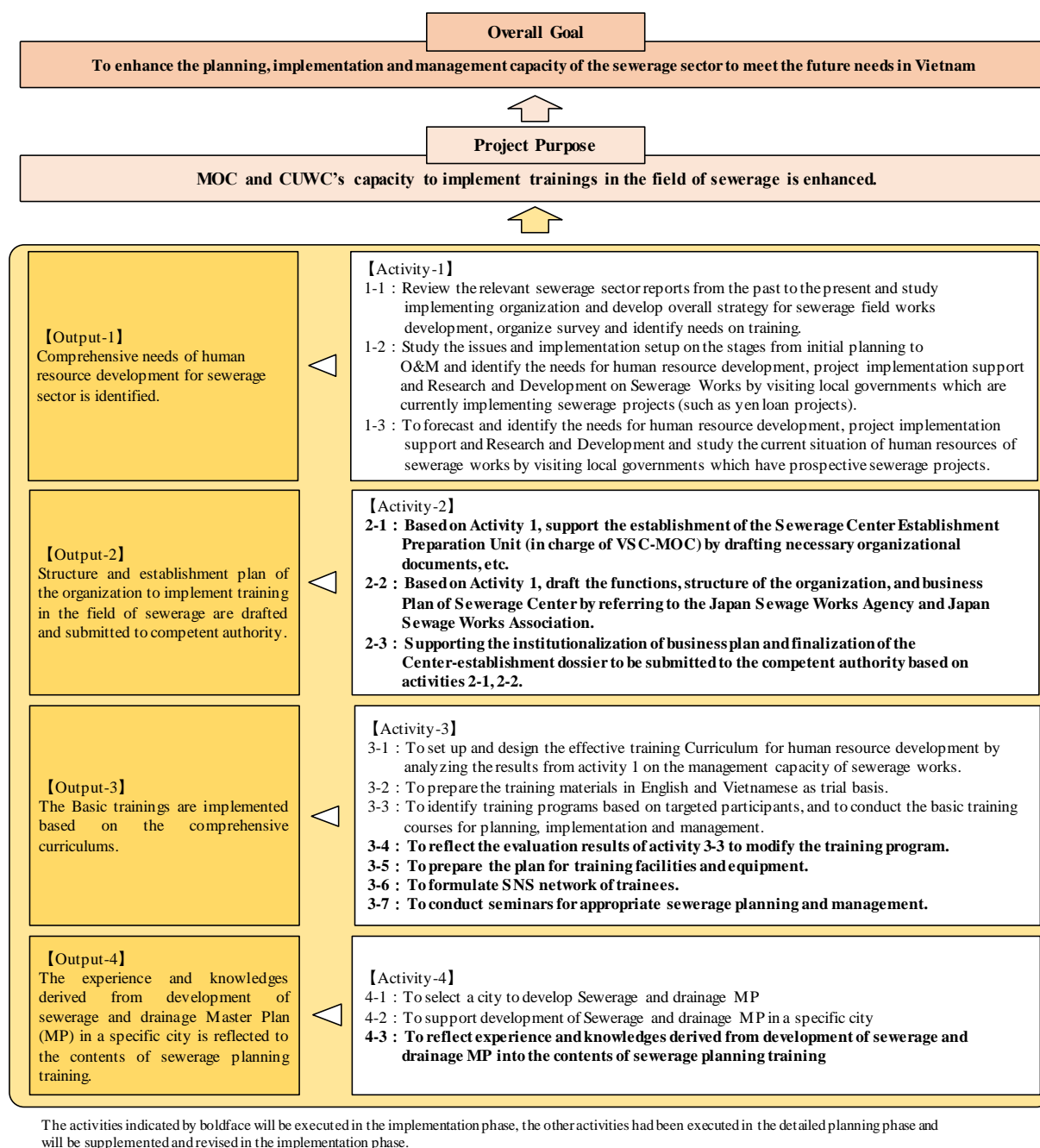


Source: JICA Consultant Team

**Figure 1.4.1 Goal, Output, and Activities of the Project and Scope of Implementation Phase (Before June 2018)**

As stated in 1.3, PDM was changed in the 4<sup>th</sup> JCC in June 2018. Based on the amended PDM, the goal, output, and activities of the Project were updated as described in Figure 1.4.2. Accordingly, items related to the establishment plan of VSC was deleted in the project purpose after July, 2018 and changed to “MOC and CUWC’s capacity to implement trainings in the field of sewerage is enhanced.” Additionally, the output-5, activities related to R&D was deleted. Moreover, the activity 3-2 to 3-7 were revised or added in the output-3, and the activity 4-2 and 4-3 were revised in the output-4.

The goal, output, and activities of the Project after July, 2018 are described in Figure 1.4.2.



Source: JICA Consultant Team

**Figure 1.4.2 Goal, Output, and Activities of the Project and Scope of Implementation Phase (After July 2018)**

## 1.5 Workflow and Schedule of Phase-2

Figure 1.5.1 shows the workflow of the Project and activities for each output of the Project before PDM modification, while Figure 1.5.2 shows that after PDM modification. Also, the outline of activity contents and implementation schedule are stated as below.

**(1) Initial Activity Contents until June 2018**

At the beginning of the implementation phase, the following Activity contents and schedule were planned.

- 1) From July to September: Launch of activity, Discussion and consensus formulation with C/P and JICA expert, Support of setting up the joint working group regarding output 3.
- 2) From September 2017 to February 2018: Support of each activity of the first year
- 3) From February to May 2018: Summarize the activity of the first year, Study on the problems, Study on the policy of the activity in the second year, Discussion with C/P and JICA expert, Making progress report
- 4) From July 2018 to March 2019: Support of each activity of the second year, Support of training course in Japan
- 5) From March to May 2019: VSC becomes independent, Support of summarizing the organization structure which can be self-sustainable., Making the project completion report

**(2) Activity Contents after changing PDM**

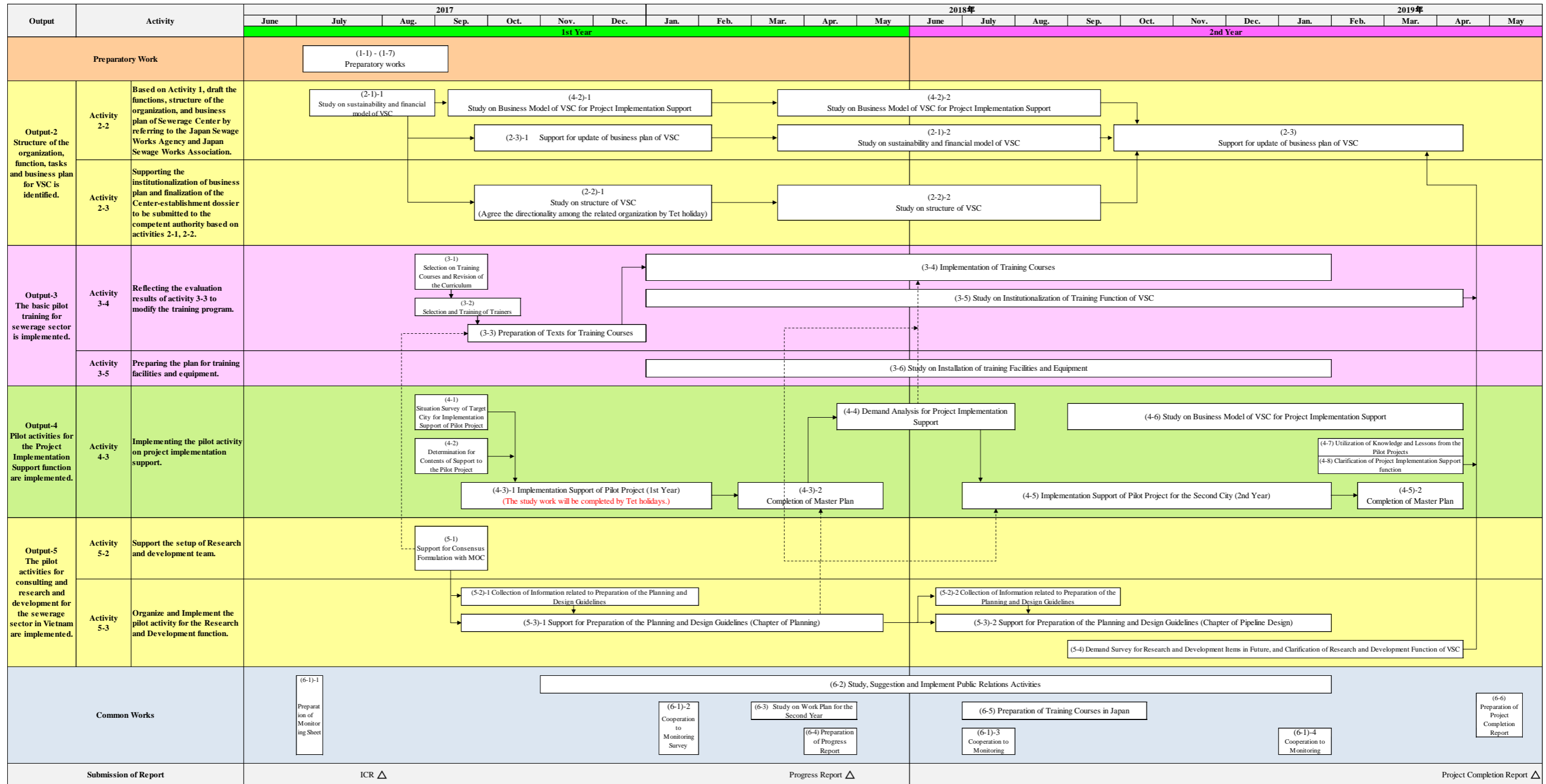
As stated in clause 1.3, activity contents and schedule after July 2017 had been changed as follows based on the revised PDM in the fourth JCC in June 2018.

- 1) From July 2018 to March 2019: Support of activity regarding training function in the second year, Reflect knowledge, which obtained by making master plan as activity of project implementation support in the first year, to the planning course of pilot training.
- 2) From April to May 2019: Summarize the activity of the second year, Study on the organization as training implementation organization and budget planning

Moreover, activity duration was extended for half year because C/P strongly requested to extend the project duration in May 2019 and it was judged that it will contribute to make training implementation organization self-sustainable. Working contents and schedule were decided as below.

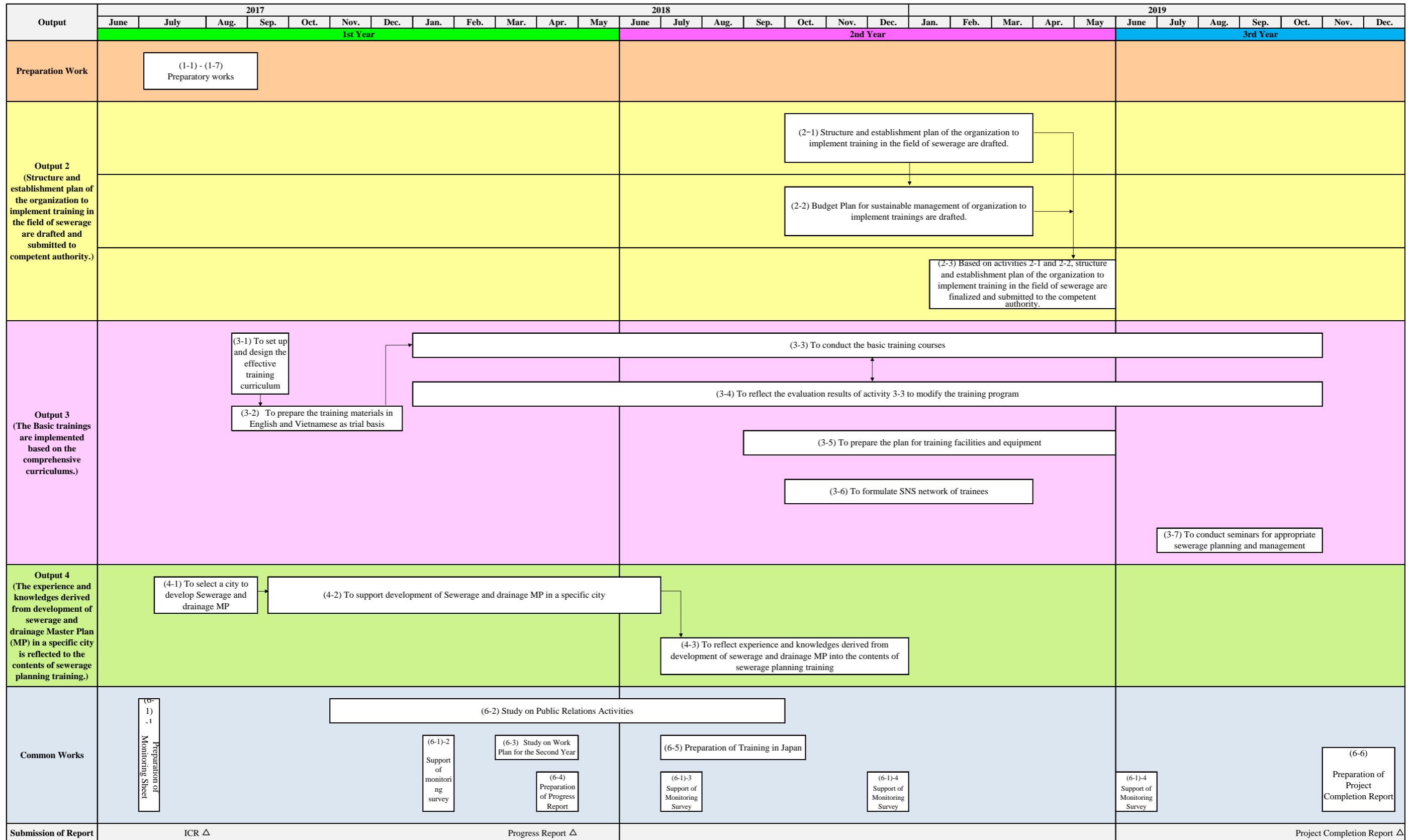
- 3) From June to November 2019: Support of activity regarding training function, Study on recommendations to achieve the overall goal
- 4) December 2019: Making the project completion report





Source: JICA Consultant Team

Figure 1.5.1 Flowchart of the Implementation Phase (Before June 2018)



Source: JICA Consultant Team

Figure 1.5.2 Flowchart of the Implementation Phase (After July 2018)

## 1.6 Formation of the JICA Expert Team

In the implementation phase, the project team of the Japanese side (hereinafter called the “JICA Expert Team”) consists of three long-term experts who belong to the JICA Global Environment Department, JICA Vietnam Office and MOC, and the members of the consultant team who are employed by JICA headquarters.

The formation was changed after the 4<sup>th</sup> JCC in June 2018 because of the PDM modification.

In addition, the formation was changed again in May 2018 because of the extension and expansion of the project.

The formation of the JICA Expert Team is described in Table 1.6.1.

**Table 1.6.1 Formation of the JICA Expert Team**

Until June 2018

No.	Name	Position
JICA Long-term Expert		
1	WAKO Takatoshi	Chief advisor cum sewerage policy advisor
2	WAKABAYASHI Junji	Sub-chief advisor/formulation of business plan
3	MORI Tamaki	Planning of training/operational coordination
JICA Consultant Team		
1	KAJIURA Takeki	Team leaders/sewerage works planning
2	SASAKI Masaya	Deputy team leader/development of local human resources
3	KAMATA Hiroko	Planning of training courses -1
4	KAWAI Takehiko	Planning of training courses -2
5	ISHII Kenichi	Sewerage project implementation support
6	TAKAMURA Yoshihiro	R&D
7	NISHIMAKI Hiroshi	Formulation of financial mechanism
8	KAWAGUCHI Yukio	Training of trainer -1
9	UEDA Tatsuhiko	Training of trainer -2

From July, 2018 to April 2019

No.	Name	Position
JICA Long-term Expert		
1	WAKABAYASHI Junji	Sub-chief advisor/formulation of business plan (until end of September 2018)
2	MORI Tamaki	Planning of training/operational coordination
JICA Consultant Team		

1	KAJIURA Takeki	Team leader/sewerage works planning
2	SASAKI Masaya	Deputy team leader/development of local human resources
3	KAMATA Hiroko	Planning of training courses -1
4	KAWAI Takehiko	Planning of training courses -2
5	TABATA Satomi	Training preparation and implementation support/operational coordination
6	YANAMOTO Satoshi	Training materials making support
7	MORI Isao	Planning of training facilities and equipment

From May to November 2019

No.	Name	Position
JICA Long-term Expert		
1	MORI Tamaki	Planning of training/operational coordination
JICA Consultant Team		
1	KAJIURA Takeki	Team leader/sewerage works planning
2	SASAKI Masaya	Deputy team leader/development of local human resources
3	TABATA Satomi	Training preparation and implementation support/operational coordination
4	MORI Isao	Planning of training courses -3

Source: JICA Consultant Team

### **1.7 Project Implementation Structures of the Vietnamese Side and Japanese Side**

Additionally, the project implementation structures of both Vietnamese side and Japanese side are described in Table 1.7.1. Working groups for training, PIS, and R&D functions were established. Moreover, working group members were assigned from both sides.

**Table 1.7.1 Project Implementation Structure**

**Until June 2018**

**Vietnamese Side**

**Japanese Side**

JWG0 (Overall Issue including Financial Planning)

ATI-MOC	Tran Thi Thao Huong	Head of Drainage & ww management Division ATI-MOC	Long-term Expert Team	WAKO Takatoshi	Chief Advisor
ATI-MOC	Nguyen Ngoc Duong	Deputy Head of Drainage & ww management Division ATI-MOC	Long-term Expert Team	Do Thi Nga	National Project Coordinator
ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	JICA Consultant Team	KAJIURA Takeki	Team Leader / Sewerage Works Planning
			JICA Consultant Team	SASAKI Masaya	Deputy Team Leader / Development of Local Human Resources
			JICA Consultant Team	NISHIMAKI Hiroshi	Formulatin of Financial Mechanism
			JICA Consultant Team	Do Thanh Van	Secretary / Interpreter

JWG1 (Training)

ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	Long-term Expert Team	MORI Tamaki	Long-term Expert (Training)
CNEE-CUWC	Vu Thi Hoai An	Deputy Director of CNEE/CUWC	JICA Consultant Team	KAMATA Hiroko	Planning of Training Courses
			JICA Consultant Team	KAWAI Takehiko	Planning of Training Courses
			JICA Consultant Team	Chu Dieu Ha	Translator / Interpreter

JWG2 (Project Implementation Support: PIS)

ATI-MOC	Do Manh Quan	Drainage & ww management Division ATI-MOC	Long-term Expert Team	WAKABAYASHI Junji	Sub-Chief Advisor
ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	JICA Consultant Team	ISHII Kennich	Sewerage Project Implementation Support
Nam Dinh DOC	Nguyen Nhu Vinh	Infrastructure and Urban Development Division	JICA Consultant Team	To Thi Kim Phung	Translator / Interpreter

JWG3 (R&D)

ATI-MOC	Ngo Van Yen	Drainage & ww management Division ATI-MOC	Long-term Expert Team	WAKO Takatoshi	Chief Advisor
ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	JICA Consultant Team	TAKAMURA Yoshihiro	Research and Development
			JICA Consultant Team	Do Thanh Van	Secretary / Interpreter

**From July 2018 to April 2019**

**Vietnamese Side**

**Japanese Side**

JWG0 (Overall Issue including Financial Planning)

ATI-MOC	Tran Thi Thao Huong	Head of Drainage & ww management Division ATI-MOC	Long-term Expert Team	WAKABAYASHI Junji	Sub-Chief Advisor
ATI-MOC	Nguyen Ngoc Duong	Deputy Head of Drainage & ww management Division ATI-MOC	Long-term Expert Team	MORI Tamaki	Long-term Expert (Training)
ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	Long-term Expert Team	Do Thi Nga	National Project Coordinator
			JICA Consultant Team	KAJIURA Takeki	Team Leader / Sewerage Works Planning
			JICA Consultant Team	SASAKI Masaya	Deputy Team Leader / Development of Local Human Resources
			JICA Consultant Team	Do Thanh Van	Secretary / Interpreter

JWG1 (Training)

ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	Long-term Expert Team	MORI Tamaki	Long-term Expert (Training)
CUWC	Bui Hong Hue	Rector of CUWC	JICA Consultant Team	KAMATA Hiroko	Planning of Training Courses
CNEE-CUWC	Pham Thanh Dat	Director of CNEE/CUWC	JICA Consultant Team	KAWAI Takehiko	Planning of Training Courses
CNEE-CUWC	Vu Thi Hoai An	Deputy Director of CNEE/CUWC	JICA Consultant Team	TABATA Satomi	Support of Preparation and Implementation of Training
CUWC	Hoang Quoc Liem	CUWC	JICA Consultant Team	YANAMOTO Satoshi	Support of Preparation of Textbook
CUWC	Nguyen Cong Duc	CUWC	JICA Consultant Team	MORI Isao	Development Planning of Training Facilities and Equipment
CUWC	Bui Quang Quy	CUWC	JICA Consultant Team	Chu Dieu Ha	Translator / Interpreter

JWG2 (Project Implementation Support: PIS)

ATI-MOC	Do Manh Quan	Drainage & ww management Division ATI-MOC	Long-term Expert Team	WAKABAYASHI Junji	Sub-Chief Advisor
ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	JICA Consultant Team	KAJIURA Takeki	Team Leader / Sewerage Works Planning
Nam Dinh DOC	Nguyen Nhu Vinh	Department of Urban and Infrastructure Development of Nam Dinh City	JICA Consultant Team	To Thi Kim Phung	Translator / Interpreter

## From May to November 2019

### Vietnamese Side

### Japanese Side

#### JWG0 (Overall Issue including Financial Planning)

ATI-MOC	Tran Thi Thao Huong	Head of Drainage & ww management Division ATI-MOC	Long-term Expert Team	MORI Tamaki	Long-term Expert (Training)
ATI-MOC	Nguyen Ngoc Duong	Deputy Head of Drainage & ww management Division ATI-MOC	Long-term Expert Team	Do Thi Nga	National Project Coordinator
ATI-MOC	Bui Manh Dung	Full-time Staff in charge of VSC Project	JICA Consultant Team	KAJIURA Takeki	Team Leader / Sewerage Works Planning
CUWC	Bui Hong Hue	Rector of CUWC	JICA Consultant Team	SASAKI Masaya	Deputy Team Leader / Development of Local Human Resources
			JICA Consultant Team	Do Thanh Van	Secretary / Interpreter

#### JWG1 (Training)

ATI-MOC	Bui Manh Dung	ATIフルタイムカウンターパート	Long-term Expert Team	MORI Tamaki	Long-term Expert (Training)
CUWC	Bui Hong Hue	CUWC学長	JICA Consultant Team	MORI Isao	Planning of Training Courses
CNEE-CUWC	Pham Thanh Dat	CNEE/CUWC所長	JICA Consultant Team	TABATA Satomi	Support of Preparation and Implementation of Training
CNEE-CUWC	Vu Thi Hoai An	CNEE/CUWC副所長	JICA Consultant Team	Chu Dieu Ha	Translator / Interpreter
CUWC	Hoang Quoc Liem	CUWC	JICA Consultant Team	To Thi Kim Phung	Translator / Interpreter
CUWC	Nguyen Cong Duc	CUWC			
CUWC	Bui Quang Quy	CUWC			

Source: JICA Consultant Team

## CHAPTER 2 SUMMARY OF ACHIEVEMENTS OF THE PROJECT

### 2.1 Status of Implementation of Each Activity

The status of implementation of each activity based on the latest PDM updated in May 2019 is shown in Table 2.1.1.

**Table 2.1.1 List of Output and Implementation Status of Activities in the Project**

Output and Activity	Implementation Status
<b>Output 1: Comprehensive needs of human resource development for sewerage sector is identified.</b>	
1-1 Review the relevant sewerage sector reports from the past to the present and study the implementing organization and develop overall strategy for sewerage field works development, organize survey, and identify needs on training.	During the period of the Detailed Planning Phase, the collection and analysis of data and the needs survey were implemented. The needs and demand of human resource development, project implementation support, and R&D in the field of sewerage were also clarified. Based on the above needs and demands, the contents of activities in the Implementation Phase for three functions including training, project implementation support, and R&D were proposed.
1-2 Study the issues and implementation setup on the stages from initial planning to O&M; and identify the needs for human resource development, project implementation support, and R&D on sewerage works by visiting local governments that are currently implementing sewerage projects such as yen loan projects.	
1-3 To forecast and identify the needs for human resource development, project implementation support, R&D and study the current situation of human resources by visiting local governments that have prospective sewerage projects.	
<b>Output 2: Structure and establishment plan of the organization to implement training in the field of sewerage are drafted and submitted to competent authority.</b>	
2-1 Based on Activity 1, the structure and establishment plan of the organization to implement training in the field of sewerage are drafted by referring to the Japan Sewage Works Agency and Japan Sewage Works Association.	The methodology and structure of the existing organizations in Vietnam as well as implementing trainings and the existing system of MOC for human resource development were surveyed. Based on the above survey results and the past practices and issues attacked in Japan to expand sewerage system, the Proposal on Sustainable Training Organization in Sewerage Sector of Vietnam was prepared.
2-2 Based on 2-1, budget plan for sustainable management of the organization to implement trainings (including tuition collection from trainees and subsidy) are drafted.	
2-3 Based on activities 2-1 and 2-2, structure and establishment plan of the organization to implement training in the field of sewerage are finalized and submitted to the competent authority.	The official document was not prepared and submitted to the competent authority during the project period.
<b>Output 3: The basic trainings are implemented based on the comprehensive curriculum.</b>	
3-1 To set up and design the effective training curriculum for human resource development by analyzing the results from activity 1 on the management capacity of sewerage works.	Training curriculum related to sewerage planning and design was prepared, which is necessary for the expansion of the sewerage system.
3-2 To prepare the training materials in English and Vietnamese as trial basis.	Training materials of sewerage planning and preliminary design were prepared in both English and Vietnamese.
3-3 To identify training programs based on targeted participants, and to conduct the basic training courses for planning, implementation, and management.	Training courses of sewerage planning were organized twice in the detailed planning phase in August and November 2016 and six times in the implementation phase in October 2017, April, July, October, and December 2018 and September 2019. Training courses of preliminary design were organized three times in the implementation phase in March, July, and October 2019.



3-4 To reflect the evaluation results of activity 3-3 to modify the training program.	Questionnaire survey was executed at every training course and the survey result was reflected to the next training course.
3-5 To prepare the plan for training facilities and equipment.	The development plan of small-scale sewerage system in CUWC as the experienced-based training facility was prepared.
3-6 To formulate SNS network of trainees.	The network of trainees was tried to be formulated with the use of SNS and the trainees who attended to the pilot training courses in the Project were invited to the network.
3-7 To conduct seminars for appropriate sewerage planning and management	Two seminars were organized in July and November 2019 to which implementation agencies of sewerage projects were invited.
<b>Output 4: Sewerage and drainage master plan (MP) in a specific city is developed and the experience through the development of the MP is shared /reflected in the basic trainings</b>	
4-1 To select a city to develop sewerage and drainage MP	In the detailed planning phase, Nam Dinh City was selected among the cities in which sewerage projects had not yet been started.
4-2 To support development of Sewerage and drainage MP in a specific city	Study on the sewerage and drainage MP for Nam Dinh City was implemented from September 2017 to December 2018, and the MP was approved by Nam Dinh City People's Committee in December 2018.
4-3 To reflect experience and knowledge derived from the development of sewerage and drainage MP into the contents of sewerage planning training	The outline of the sewerage and drainage MP for Nam Dinh City was introduced in the training courses organized in July, September, and December 2018. The data of the sewerage and drainage MP for Nam Dinh City was utilized as textbook material in the training for the design of pipe networks organized in July and October 2019.

Source: JICA Consultant Team

## **2.2 Implementation Schedule of the Activities (Actual Performance)**

Implementation schedule of each activity shown in Section 2.1 is described in Figure 2.2.1 of the next page.



## 2.3 Record of the Dispatch of Consultant Team

### 2.3.1 Expert from Japan

As stated in clause 1.6, three JICA long-term experts and consultant team were dispatched, and they cooperated as one team. The members are shown as below.

#### (1) JICA Long-term Expert

Record of dispatch of the JICA long-term expert to the site is described in Table 2.3.1.

**Table 2.3.1 Record of Dispatch of JICA Long-Term Expert**

No.	Name	Position	Term of Dispatch to Vietnam
1	WAKO Takatoshi	Chief advisor cum sewerage policy advisor	April 2017 ~ June 2018
2	WAKABAYASHI Junji	Sub-chief advisor/formulation of business plan	April 2017 ~ September 2018
3	MORI Tamaki	Planning of training/operational coordination	April 2017 ~ November 2019

Source: JICA Consultant Team

#### (2) Consultant

Record of dispatch of the consultant team to the site is described in Table 2.3.2.

**Table 2.3.2 Record of Dispatch of Consultant Team**

No.	Name	Position and Task	Time of Dispatch to Vietnam
1	KAJIURA Takeki	Team Leader/Sewerage Works Planning	1) 2017.7.13 ~ 27 (15 days) 2) 2017.8.29 ~ 10.31 (64 days) 3) 2017.11.13 ~ 12.13 (31 days) 4) 2018.1.7 ~ 27 (21 days) 5) 2018.3.18 ~ 4.21 (35 days) 6) 2018.5.20 ~ 6.2 (14 days) 7) 2018.6.12 ~19, 6/23 ~ 7.14 (30 days) 8) 2018.9.3 ~ 10.13 (41 days) 9) 2018.11.14 ~ 12.15 (32 days) 10) 2019.2.13 ~ 21 (9 days) 11) 2019.3.3 ~ 4.4 (33 days) 12) 2019.11.3 ~ 16 (14 days) 13) 2019.11.24 ~ 30 (7 days) Total 346 days
2	SASAKI Masaya	Deputy Team Leader/Development of Local Resources	1) 2018.7.9 ~ 12 (4 days) 2) 2018.12.4 ~ 8 (5 days) Total 9 days
3	KAMATA Hiroko	Planning of Training Course-1	1) 2017.8.29 ~ 10.28 (61 days) 2) 2018.3.4 ~ 4.16 (44 days) 3) 2018.5.20 ~ 6.2 (14 days)

No.	Name	Position and Task	Time of Dispatch to Vietnam
			4) 2018.8.27 ~ 9.25 (30 days) 5) 2018.10.9 ~ 31, 11/3 ~ 26 (47 days) 6) 2018.12.4 ~ 2019.1.9 (37 days) 7) 2019.2.17 ~ 4.3 (46 days) Total 279 days
4	KAWAI Takehiko	Planning of Training Course-2	1) 2017.7.16 ~ 27 (12 days) 2) 2017.8.29 ~ 9.12 (15 days) 3) 2017.10.17 ~ 28 (12 days) Total 39 days
5	ISHII Kenichi	Sewerage Project Implementation Support	1) 2017.7.13 ~ 27 (15 days) 2) 2017.8.27 ~ 9.22 (25 days) 3) 2017.11.12 ~ 12.2 (21 days) 4) 2018.1.28 ~ 2.14 (18 days) 5) 2018.4.4 ~ 19 (16 days) 6) 2018.5.13 ~ 6.1 (20 days) Total 115 days
6	TAKAMURA Yoshihiro	R&D	1) 2017.7.13 ~ 27 (15 days) 2) 2017.8.27 ~ 10.7 (42 days) 3) 2017.10.18 ~ 12.9 (53 days) 4) 2018.1.22 ~ 2.14 (24 days) 5) 2018.3.12 ~ 4.21 (41 days) Total 175 days
7	NISHIMAKI Hiroshi	Financial Mechanism	1) 2017.7.16 ~ 27 (12 days)
8	KAWAGUCHI Yukio	Training of Trainers -1	No dispatch
9	UEDA Tatsuhiro	Training of Trainers -2	1) 2017.10.17 ~ 28 (12 days)
10	TABATA Satomi	Support of Preparation and Implementation of Training	1) 2018.9.3 ~ 10.13 (41 days) 2) 2018.11.18 ~ 12.15 (28 days) 3) 2019.3.3 ~ 30 (28 days) 4) 2019.11.24 ~ 30 (7 days) Total 104 days
11	YANAMOTO Satoshi	Support of Preparation of Textbook	1) 2018.9.24 ~ 28 (5 days)
12	MORI Isao	Development Planning of Training Facilities and Equipment	1) 2018.9.11 ~ 25 (15 days) 2) 2018.11.21 ~ 12.15 (25 days) 3) 2019.1.17 ~ 26 (10 days) 4) 2019.2.17 ~ 3/7, 3/9 ~ 30 (41 days) 5) 2019.6.27 (1 days) Total 92 days
13	MORI Isao	Planning of Training Course-3	1) 2019.6.20 ~ 26, 6.28 (8 days) 2) 2019.7.10 ~ 20 (11 days) 3) 2019.9.17 ~ 27 (11 days) 4) 2019.10.23 ~ 11.2 (11 days) 5) 2019.11.10 ~ 14 (5 days) Total 46 days

Source: JICA Consultant Team

### 2.3.2 Counter Part in Vietnam

As stated in clause 1.7, following members as shown in Table 2.3.3 were assigned to this project.

**Table 2.3.3 Members Assigned from Vietnamese side**

No.	Name	Organization	Assigned work
1	Tran Thi Thao Huong	ATI Sewerage Dept. Manager	Project management
2	Nguyen Ngoc Duong	ATI Sewerage Dept. Deputy Manager	Project management
3	Bui Manh Dung	ATI Sewerage Dept.	Project management / Training
4	Do Manh Quan	ATI Sewerage Dept.	Project implementation support
5	Ngo Van Yen	ATI Sewerage Dept.	R&D
6	Bui Hong Hue	CUWC Rector	Training
7	Pham Thanh Dat	CNEE/CUWC 所長	Training
8	Vu Thi Hoai An	CNEE/CUWC 副所長	Training
9	Hoang Quoc Liem	CUWC	Training
10	Nhuyen Cong Duc	CUWC	Training
11	Bui Quang Quy	CUWC	Training

Source: JICA Consultant Team

### 2.4 Record of the Acceptance of Trainees

During the Implementation Phase, the training in Japan was implemented from January 9 to 19, 2019. Here, the seven trainees listed in Table 2.4.1 were brought from Vietnam.

**Table 2.4.1 List of Trainees of Training in Japan**

No.	Name	Organization and Position
1	Ms. Tran Thi Thao Huong	Head of Sewerage Division of Administration of Technical Infrastructure, Ministry of Construction (MOC)
2	Ms. Do Thi Hong Mai	Official, Department of Personnel and Organization, MOC
3	Mr. Nguyen Thanh Phong	Deputy Head of Water Supply and Sewerage Faculty, Architecture University
4	Mr. Bui Hong Hue	Rector of College of Urban Works Construction (CUWC)
5	Ms. Vu Thi Hoai An	Deputy Director of Training Center for Water & Environment Sector (CNEE), Deputy Head of Technical Infrastructure of CUWC
6	Mr. Pham Thanh Dat	Director of CNEE, CUWC
7	Mr. Chau Ngo Anh Nhan	Director of Khanh Hoa Development Project Management Unit (KDPM)

Source: JICA Consultant Team

The details of training in Japan are described in Chapter 4 and in the Appendix.

## 2.5 Record of the Procurement and the Donation of Equipment

### 2.5.1 Burden of Expense by Japanese Side

The equipment procured by Japanese expense is stated as below.

#### (1) Cost for Office Operation

The following items were covered by Japanese side for the smooth project operation and implementation.

- 1) Manpower cost such as secretary, interpreter and supporting engineer
- 2) Water supply and electricity cost, furniture and communication cost such as internet
- 3) Cost for printing, material and venue regarding pilot training course
- 4) Reconsignment fee for local consultant regarding project implementation support

#### (2) Donated Equipment

The equipment listed in Table 2.5.1 is purchased in the Project, so that CUWC can make use of them for the training course not only during the project but after completion of this project.

**Table 2.5.1 List of Donated Equipment**

No.	Equipment	Specification	Qty.	Installation Location	Treatment After the Project Completion
1	Laptop computer	Dell Ins 14 N7460	4	Project office, ATI and CUWC	Donated to ATI and CUWC after JICA Expert Team using
2	Projector	EPSON EB-X05	1	Ditto	Donated to CUWC after JICA Expert Team using
3	Desktop computer	HP ProDesk 400 G5 MT	1	CUWC	Donated to CUWC
4	Monitor	HP V244H23.8 LED	1	Ditto	Ditto
5	Large-sized screen	SHARP 60-inch LC-60UA	1	Ditto	Ditto
6	Software of AutoCAD	AutoCAD Single user	1	Ditto	Ditto
7	Software of MapInfo	MapInfo Pro v15.2	1	Ditto	Ditto
8	Table	For using desktop computer, 2 m x 1 m	1	Ditto	Ditto
9	Chair	For using desktop computer	1	Ditto	Ditto
10	Software of pipe design supporting system	Pipe Design Pro	1	Ditto	Ditto
11	Software of sewer network database system	Compus II	1	Ditto	Ditto
12	Laptop computer	Dell Ins 7436	10	Ditto	Ditto
13	Wireless LAN router	Liksys EA2750	1	Ditto	Ditto
14	Model of sewage treatment facilities	PTF Method	1	Ditto	Ditto
15	Table for the above-listed model No.14	91 cm x 60 cm x 73 cm	1	Ditto	Ditto

16	Model of household connection to sewer line	Vinyl chloride drainage facilities, sanitary equipment and pedestal	1	Ditto	Ditto
17	Stair case for the above-listed model No.16	L 6.7 m x W 0.65 m x H 1.5 m	1	Ditto	Ditto
18	Model of material for rainwater harvesting	Cross-wave	1	Ditto	Ditto
19	Explanatory panel for above-listed model No.10, 11, 14, 16 and 18	A1 size	5	Ditto	Ditto
20	Whiteboard to attach the above-listed panel No.19	1.8 m x 1.2 m	4	Ditto	Ditto

Source: JICA Consultant Team

### 2.5.2 Burden of Expense by Vietnamese Side

The following items were covered by Vietnamese side.

- 1) Rental fee of project office
- 2) Accommodation fee for trainees of pilot training course

### 2.6 Transition of Project Design Matrix (PDM)

History of the transition of PDM is summarized in Table 2.6.1.

- 1) The first edition of PDM which specifies overall goal, purpose and output and contents of activity of this project was agreed between Japan and Vietnam in March 14<sup>th</sup>, 2017.
- 2) JCC was hold when the activity of the first year of the implementation phase ended in June 15<sup>th</sup>, 2018, and the revision of PDM was agreed between Japan and Vietnam. VSC was not listed in the decision of the Minister of Construction related to ATI's function, duty, right, and organizational structure issued on September 25, 2017 (No. 986/QD-BXD) and VSC cannot be established. The activity regarding project implementation support was gradually changed, and the activity regarding R&D was deleted.
- 3) PDM was again revised, which Japan and Vietnam agreed on May 22<sup>nd</sup>, 2019 before the expected project close date of May 29<sup>th</sup>, 2019. The project period was extended for six months and the implementation of seminars for appropriate sewerage planning and management were added as activity.

**Table 2.6.1 Transition of PDM**

No.	Date	Described Items and Contents of Amendment
1	March 14, 2016	Overall goal, purpose, output and contents of activities were described.
2	June 15, 2018	1) VSC was not listed in the decision of the Minister of Construction related to ATI's function, duty, right, and organizational structure issued on September 25, 2017 (No. 986/QD-BXD) and VSC cannot be established. Therefore, activities related to the establishment of VSC and the preparation of business plan were changed to the study on the

		<p>structure and budget plan of the organization focusing on the training function.</p> <p>2) Activities to prepare in the mid- and long-term plan to sustain project implementation support function were deleted and the activities to reflect the experience and knowledge derived from the pilot activity to the training function were added.</p> <p>3) All activities related to R&amp;D were deleted.</p>
3	April 15, 2019	<p>1) The project period was extended for six months and the completion date was changed to November 2019.</p> <p>2) Two activities including the formulation of network of trainees with the use of SNS and the implementation of seminars for appropriate sewerage planning and management were added.</p> <p>3) CUWC, the implementation organization of training, was assigned to the deputy project director / project manager.</p>

Source: JICA Consultant Team

## 2.7 Record of Joint Coordination Committee (JCC)

A total of six JCC meetings was organized in the Project. The outline of each JCC meeting is described in Table 2.9.1.

**Table 2.7.1 Outline of JCC**

No.	Date	Participants	Major Items Discussed
1	March 14, 2016	<p>1) Vietnamese side ATI (9 persons) DG Tien Deputy DG Mai Huong and others MOC (9 persons) VWSA Vice chairman Dzung CUWC Rector Hue Journalist of the Construction Newspaper</p> <p>2) Japanese side JICA HQ (2 persons) JICA Vietnam Office (2 persons) Policy advisor (1 person) Ministry of Land, Infrastructure, Transport and Tourism (1 person) Consultant (7 persons)</p>	<p>To start the Project, the following items were confirmed by both sides.</p> <p>1) Project purpose and implementation schedule</p> <p>2) Establishment of VSC under ATI is planned</p> <p>3) Personnel cost of the counterpart will be covered by MOC and other expenditures will be covered by JICA</p> <p>4) Member of JCC</p>
2	October 28, 2016	<p>1) Vietnamese side MOC (9 persons) Vice Minister Linh and others ATI (9 persons) Deputy DG Mai Huong and others CUWC (2 persons)</p> <p>2) Japanese side JICA HQ (3 persons)</p>	<p>The Japanese side reported the progress of activities and the following items were confirmed by both sides.</p> <p>1) VSC with three functions will be established in 2017.</p> <p>2) It is necessary to execute the nationwide survey for each function to ensure the sustainability of VSC.</p>



No.	Date	Participants	Major Items Discussed
		JICA Vietnam Office (2 persons) Policy advisor (1 person) Japanese embassy (1 person) Consultant (9 persons)	
3	February 28, 2017	1) Vietnamese side ATI (13 persons) DG Tien Deputy DG Mai Huong and others VWSA Vice chairman Dzung CUWC Rector Hue 2) Japanese side JICA HQ (4 persons) JICA Vietnam Office (2 persons) Policy advisor (1 person) Consultant (8 persons)	To conclude the detailed planning phase, the following items were confirmed and agreed by both sides. 1) Contents of activities to be executed in the implementation phase 2) Additional study on tuition fee will be implemented by both sides. 3) A full-time counterpart will be assigned by ATI. 4) Financial plan and mechanism will be studied so that VSC can be financially independent.
4	June 15, 2018	1) Vietnamese side ATI (9 persons) DG Mai Huong and others CUWC (2 persons) Nam Dinh City (1 person) 2) Japanese side JICA HQ (2 persons) JICA Vietnam Office (3 persons) Policy advisor (1 person) Long-term expert (2 persons) Consultant (1 person)	To start the second year of implementation phase, the following items are confirmed and agreed by both sides. 1) Achievements of activities executed in the first year of implementation phase. 2) It is necessary to focus on the activities related to training function in the second year and amend the PDM. 3) Additional study will be executed to operate the implementing organization of training on a stand-alone basis.
5	December 13, 2018	1) Vietnamese side ATI (7 persons) DG Mai Huong and others CUWC (2 persons) 2) Japanese side JICA HQ (2 persons) JICA Vietnam Office (3 persons) Policy advisor (1 person) Long-term expert (1 person) Consultant (5 persons)	The following items are confirmed and agreed by both sides. 1) Achievements of activities executed in the implementation phase. 2) Work plan and action plan for the remaining period of the Project.
6	November 13, 2019	1) Vietnamese side ATI (4 persons) DG Mai Huong and others CUWC (3 persons) 2) Japanese side JICA HQ (1 person) JICA Vietnam Office (3 persons) Policy advisor (1 person) Long-term expert (1 person) Consultant (4 persons)	To conclude the Project, the following items are confirmed and agreed by both sides. 1) Achievements of activities implemented through the Project. 2) Action plan of the Vietnamese side, recommendation to the Vietnamese side, and the necessity of follow-ups to achieve the overall goal after the project completion.

Source: JICA Consultant Team

## 2.8 Record of Supporting Committee in Japan

Supporting committee in Japan was planned to be organized every six months as a conference to receive advice from knowledgeable persons in Japan for the appropriate operation of the Project. The supporting committee in Japan were organized three times during the Implementation Phase. It was conducted three times in both the detailed planning phase and the implementation phase respectively, thus six times in total. The outline of each conference is summarized in Table 2.8.1.

**Table 2.8.1 Outline of Supporting Committee in Japan**

No.	Date	Participants	Major Items Discussed
1	January 24, 2018	Chairman Dr. Morita Mr. Hatada (JS) Mr. Matsubara (MLIT) JICA HQ: 6 persons JICA Vietnam Office: 2 persons Long-term expert: 3 persons Consultant: 3 persons	1) Progress report of the whole project 2) Report of the progress of activities for the three functions 3) Explanation of the implementation schedule of activities to be executed 4) Advice, recommendation, and question from the committee members to ensure the sustainability of VSC
2	November 28, 2018	Chairman Dr. Morita Mr. Hatada (JS) JICA HQ: 5 persons JICA Vietnam Office: 2 persons Long-term expert: 1 person Consultant: 5 persons	1) Progress report of the whole project and the outline of activities 2) Explanation of the action plan for the remaining project period 3) Advice, recommendation, and question from committee members
3	May 22, 2019	Chairman Dr. Morita Mr. Hatada (JS) Mr. Hisaoka (MLIT) JICA HQ: 4 persons JICA Vietnam Office: 2 persons Long-term expert: 1 person Consultant: 2 persons Mr. Yasuda (Nagoya City) Mr. Kitamura (Otsu City)	1) Progress report of the whole project 2) Report of the outline of activities implemented including the training in Japan 3) Explanation of the work plan for the additional period until November 2019 4) Advice, recommendation, and question from the committee members 5) Advice and recommendation from Mr. Yasuda (Nagoya City) and Mr. Kitamura (Otsu City) to solve problems in sewerage projects of Vietnam

Source: JICA Consultant Team

## CHAPTER 3 ACHIEVEMENT OF THE ACTIVITIES RELATED TO OUTPUT-2 (PLAN OF ORGANIZATION STRUCTURE AND BUDGET)

### 3.1 Purposes of Activities

The following activities are conducted to make the training course sustainable after the completion of this project.

- (1) Investigation of the appropriate structure of organization that can sustainably operate the training course.
- (2) Investigation of economical sustainability and preparation of a feasible budget plan for the training course.

CNEE/CUWC have conducted six planning courses and three preliminary design courses as the implementing organization in the implementation phase and will take over the training function. Therefore, points stated above are checked with CNEE/CUWC.

### 3.2 Schedule and Achievement of Activities

Implementation schedule and the actual plan are shown in the figure below.

Activity	Year	2016												2017												2018												2019											
		Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
2-1 Based on Activity 1, structure and establishment plan of the organization to implement training in the field of sewerage are drafted by referring to the Japan Sewage Works Agency and Japan Sewage Works Association.	Plan	█												█												█												█											
	Actual	█												█												█												█											
2-2 Based on 2-1, budget Plan for sustainable management of organization to implement trainings (including tuition collection from trainees and subsidy) are drafted.	Plan																									█												█											
	Actual																									█												█											
2-3 Based on activities 2-1 and 2-2, structure and establishment plan of the organization to implement training in the field of sewerage are finalized and submitted to the competent authority.	Plan																																					█											
	Actual																																					█											

Source: JICA Consultant Team

**Figure 3.2.1 Implementation Schedule of Activity and Actual Achievement on Output 2**

As stated in Chapter 1, the establishment of VSC turned out to be difficult because it was not able to be positioned to No. 986/QD-BXD, which is the Ministry’s decision on the function, allegiance, right and organization structure of ATI, by ATI, even though the JICA Expert Team had worked for establishing a new organization from the commencement of this project up to September 2017. Responding to the situation, PDM was modified in the 4<sup>th</sup> JCC held in June 2018. The modified activities presuppose that CUWC takes over the training function after the completion of this project.

Based on the background stated above, the contents of activities stated as follows are focused on the activities conducted after July 2018.

Also, training function will be taken over by CNEE/CUWC which is existing organization after the completion of this project as stated above. The concrete discussion was not done between CUWC and JICA consultant team in the activity regarding output 2, because the structure of organization of training implementation and budget plan were left entirely up to CUWC. The activity content stated below is the result of collecting information, analysis and study by JICA expert. Hopefully, it is referred by CUWC to continue the activity after the completion of this project.

### **3.3 Activities Related to Organization Structure of Training Implementing Organization (Activity 2-1)**

#### **3.3.1 Collection Information and Analysis of Existing Organization Structure**

##### **(1) CUWC**

The College of Urban Works Construction (hereinafter, this is called CUWC), which is public non-profit making training school, was established under the MOC by Decision No. 685/QD-BGD. It is given individual accountability by law, but their remuneration is covered by MOC.

As of January 2019, CUWC is composed of 15 departments and agencies. CNEE is one of them, which is the main implementing agency in this project. The number of staff, their academic background and the organizational chart of CUWC are shown in Table 3.3.1, Table 3.3.2, and Figure 3.3.1, respectively.

**Table 3.3.1 Number of Staff as of January 1, 2019**

<b>No.</b>	<b>Name of Organization</b>	<b>No. of staff</b>	<b>(%)</b>
1	Personnel and Administration Office	13	7.8
2	Training Management Office	15	9.0
3	Equipment and Facility Management Office	13	7.8
4	Science Research and International Relations Office	3	1.8
5	Quality Assurance and Networking Office	6	3.6
6	Finance – Accounting Office	5	3.0
7	Faculty of Political and Basic Science	29	17.4
	7.1 Department of Politics – Law		
	7.2 Nature Department		
	7.3 Department of Social Affairs		
	7.4 Department of Foreign Languages		
	7.5 Department of Defense Education - Security and Physical		
	7.6 Department of Informatics		
8	Faculty of Construction and Urban Management	18	10.8
	8.1 Department of Architecture		
	8.2 Department of Economics		
	8.3 Department of Construction		
9	Faculty of Urban Engineering	6	3.6
	9.1 Department of Urban Engineering		
	9.2 Department of Water Supply and Sewerage		
	9.3 Department of urban technical infrastructure		
10	Faculty of Electrical – Electronics	15	9.0
	10.1 Department of Civil and Industrial Electricity		

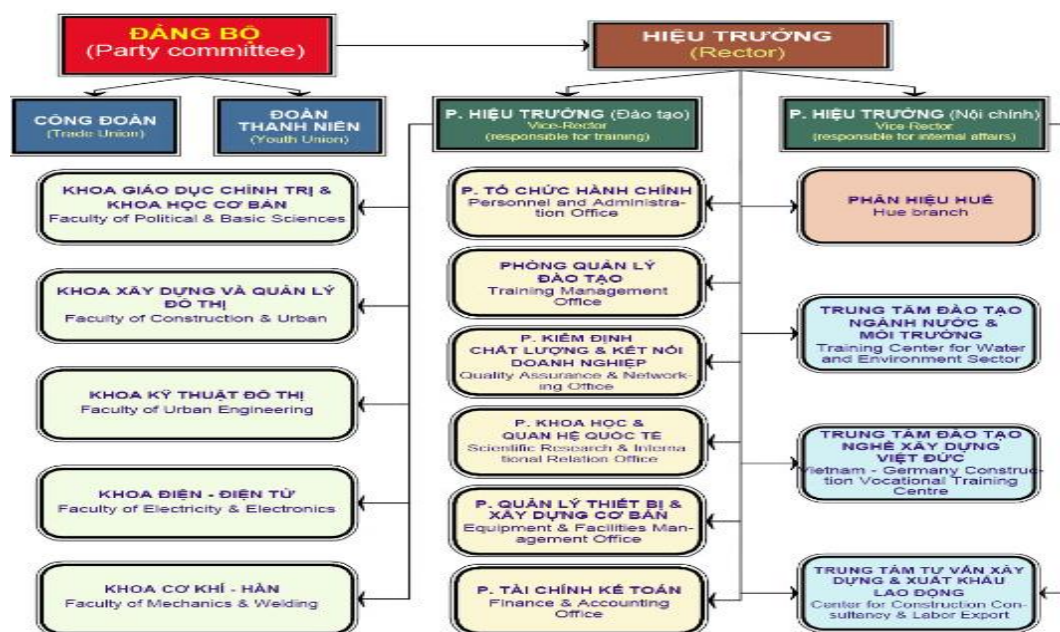
No.	Name of Organization	No. of staff	(%)
	10.2 Department of Electronics – Automation		
11	Faculty of Mechanics and Welding	18	10.8
	11.1 Department of Civil Engineering		
	11.2 Department of Mechanical Engineering		
12	Branch of CUWC in Thua Thien – Hue	11	6.6
13	Training Center for Water and Environment-CNEE	7	4.2
14	Center for Construction Consultancy and Labor Export	5	3.0
15	Vietnam - Germany Construction Vocational Training Center	3	1.8
	Sum	167	100.0

Source: CUWC

Table 3.3.2 Academic Background of the Staff

Academic Background	Doctor	Master	Bachelor	Junior College Graduate	Others	Total
Number of Staff	3	91	54	11	8	167
(%)	1.8	54.5	32.3	6.6	4.8	100

Source: CUWC



Source: CUWC

Figure 3.3.1 Organization Chart of CUWC

Also, CUWC sets up their futuristic view and appointed work as stated below.

Futuristic view: Training school that cultivates qualified human resources who can develop pro-environment behavior in the field of urban construction.

Appointed work: To cultivate qualified human resources who can meet the requirements of domestic and international firms in the field of construction. The following are their appointed works:

- Improve the level of teachers

- Build a creative and flexible training program with new technology
- Install modern facilities
- Establish a framework for multiple and sustainable international cooperation
- Build the safe and kind training course

**(2) CNEE**

**1) Number of staff and organization chart**

CNEE is one of the agencies of CUWC. It is composed of seven members, i.e.; 1. Center president, 2. Vice center president (Management of training course), 3. Person in charge of examination, 4. Person in charge of workshop, 5. Person in charge of laboratory maintenance, 6. Person in charge of general affairs, and 7. Accountant.

**2) Method of Training**

There are two types of training. One is the “ready-made” type which has the name, contents, training period, participation fee, and so on, which were already decided. These are offered on the website and associated documents in recruiting the participants. The other type is “order made.” CNEE adopts the latter method.

**3) Training Course**

The contents of the training course are shown in Table 3.3.3. These are related to water supply projects. There is no course of drainage and sewerage.

**Table 3.3.3 Contents of Training Course of CNEE**

<b>Name</b>	<b>Intended Participants</b>	<b>Contents</b>
Management of water purification plant	<ul style="list-style-type: none"> <li>- Basic understanding of safe water supply system, leakage prevention, customer service, work safety of O&amp;M</li> <li>- Water purification technology which is actually adopted</li> <li>- O&amp;M of system equipment and safe water supply plan</li> </ul>	<ol style="list-style-type: none"> <li>1. Outline of water supply plan</li> <li>2. Water leakage and its countermeasure</li> <li>3. O&amp;M of water purification plant</li> <li>4. O&amp;M of the pumping station</li> <li>5. Supply of electricity to the pumping station</li> <li>6. Chemicals for water purification</li> </ol>
Countermeasure for water leakage	<ul style="list-style-type: none"> <li>- Basic understanding of safe water supply system and leakage prevention</li> <li>- Leakage prevention plan</li> <li>- Leakage investigation</li> <li>- The usage of the equipment for leakage detection</li> </ul>	<ol style="list-style-type: none"> <li>1. Outline of water supply plan</li> <li>2. Measure for increase of income</li> <li>3. Outline of safe water supply</li> <li>4. Water leakage and its countermeasure</li> </ol>
Installation of water supply pipe	<ul style="list-style-type: none"> <li>- Basic understanding of safe water supply system, leakage prevention, customer service, tariff, and work safety of pipe installation</li> </ul>	<ol style="list-style-type: none"> <li>1. Outline of water supply plan</li> <li>2. Water leakage and its countermeasure</li> <li>3. Installation of water supply pipe</li> </ol>

<b>Name</b>	<b>Intended Participants</b>	<b>Contents</b>
Installation of water supply pipe	<ul style="list-style-type: none"> <li>- Network of water supply pipe</li> <li>- Installation method of various pipelines</li> <li>- Installation of a meter at households</li> <li>- Basic understanding of a meter Ex.) How to use and read the meter</li> </ul>	<ol style="list-style-type: none"> <li>1. Supplemental treatment</li> <li>2. Meter</li> </ol>
Customer service	<ul style="list-style-type: none"> <li>- Knowledge of purification technology that is adopted as water supply system</li> <li>- Positioning of customers and supplemental knowledge of the importance of their role</li> <li>- The reason of the necessity of customer service</li> <li>- The importance of communication skills with their customer likewise technical skills.</li> <li>- Correct reading of a meter for reducing leakage</li> </ul>	<ol style="list-style-type: none"> <li>1. Outline of the water supply system</li> <li>2. Countermeasure for leakage and communication skill</li> <li>3. Collection of customer data and record</li> <li>4. Customer data management</li> <li>5. Evaluation of customer satisfaction level</li> <li>6. Recording of the indefinite number of meter</li> <li>7. Tariff collection and liabilities</li> </ol>
Monitoring	<ul style="list-style-type: none"> <li>- Basic understanding of water supply system, meter, and leakage</li> <li>- Communication skill with customers</li> <li>- Providing legal information and proposing countermeasures for contravention and analysis</li> </ul>	
Water quality management	<ul style="list-style-type: none"> <li>- Successful sampling method by using a meter</li> <li>- Sampling schedule based on the rule</li> <li>- Appropriate chemical usage in the purification plant</li> <li>- Analysis technology such as 15 analysis items, NH<sub>4</sub>, TDS, and EC</li> <li>- Successful usage of jar tester, spectral apparatus, pipette washer, and still container</li> <li>- Chemical input based on the analysis method of each index</li> <li>- Accurate record, management, and analysis of the examination result</li> </ul>	<ol style="list-style-type: none"> <li>1. Outline of water supply system</li> <li>2. Outline of water quality standard</li> <li>3. Blocking</li> <li>4. Direction of liquid adjustment</li> <li>5. Items of water quality analysis and their analysis method</li> <li>6. Practice</li> <li>7. Sampling, preservation, and water quality monitoring</li> </ol>
O&M of equipment	<ul style="list-style-type: none"> <li>- Enhancing experience of exchanging opinions with water supply company</li> <li>- O&amp;M of purification facilities</li> <li>- Installation of monitoring panel of pumps and circuit protection</li> </ul>	<ol style="list-style-type: none"> <li>1. Outline of water supply system</li> <li>2. Facilities for O&amp;M of water pipe network</li> <li>3. O&amp;M of pumping station</li> <li>4. O&amp;M of mechanical equipment</li> <li>5. Installation</li> </ol>

Source : CNEE

#### **4) Tuition fee**

CNEE decides the contract amount with the client. The contract amount differs according to the venue, program, duration, and number of trainees. If there is a difference between the actual expense and the contract amount, CUWC utilizes the surplus amount for another CUWC activity.

Actually, CNEE obtains each quotation of necessary expense, including transportation fee and accommodation fee as well as the direct expense for training course, and CNEE decides the contract amount based on the total expected cost. Therefore, the contract amount differs case by case and CNEE does not set the regulation to decide the contract amount.

### **3.3.2 Study on Establish the New Implementation Organization of Training**

As stated above, while CNEE/CUWC will take over the training course and implement these training programs for the time being after the termination of this project, it has to be considered which organization implements the training program effectively in the future. Six options for every organization, each having its own advantages and disadvantages, are proposed as shown in Table 3.3.4. The most appropriate training structure will be selected among the six options or any other option in consideration of the trend of development and circumstance surrounding the sewerage sector. This will mainly come from the institutional and financial point of view for the future implementing organization. As of this moment, the JICA Expert Team will evaluate Option-1 as the most realistic option to be implemented immediately. In comparison with other methods, it can be realistic option to establish the new implementation organization which focuses on the field of sewerage in the CUWC, and continue to conduct sewerage training after the completion of this project. It is apart from CNEE.

On the other hand, other options have big disadvantages that will be affected by the directions of other organizations. Persistent discussion with MOC and other related authorities to obtain their approval and coordination.

Additionally, it is expected that the future organization structure will be determined in consideration of the progress situation of each sewerage project and the changes in circumstances surrounding the sewerage works in Vietnam after the discussion focusing on the aspects of structure and finance among related organizations lead by MOC.

The background and proposed schedule of establishing the new implementation organization of training are stated in the Appendix-D.



**Table 3.3.4 Advantages and Disadvantages of Six Options of the Most Appropriate Structure of Training**

Organization in Charge of Training Position	Organization Name/Description	Regulatory Organization	Advantage	Disadvantage	Evaluation
Existing organization	Existing CNEE (Existing organization implements trainings.)	CUWC	<ul style="list-style-type: none"> <li>The staff of CNEE can maximize the use of the experience and know-how derived from JICA's project.</li> <li>Training courses can be started immediately after JICA's project completes.</li> </ul>	<ul style="list-style-type: none"> <li>Since this training course is very new and the publicity among the local government is low, it might be difficult to recruit participants.</li> </ul>	◎
	Sewerage Division of CNEE (CNEE is divided into the Water Division and the Sewerage Division. CUWC continues to manage both divisions.)		<ul style="list-style-type: none"> <li>As same as above.</li> <li>This system can appeal outside that CUWC commits the sewerage sector besides water supply sector.</li> </ul>	<ul style="list-style-type: none"> <li>Same as above.</li> <li>CNEE has already implemented more than ten sewerage training programs in combination with water supply projects such as training programs contracted with Noi Bai International Airport Company besides the JICA project. Therefore, there is little necessity to divided this into two organizations. It requires a rearrangement of structure such as recruitment of new personnel, new room for new director, and so on.</li> </ul>	○
Establishment of new organization	New Training Center under ATI or MOC (New training center will be established, which will be financially independent from CUWC.)	ATI	<ul style="list-style-type: none"> <li>ATI or MOC can utilize their power to support the collection of trainees.</li> </ul>	<ul style="list-style-type: none"> <li>There is a risk of conflict with the government's policy to minimize administrative facilities. Accordingly, it will take a long time to establish the new organization.</li> <li>If the policy of MOC does not change, it is impossible to establish the new organization.</li> </ul>	×
		MOC			×
Incorporate with existing organization	CIRD/Sewerage Division of CNEE (Two existing organizations will be incorporated.)	ATI	<ul style="list-style-type: none"> <li>Since the regulatory organization of CIRD is ATI, the new organization does not have to increase its administrative facilities.</li> <li>CIRD has a power to push each province/PMU to send the participants to the training course, although this is not the fundamental solution for securing the participants.</li> <li>Since the main function of CIRD is R&amp;D of technical infrastructure, the functions of both organizations are not duplicated.</li> </ul>	<ul style="list-style-type: none"> <li>Since there is no discussion with this issue, it will take a long time to adjust and incorporate the two existing organizations.</li> <li>Since the main function of the CIRD is R&amp;D and consultancy in the field of construction in general, the functions of both entities are different and the reason for the incorporation is not clear.</li> </ul>	△
	VWSA/Sewerage Division of CNEE (Two existing organizations will be incorporated.)	Independent	<ul style="list-style-type: none"> <li>VWSA has a lot of training experience in the sewerage sector, especially in O&amp;M activities.</li> <li>Since the main subject of CNEE is planning and design field, the synergy effect is expected from planning to O&amp;M stage, which means this new facility can implement only one comprehensive training course in Vietnam.</li> </ul>	<ul style="list-style-type: none"> <li>Since there is no discussion regarding this issue, it will take long time to adjust and incorporate existing two organizations.</li> <li>Most training programs of VWSA are under the projects financed by external donors such as GIZ. Therefore, if they withdraw, the trainings also stop or lessen.</li> <li>Since VWSA is independent from MOC, it might be difficult for VWSA to incorporate CNEE under MOC.</li> </ul>	△

Source: JICA Consultant Team

### 3.4 Activities Related to the Budget Plan to Sustain the Training Implementing Organization (Activity 2-2)

#### 3.4.1 Review of the Expenses of Past Pilot Training Courses

As stated above, the concrete discussion of the structure of organization of training implementation and budget plan was not done between CUWC and JICA consultant team.

Therefore, the activity content stated below is the result of collecting information, analysis and study by JICA expert. Hopefully, it is referred by CUWC to continue the activity after the completion of this project.

##### (1) Income and Expenditure Plan calculated in the Detailed Planning Phase

Two pilot training courses were organized in the detailed planning phase. The plan of income and expenditure of VSC in 2017 (Before the establishment of VSC), 2018 (At the start of VSC), and 2019 (After the Project completion) are described in the completion report of the Detailed Planning Phase as shown in Table 3.4.1, although there is no statement of expenditure used for the training.

**Table 3.4.1 Plan of Balance of Payment of VSC (2017 – 2019) calculated in the Detailed Planning Phase**

(Unit: VND)

Year	Income		Expense		Balance	Note
2017	Tuition fee	400,000,000	Expense for training	246,825,000	153,175,000	Nos: 5 courses x 2 times
2018	Tuition fee	1,800,000,000	Expense for training	493,650,000	1,306,350,000	Trainees: local government staff 10, private company 20
			Salary for VSC staff	636,000,000		Fee: 2,000,000 VND for local government staff, 9,000,000 VND for private company
			Travel cost	2,250,000		
			Cost for web	100,000,000		
			Communication cost	24,000,000		
			Other cost	10,000,000		
	Total	1,800,000,000		1,265,900,000	534,100,000	

Source: Project Completion Report of the Detailed Planning Phase

##### (2) Actual Expenditure in Implementation Phase

Expenditures for the five pilot training courses organized from October 2017 to December 2018 are summarized below. In the planning course, the tuition fee was not collected and the cost for the training course was covered by CUWC and JICA.

A textbook was prepared for the first pilot training and the repeated minor amendments were executed for the next training courses. Accordingly, most of the costs for the preparation of textbooks were necessary for the first pilot training. Therefore, the average cost for five pilot training courses, excluding the cost for preparation of textbook, is estimated in Table 3.4.2 at VND 136,160,000.

**Table 3.4.2 Actual Expenses for Five Times Training (Planning Course) from October 2017 to December 2019**

Period Place	2017.10.23-27	2018.4.9-13	2018.7.9-12	2018.10.9-12	2018.12.4-6	Total	Average	Ratio (%)
	Hanoi	Hue	Nha Trang	HCMC	Can Tho			
Training No.	No.1	No.2	No.3	No.4	No.5			
No. of trainees	41	30	48	35	50	204	40.8	
Text book	Preparation	330,900,000				330,900,000		
	Printing	15,600,000	39,690,000	43,770,000	34,945,000	52,950,000	186,955,000	37,391,000
	Shipping	0	2,285,000	1,894,000	2,426,000	3,446,000	10,051,000	2,010,200
Remuneration of lecturer	51,920,000	113,280,000	113,280,000	48,300,000	37,950,000	364,730,000	72,946,000	53.6
Sund ries	Certificate	400,000	400,000	400,000	3,200,000	3,085,000	7,485,000	1,497,000
	Stationery	4,000,000	4,000,000	4,000,000	3,410,000	3,107,000	18,517,000	3,703,400
Farewell party		31,320,000	12,424,000	16,790,000	13,918,000	74,452,000	18,613,000	13.7
Cost for venue	Venue: CUWC	Covered by CUWC						
Total	7,192,000*	190,975,000	175,768,000	109,071,000	114,456,000	662,190,000*	136,160,600	100.0
Expense per trainee	1,754,146	6,365,833	3,661,833	3,116,314	2,289,120	3,246,029	3,337,270	

\*: Personnel cost to prepare the textbook is not included.

Source: JICA Consultant Team

The result of the comparison between the plan of the payment of balance prepared in the detailed planning phase and the actual expenses of the five pilot training courses in the implementation phase is described in Table 3.4.3 and Figure 3.4.1. A four-day training course was assumed in the plan of the payment of balance. However, it is actually a five-day training course. One day was allotted for each of the five training courses. Therefore, it is difficult to simply compare between the plan and actual expense. However, the actual total expense of the five-day training courses and cost per trainee are 7.0 times and 5.2 times more than the plan, respectively. If the personnel cost for the preparation of textbook, VND 330,900,000 is added, the total cost becomes higher.

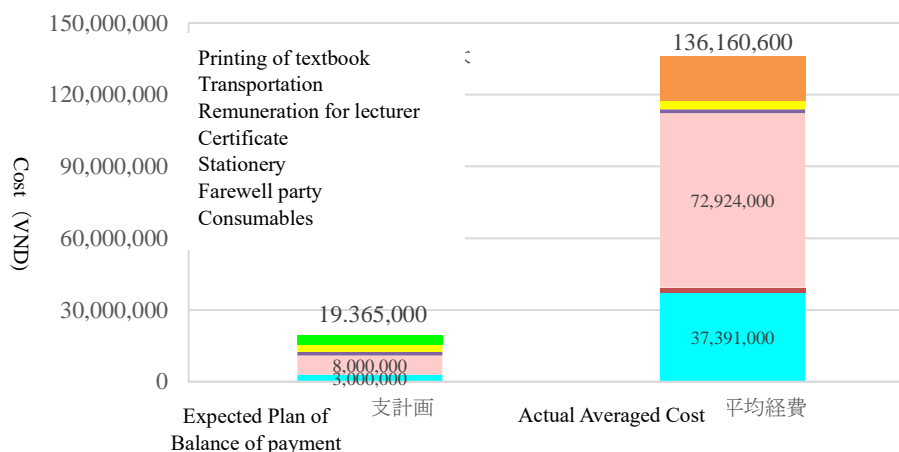
It is expected to use the prepared textbooks for the planning and design course in the future. However, if CNEE/CUWC starts the additional training courses and outsources the preparation of textbooks, additional cost will be necessary.

**Table 3.4.3 Comparison Between the Expected Plan of Balance of Payment and the Actual Expense (Excluding the Cost for Preparation of Textbook)**

Item	Expected Plan of Balance (1)		Actual Averaged Expense (2)		Ratio (3) (3)=(2)/(1)
	Expense (%)		Expense (%)		
Preparation of textbook			330,900,000		
Printing of textbook	3,000,000	15.5	37,391,000	27.5	12.5
Transportation	-	0.0	2,010,200	1.5	
Remuneration for lecturer	8,000,000	41.3	72,946,000	53.6	9.1
Certificate	1,500,000	7.7	1,497,000	1.1	1.0
Stationery	3,000,000	15.5	3,703,400	2.7	1.2
Farewell party	-	0.0	18,613,000	13.7	
Consumables	3,865,000	20.0	0	0.0	
Total	19,365,000	100.0	136,160,600	27.5	7.0
Cost/trainee	645,500		3,337,270		5.2

The expense for preparation textbook is not included.

Source: JICA Consultant Team



Source: JICA Consultant Team.

**Figure 3.4.1 Expected Plan of Balance of Payment and Actual Averaged Cost**

The major reason why the actual expense was higher than the expected plan is the remuneration of the lecturer and the high printing cost of textbooks. Therefore, it is necessary to reduce the cost of the following countermeasures.

- a) Basically, CUWC assigns the lecturers internally because the remunerations were paid to the lecturers from the outside of CUWC, which accounted 53.6% of the total expense of the pilot training courses.
- b) The reason why the printing cost of textbook is higher than the expected plan is that there were many colored printing done for the preparation of the textbook, which accounted for 27.5% of the total expense of the pilot training courses. Therefore, it is necessary to reduce the number of pages and apply black and white printing in more pages in order to reduce the total expense.
- c) The costs of a farewell party and the transportation of textbooks are not high but is an unexpected expense, which accounted for 13.7% and 1.5%, respectively, of the total expense of the pilot training courses.
- d) CUWC uses the existing facilities in Hanoi and Hue because these do not require the venue fee, although the venue of training courses will be dependent on the decision of CUWC.

### 3.4.2 Discussion about Budget of Training Cost

The discussion regarding the budget of training cost is described below. However, the activity to prepare the budget plan of the training cost was not implemented as mentioned in Section 3.4.3.

#### (1) Expense required for Training

##### 1) Current Trainings Implemented by CNEE

CUWC is a financially-independent organization, therefore CNEE operates their training courses based on the contracts with clients. Also, CNEE decides the contract amount based on the total expected cost. Therefore, the contract amount differs case by case and CNEE does not set the regulation to decide the contract amount.

## **2) Pilot Training Courses in the Implementation Phase (Planning Course)**

The situation of cost burden of the five pilot training courses (planning course) organized from October 2017 to December 2018 is described below.

- a) The tuition fee was not collected because the trainees are officers of local governments.
- b) The CUWC and the JICA Expert Team covered the costs for accommodation of trainees, rental of venue of the training course, preparation and printing of textbooks, transportation, remuneration of lecturer, certificate, stationery, and other consumables.
- c) Additionally, the local staff of the JICA Expert Team worked on the preparation and shipping of application, preparation of textbook and venue, distribution and collection of questionnaire paper, and other supporting activities.

## **3) CNEE's Vision for the Cost of Future Training Course**

According to the Director of CNEE, CNEE's vision for the cost of future training courses is described below.

- a) CUWC is financially-independent organization, therefore, CNEE plans to collect the tuition fee after the Project completion. However, CNEE does not prepare their own budget plan. In line with this, CNEE will start to prepare the budget plan in consideration of the financial independence.
- b) MOC subsidizes the local governments every year as the budget of human resources developments. Therefore, if the local governments consider CUWC's training courses as beneficial and useful for them, it is possible to collect the tuition fee from the local government as well as private firms. However, the tuition fee was not collected from the local government in the pilot training courses of the Project.
- c) CNEE will consider how to treat the accommodation fee covered by CUWC at the five pilot training courses organized from October 2017 to December 2018.

## **(2) Income by Collection of Tuition Fee**

It is recommended to collect the tuition fee of the planning course from the local government for the following reasons:

- a) Local governments can dispatch their officers to the training courses of the sewerage sector with the use of the MOC's subsidies for human resources development.
- b) About 1/4 (25.1%) of participants of the planning courses are from PMBs and/or water supply companies, which are not local governments as described in Table 3.4.4.

**Table 3.4.4 Number of Trainees by Organizations**

No./Organization	Province	DOC	CPC	Town PC	PMB	Company	Total
No.1	6	19	16	0	0	0	41
No.2	0	8	12	1	8	4	33
No.3	0	16	10	3	14	5	48
No.4	0	11	9	7	6	2	35
No.5	0	24	13	0	6	7	50
Total	6	78	60	11	34	18	207
Ratio (%)	2.9	37.7	29.0	5.3	16.4	8.7	100.0

Source: JICA Consultant Team

- c) If the tuition fee is not collected, CNEE is required to cover whole cost for the training course. The salaries of CNEE staff are covered by MOC, however, CNEE is required to be financially-independent except for the salaries of their staff. Therefore, if the tuition fee is not collected, CNEE needs to use the surplus budget of the training courses of the water supply sector for the training courses of the sewerage sector. However, this surplus budget is not enough to continue the training courses of the sewerage sector, which will cause the reduction of the amount of time or the discontinuance of the training courses of sewerage sector.

CNEE has not yet decided the specific price of tuition fee to be collected, however, the results of trial calculations for three cases that the tuition fee is free, VND 1,000,000/trainee and VND 2,000,000/trainee are described in Table 3.4.5, which are under the condition that the surplus budget of the training courses of water supply sector is utilized for the training courses of sewerage sector.

**Table 3.4.5 Plan of Balance of Payment for One Training Course**

(Unit: VND 1,000)

Item	Tuition fee (VND/人)			Remarks
	0	1,000,000	2,000,000	
Cost for training	0	40,000	80,000	Assumed the number of trainees is 40.
Surplus budget	49,560	49,560	49,560	Result in 2018
Income	49,560	89,560	129,560	
Expense <sup>*1</sup>	136,160	136,160	136,160	Averaged cost for pilot trainings, Refer to Table 3.4.2
Balance	△86,600	△46,600	△600	

\*1: Cost covered by CUWC is not included in this expense.

Source: JICA Consultant Team calculated based on the provided document by CNEE.

Table 3.4.5 indicates that if VND 2,000,000/trainee is collected, the balance can be break-even, however, if the tuition fee is VND 1,000,000/trainee or free, the balance is - VND 46,600,000 and - VND 86,600,000, respectively.

Moreover, the annual payment of balance for the case that training courses are organized several times in a year is described in Table 3.4.6 and Figure 3.4.2. The necessary cost for one training course can be reduced by assigning CUWC's in-house staff to lecturer and reducing the color pages of textbook. However, the surplus budget of the training courses of the water supply sector, VND 49,560,000 is only 36% of the cost covered by the JICA side, VND 136,160,000. Additionally, the accommodation fee and lunch cost for trainees are not included in this VND 136,160,000, therefore, CNEE will be required to cover a higher cost after the Project completion. If the necessary cost can be half of the current price by

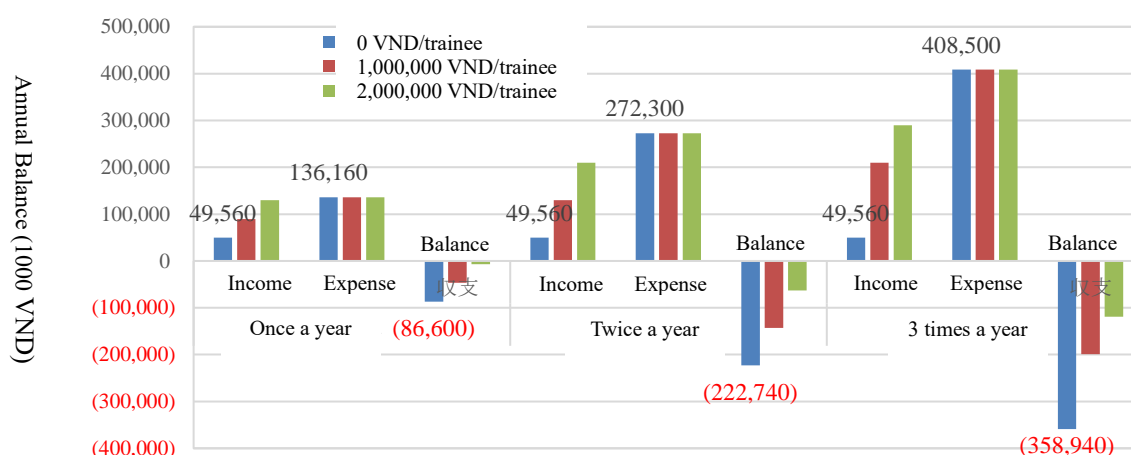
reducing the expenditure, CNEE can organize the training course of the sewerage sector only once a year.

**Table 3.4.6 Plan of Balance of Payment for the Case that Training Courses are Organized Several Times in a Year**

(Unit: VND 1,000)

Item	Tuition Fee per Trainee					
	0		1,000		2,000	
Number of times per year	2	3	2	3	2	3
Cost of training course	0	0	80,000	120,000	160,000	240,000
Surplus budget of water supply sector	49,560	49,560	49,560	49,560	49,560	49,560
Income	49,560	49,560	129,560	169,560	209,560	289,560
Expense	272,300	408,500	272,300	408,500	272,300	408,500
Balance	△222,740	△358,940	△142,740	△238,940	△62,740	△118,940

Source: JICA Consultant Team



Source: JICA Consultant Team

**Figure 3.4.2 Annual Plan of Balance of Payment by Collected Tuition Fee for the Case that Training Courses are Organized Several Times in a Year**

Considering the above-described serious condition and hard reality, if CNEE collects a certain level of tuition fee from trainees, there is a possibility for CNEE to sustain the training courses of sewerage sector. Therefore, it is necessary for CNEE/CUWC to study the suitable price of tuition fee to be collected. Also, if the balance falls into the red, it is necessary for CNEE to confirm with CUWC whether CUWC can cover the shortfall or not and to prepare the budget plan to sustain the training courses of sewerage sector based on the CUWC's policy.

### **3.5 Activities Related to Finalization of Establishment Plan of the New Training Implementing Organization and Submission to Competent Authority (Activity 2-3)**

As described in Section 3.3.2 (2), according to the rector of CUWC and the director of CNEE, CUWC intends to establish a new training center for the sewerage field in CUWC in the future. However, CUWC plans to incorporate the training function of the sewerage field into the existing CNEE at present. Therefore, the establishment plan of a new training implementing organization was not prepared and submitted to the competent authority during the Project period.

It is expected that CUWC will continue the training courses of the sewerage field by making use of the existing facilities and prepare the establishment plan of a new training center at an appropriate time after the Project completion.

Therefore, the activities which is required for CUWC to establish the new training implementation organization, which was studied by JICA expert.

#### **3.5.1 Procedure to Establish the New Implementation Organization of Training**

The procedure to establish a new organization in CUWC is shown below.

- 1) CUWC can execute the internal organizational change of CUWC without the approval of MOC based on Decision No.82/QD-BXD dated January 1, 2018.
- 2) There is a possibility to amend a part of Decision No.82/QD-BXD based on the content of organizational change, however, the necessity of the amendment is unclear because of the organizational change that CUWC has not yet discussed.

#### **3.5.2 Necessity Work during the Preparation Period for Establishing the New Organization in CUWC**

The necessity activities for CNEE, which will be the main implementation organization of training course to establish the new organization, after the completion of this project are stated as below.

- 1) To specify the problem and study on its solution by continuing the training course in the field of sewerage

CNEE implements training course in the field of sewerage for several time in a year without any support by JICA expert, by making use of their experience which obtained in this project. It will contribute to clear the items which CNEE can manage by themselves and cannot do it. It will make them to think about solution for the next training course.

- 2) Study on how to manage the budget of training course to sustain it

It is essential to be financially independent to sustain the training course in the field of sewerage, which means that it is necessary to collect participant fee from trainees. Therefore, CNEE has to discuss the appropriate fee during the preparation period. it can be used for making the budget plan.

- 3) Continuous improvement of training curriculum and material



Although CNEE can use the training curriculum and materials which are prepared in this project for a while, they must update based on the needs. Also, they have to periodically interview the main local government to grasp the needs.

4) Enforce the PR activity of training course

It is necessary to ensure the number of trainees to put the training course on track, which means that it is required to widely spread the contents of training course and its superiority to the related persons in Vietnam. Therefore, it is needed to prepare the leaflet which contains the training contents and photo of facility, and distribute to the local government. Website of CUWC and SNS which built up in this project can be made use of for the PR activity.

Above activities are commonly required to achieve the overall goal of this project. Thus, they are stated in the chapter 6 as recommendation.

## **CHAPTER 4 ACHIEVEMENT OF THE ACTIVITIES RELATED TO OUTPUT-3 (TRAINING FUNCTION)**

### **4.1 Purposes of Activities**

The Government of Vietnam regards the improvement of sewerage as an urgent social issue. Accordingly, there was an increase in the number of WWTPs that were constructed by Japan and through other donor's financial cooperation and private funds. However, the ratio of covered population of wastewater treatment is only around 20% even in Hai-phong City and Can-tho City, which are part of a group of five biggest cities; therefore, long periods of time are required to achieve the goal of “50%” that is regarded by the Government of Vietnam as the target in 2025. (Refer to Appendix 4.1 – 4.3)

As mentioned above, Vietnam has a very high demand for the development of new sewage systems. However, there are limited human resources who can handle the planning and implementation of development projects, which is one of the obstacles to sewerage service increase. Especially in the medium and small cities which plan to install a sewerage system in the near future, the number of sewage engineers is limited, resulting in the lack of sewerage implementation capability, including sewer service development plan, etc.

In order to solve these problems, this training function aims to further improve the sewerage project planning and management capacity of the local government officials, such as the provincial, the People's Committee, and the Construction Department across the country, by establishing the training system in Vietnam.

### **4.2 Schedule of Activities and Performance**

The activity schedule and performance about training function is shown in Figure 4.2.1.

First of all, the curriculum was revised based on the one which had been formulated in the detailed designing phase. It was started to prepare the training materials such as textbook for the decided 2 courses from July 2017. Materials had been updated to reflect trainees' opinions.

The planning course and the preliminary design course had been conducted for 6 times and 3 times respectively from July 2017 to November 2019. Also, social network service was provided to trainees so that they can use it as an area of exchange of information and follow up of training even after the training course.

The preparation of exhibition which is for helping trainees to understand the contents of trainings better such as models were begun from May 2018, and all the exhibitions were installed in CUWC in November 2019.

Moreover, the seminars for appropriate sewerage planning and management were conducted twice in July and November 2019. The importance of house connection was addressed.

Activity	Year Month	2016				2017				2018				2019											
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
3-1 To set up and design the effective training Curriculum for human resource development by analyzing the results from activity 1 on the management capacity of sewerage works.	Plan																								
	Actual																								
3-2 To prepare the training materials in English and Vietnamese as trial basis.	Plan																								
	Actual																								
3-3 To identify training programs based on targeted participants, and to conduct the basic training courses for planning, implementation and management.	Plan																								
	Actual																								
3-4 To reflect the evaluation results of activity 3-3 to modify the training program.	Plan																								
	Actual																								
3-5 To prepare the plan for training facilities and equipment.	Plan																								
	Actual																								
3-6 To formulate SNS network of trainees.	Plan																								
	Actual																								
3-7 To conduct seminars for appropriate sewerage planning and management.	Plan																								
	Actual																								

Source: JICA Consultant Team

Figure 4.2.1 Activity Schedule and Performance of Output 3

### 4.3 Activity for Formulating Training Program

#### 4.3.1 Training Program Formulated in the Detailed Planning Phase

The following items were revealed by the study which implemented in the detailed planning phase from February 2016 to February 2017.

- 1) The higher priority subjects in the cities which sewerage system is not developed or about to start to be installed are 1. Sewerage planning, 2. Design of pipeline, 3 Construction supervision and 4 Selection of waste water treatment.
- 2) The higher priority subjects in the cities which sewerage system is developed are 1 Evaluation of new technology, 2 O&M work of pipeline and 3 Know-how of cutdown of O&M cost etc.
- 3) It is required to educate working -level engineers.
- 4) It is effective to use the actual sewerage facilities in the training course.
- 5) The subject of O&M of sewerage facilities shall no included in this training course, because it has been done by VWSA with the support from GIZ. It must be considered the roles among the donors.

Considering the above outcomes, five kinds of training programs, namely 1) management of sewerage project, 2) sewerage planning, 3) design of sewer pipe, 4) design of wastewater treatment facility, and 5) new technology (pipe jacking method), that were formulated in the detailed planning phase from

February 2016 to February 2017. Programs 1), 2), and 3) had been conducted as the pilot training. Subjects of each course are shown in Table 1.6.1

**Table 4.3.1 Training Program Proposed in the Detailed Planning Phase**

No.	Training course	Subject
1	Management of sewerage project	<ol style="list-style-type: none"> <li>1) Overview of sewerage</li> <li>2) Sewerage government (Law, administrative organization, know-how of project promotion)</li> <li>3) Outline of sewerage master plan</li> <li>4) Sewerage tariff and operation</li> <li>5) Importance of O&amp;M of sewerage</li> <li>6) Public relations</li> <li>7) Site visit of sewerage facility</li> </ol>
2	Sewerage planning	<ol style="list-style-type: none"> <li>1) Outline of urban planning master plan</li> <li>2) Outline of sewerage master plan</li> <li>3) Explanation about decree 80 in Vietnam</li> <li>4) Basic planning of sewer pipe</li> <li>5) Function of sewerage treatment plant and selection of treatment method</li> <li>6) Sewerage tariff and operation</li> <li>7) Site visit of sewerage facility</li> </ol>
3	Design of sewer pipe	<ol style="list-style-type: none"> <li>1) Overview of Sewerage</li> <li>2) Planning method of pipeline</li> <li>3) Design method of pipeline</li> <li>4) Construction method of pipeline</li> <li>5) Selectin method of earth retaining work</li> <li>6) O&amp;M of pipeline</li> <li>7) Site visit of construction site of pipeline</li> </ol>
4	Design of wastewater treatment facility	<ol style="list-style-type: none"> <li>1) General remark of water treatment</li> <li>2) General remark of sludge treatment</li> <li>3) Check point of STP design</li> <li>4) Importance of water quality management</li> <li>5) Practical training of water quality test</li> <li>6) O&amp;M of STP</li> <li>7) Site visit of sewerage facility</li> </ol>
5	New technology (pipe jacking method)	<ol style="list-style-type: none"> <li>1) Outline of sewerage project</li> <li>2) Outline of sewer pipe system</li> <li>3) Overview of pipe jacking method and selection method of appropriate construction method</li> <li>4) Design method of ground improvement method</li> <li>5) Point of design of pipe jacking method</li> <li>6) Exercise of design of pipe jacking method</li> <li>7) Site visit of construction site</li> </ol>

Source: JICA Consultant Team

### 4.3.2 Training Program Reformulated in Implementation Phase

The curriculum proposed in the detailed planning phase referred to the one of Japan sewage work agency. All the subjects are necessary to learn the sewerage planning and project implementation, but the curriculum was revised in the implementation phase.

- 1) Sewerage treatment plants (STPs) have been constructed by foreign support, such as yen loan, in urban areas in Vietnam. However, the values of inflow water quality and volume are not as high as the design value in those STPs because house connection is not done in most of the cities. This is a large problem.
- 2) The curriculum proposed in the detailed planning phase is comparatively general planning and design method; therefore, it is revised to focus on the solution of 1) so that problems are shared among the people involved in sewerage projects. Moreover, it is expected that the effect of training implementation is maximized.
- 3) It is expected that the effect of training implementation is maximized by introducing Japanese technologies which are widely used and which contribute to solve the problems written in 1).
- 4) It is necessary to install fascinating subjects with training tools, because it is intended that CUWC as the training course implementation organization can make this training course self-sustaining by collecting participation fees.

Given the above condition, two courses are highlighted, namely 1) planning course and 2) preliminary design course. The curriculums are revised, and pilot training are conducted together with training the lecturers.

Training curriculums, which are set in the implementation phase, are shown in Table 4.3.2.

**Table 4.3.2 Training Curriculum Set in The Implementation Phase**

No.	Training Course	Training Subject
1	Planning course	<ol style="list-style-type: none"> <li>1) Structure of sewerage and drain master plan</li> <li>2) Enhancement of sewage collecting system by promoting house connection</li> <li>3) Basic planning of sewer pipeline network</li> <li>4) Overview of CCTV camera</li> <li>5) Sewer pipeline database system (technical introduction by Japanese company)</li> <li>6) Pipeline design assist system (technical introduction by Japanese company)</li> <li>7) Jokaso (technical introduction by Japanese company)</li> <li>8) Small type uPVC manhole and pipe material (technical introduction by Japanese company)</li> <li>9) PTF method (technical introduction by Japanese company)</li> <li>10) Pipe jacking method (technical introduction by Japanese company)</li> <li>11) Site visit</li> </ol>
2	Preliminary design course	<ol style="list-style-type: none"> <li>1) Challenge and solution for appropriate sewerage system</li> <li>2) Points to be checked in the design work for sewer</li> <li>3) Data management of sewer network and house connection by using database system (lecture with exercise by using the actual software)</li> </ol>

		<p>4) Promotion of installation of sewer pipeline by making use of pipe design assist system (lecture with exercise by using the actual software)</p> <p>5) Small type uPVC manhole and pipe material (technical introduction by Japanese company)</p>
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Source: JICA Consultant Team

### 4.3.3 Fact-Finding Survey of House Connecting Condition in the Cities where Sewerage System is Developed

As stated in Subsection 4.3.2, it is a problem that the inflow water quality and the volume of STP are not as high as designed in most of the cities where an STP is running because house connection is not implemented.



On the other hand, according to the article “Socialist Republic of Vietnam, Performance of the Wastewater Sector in Urban Areas: A Review and Recommendations for Improvement” which was issued by the World Bank, separate sewerage system is installed in Buon Me Thuot City, Da Lat City, and Binh Duong Province. Their sewerage systems are developed with house connection. A fact-finding survey was conducted to improve the contents of training course by considering their experience and know-how. An interview with a sewerage administrative organization and site visits were conducted. The overview of the survey is shown in Table 4.3.3.

**Table 4.3.3 Overview of Fact-Finding Survey**

Investigation Items	Buon Me Thuot City	Da Lat City	Binh Duong Province
Organization	Dak Lak Urban & Environment JSC	LAWACO	Binh Duong Water-Environment JSC (BIWASE)
House connection ratio	50%	60%	50%
Promotion activity for house connection	50% of PMU officers worked on the PRs activity with use of model of house connection and explanatory board exhibited in STP	LAWACO implemented the PRs in the evening or night once or twice for each district with use of the descriptive model and panel exhibited in the STP. Also, PR activities were implemented through local TV and radio programs.	BIWASE implements the annual competition among districts and introduces the award and penalty system. Additionally, PR activities are implemented through local TV program, radio program and seminar in high school.
How to handle septic tank	It is demolished during the house connecting construction.		
Financial support system	If residential people implement house connection work within two years after sewer pipes are installed, they can receive a certain amount of subsidy.	Same as on the left	BIWASE has loan and subsidy system

Source: JICA Consultant Team

It was found that all of the three cities/province have made intense and effective efforts on public relations. Also, the obvious positive effect on the environment was observed in the survey. The water quality of urban river and the inflow water quality have improved. Their positive impacts are larger than other cities where STPs have been installed.

 <p>Water quality of urban river has been improved in Da Lat City</p>	 <p>Same as on the left</p>
 <p>Inflow water quality is high in STP in Buon Me Thuot City</p>	 <p>Inflow water quality is high in STP in Binh Duong Province</p>

Details are in the fact-finding report in the appendix.

#### **4.4 Schedule and Achievement of Activities**

##### **4.4.1 Schedule of Pilot Training Course**

The first and second pilot training courses were conducted in the detailed planning phase. The 3<sup>rd</sup> and 11<sup>th</sup> pilot training courses were conducted in this phase. The schedule of pilot training courses is shown in Table 4.4.1

**Table 4.4.1 Schedule of Pilot Training Course**

No.	Date	Contents	Venue	Target Trainee	Participants
No.1	2016/8/9~10	Project operation	Hanoi	Local government employee	20
No.2	2016/11/15~18	Planning & Design course	Hanoi	Local government employee	22

No.3	2017/10/23~27	Planning course	Hanoi	Local government employee	40
No.4	2018/4/9~13	Planning course	Hue	Local government employee	30
No.5	2018/7/9~12	Planning course	Nha Trang	Local government employee	48
No.6	2018/10/9~12	Planning course	Ho Chi Minh	Local government employee	35
No.7	2018/12/4~6	Planning course	Can Tho	Local government employee	50
No.8	2019/3/26~28	Preliminary design course	Hanoi	Consultant	20
No.9	2019/7/17~19	Preliminary design course	Ho Chi Minh	Consultant	20
No.10	2019/9/23~25	Planning course	Lao Cai	Local government employee	41
No.11	2019/10/30~11/1	Preliminary design course	Nha Trang	Consultant	45

Source: JICA Consultant Team

#### **4.4.2 Improved Points**

Questionnaires to trainees, lecturers and supporting staff were done in each pilot training. The outcome of them were shared and discussed in JICA consultant team, and the contents and operation method of training had been improved gradually. The main improved points are shown as below.

- Figures and tables were inserted to textbook to help trainees understand the contents.
- The presentation materials were also attached to the textbook.
- It was found out that it is difficult for local government employees who are in the manager class to leave their office for 4 days, since they are busy. Considering this situation, the duration of the pilot training course was shortened to 3 days.
- Site visit was planned as much as possible to help trainees understand the training contents.
- Enough break time was scheduled to let trainees stay focus on the lectures in addition to lunch break.

At the beginning, Q&A session was scheduled at the last day of training course, but it was changed to set in each end of lecture.



## 4.5 Contents of Activity \_ Training of Trainers

### 4.5.1 Trainer of Pilot Training (Planning Course)

There were 17 lectures conducted in the five pilot training courses, and the total number of their lecturers were 49. 12 lecturers (24.5%) are from MOC, 17 lecturers (34.7%) are from the JICA Expert Team, and 4 lecturers (32.7%) are from CUWC. Each lecturer is shown in Table 4.5.1.

**Table 4.5.1 Trainer of Training Course**

Subject	No.	Lecturer	Organization			
			MOC	JEC	CUWC	Private company
1. Management and Planning of Sewerage and Drainage – Wastewater Treatment in Viet Nam	1	Ms. Tran Ti Thao Hung	○			
	2		○			
	3		○			
	4		○			
	5		○			
2. Decree No.16/2016/NĐ-CP on Management of Utilization of ODA funds	1	Mr. Nguen Ngoc Duong	○			
	2		○			
	3		○			
3. Outline of sewage work and structure of sewerage and drainage Master Plan	1	Dr. Do Thuan An		○		
	2			○		
	3			○		
	4			○		
	5			○		
4. Case study about Nam Dinh City Sewerage and Drainage MP formulation	3	Mr. Do Manh Quan	○			
	4		○			
	5		○			
5. Lessons Learned from WB Report – Discussion	2	Dr. Do Thuan An		○		
6. Feasibility Study in Vietnam	1	Mr. Takeki Kajiura		○		
7. Feasibility Study -Case Study of Phan Rang-Thap Cham Project	2	Mr. Kien Hung		○		
	3			○		
8. Basic Planning for Sewerage Pipe Network and Its Exercise	1	Dr. Do Thuan An		○		
	2			○		
	3			○		
	4			○		
	5			○		
9. Critical issues of sewerage system of Viet Nam; necessity of household connection and tertiary network	3	Mr. Tamaki Mori		○		
	4			○		
	5			○		
10. Separated Sewerage system including Q&A	5	Mr. Pham Thanh Dat			○	
11. Exercise for MP and FS	2	Mr. Bui Manh Dung	○			
12. Pipe Jacking and Micro Tunneling	2	Iseki Poly- Tech.Inc				○
	3					○

	4					○
	5					○
13. CCTV	2	Ms. Vu Thi Hoai An			○	
	3				○	
	5				○	
14. Small type manhole and Plastic materials for flood control facility	2	Sekisui Chemical Co. Ltd				○
	3					○
	4					○
	5					○
15. PTF Technology	3	Metawater Water Co. Ltd				○
	4					○
	5					○
16. Database and mapping for sewerage and drainage	2	Tamano Consultants .Co. Ltd				○
	3					○
	4					○
	5					○
17. Pipe Design Program (PDP)	5	Pipe Design Inc.				○
Total (Number of lecturer)			12	17	4	16
Total (Ratio of each entity %)			24.5	34.7	8.2	32.7

Source: JICA Consultant Team

#### 4.5.2 Securing Lecturer for Planning Course

According to Mr. Dat, CNEE has the following opinions about the lectures for the planning course.

- 1) CNEE will make an effort to secure the lecturers for the training course based on the request.
- 2) There are seven officers in CNEE. Also, officers from the department of water supply and sewerage, which is the other department in CUWC, can be candidates for the lectures of training course. Talented officers from not only CNEE but the Department of Water Supply and Sewerage should be hired as lecturers for the planning course. (See Table 4.5.2)
- 3) It is possible to engage experts from external organizations, such as training, research and business model, because CNEE has established a network with them. One of the strong candidates is VWSA since they have affluent experience in engineering consulting. CNEE can corroborate with VWSA depending on the contents of the training course.

**Table 4.5.2 Candidates for Lecturers in CUWC**

No.	Name	Major Specialty	Position	Years of Experience
<b>I. Main Lecturers</b>				
1	Pham Thanh Dat	Master of water supply, sewage and environment	Director	14
2	Vu Thi Hoai An	Master of water supply, sewage and environment	Vice director	17
3	Dinh Quang Hiep	Engineer of wated supply and sewage	Lecturer	25

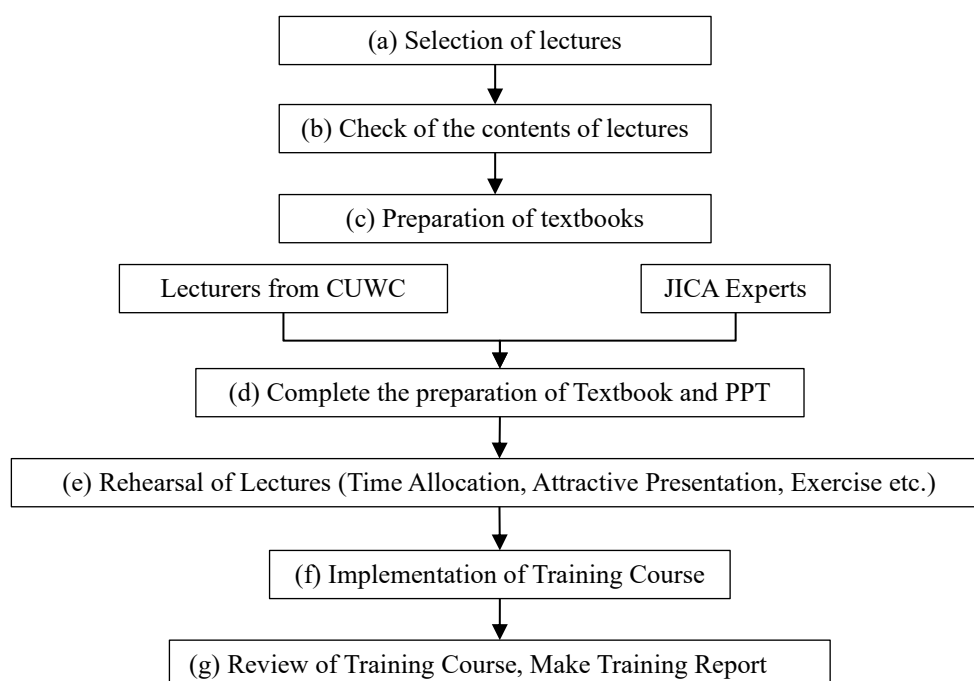
4	Duong NGoc Anh	Degree of water supply, sewage and environment	Lecturer	7
5	Nguyen Thi Bich Lien	Master of water, environment, oceanography	Lecturer	5
6	Le Nho Khanh	Diploma of automatic electricity	Lecturer	20
7	Tran Thi Thu Huong	Diploma of accounting	Staff	3
8	Nguyen Thi Thanh Mai	Degree of Chemistry	Officer	
<b>II. Lecturers</b>				
1	Hoang Quoc Liem	Master of water supply, sewage and environment	Dean of Urban technical, Head of Department of water supply & sewage	17
2	Thach Thanh Minh	Master of water supply, sewage and environment	Vice director of Center of construction	16
3	Khuong Hai Yen	Master of water supply, sewage and environment	Lecturer	15
4	Vu Thi Thu Hien	Master of water supply, sewage and environment	Lecturer	15
5	Nguyen Quoc Tam	Master of automatic electricity	Associate Dean of technology	13
6	Nguyen Van Minh	Master of law, labor safety	Ass Dean	15
7	Nguyen NGoc Nam	Engineer of water supply and sewage	Lecturer	22
8	Bui Thi Van	Degree of Chemistry	Lecturer	25
9	NguyenVan Toi	Degree of welding	Lecturer	28
<b>III. A part-time lecturers</b>				
1	Tran Duc Ha	Ass Prof, Phd of water supply , sewage and environment	Former head of Department of CTN & environment, University of Construction	35
2	Nguyen Viet Anh			20
3	Nguyen Van Tin	Ass Prof, Phd of water supply and sewage	University of Construction	35
4	Nghiem Van Khanh	Phd of water supply, sewage and environment	Ass dean of technical infrastructure- University of architecture	12
5	Nguyen Xuan Quyet	MBA of water supply and sewage	Director of Bac Ninh sewage JSC	14
6	Nguyen Trieu Duong		Vietnam Academy of Science and technology	17
7	Nguyen Bang Giang	MBA of Chemistry		25
8		MBA of water supply and sewage	Director of Dong Anh water plant	15
9	Nguyen Xuan Dai	MBA of water supply and sewage	Director of design factory- Fresh water No2 JSC, Hanoi	16
10	Ngo Van Duc		Manager of Planning Dept, Fresh water No2 JSC, Hanoi	

Source: JICA Consultant Team

#### 4.6 Training of Trainers for the Preliminary Training Course

The JICA VSC Team had to hire lecturers from the local consultant and manufacturer since the lecturers in CUWC are not that competent in each subject of the planning course. However, it was decided to conduct all four subjects of the preliminary design course with lecturers from CUWC. Lecturers were selected from CUWC in November 2018, and the training of trainers (TOT) had been intensively conducted until March 2019. Also, the JICA Consultant Team repeatedly followed up with them right before the training courses held in July, September, and October.

The methodology of the TOT for the four subjects is shown in Figure 4.6.1. The time allocated for each step will be decided based on the discussion between lectures from CUWC and the JICA Expert Team.



Source: JICA Consultant Team

**Figure 4.6.1 Procedure of TOT**

##### 4.6.1 Subject and Lecturer

The subjects and their contents for the preliminary design course are shown in Table 4.6.1.

**Table 4.6.1 Subjects and Contents**

No.	Subject	Main contents
1	Challenge and Solution for appropriate sewerage	Sewerage planning 1. Current situation of sewerage sector in Vietnam 2. Overview of planning course 3. Main issues which were mentioned in planning course (1) Waste water treatment method (2) Selection of place of treatment plant (3) The importance of tertiary pipe 4. Concrete countermeasure of those issues and important points

		<p>Selection of sewerage treatment method</p> <ol style="list-style-type: none"> <li>1. Characteristic of each sewerage treatment method             <ol style="list-style-type: none"> <li>(1) Anaerobic method</li> <li>(2) Aerobic method (fixing method/floating method)</li> </ol> </li> <li>2. Trade-off relationship among each factor</li> <li>3. Construction and O&amp;M cost of typical treatment method</li> <li>4. Points to be checked in the selection of treatment method (place of STP, site area, soil condition, sewerage system development area, planned population and so on)</li> <li>5. Selection of treatment method based on quantitative and qualitative evaluation</li> <li>6. Points to be checked when new technology is installed</li> </ol>
2	Points to be Checked in the Design Work of Sewer	<ol style="list-style-type: none"> <li>1. The necessity of checking the sewerage system by consultants and local government officers in the designing phase.</li> <li>2. Points to be Checked in the Design Work of Sewer             <ol style="list-style-type: none"> <li>(1) Interval and structure of manhole</li> <li>(2) Selection of pipe material</li> <li>(3) Load on pipe material</li> <li>(4) Foundation of pipeline</li> <li>(5) Install method of pipeline</li> </ol> </li> <li>3. Check points of structure             <ol style="list-style-type: none"> <li>(1) Selection of earth retaining method</li> <li>(2) Important point of earth retaining</li> </ol> </li> <li>4. Design of rainwater storage and infiltration facility</li> </ol>
3	Pipe Design Supporting System (Pipe Design Pro; PDP)	<ol style="list-style-type: none"> <li>1. Overview of pipe design supporting system (PDP)</li> <li>2. Purpose and advantage of utilization of PDP</li> <li>3. Demonstration of software</li> <li>4. How to use</li> <li>5. Points to be checked in the actual operation</li> <li>6. Compatibility with other software</li> </ol>
4	Sewer Network Database System (COMPUS II)	<ol style="list-style-type: none"> <li>1. Overview of sewer network database system (COMPUS II)</li> <li>2. Purpose and advantage of utilization of COMPUS II</li> <li>3. Demonstration of COMPUS II</li> <li>4. How to use</li> <li>5. Points to be checked in the actual operation</li> <li>6. Compatibility with other software</li> <li>7. Utilization method of COMPUS II for appropriate O&amp;M (replace and repairment of pipe)</li> </ol>

Source: JICA Consultant Team

Also, each lecturer and supporting members from the JICA Consultant Team are shown in Table 4.6.2.

**Table 4.6.2 Lectures of Preliminary Course**

Subject	Member	
1. Review of Planning Course	JICA Expert Team	Ms. Hiroko Kamata Dr. Do Thuan An
	CUWC (Lecturer)	Mr. Pham Thnh Dat
2. Points to be Checked in the Design Work of Sewer	JICA Expert Team	Mr. Takeki Kajiura Mr. Satoshi Yanamoto Ms. Satomi Tabata
	CUWC (Lecturer)	Ms. Vu Thi Hoai An
3. Pipe Design Supporting System (Pipe Design Pro; PDP)	JICA Expert Team	Mr. Hiroshi Oura
	CUWC (Lecturer)	Mr. Hoang Quoc Liem
4. Sewer Network Database System (COMPUS II)	JICA Expert Team	Mr. Isao Mori
	CUWC (Lecturer)	Mr. Nguen Cong Duc

Source: JICA Consultant Team

### 4.6.2 Implementation Schedule of TOT

The implementation schedule of the TOT is shown in Figure 4.6.2 .

		2018		2019																
		11	12	1	2	3	4	5	6	7	8	9	10	11						
1) Selection of a lecturer	Plan																			
	Actual																			
2) Preparation of textbook and PPT	Plan																			
	Actual																			
3) Rehearsal of lecture	Plan																			
	Actual																			
4) Implementation of lecture	Plan																			
	Actual																			
5) Review	Plan																			
	Actual																			

Source: JICA Consultant Team

**Figure 4.6.2 Implementation Schedule of TOT**

### 4.6.3 Training of Trainers, Technology Transfer

The contents of the TOT for the preliminary design course are discussed below.

#### (1) Subject 1 “Challenge and Solution for Appropriate Sewerage”

The contents of the TOT for Subject 1: “Challenge and Solution for appropriate sewerage” is shown in Table 4.6.3.

**Table 4.6.3 Contents of TOT for Subject 1: “Challenge and Solution for Appropriate Sewerage”**

No.	Date	Main contents of meeting
1	2018.12.10	1 <sup>st</sup> meeting with Mr. Dat. Check of TOT method
2	2018.12.14	2 <sup>nd</sup> meeting with Mr. Dat, CNEE. Check of the contents of lecture and textbook
3	2018.12.17	3 <sup>rd</sup> meeting with Mr. Dat, CNEE. Check of the contents of lecture and textbook
4	2018.12.19	4 <sup>th</sup> meeting with Mr. Dat, CNEE. Check of the contents of lecture and textbook
5	2018.12.24	Effluent standard was discussed with Mr. Dung from ATI, because stricter effluent standard will be applied if intake point of water treatment plant is constructed at a downstream side of discharge point of STP.
6	2019.1.4	5 <sup>th</sup> meeting with Mr. Dat, CNEE. Check of the contents of textbook
7	2019.1.7	6 <sup>th</sup> meeting with Mr. Dat, CNEE. Revise of textbook and check of work for finalizing
8	2019.2.21	7 <sup>th</sup> meeting with Mr. Dat, CNEE. Check of revised textbook
9	2019.2.25	It was decided that flood control measure was included in the lecture. Revised PPT was sent to Mr. Dat.
10	2019.3.11	Textbook (Vietnamese ver.) was sent to Mr.Dat.
11	2019.3.15	Rehearsal of 4 subjects were conducted in CUWC, and improvement points and comment were discussed among the presenters and JICA expert team members.
12	2019.3.29	8 <sup>th</sup> meeting with Mr. Dat, CNEE. Review of TOT

Source: JICA Consultant Team



3<sup>rd</sup> Meeting



5<sup>th</sup> Meeting



Rehearsal of Lecturer

Source: JICA Consultant Team

**Figure 4.6.3 TOT of Subject 1**

**(2) Subject 2: “Points to be Checked in the Design Work of Sewer”**

The contents of the TOT for Subject 2: “Points to be Checked in the Design Work of Sewer” is shown in Table 4.6.4.

**Table 4.6.4 Contents of TOT for Subject 2: “Points to be Checked in the Design Work of Sewer”**

No.	Date	Main contents of meeting
1	2019.12.27	Draft textbook which made by consultant team was sent to Ms. An from CNEE, and she reviewed its contents,
2	2019.1.14	Meeting was held during the training in Japan. The contents of textbook were checked
3	2019.2.18	Meeting with Ms. An. Check of the contents of textbook
4	2019.3.8	Meeting with Ms. An. Check of the contents of textbook
5	2019.3.15	Rehearsal of lecture

Source: JICA Consultant Team



Rehearsal of Lecturer

Source: JICA Consultant Team

**Figure 4.6.4 TOT of Subject 2**

**(3) Subject 3: “Pipe Design Pro (PDP)”**

The contents of TOT for Subject 3: “Pipe Design Pro (PDP)” is shown in Table 4.6.5.

**Table 4.6.5 Contents of TOT for Subject 3: “Pipe Design Pro (PDP)”**

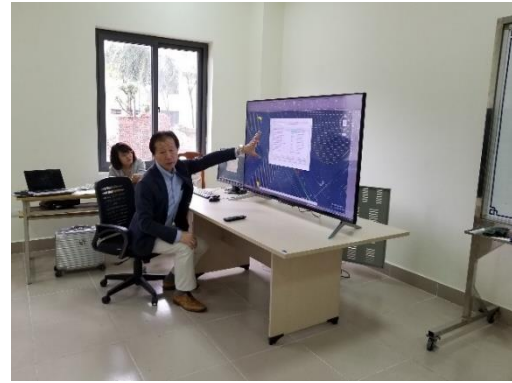
No.	Date	Main Contents of Meeting
1	2018.12.10	Meeting with lecturers. The overview of PDP was introduced. The contents and schedule of TOT were explained.
2	2018.12.11	System and advantage of PDP were explained to lecturers. Usage example was introduced.
3	2018.12.12	Operation practice of the software to understand it deeply
4	2019.1.21	Discussion of the lecture contents in the preliminary design course
5	2019.1.22-23	Operation practice of the software
6	2019.2.20-22	Operation practice of the software
7	2019.3.12	Set up of 10 note PCs
8	2019.3.13-14	Operation practice of the software
9	2019.3.15	Rehearsal of lecture
10	2019.6.25-26	The contents of lecture which is planned in the next month was checked and revised points from the previous training course were also checked. Operation practice of the software
11	2019.7.11-12	Revised presentation documents were explained. The data of Nam Dinh MP was installed as sample data for PDP. Operation method of demo data was taught.
12	2019.7.15	Simple rehearsal and preparation of training course
13	2019.9.18-20	Presentation contents of the planning course was discussed, and presentation and textbook were revised. Auto CAD and PDP software were updated, and new form was installed into each PC.
14	2019.10.24-25	Check of lecture contents which was updated. Operation practice of demo data (Nam Dinh MP)
15	2019.10.28	Simple rehearsal and preparation of training course

Source: JICA Consultant Team





Meeting in 2018.12.10 ~12



Meeting in 2018.12.10 ~12



Meeting in 2019.1.21~23



Meeting in 2019.1.21~23



Meeting in 2019.2.20~22



Meeting in 2019.2.20~22



Meeting in 2019.3.12~14



Meeting in 2019.3.12~14



Rehearsal in 2019.3.15



Meeting in 2019.6.25~26



Data install in 2019.7.11



Meeting in 2019.7.11~12



Meeting in 2019.10.24~25



Meeting in 2019.10.24~25

Source: JICA Consultant Team

Figure 4.6.5 TOT of Subject 3

(4) Subject 4: “Compus II”

The contents of TOT for Subject 4: “Compus II” is shown in Table 4.6.6.

Table 4.6.6 Contents of TOT for Subject 4 “Compus II”

No.	Date	Main Contents of Meeting
1	2018.12.10	Meeting with lecturers. The overview of Compus II was introduced. The contents and schedule of TOT were explained.
2	2018.12.11	System and advantage of Compus II were explained to lecturers. Usage example was introduced.
3	2018.12.12	Operation practice of the software to understand it deeply

No.	Date	Main Contents of Meeting
4	2019.1.21	Discussion of the lecture contents in the preliminary design course
5	2019.1.22-23	Operation practice of the software
6	2019.2.20-22	Operation practice of the software
7	2019.3.12-14	Operation practice of the software
8	2019.3.15	Rehearsal of lecture
9	2019.6.25-26	The contents of lecture which is planned in the next month was checked and revised points from the previous training course were also checked. Operation practice of the software
10	2019.7.11-12	Revised presentation documents was explained. Operation practice demo data
11	2019.7.15	Simple rehearsal and preparation of training course
12	2019.9.18-20	Presentation contents of the planning course was discussed, and presentation and textbook were revised.
13	2019.10.24-25	Revised presentation documents was checked. Operation practice demo data
14	2019.10.28	Simple rehearsal and preparation of training course. Update and explanation of data for exhibition in CUWC

Source: JICA Consultant Team



Meeting in 2018.12.10~12



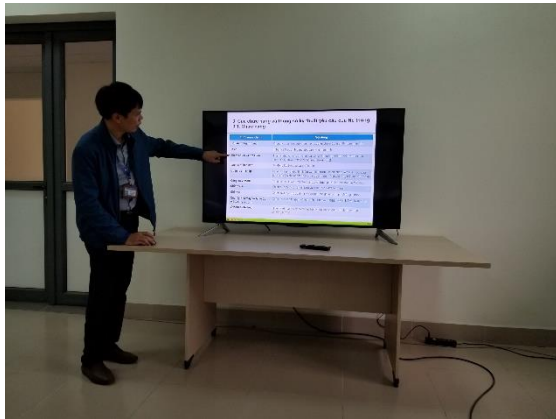
Meeting in 2018.12.10~12



Meeting in 2019.2.20~22



Meeting in 2019.2.20~22



Rehearsal in 2019.3.15



Meeting in 2019.6.25~27



Meeting in 2019.7.11~12



Meeting in 2019.9.18~20



Meeting in 2019.10.24~25



Update of data for exhibition in CUWC in 2019.10.28

Source: JICA Consultant Team

**Figure 4.6.6 TOT of Subject 4**

## **4.7 Analyze and Consideration of Training Contents and Duration in the Future**

### **4.7.1 Purpose**

A questionnaire was distributed to the trainees as part of the survey conducted in all the training courses. Also, it was done to the lecturers' supporting staff. The result of the questionnaire was analyzed in order to improve the training course in the future.

## 4.7.2 Evaluation of the Training Contents

### (1) Five Alternative Questions

The results of five alternative questions about the contents of the planning course were summarized in Table 4.7.1. The planning courses were implemented five times from October 2017 to December 2018. The major answer was “mostly satisfied”, and the weighted mean is beyond 4.0.

In the questionnaire, 5 corresponds to “very satisfied”, and 1 corresponds to “not useful”. Meanwhile, the answer from lecturers and supporting staff includes ratings below 4.0, as shown in Table 4.7.2.

**Table 4.7.1 Number of Answers from Trainees and Weighted Mean for Each Subject**

Subject	Content of Question	Nos. of Answers from Trainees					Weighted Mean
		5	4	3	2	1	
Management and Planning of Sewerage and Drainage – Wastewater Treatment in Vietnam	Practical contents	42	74	7	0	0	4.3
	Understandable lecture	39	73	9	0	0	4.2
Outline of Sewage Works and Structure of Sewerage/Drainage Master Plan	Useful for work	55	85	8	0	0	4.3
	Understandable textbook	45	89	10	0	0	4.2
	Readable textbook	46	82	15	1	0	4.2
Case study about Nam Dinh City Sewerage and Drainage MP formulation	Practical contents	34	52	7	0	0	4.3
	Understandable textbook	23	55	14	0	0	4.1
Lessons Learned from WB Report – Discussion	Understandable lecture	2	4	1	0	0	4.1
Feasibility Study in Vietnam	Understandable lecture	5	11	1	0	0	4.2
	Understandable textbook	8	8	1	0	0	4.4
	Readable textbook	5	11	1	0	0	4.2
Feasibility Study – Case Study of Phan Rang-Thap Cham Project	Practical contents	16	36	13	0	0	4.0
	Understandable lecture	15	37	13	0	0	4.0
	Readable textbook	15	25	12	0	0	4.1
Basic Planning for Sewerage Pipe Network and Its Exercise	Practical contents	8	13	2	0	0	4.3
	Understandable lecture	44	87	11	0	0	4.2
	Readable textbook	37	93	9	0	0	4.2
Critical issues of sewerage system of Viet Nam; Necessity of household connection and tertiary network	Understandable lecture	47	44	1	0	0	4.5
Exercise for MP and FS	Useful for work	2	7	0	0	0	4.2
	Interesting teaching method	2	7	0	0	0	4.2
Pipe Jacking and Micro Tunnelling	Practical contents	37	69	7	0	0	4.3
	Understandable lecture	31	78	7	0	0	4.2
CCTV	Practical contents	28	53	4	0	0	4.3
	Understandable textbook	31	50	4	0	0	4.3
Small type manhole and Plastic materials for flood control facility	Practical contents	34	51	5	0	0	4.3
	Understandable lecture	29	55	6	0	0	4.3
PTF Technology	Practical contents	26	55	8	0	0	4.2
	Understandable lecture	18	59	12	0	0	4.1
Database and mapping for sewerage and drainage	Practical contents	28	53	4	0	0	4.3
	Understandable lecture	18	60	6	1	0	4.1
Pipe Design Program (PDP)	Practical contents	8	18	2	0	0	4.2
	Understandable lecture	4	20	4	0	0	4.0

Source: JICA Consultant Team

**Table 4.7.2 Answer from Lecturers and Supporting Staff**

Subject	Content of Question	Nos. of Answers					Weighted Mean
		5	4	3	2	1	
Question to lecturers	Satisfaction of work	9	26	7	2	1	3.9
	Useful textbook for the lecture	19	21	4	0	0	4.3
	Useful PPT for the lecture	11	27	3	0	0	4.2
Questions to supporting staff	Translation of textbook and PPT	4	14	0	0	0	4.2
	Smooth and harmonized logistical preparation work	5	16	0	0	0	4.2
	Appropriate volume of textbook contents	2	16	5	0	0	3.9
	Understanding and response from trainees	1	15	5	2	0	3.7

Source: JICA Consultant Team

## (2) Main Problems from the Answer of Description Type

### 1) Unify of the Level of Trainees

There is no selection of trainees, although GI regulates the expected experiences. Some belong to the PMB and know a lot about the sewerage planning. Others do not have much knowledge about the sewerage system. All the trainees attend the lectures together, and some get bored according to the questionnaire. The level of trainees should be unified, or participatory lecture is desirable in case it is difficult to unify them.

**Table 4.7.3 Organization of Trainees of the Planning Course**

No.	Province	DOC	CPC	Town PC	PMB	Company	計
1	6	19	16	0	0	0	41
2	0	8	12	1	8	4	33
3	0	16	10	3	14	5	48
4	0	11	9	7	6	2	35
5	0	24	13	0	6	7	50
Total	6	78	60	11	34	18	207
Ratio (%)	2.9	37.7	29.0	5.3	16.4	8.7	100.0

Source: JICA Consultant Team

**Table 4.7.4 Position of Trainees of the Planning Course**

No.	Applicants	Participants					Participants completed training
		Clerical officer	Technical officer	Manager class	Others	Total	
1	48	0	32	9	0	41	40
2	33	0	23	7	0	30	30
3	48	0	29	19	0	48	46
4	35	0	20	15	0	35	35
5	55	0	23	27	0	50	45
Total	219	0	127	77	0	204	196
Ratio (%)		0	0	62.3	37.7	0.0	100.0

Source: JICA Consultant Team

### 2) Training Period

Five days were allocated for the 1<sup>st</sup> and 2<sup>nd</sup> training courses. However, the 3<sup>rd</sup> training course was shortened to 3 days because it was difficult for the trainees who had managerial positions to leave their work for 5 days. According to the result of questionnaire, 85.2% of the trainees answered that the training period is appropriate, so 5 days was deemed not too long.

**Table 4.7.5 Result of Questionnaire about Training Period of the Planning Course**

No.	Answers	Answers					Weighted mean
		Too long (5)	Long (4)	Appropriate (3)	Short (2)	Too short (1)	
1	18	0	9	17	1	0	3.3
2	18	0	1	17	0	0	3.1
3	40	0	2	35	3	0	3.0
4	24	0	2	22	0	0	3.1
5	26	0	1	24	1	0	3.0
Total	135	0	15	115	5	0	3.1
Ratio (%)		0	11.1	85.2	3.7	0.0	

Source: JICA Consultant Team

The time for the lecture was drastically shortened because the training course period was shortened, and a site visit was included to the curriculum. Also, some trainees requested to add various subjects. In order to do so, the training course period needed to be longer or the break time and lunch time had to be shortened. However, most of the trainees preferred to have enough break time. It is impossible to satisfy everyone's opinions, but all feedback is necessary to consider and decide the appropriate schedule.

The 1<sup>st</sup> day is for distribution of the textbook, and the lecture finishes at noon of the 5<sup>th</sup> day, so the mean training period is essentially 3.5 days. In case of a 3-day training, the resulting mean training period is 2.5 days. The reason why the lecture finishes at noon of the last day is for consideration of those who are from far areas.

As stated in Chapter 3, the mean and median training period of other training courses are 2.9 and 3 days, respectively. The standard training period seems to be about 3 days.

Given the above condition, a 3-day training course is reasonable, although there are various opinions on the questionnaire.

### 3) Training Method

Many suggested that the contents should not be general but instead be more practical, such as successful and failed examples.

Also, lectures tend to be one way (i.e., from lectures to trainees) since the lecture time was limited. Many suggested that there should be discussion among lecturers and trainees, especially for the afternoon lectures since trainees become sleepy even if the lecture is interesting. Therefore, more interactive and useful contents for trainees should be considered.

#### 4.7.3 Proposal for the Future Training Course

The following contents are proposed based on the questionnaire and discussion among the JICA Consultant Team.

##### (1) Training Method

Not only one-way lecture but participatory type lecture, e.g., with exercises and discussions among trainees, should be taken in the planning and design course. Also, the lecture should be not general but

practical, such as explaining successful and failed experiences, to give the trainees the chance to reflect on their own work.

## **(2) Contents of Training**

- It must focus on the most important problem in Vietnam. It is that house connection has not been implemented, which causes a relatively low inflow water quality. Also, septic tanks are used in households, which do not contribute to improve the water quality of public water body.
- A lecture on the importance of house connection is required. A site visit to the construction site of the house connection should be included, if possible. It should also be considered to teach the concrete method for obtaining the budget for house connection since it is difficult for the local government. It is good to consider asking the staff from the advanced province or city to conduct a lecture to raise the awareness of residents about the sewerage system.
- There should be an introduction on the PVC manhole and the micro-tunneling method which contributes to solving the problem stated above in Vietnam.
- The query on the “priority of 5 factors in order to drive forward the sewerage projects” was added to the questionnaire in the 3<sup>rd</sup> training course. The ranking order is legislative preparations, financial support, social interest, technology, and organization/system. Technology ranked 4<sup>th</sup>. Trainees feel the importance of non-technological factors in their daily work even though they are engineers. Therefore, not only technological subjects but other related ones should be added to the training course.

## **(3) Training Period**

For now, 3 days is appropriate for the training, but it should be considered to conduct a 2-week intensive training course in the future.

## **4.8 Training Course in Japan**

Training courses were conducted for operation directors of Vietnamese training organizations and candidates of lecturers in Japan from 9 to 19 January 2019. The outline of the activity is shown below.

### **4.8.1 Purpose**

The objective of the training in Japan is to enhance the knowledge of management personnel and trainers to contribute to the expansion of the sewerage system in Vietnam. It is especially aimed to spread the importance of improvement of house connections and terminal pipelines. The main training items are as follows:

- 1) Studying the example of house connection, which is one of the most important parts of the sewerage system
- 2) Studying the usage example of a sewer network database system, which is essential for the appropriate development and operation of sewerage system



- 3) Viewing the Japanese technologies and products to be utilized for materials of future training courses
- 4) Visit of actual training centers of Japan Sewage Works Agency and the Bureau of Tokyo Metropolitan Government
- 5) Preparing the action plan to utilize trainees' future activities based on the experiences of training in Japan

#### 4.8.2 Schedule

The schedule of training in Japan is shown in Table 4.8.1.

**Table 4.8.1 Schedule of Training in Japan**

Date	Time	Contents
1/9(Wed)		Flight to Japan (Hanoi ⇒ Tokyo-Haneda)
1/10(Thu)	AM	Briefing by TIC
		Orientation of training course in TIC
	PM	Move (TIC ⇒ Sunamachi STP of Tokyo metro.)
	15:00 – 17:00	Training center of the Bureau of Sewerage in Tokyo metro.
	17:00 –	Move (Sunamachi STP ⇒ TIC)
1/11(Fri)	~10:00	Move (TIC ⇒ Takasaki City)
	10:00~12 : 00	Takasaki City Office (Lecture: sewer design system and database system)
	13:30~15 : 00	Takasaki City (Site visit: house connection site)
1/12(Sat)	-	Holiday (Tokyo)
1/13(Sun)	-	Holiday (Tokyo)
1/14(Mon)	AM	Trainees' discussion to prepare the future action plan at JICA Tokyo
	PM	Move (Tokyo ⇒ Nagoya)
1/15(Tue)	9:15~10:15	Nagoya City Waterworks and Sewerage Bureau (Lecture: Rainwater management)
	10:15~10:45	Courtesy call on a chief of bureau of Waterworks and Sewerage Bureau, Nagoya City
	11:15~11:45	Nagoya City Waterworks and Sewerage Bureau (Site visit: construction site of rainwater storage facility)
	13:30~15:00	Nagoya City Waterworks and Sewerage Bureau (Lecture: Sewer database system)
	16:00~17:00	Tamano Consultant (Introduction of database software)
	17:00~	Move (Nagoya ⇒ Kyoto)
1/16(Wed)	~10:00	Move (Kyoto ⇒ Otsu City)
	10:00~12:00	Otsu City (Site visit: house connection, sewer database system)
	12:00~14:00	Move (Otsu City ⇒ Ritto City)
	14:00~16:00	Sekisui Company (Site visit: Ritto factory)
	16:00~	Move (Ritto City ⇒ Okayama)
1/17(Thu)	~12:40	Move (Okayama ⇒ Kochi City)
	12:40~16:30	Kochi City Waterworks and Sewerage Bureau (Site visit: Shimodi STP (PTF method), construction site of House connection)
	16:30~	Move (Kochi City ⇒ Tokyo)
1/18(Fri)	~9:30	Move (TIC ⇒ Toda City)

	9:30~11:30	Training center of Japan Sewage Works Agency (Lecture: management of training course, Observing training facility)
	11:30~13:30	Move (Toda City ⇒ JICA HQ)
	13:30~16:40	Preparation and presentation of future action plan at JICA HQ
	16:45~	Wrap-up and closing ceremony
1/19(Sat)		Flight to Vietnam (Tokyo-Haneda ⇒ Hanoi)

Source: JICA Consultant Team

### 4.8.3 Participants

Participants are selected as shown in Table 4.8.2. Trainers and management members of the training course are selected as participants from the viewpoint of sustainable training course management in Vietnam.

**Table 4.8.2 List of Participants**

No.	Name	Organization and Position
1	Ms. Tran Thi Thao Huong	Head of Sewerage division of Administration of Technical Infrastructure, Ministry of Construction (MOC)
2	Ms. Do Thi Hong Mai	Official, Department of Personnel and organization, MOC
3	Mr. Nguyen Thanh Phong	Deputy head of Water supply and sewerage Faculty, Architecture University
4	Mr. Bui Hong Hue	Rector of College of Urban Works Construction (CUWC)
5	Ms. Vu Thi Hoai An	Deputy director of Training Center for Water and Environment Sector (CNEE), Deputy head of technical infrastructure of CUWC
6	Mr. Pham Thanh Dat	Director of CNEE, CUWC
7	Mr. Chau Ngo Anh Nhan	Director of Khanh Hoa Development Project Management Unit (KDPM)

Source: JICA Consultant Team

### 4.8.4 Overview of Training

Some photos from the training are shown below.

#### (1) Training center of the Bureau of Sewerage in Tokyo Metro (10 January 2019)



Lecture



Structure of manhole

**(2) Takasaki City Sewerage Bureau (11 January 2019)**



Lecture



House connection

**(3) Nagoya City Waterworks and Sewerage Bureau (15 January 2019)**



Starting shaft of rainwater storage pipe



Sewerage database system

**(4) Otsu City (16 January 2019)**



Lecture



House connection

**(5) Ritto Factory/Sekisui Company (16 January 2019)**



Lecture



Display room

(6) Kochi City Waterworks and Sewerage Bureau (17 January 2019)



Construction site of a main sewer pipe



Observing of Shimodi STP

(7) Training Center of Japan Sewage Works Agency (18 January 2019)



Lecture



Water quality laboratory

4.8.5 Outline of Action Plan of Each Trainee

Trainees took a look back on the training in Japan and made action plans which were composed of short-term and long-term plans. They made presentations as well. The outline of the action plans of each trainee is shown below.

Table 4.8.3 Outline of Action Plan of Each Trainee

Trainees	Short Term Action Plan	Long Term Action Plan
Bui Hong Hue (CUWC Rector)	<ol style="list-style-type: none"> <li>1) The facilities of CUWC should be relocated</li> <li>2) Training for engineers should be improved.</li> <li>3) The evacuation route of dormitory should be well arranged. Bed should be relocated.</li> </ol>	<ol style="list-style-type: none"> <li>1) Establish sewerage training course in CNEE</li> <li>2) Install facilities and equipment for training course, and develop the capacity of trainers in order to make CUWC the best training center in Vietnam.</li> <li>3) Drainage system of new school building should be changed from combined sewer system to separate sewer system because of the odor. Also, drainage of the campus also should be changed to separate system as well. It will take more than 5 years (until 2023).</li> </ol>

Trainees	Short Term Action Plan	Long Term Action Plan
		4) I would like to construct small-scale sewage treatment plant inside the campus.
Phan Thanh Dat (Director, CNEE)	<ol style="list-style-type: none"> <li>1) Educational training and awareness raising for officers</li> <li>2) Relocate facilities and equipment based on the 5S</li> <li>3) Optimize the curriculum of training</li> <li>4) Establish the subject of sewerage system design in the training course.</li> </ol>	<ol style="list-style-type: none"> <li>1) Educate teachers and relocate facilities and equipment according to the school guideline.</li> <li>2) CNEE and private company will cooperate to open the practical training course. Contents of Training course should be better (2019~2023)</li> <li>3) I will develop VSC, make human resources and facilities better, and make it the best training center for sewerage. VSC will open training course for engineering consultants and become financially independent. (2019~2029)</li> </ol>
Vu Thi Hoai An (Duputy director, CNEE)	<ol style="list-style-type: none"> <li>1) Establish training course for sewerage</li> <li>2) Education for house connection</li> <li>3) As VSC, a seminar of database system will be hold in July. It will be also held in CUWC in November</li> </ol>	1) Conduct sewerage training course at least once in a month base on the school policy.
Chau Ngo Anh Nhan (Director, KDPM)	<ol style="list-style-type: none"> <li>1) TOR of sewerage database system will be implemented in March and April 2019. Consultant will be selected in May to start it in July.</li> <li>2) Project to raise the house connection ratio will be started in March 2019. The activity for the residents' awareness will be implemented.</li> <li>3) Report to the government about the outcome of this training course, and share it with colleague. (February 2019)</li> </ol>	<ol style="list-style-type: none"> <li>4) Expand database system and make it completed in 2020. Create its rules of use and management in 2012.</li> <li>5) The house connection ratio will reach 90% by 2020. The connection ratio of private companies, factories and restaurants will reach 80%. The connection ratio of households will reach 30%.</li> <li>6) Inspection and renewal of existing sewer pipes will be implemented. I will propose a project by 2020, and find the donor. FS study will be conducted in 2022, roan agreement in 2023 and construction in 2025. I request JICA to support us.</li> <li>7) There is a relationship between a provincial city in Japan and Nah Trang City. An event related to Japan is hold in Nah Trang City.</li> </ol>
Nguyen Thanh Phong (Deputy head of Water supply and sewerage Faculty,	<ol style="list-style-type: none"> <li>1) Share the knowledge and experiment which I got in Japan with my colleague within this year.</li> <li>2) Write an article of this knowledge and experience, and contribute it to the</li> </ol>	<ol style="list-style-type: none"> <li>3) I will become a lecturer after Mr. Hue establish VSC in CUWC.</li> <li>4) I will update the information of this project and instruct to my colleagues</li> </ol>

Trainees	Short Term Action Plan	Long Term Action Plan
Architecture University)	magazine in Vietnam.	and students.
Do Thi Hong Mai (Official, MOC)	<ol style="list-style-type: none"> <li>1) I will report to my department; human resources about the knowledge and experience I obtained in this training. I will tell my knowledge of Japanese sewerage development and O&amp;M technology if there is an opportunity.</li> <li>2) Flooding happens in HCMC because of back water caused by tide. I would like to tell them the countermeasure of flood.</li> <li>3) Regulate the sewerage database system to the local government.</li> <li>4) Regulate the notification system for a beginning of service of sewerage facility.</li> <li>5) Make it possible for residents and company to access the database system</li> <li>6) Adopt OJT training to VSC. There are not so many practical trainings in Vietnam</li> <li>7) It is necessary to change in the way of thinking by government officers. For instance, PR activity for the house connection can be done in holidays. The examination of application for the house connection can be simpler.</li> </ol>	<ol style="list-style-type: none"> <li>8) I am an expert of law, and in charge of urban development. In the next, I will work on the law of water supply and sewage. I would like to regulate the house connection by the law. Decree 80 only regulates to submit the drawings of house connection. It is not clear if they really implement it.</li> <li>9) I would like to support VSC when it is founded by Mr. Hue.</li> <li>10) I would like to participate in the developing work of the law of sewerage.</li> </ol>

Source: JICA Consultant Team

## 4.9 Building up the Network of Trainees

### 4.9.1 Purpose

The purpose of this project is to improve and manage the capacity of the local government officials for the further development of a sewerage system in Vietnam. Pilot projects had been conducted in various regions in Vietnam. However, it is most important to know how the trainees take action for the development of the sewerage system after the training. Therefore, communication via SNS is provided so that they can follow up on the training course and exchange information among participants.

## 4.9.2 Members for Implementation

Members for implementation are shown in Table 4.9.1

**Table 4.9.1 Members for Implementation of Building up the Network of Trainees**

Item	Members
Preparation of Facebook Page	Mr. Manh Dung Bui (ATI/ Full time C/P) Mr. Quy (CUWC)
Publication of information on Facebook Page	Main : Mr. Manh Dung Bui (ATI/ Full time C/P) Sub1 : CUWC Mr. Quy, Ms. An Sub2 : Tabata (Consultant team)
Management of Facebook Page	Main : Mr. Manh Dung Bui (ATI/ Full time C/P) Sub1 : CUWC Mr. Quy, Ms. An Sub2 : Tabata (Consultant team)

Source: JICA Consultant Team

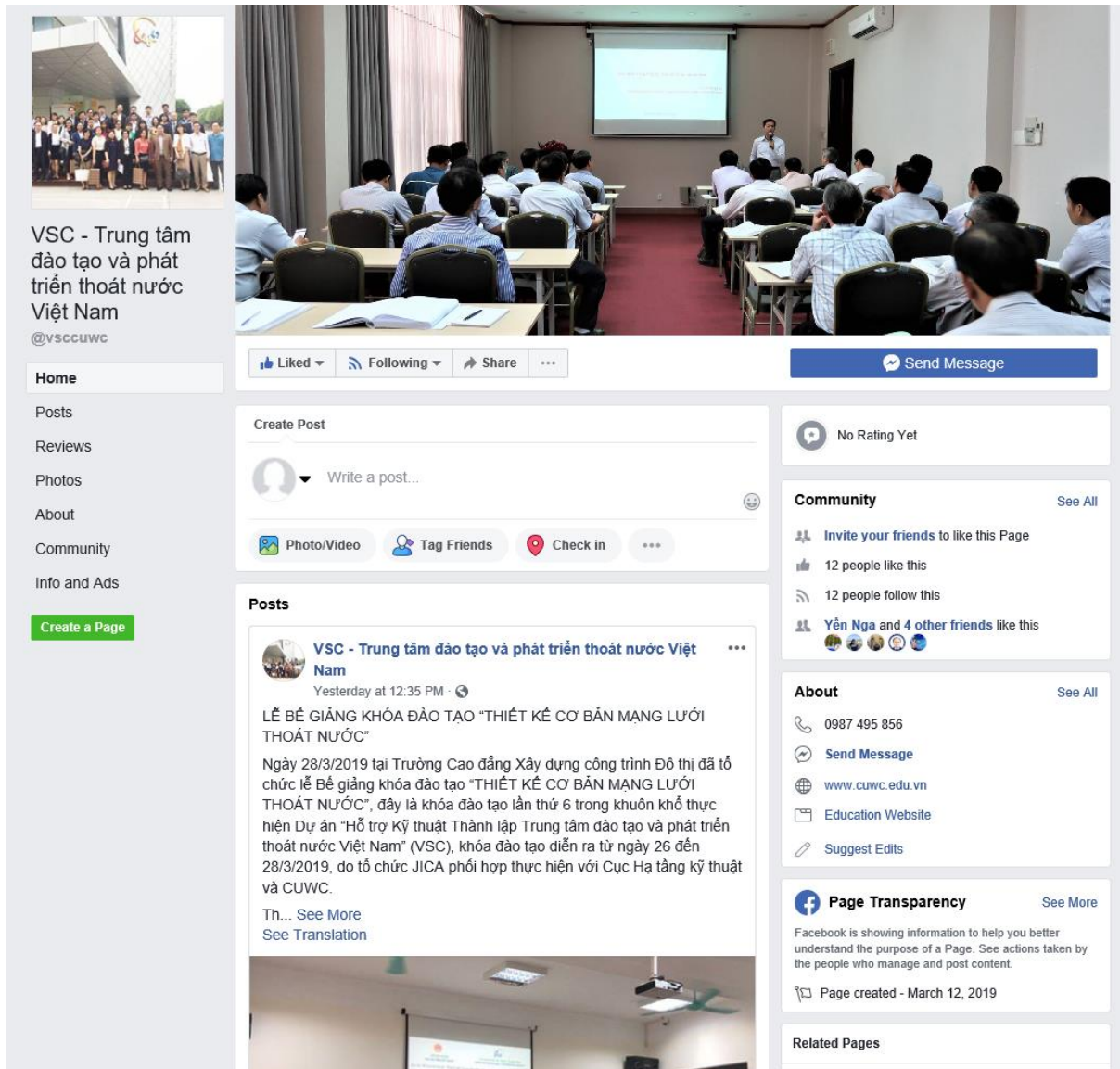
## 4.9.3 Contents of Activity

The contents of activity are shown below.

**Table 4.9.2 Contents of Activity**

Period	Contents of Activity
June 2018	Mr. Dung made VSC Facebook page.
Middle of Oct. ~ middle of Dec. 2018	Several meetings had done with Mr. Dung about the management of VSC Facebook page. Also, the photos of training courses were provided to him by JICA consultant team.
Middle of Mar. 2019	Active operation of the Facebook page had not conducted by CUWC although there were trial and error for the better management. Thus, new VSC Facebook page was established by new CUWC member, which is easy to be operated by CUWC. (Figure 4.9.1) Moreover, discussion of O&M method of the page was done with CUWC for twice. The links of VSC Facebook page and CUWC are on each HP.
Middle of March	The information of the preliminary design course, March 26 <sup>th</sup> ~28 <sup>th</sup> 2019, was announced on the page by CUWC. It was started to invite trainees who participated previous training course to the VSC Facebook page, and it will be continued in the future as well.
End of March	The condition of training course was posted on the page by CUWC. (Figure 4.9.2)
Beginning of April~	Continuous O&M of VSC Facebook page such as updating the participants list, the contents of training and the condition of the training course.

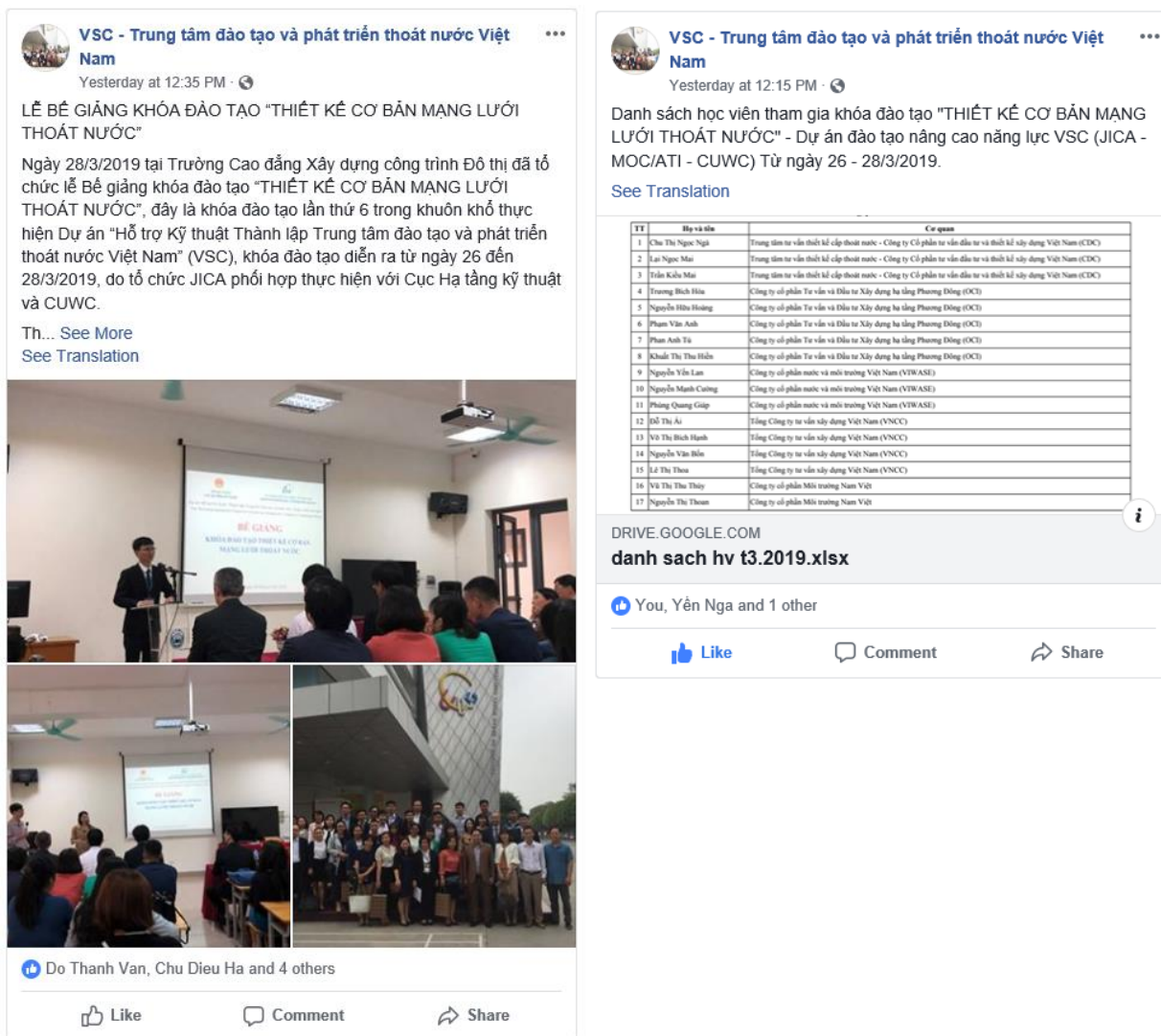
Source: JICA Consultant Team



Source: JICA Consultant Team

Figure 4.9.1 VSC Facebook Page





Source: JICA Consultant Team

**Figure 4.9.2 Post on VSC Facebook Page (Left: Report of Training Course, Right: List of Trainees)**

#### 4.10 Activities of Procurement and Installation of Equipment for the Training

##### 4.10.1 Purpose

Japanese sewerage technologies were introduced in the pilot training course in April, July, and October 2018. The JICA Consultant Team thinks that Japanese technologies should be introduced even after the completion of this project in order to improve the sewerage system in Vietnam. Therefore, it was proposed to install the equipment, such as model, panel for explanation, and video for training in CUWC, for the trainees' better understandings.

Given the above background, it was decided to install the equipment for training in CUWC.

##### 4.10.2 Equipment

Procured equipment is shown below.

**Table 4.10.1 Overview of Procured Equipment**

No.	Name	Contents	Supplier
1	Sewer network database system (Compus II), Pipe design supporting system (Pipe Design Pro)	Software Desktop PC Large monitor for system Note PC for training Other equipment related to PCs.	Tamano Consultants Co., Ltd. PIPE DESIGN, Inc.
2	Pre-treated Trickling Filter (PTF)	Model	Metawater
3	House connection model with PVC manhole and pipe, Rainwater Storage Facility (Cross Wave)	Model	SekisuiSEKISUI CHEMICAL CO., LTD. (PVC material) TOTO LTD. (sanitary equipment)

Source: JICA Consultant Team

### 4.10.3 Overview of Installed Technologies

An overview of installed technologies is given below.

#### (1) Sewerage database system (Compus II), Sewer pipe design supporting system (Pipe Design Pro (PDP))

Compus II is the management tool of the information of the sewer and drain pipes. Users can easily and quickly collect and search the data of pipeline, manhole, and other related structures. It is installed in 16 cities in Japan and also in Ha Long City in Vietnam.

PDP is the design supporting system for sewer and drain pipelines. It helps to design rapidly and precisely, and it is widely used in Japan.

They can be utilized for each phase of sewer network development, such as planning, design, and O&M. Thus, they are expected to be utilized in the training in CUWC in the future because rapid and effective development of sewerage system is required in Vietnam.

#### (2) PTF

PTF is the energy-saving type of sewerage treatment method. It is installed not only in Japan but in Hoi An City in Vietnam. The advantages of the TF are as follows:

- a) Low electric consumption: It is appropriate in the developing countries where electric supply is unstable. Energy saving system.
- b) Easy O&M: Skilled operators are not required because of automatic operation.
- c) Stable treated water quality: It can meet the effluent standard of SS and BOD.
- d) Low life cycle cost: Construction and running cost are lower because the system is simple.

**(3) House connection model with PVC manhole and pipe, Rainwater Storage Facility (Cross Wave)**

It is essential not only in developing the STP and the main pipeline, including the interceptor, but also in completing the house connection to spread the appropriate sewerage system in Vietnam. However, the volume of branch pipes which must be installed is much larger than that of main pipelines. The material of branch pipes is concrete, which takes a lot of time to construct. It is desirable to use a lighter and smaller material for branch pipes, manholes, and chambers. Therefore, it is expected to accelerate the development of sewerage system by using the PVC manhole and pipe.

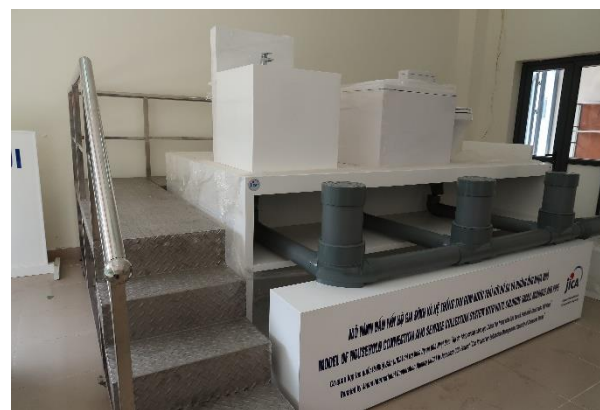
Flood management is one of the major problems in the sewerage and drainage sector, and the rain water storage facility can be the countermeasure for flood control in the urban area. However, the construction cost is significantly high because a huge concrete structure is designed. Cross wave, which is made from PVC, can be the solution for the above condition. It is a light and very strong structure and utilizing this can shorten the construction period. Moreover, the O&M of the storage can be easier.

**4.10.4 Installation of Equipment**

The condition of the installed equipment is shown below.



House connection model



House connection model



House connection model



Cross wave



Explanation Panel for Cross wave



Compus II and PDP



PTF



PTF

#### 4.11 Activity Related to Small-Scale Wastewater Treatment Plant

##### 4.11.1 Purpose

The lecture should be combined with the site visit to actual facilities for trainees' better understanding. From that point of view, the small-scale wastewater treatment plant should be installed as part of the interactive facilities in the CUWC in the near future. Trainees can utilize them to understand the structure and mechanism of sewerage facilities.

Considering the above background, investigation and planning for the small-scale wastewater treatment plant was implemented.

##### 4.11.2 Methodology

###### (1) Work Item

Work items of this investigation and planning are shown in Table 4.11.1.

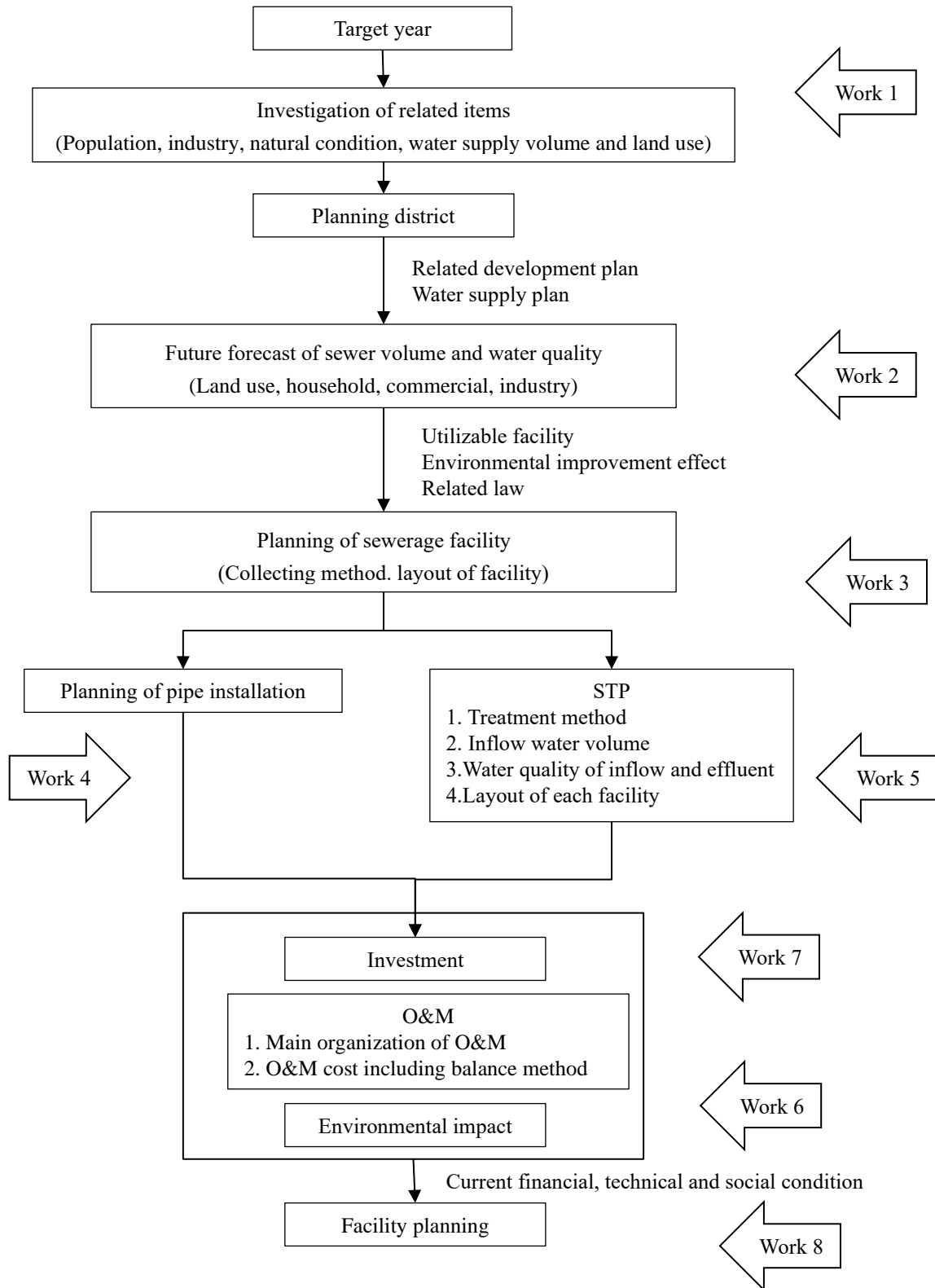
**Table 4.11.1 Work Items of Investigation and Planning**

No.	Work Item
1	Basic survey (site visit, survey of existing structure, data collection)
2	Consideration of planning frame (target population, unit sewage volume)
3	Consideration of layout plan of main facilities
4	Plan of sewer pipeline (size, route and so on)
5	Plan of STP (capacity, treatment method and layout)
6	Rough assessment of environmental impact
7	Rough cost estimation
8	Reporting

Source: JICA Consultant Team

(2) Work Flow

The work flow is shown in Figure 4.11.1.



Source: JICA Consultant Team

Figure 4.11.1 Work Flow

### 4.11.3 Contents of Activity

Activities related to this investigation is shown in Table 4.11.2.

**Table 4.11.2 Contents of Activities Related to Small-Scale Wastewater Treatment Plant**

No.	Date	Main Contents of Activities
1	2018.9.11 - 17	Making investigation plan
2	2018.9.18	Explained CUWC about activity purpose, work flow and so on, and obtained consensus.
3	2018.9.19 - 11.16	Site survey (existing drainage facility, data collection), Consideration of planning frame
4	2018.11.22 - 30	Discussion with engineer in charge of this investigation Site survey Meeting with persons from CUWC
5	2018.12.3 - 7	Checking of design condition, setting of design policy of sewer pipe planning
6	2018.12.23 - 14	Provide the direction to the engineer about the design policy and work plan
7	2019.1.9 - 11	Meeting with team leader of consultant team about design policy, and checking the planning policy of treatment facility.
8	2019.1.18 -19	Discussion with engineer about the layout of pipeline.
9	2019.1.25	Discussion with JICA consultant team about table of contents of the final report
10	2019.2.8 - 15	Small-scale wastewater treatment plant (pipeline part)
11	2019.2.26 - 28	Making document for middle term reporting. Meeting with CUWC to report the progress
12	2019.3.1 - 7	Small-scale wastewater treatment plant (treatment facility part) is planned
13	2019.3.29	Checking of planning drawing, organizing the calculation sheet
14	2019.4.18 - 24	Preparation of draft report
15	2019.6.22 - 27	Preparation of draft report, meeting with CUWC to explain the draft report
16	2019.7.11 -15	Check of comment to the draft report, meeting with the engineer
17	2019.9.4 - 6	Re-setting of design condition of small-scale wastewater treatment plant (pipeline and treatment facility)
18	2019.9.18 -20	Meeting with the engineer to provide the direction of plan and profile of pipeline, modification of drawing
19	2019.10.24 – 25	Meeting with JICA consultant team to check the report
20	2019.10.28	Meeting with CUWC to explain the report

Source: JICA Consultant Team

### 4.11.4 Report of Small-Scale Wastewater Treatment Plant

The report is in the Appendix.

## 4.12 Seminar for the Appropriate Sewerage Development Plan and Project Implementation

Seminars for the appropriate sewerage development plan and project implementation were conducted in July and November 2019. Their purpose, schedule, and contents are shown below.

The details of each seminar are stated in the seminar report in the Appendix.

#### 4.12.1 Purpose

It is a major problem of the existing sewerage system in Vietnam that water quality and volume of inflow to the STP are quite low compared to the design value. The reason identified in this project was the low ratio of house connection. Considering this condition, the purpose of the seminar was decided as follows:

- 1) To share the current situation including a legal system for household-connection and challenges for appropriate sewerage system from Implementation Agencies
- 2) To understand detailed structure of separate and combined sewerage pipe system
- 3) To introduce Japanese experience on household-connection works
- 4) To introduce Japanese new technologies as one of the solutions for house-connection matter

#### 4.12.2 Date, Venue, and Participants

The date, venue, and participants are shown in Table 4.12.1.

**Table 4.12.1 Date, Venue, and Participants**

Item	1 <sup>st</sup> Seminar	2 <sup>nd</sup> Seminar
Date	30 July 2019 8:00~13:45	13 November 2019 8:00~13:45
Venue	Duy Tan I Hotel (Hue City)	Movenpick Hotel (Hanoi City)
Participants	1) JICA Vietnam : 5 2) JICA consultant team : 4 3) ATI (MOC) : 1 4) Hue CPC : 2 5) Hue PPC : 4 6) HEPCO : 2 7) Hue PMU : 2 8) HCMC DOC : 1 9) LAWACO : 1 10) URENCO : 2 11) CUWC : 2 12) Sekisui Co. Ltd. : 3  Total: 29	1) JICA Headquarter 2) JICA Viet Nam 3) JICA VSC 4) ATI (MOC) 5) Binh Duong PMU 6) Buon Ma Thuot PMU 7) Hanoi DOC 8) Maintenance Board for technical infrastructure works - Hanoi DOC 9) Hanoi Sewerage and Drainage Company (HSDC) 10) Hanoi Construction, Investment on water supply, drainage, sewerage and environment PMU 11) Ha Long PMU 12) Hai Phong PMU 13) Hung Yen CPC 14) Hung Yen DOC 15) Thai Binh DOC 16) Phu Ly CPC – Ha Nam province 17) Hoa Binh DOC 18) Phu Tho DOC 19) Bac Giang CPC 20) Hanoi University of Architecture 21) Institute on Science, Technique and Environment 22) Representative from ADB 23) Representative from GIZ 24) CUWC 25) SEKISUI Co.  Total: 62

Source: JICA Consultant Team

### 4.12.3 Contents of Seminar

The contents of seminars are shown in Table 4.12.2.

**Table 4.12.2 Contents of Seminars**

No.	Content	Presenter
1 <sup>st</sup> seminar	1) Legal framework of household-connection	ATI
	2) Current situation of Hue City Environment Improvement Project and Household-connection in Hue City	Hue CPC
	3) Household-connection in Separate Sewerage System in Da Lat as successful example	LAWACO
	4) Household-connection in Combined Sewerage System, Separate Sewerage System and Semi-Sewer System in HCMC as successful example	HCMC DOC
	5) Current situation and necessity for appropriate sewerage system and detailed structure of separate and combined sewerage pipe system with Japanese experiences	JICA expert
	6) Sharing gained knowledge and experience of Japanese procedures of all related household-connection works via the training course in Japan under VSC Project	CUWC
	7) Introduction of Japanese new technology appropriate for household-connection	Sekisui Co. Ltd.
	8) Discussion for the appropriate sewerage system development	All participants
2 <sup>nd</sup> seminar	1) Explanation of legal framework of household-connection	ATI - MOC
	2) Sharing experience on Household Connection works in Binh Duong province	Binh Duong Province
	3) Sharing experience in Household Connection implementation works in Buon Ma Thuot. Difficulties and challenges during project implementation	Buôn Ma Thuot PMU
	4) Direction and Plan of Necessity of house-hold connection and pipe collection system from the viewpoint of Donor	Representative of ADB
	5) Study on improvement of legal framework in sewerage works	JICA Expert of MOC Policy Advisor
	6) Explanation of current situation and necessity for appropriate sewerage system and introduce Japanese experience on household-connection and pipe network	JICA Expert of VSC Project
	7) Sharing gained knowledge and experience of Japanese procedures of all related household-connection works via the training course in Japan	Representative of CUWC
	8) Discussion and Way forward	All participants

Source: JICA Consultant Team



**CHAPTER 5 ACHIEVEMENT OF THE ACTIVITIES RELATED TO  
OUTPUT-4 (PROJECT IMPLEMENTATION SUPPORT FUNCTION)**

**5.1 Purposes of Activities**

**(1) Purpose of the Activity of the First Year**

At the beginning of the Project, the ultimate objective of the Project Implementation Support (PIS) was to enhance the sewerage planning and project implementation capacities for sewerage works in Vietnam through the supporting pilot activities by the Vietnam Sewerage Center (VSC). The contents of supporting activities for the pilot project will be reflected in the establishment plan of VSC.

Therefore, the VSC team supported the preparation of the sewerage sector master plan for the prioritized city as the pilot project. The objective of the pilot project was to formulate a business scheme through the clarification of the detailed supporting works of VSC.

**(2) Purpose of the Activity of Second Year**

Regarding the establishment of VSC, a new organization or department was planned to be established under an Administration of Technical Infrastructure (ATI) originally at the start of the Project. However, VSC was not listed in the decision of the Minister of Construction related to the ATI’s function, duty, right, and organization structure issued on September 25, 2017 (No. 986/QD-BXD). Because of this, the establishment of VSC became a big challenge. Therefore, the activities of the PIS function could not be continued as originally scheduled, which assumed the VSC will be established.

Based on the above-mentioned background, the policy of the activity of the PIS function of the second year was changed drastically. The information of the sewerage sector master plan was spread to public officers as reference for their sewerage projects in the pilot training courses organized in the second year which included the outline of the sewerage sector master plan, the issue and resolution on the approval process, and the issue and resolution on the management of quality and schedule of the local consultant.

**5.2 Plan and Actual Performance of the Activities**

The original schedule and actual performance of each activity related to the PIS function are described in Figure 5.2.1.

Activity	Year	2016												2017												2018												2019											
		Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11
4-1 To select a city to develop Sewerage and drainage MP	Plan											■	■																																				
	Actual											■	■		■	■	■																																
4-2 To support development of Sewerage and drainage MP in a specific city	Plan																																																
	Actual																											■	■	■	■	■	■	■	■	■													
4-3 To reflect experience and knowledges derived from development of sewerage and drainage MP into the contents of sewerage planning training	Plan																																																
	Actual																																													■	■	■	■

Source: JICA Consultant Team

**Figure 5.2.1 Original Schedule and Actual Performance of Activities Related to Output-4**

At the beginning of the Project, it was planned that the first pilot project implementation support was implemented as Activity 4-2 for the selected city in Activity 4-1, then the second pilot implementation support would be implemented after the second city was selected. However, since the establishment of VSC became difficult, the second pilot project implementation support was stopped and the experience and knowledge derived from the first pilot project implementation support was planned to be reflected into the training function as Activity 4-3.

### **5.3 Outlines of Activities**

#### **5.3.1 Section in This Chapter, in Which Each Activity is Detailed**

The content of each activity is detailed in the section and summarized in Table 5.3.1.

**Table 5.3.1 Chapter Activity Details**

<b>Output</b>	<b>Work Item</b>	<b>Outline of Work</b>	<b>Section</b>
Activity 4-2	4-1	Situation survey of target city for the implementation of pilot support	Section 5.4.1
	4-2	Determination of the support contents of the pilot support	Section 5.4.2, 5.4.3, 5.4.4
	4-3	Implementation support of the pilot support	Section 5.5, 5.6
Activity 4-3	4-4	To reflect the experience and knowledge derived from the first pilot support into the training function	Section 5.7

Source: JICA Consultant Team

#### **5.3.2 Contents and Supporting Methods of the Pilot Project**

##### **(1) Selection of the First City and Pilot Support Contents**

The needs survey for the pilot project was implemented during the detailed planning phase in the fiscal year of 2016. Here, it was revealed that Nam Dinh City was strongly interested in the preparation of a master plan for sewerage work under the support of VSC. Based on this result, it was determined that the “Formulation of the Sewerage and Drainage Master Plan for Nam Dinh City” was implemented in this fiscal year as the pilot project.

##### **(2) Supporting Method**

VSC shall formulate the business scheme for PIS in order to expand the business in the sewerage sector of Vietnam in the future. Therefore, the pilot project shall be implemented following the regulated project implementation procedures in Vietnam. So, the implementation of the study on the sewerage master plan shall be followed all the related laws and regulations of Vietnam. Thus, regarding the supporting method of the pilot project, it was determined that the most reasonable method to implement the study is through a local consultant to be procured by sub-consultancy contract with the JICA Consultant Team.

### **5.4 Work Items of the Pilot Support**

The following items were implemented in the pilot project for the first year.

- 1) Survey on the actual situation of Nam Dinh City

- 2) Confirmation of the contents of the pilot project
- 3) Signing on minutes of agreements
- 4) Preparation of sewerage and drainage master plan for Nam Dinh City

The detailed contents of the supporting activities are described below.

#### **5.4.1 Survey on the Actual Situation of Nam Dinh City**

##### **(1) Review of the existing data and information of the project**

The survey on the actual situation of Nam Dinh City was implemented during the detailed planning phase in the fiscal year of 2016 by the former Japanese Consultant Team. The long-term expert and the JICA Consultant Team continuously commenced the actual work for VSC up to April 2017. Therefore, the latest site conditions and concrete issues had not been clear for the JICA Expert Team at the beginning of the Project. In order to confirm the current situation of Nam Dinh City, the JICA Expert Team reviewed the urban master plan of the city and drainage improvement project by World Bank in July 2017 prior to the pilot project.

The required data and inquiry items were summarized in the questionnaire sheet, and it was utilized for the meeting with the Nam Dinh Province and City. The following items were summarized in the questionnaire sheet;

- 1) List of requested data to be provide to the Local Consultant Team
- 2) Current status of revised general master plan and the World Bank project
- 3) General questionnaire for the World Bank project
- 4) Scope of works of the sewerage and drainage master plan to be implemented as the pilot project
- 5) Approval procedures for sewerage and drainage master plan for Nam Dinh City
- 6) Responsibility of Nam Dinh City as well as relevant organization, and information for the counterpart staff
- 7) Confirmation of implementation schedule for the pilot project

##### **(2) Field survey and interview with Nam Dinh City**

The field survey was implementation on July 21, 2017. The members of the survey consisted of four people, the JICA long-term expert, the Vietnamese national project coordinator, the JICA Consultant Team and the Vietnamese translator. The counterpart staff of ATI did not participate in the survey due to his availability and duration after his assignment of the Project. The field survey and interview with Nam Dinh City were smoothly implemented and the JICA Expert Team confirmed the following:

**1) List of requested data to provide to Local Consultant Team**

The Local Consultant Team received a soft copy of the reports for the general master plan (November 2011, No.2084QD-TTg) including drawings and World Bank project from Nam Dinh City. However, other requested data were not collected on the same day. Nam Dinh City would check the data whether it was available or not and provide to JICA Expert Team or Local Consultant Team in order to conduct the master plan study.

**2) Current status of the revised general master plan and the World Bank project**

The JICA Consultant Team asked Nam Dinh City the latest status of the both of the projects. Nam Dinh City informed the team that the revised general master plan was the legal upper plan of the pilot project for the preparation of the master plan. The World Bank project was nominated as part of the general master plan. After approval of the general master plan, several urban projects and local drainage projects were implemented. However, the projects were not nominated in the general master plan. Therefore, Nam Dinh City requested that the sewerage and drainage master plan, to be prepared in the pilot project, should be followed, and that all the projects planned would be implemented after the approval of the general master plan.

**3) General questionnaire for the World Bank project**

Nam Dinh City explained that the PMU was the implementing agency and Nam Dinh City People's Committee (CPC) was the employer for the World Bank project. Because the Project consisted of more than 100 contract packages, Nam Dinh City could not provide each and every one of the contract information to the Local Consultant Team during the meeting. The pre-FS was implemented by the foreign consultant firm and the FS was conducted by CDC, the Vietnamese consultant. The pre-FS was approved by the Prime Minister's office because the project scale was large. Afterwards, Nam Dinh Provincial People's Committee (PPC) approved the project from the FS for construction.

**4) Scope of works on the sewerage and drainage master plan study for Nam Dinh City**

There are no wastewater treatment plants in Nam Dinh City as of July 2017. In the World Bank project, the expansion of the drainage canal, the construction of the Quan Chuot drainage pumping station (PS) (with a capacity of 15.86 m<sup>3</sup>/s), and Kenh Gia drainage pumping station (with a capacity of 12,5 m<sup>3</sup>/s) are implemented. The discharge water area of the Quan Chuot PS is the Red River. The most serious environmental problem for Nam Dinh City is the pollution of the water source because the water intake point is located at the downstream of the discharged point for the drained water. The distance between the discharged point and the water intake is 4.4 km. In addition, there is an odor problem at the expanded drainage canal connecting to the pumping station due to existing blackish water. Therefore, Nam Dinh City strongly requested the preparation of the sewerage master plan to improve the living environment of the city.

Regarding the project area, there are two alternatives. One is the city central area with 4,600 ha, and the other is including the surrounding area with 18,400 ha as well as the central area. Nam Dinh City

prioritized the latter alternative at the meeting considering the future development and expansion of the city area.

**5) Project approval procedures on the sewerage and drainage master plan for Nam Dinh City**

The approval normal procedure method shall be followed based on the regulation of Vietnam.

**6) Responsibility of Nam Dinh City as well as relevant organization, and information on the counterpart staff**

Nam Dinh City shall have responsibility of the approval matter for the pilot project through the assignment of a counterpart organization. However, Nam Dinh City, as of July 2017, had not decided yet on which organization would manage the pilot project. Nam Dinh City requested the JICA Expert Team to issue the official letter to conduct the pilot project. After receiving the official letter, Nam Dinh City would decide on the counterpart organization to manage the pilot project and would proceed to the approval procedures.

**7) Confirmation of the implementation schedule for the pilot project**

The JICA Expert Team explained the implementation schedule of the pilot project, especially the work duration of 8 months. Nam Dinh City agreed with the schedule.

The JICA Expert Team confirmed the necessity and urgency of the preparation of the sewerage master plan and design of the wastewater treatment plant through the discussions with Nam Dinh City.

Regarding the pilot project, Nam Dinh City requested to consider the surrounding area for the sewerage and drainage master plan because the area will be developed as an industrial zone in the future. The boundary of the target area should be clarified with Nam Dinh City.

**(3) Determination of the contents of the pilot project**

The JICA Expert Team internally discussed the contents of the pilot project after the field survey and discussion in Nam Dinh City. The purpose of the pilot project is to prepare the master plan, and the final output is just a general planning map with a scale of 1:10,000 in order to meet Vietnamese regulation. On the other hand, further processes such as design work should be required in the future for the development of sewerage facilities in Nam Dinh City. Thus, some experts suggested that some design work must be included in the pilot project in order to accelerate the project implementation.

According to the Law on Construction of Vietnam, the implementation of a pre-FS is always required after the preparation of a master plan. It is because the implementation of a pre-FS after master plan formulation is regulated by the Law on Construction as an implementation procedure. The project cannot proceed to the further stages such as detailed design and construction work without following this procedure. Therefore, a pre-FS must be implemented after master plan formulation in order for a project to be realized. Thus, JICA Expert Team discussed the possibility of implementing a pre-FS in the pilot project for the acceleration of the project. The team also discussed the possibility of implementing pre-FS in the pilot project for the acceleration of the project. However, the topographic survey and

geotechnical survey is required based on Vietnamese Law during the pre-FS. Considering the limitation of the budget and duration of the pilot project, implementation of pre-FS is impossible in the first year. In conclusion, preparation of the master plan would only be implemented as the pilot project in the first year.

However, it became clear through the discussion that the first priority for Nam Dinh City is to develop the two wastewater treatment plants. Thus, the JICA Expert Team suggested that the pilot project should include a rough design of the wastewater treatment plant in order to implement a pre-FS soon after the pilot project. Nam Dinh City agreed with the suggestion, and the final scope of the pilot project is determined as the preparation of the master plan and rough design of Wastewater Treatment Plants (WWTPs).

#### **(4) Operational issues on the survey for the actual situation of Nam Dinh City**

The Nam Dinh Province and City tried to quickly implement the pilot project, however, it was difficult due to the limitation of an administrative system in Vietnam. As the result, Nam Dinh City requested the JICA Expert Team to issue the official letter for assignment of the counterpart organization to manage the pilot project. If it would not be issued, Nam Dinh City could not proceed with any action.

The JICA Expert Team quickly issued the letter to Nam Dinh PPC in collaboration with ATI. Then, Nam Dinh City established the counterpart organization by themselves. Close communication involving the ATI staffs and quick response on requests were the key solutions for smooth implementation and operation.

Although the JICA Expert Team thought that Nam Dinh City had already arranged the implementing organization, it had not been decided yet. It is assumed that a similar situation in the future would occur. It should be confirmed for smooth operation whether a counterpart organization has been arranged in advance or not.

#### **(5) Operational idea on the survey for the actual situation of Nam Dinh City**

The rough design of the two wastewater treatment plants was added to the contents of the pilot project in addition to the preparation of the master plan in order to accelerate the project implementation. In case the design works are conducted following the Vietnamese Law, a topographic survey and geological survey shall be required in the pre-FS. However, these surveys cannot be conducted in the pilot project due to the limitation of budget and duration of the Project. The planned output of the rough designs is not qualified according to the Vietnamese Law. Therefore, it should be modified in the actual pre-FS stage. It will just be utilized as base data for further pre-FS to reduce the study duration.

### **5.4.2 Determination of the Pilot Project**

The pilot project commenced at the end of July 2017. The first draft of the terms of reference (TOR) was prepared by the JICA Expert Team and provided to ATI and Nam Dinh City for their review. The determination procedure for the contents of the pilot project is summarized in Table 5.4.1.

**Table 5.4.1 Chronological Review of the Pilot Project Contents**

Date	Work Item	Actual Activity
End of July, 2017	Preparation of draft TOR	The JICA Expert Team prepared the draft TOR and provided it to JICA Vietnam office, ATI and Nam Dinh for their review.
Aug/1st ~ 15 <sup>th</sup> / 2017	Review of TOR by relevant organizations	Each party reviewed the draft TOR and sent back their comments to the JICA Expert Team.
Aug/16th ~ 23 <sup>rd</sup> / 2017	Revision of TOR	The JICA Expert Team revised the TOR based on the received comments. The JICA Expert Team sent the TOR back to ATI and Nam Dinh for their confirmation.
Aug/24th ~ 30 <sup>th</sup> / 2017	Finalization of TOR	After receiving the additional comments on the revised TOR, the JICA Expert Team finalized the TOR

Source: JICA Consultant Team

Majority of the comments from the relevant organizations were the modification of expression methodologies and clarification of the work contents. The TOR was revised based on the comments from the relevant organizations. There were three items that were deeply in the revision of the TOR. They are described below.

**(1) Target year of the Study**

The target year of the pilot project is set to the year of 2030 based on the revised general master plan prepared in 2011.

**(2) Items for estimation of construction cost**

There is a comment to request the implementation of a detailed cost estimation for the prioritized projects. However, such cost estimate method is not suitable for a master plan and should be considered only in the pre-FS stage. Therefore, it was not added to the TOR and this request will be followed in the study. Thus, the TOR was not modified in the cost estimate part.

**(3) Finalization of the project scope**

Through the discussion between JICA Expert Team and Nam Dinh side, the TOR, implementation schedule and reports to be submitted were finalized on August 30, 2017.

The JICA Expert Team explained the project scope to ATI on September 1, 2017 and Nam Dinh side on September 6, respectively. ATI had no particular comments on the final TOR. Nam Dinh City requested to change the target area from 18,445 ha to only include the area of 4,625 ha of core city only. At the beginning, Nam Dinh Department of Construction (DOC) became the main counterpart at the meeting in July, 2017 and they wanted to conduct the institutional arrangement. Afterward, Nam Dinh City People's Committee (CPC) became the official counterpart organization. Nam Dinh CPC wanted to focus on the core city area and requested to mainly cover the core area. The JICA Expert Team accepted their request and revised this part.

**(4) Idea on the determination of the study scope**

Generally, the administrative procedure in Vietnam takes a long time. Even if document review and reply period is set in advance, the Vietnamese administration cannot reply on time and the procedure is often delayed.

In the pilot project, the JICA Expert Team carefully managed the work schedule and requested the Vietnamese to follow the deadline. The JICA Expert Team arranged enough review period for the Vietnamese. The period was 2 weeks for each of the first and second review of TOR.

**5.4.3 Signing of the Minutes of Understandings**

The contents of the pilot project in Nam Dinh City was agreed among Nam Dinh DOC/PPC, ATI and the JICA Expert Team.

**(1) Agreed matters**

The JICA Expert Team prepared the minutes of agreements for the study on sewerage and drainage master plan in Nam Dinh City and was presented to Nam Dinh City. There were minor comments on the agreements that the population figure would be updated at the year of 2016. Nam Dinh CPC would provide the project boundary data of 4,625 ha by soft copy and hard copy in later when the local consultant would commence the actual work.

**(2) Signing ceremony**

The agreement was signed on September 19, 2017 between the JICA Expert Team and Nam Dinh DOC/CPC. The following were the major topics in the meeting.

ATI explained the three functions of VSC and emphasized that the pilot project would be executed under the PIS function. ATI also reminded Nam Dinh CPC for its preparation of task planning and would submit it to Nam Dinh PPC for their approval before the preparation of the master plan.

Based on the current situation, the project's cost and scale would be larger than the present estimation, the loan application would be more difficult. The JICA Expert Team suggested to Nam Dinh CPC to discuss the possibility of project implementation after all the necessary data/information is prepared by the local consultant. The main purpose of the pilot project via the PIS function was to actualize future projects in Nam Dinh City. The VSC function can be measured during project implementation possibility through the pilot project.

The JICA Expert Team also emphasized that it would be very convenient for Nam Dinh City to ask MOC on their appraisal work in the future for potential projects since MOC, as the counterpart, is involved in this Project from the beginning. MOC understands the project result well and would proceed with the quick administration procedure during their appraisal works.





Source: JICA Consultant Team

**Figure 5.4.1 Photo during the Signing Ceremony**

#### 5.4.4 Contents of the Pilot Project

The pilot project scope of works conducted by the local consultant is summarized in Table 5.4.2. The local consultants are procured by the JICA fund under sub-contract.

**Table 5.4.2 Pilot Project Scope of Works**

No.	Work Item	Description
1	Review, confirmation and note of existing sewerage, drainage status and plans for Nam Dinh City	It is for the review of the existing reports and documents such as; -Revised general master plan up to 2025 -Socio-economic development plan of Nam Dinh City -Regional construction plan of Nam Dinh Province up to 2030 and orientation to 2050 -Other related projects and plans
2	Review of the ongoing projects	It is to confirm the ongoing projects in Nam Dinh City and reflect the plans on the master plan
3	Preparation of task planning	It is used for the Nam Dinh Provincial People's Committee approval of the master plan.
4	Field investigations	The following surveys are conducted to formulate the master plan: - Existing drainage system survey by site reconnaissance - Flood damage survey by interview - Rainfall, flow rate, and water levels data collection
5	Hydraulic study	It is used to establish the hydraulic model of Nam Dinh sewerage/drainage network system using engineering software and conduct the hydraulic calculation
6	Preparation of sewerage and drainage master plan	The sewerage and drainage master plan shall be prepared with scale of 1:10,000.
7	Preparation of operation and maintenance planning	It is used to survey the status of the existing operation and maintenance organization and prepare its plan for the Nam Dinh City.
8	Cost estimate	Project costs shall be estimated and will consist of the following items: - Construction and engineering service cost - Operation and maintenance cost - Administration costs including land acquisition - Contingency and price escalation
9	Preparation of implementation schedule	It will prepare how the project invests the fund in each year and which part of the project will be

		prioritized for construction.
10	Strategic environmental assessment	It is conducted in order to follow the Law on Environment Protection and Section 6 of the Law on Urban Planning.
11	Evaluation of the priority project	The proposed project is evaluated in view of the technical, economical, institutional and environmental aspects.
12	Preparation of rough design of two wastewater treatment plants	It is conducted to solve Nam Dinh City's urgent needs on wastewater issues and will be used as a pre-FS for the project to be realized sooner.

Source: JICA Consultants Team

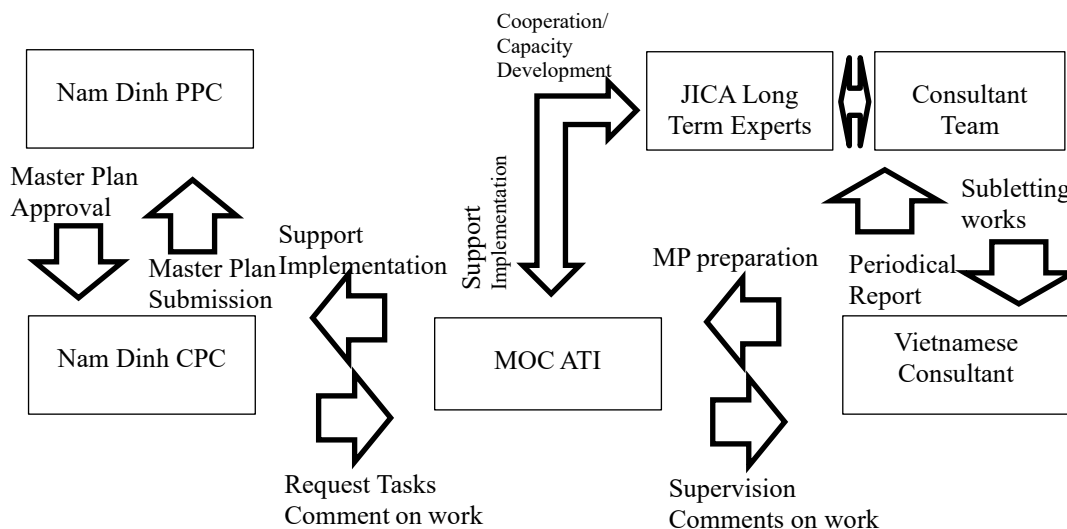
Note: It was impossible to conduct a preliminary design required by pre-FS in this study scope. Therefore, the Study Team prepared the scope to formulate the rough design as wastewater treatment plant drawing.

## 5.5 Implementation Structure and Schedule of the Pilot Support

### 5.5.1 Implementation Structure

The JICA Expert Team and Nam Dinh CPC shall perform the 1) supervision of the Vietnamese consultant and 2) management of their progress and monitoring of the project implementation. On the other hand, the JICA Consultant Team conducts the capacity development for ATI in cooperation with the JICA long-term experts.

The role of each organization is shown in Figure 5.5.1.



Source: JICA Study Team

**Figure 5.5.1 Role of Each Organization**

The roles and responsibility for Nam Dinh Province and City, and ATI are summarized in Table 5.5.1. Nam Dinh CPC shall be the counterpart organization working with the local consultant. Nam Dinh PPC and DOC, which are the provincial level organizations, shall be responsible for the project appraisal and approval matters. ATI shall be the advising organization for the study. In addition, ATI will be the agency that will be involved in the project approval in the future. In this point, the involvement of MOC shall

be deeper and MOC shall be able to develop the project implementation capacity through the Nam Dinh pilot project.

**Table 5.5.1 Roles and Responsibilities of Nam Dinh City and ATI**

<b>Agencies</b>	<b>Roles and Responsibilities</b>
Administration Technical Infrastructure (ATI)	Responsible for giving advice and comments for overall work and Sewerage and Drainage Master Plan approval procedure.
Nam Dinh Provincial People’s Committee (PPC)	Responsible for appraisal and approval of Sewerage and Drainage Master Plan.
Nam Dinh Department of Construction (DOC)	Responsible for giving advice and comments for overall work and Sewerage and Drainage Master Plan appraisal and approval procedure Responsible for cooperating work and providing necessary information and data.
Nam Dinh City People’s Committee (CPC)	Responsible for preparing and implementing the Sewerage and Drainage Master Plan as the main counterpart organization by giving advice and comments for overall works. Responsible for taking necessary action and procedure for getting Sewerage and Drainage Master Plan approval from the relevant authorities. Responsible for cooperating work and providing necessary information and data.

Source: JICA Consultant Team

### **5.5.2 Implementation Schedule of the Pilot Project**

The implementation schedule of the pilot project is shown in Figure 5.5.2. The formulation of the Master Plan by the Vietnamese local consultant commenced on the middle of September 2017 and they submitted the final report on May 31, 2018. The study period was around eight months.



### **5.5.3 Output and Results of the Pilot Project**

The study will be completed with the submission of the final report to Nam Dinh CPC. The major milestones are shown in Table 5.5.2.

Each report shall be the output for the master plan study and the final report shall be the final output product.

**Table 5.5.2 Pilot Project Output List**

<b>No.</b>	<b>Reports</b>	<b>Submission Date</b>	<b>Major Contents</b>
1	Inception Report	October 10, 2017	Plan of operation
2	Progress Report	January 10, 2018	Site survey results and Basic Plan
3	Draft Final Report	April 20, 2018	Formulation of Master Plan
4	Final Report	July 31, 2018	Finalization of Master Plan

Source: JICA Consultant Team

There is no concrete plan on the wastewater treatment plant as of 2017 even if the priority is the highest under the general master plan in 2011. It will be formulated through the pilot project activities on the preparation of sewerage and drainage master plan in Nam Dinh City. Then the output will be the basis for further studies like pre-FS, FS, and detailed design.

## **5.6 Activities, Achievements and Problems on the Pilot Project**

### **5.6.1 Preparation, Submission and Presentation of the Inception Report and Task Planning**

The contract of sub-consultancy was signed on September 18, 2017, and the local consultant commenced the preparation of the Inception Report. According to the contract, the Inception Report shall be submitted on October 10, 2017. The local consultant submitted the Inception Report on October 2, 2017 and the JICA Expert Team commented on it immediately.

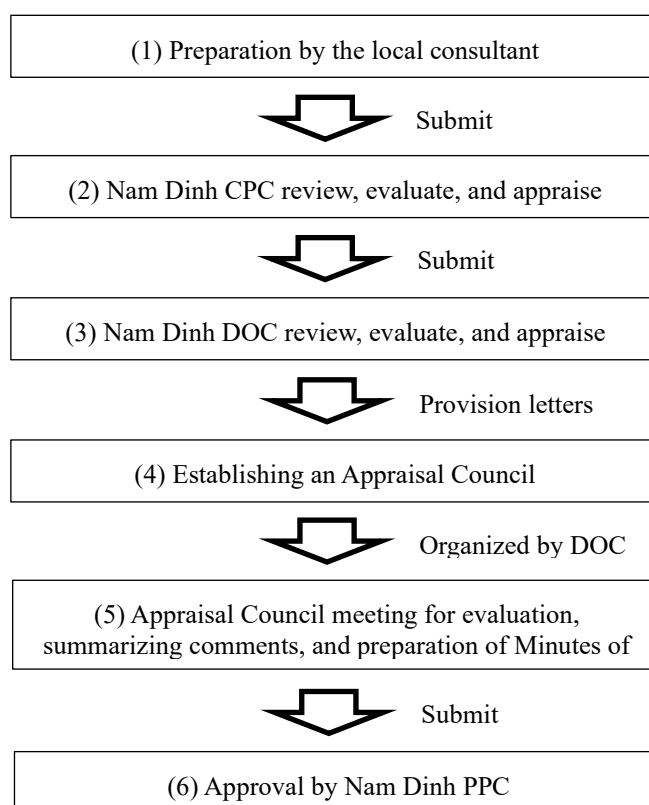
The major comment from the JICA Expert Team was to describe the planning contents of works on all work items until the submission of the Final Report. Because the local consultant only explained the plan of operation until submission of the Progress Report. The local consultant judged that it was not necessary to explain the contents after the Progress Report at that moment. However, the JICA Expert Team suggested that the Inception Report cover all the plan of operation. The local consultant revised the Inception Report after receiving the comment from the JICA Expert Team.

The revised Inception Report was submitted on October 3, 2017 to the JICA Expert Team. The local consultant submitted the Inception Report officially to Nam Dinh CPC at the same time on October 3, 2017.

The meeting with Nam Dinh CPC on the Inception Report was held on November 2, 2017. The local consultant explained the contents of the Inception Report and Nam Dinh CPC agreed with the contents. Nam Dinh CPC requested to plan two more pumping stations for drainage purposes, which were currently used for irrigation purposes.

### 5.6.2 Preparation, Presentation and Submission of Task Planning

The Provincial People’s Committee shall certify the master plan study with an official document, which is called “Task Planning” in Vietnam. Task Planning is the mandatory document to be prepared and submitted to upper authorities for the project by the implementing agency as regulated by Decree No.372010/ND-CP on the Formulation, Evaluation, Approval and Management of Urban Planning. However, Nam Dinh CPC does not have enough capacity to prepare the Task Planning document. Therefore, the local consultant prepares it for Nam Dinh CPC. The approval procedure of the Task Planning is shown in Figure 5.6.1.



Source: JICA Consultant Team

**Figure 5.6.1 Approval Procedure of the Task Planning**

Table 5.6.1 describes the chronological records on the preparation of the Task Planning document.

**Table 5.6.1 Chronological Record on Task Planning for Sewerage and Drainage Master Plan**

Date	Action
Oct 2, 2017	Local consultant submitted 1 <sup>st</sup> version of Task Planning to Nam Dinh CPC.
	Nam Dinh CPC commented on Task Planning - Change format style of the document - Change study area (1. Direct influenced area 2. Indirect influenced area)
Oct 10, 2017	Local consultant submitted 2 <sup>nd</sup> version of Task Planning to Nam Dinh CPC
	Nam Dinh CPC reviewed 2 <sup>nd</sup> version of Task Planning
Oct 25, 2017	Local consultant additionally submitted 5 sets of 2 <sup>nd</sup> version of Task Planning
Nov 10, 2017	Local consultant additionally submitted 30 sets of 2 <sup>nd</sup> version of Task Planning

<b>Date</b>	<b>Action</b>
Nov 10, 2017	Nam Dinh DOC requested the relevant organizations to provide their comments by Nov 18, 2017
Nov 22, 2017	Nam Dinh DOC requested the local consultant to reflect all comments on Task Planning
Nov 24, 2017	Local consultant prepared the explanation on all comments and replied to Nam Dinh.
Nov 28, 2017	Local consultant submitted the final Task Planning to Nam Dinh DOC

Source: JICA Consultant Team

According to the local consultant, Nam Dinh CPC/DOC mainly commented on the format and style of the document. The local consultant substantially completed the Task Planning in early October 2017. After submission of the 1<sup>st</sup> version of the Task Planning, they followed up the request from Nam Dinh CPC. The correspondence were conducted only between Nam Dinh CPC and the local consultant, the JICA Expert Team and MOC did not have a lot of involvement.

In the original plan of the pilot project, Nam Dinh DOC planned to hold the appraisal meeting on the Task Planning in the 3<sup>rd</sup> week of November 2017, from the 13<sup>th</sup> to 17<sup>th</sup>. However, it could not be held on the schedule and was postponed. Nam Dinh CPC and DOC understood the project schedule and tried to reply as soon as possible. However, the replies from relevant organizations of Nam Dinh City took longer than expected. The delay of the schedule was mainly caused by the social habit in Vietnam. Therefore, it is quite difficult to manage all schedules on time.

### **5.6.3 Activities up to the preparation of the Progress Report**

The local consultant substantially commenced their works after the submission of the Inception Report. According to the work schedule of the local consultant, the major work activities in each month until January 2018 are shown in Table 5.6.2.

**Table 5.6.2 Major Monthly Activities of the Local Consultant up to January 2018**

<b>Month</b>	<b>Planned Activity</b>
October, 2017	- Data collection - Review existing data - Field investigations - Task planning preparation
November, 2017	- Hydraulic modeling formulation - Master plan preparation
December, 2017	- Hydraulic modeling formulation - Master plan preparation
January, 2018	- Master plan preparation - Submission of Progress Report - Review an modification of Progress Report - Presentation for Nam Dinh CPC

Source: JICA Consultant Team

The JICA Consultant Team mainly conducts the following supplemental activities during this period.

- Supervising the local consultant activities,

- Having monthly meeting with the local consultant,
- Confirmation of the progress and current issues of the study, and
- Visiting Nam Dinh City for various occasions.

**(1) Activities on October 2017**

The local consultant planned to finish the data collection and field investigations within October 2017, and the works were almost on schedule except for the data collection. The data collection work could not be finished within October 2017 and continued until November 2017. The work was adjusted in order to establish the hydraulic modelling based on the collected data, and insufficient data for the modelling would be filled up after its collection.

The main works for the modelling was conducted in November 2017 in the Planning Task.

It is common in Vietnam that data cannot be collected on time because the local consultant has to collect data from many organizations. In addition, some of them are not understanding the purpose and necessity of data collection. Official letters or administrative procedures are sometimes required to collect data, and it takes longer time than expected.

**(2) Activities in November 2017**

The monthly meeting was held on November 28, 2017 among ATI, the local consultant, and the JICA Expert Team. The local consultant explained their work activities in November 2017.

The local consultant could not finish the data collection in November and continued to collect the irrigation canal data in December. According to their original schedule, the Dao River water quality modelling and MIKE flood modelling were done by the end of November. However, it was postponed until December 10.

Regarding the approval procedure of the Task Planning, the local consultant submitted the latest document to Nam Dinh DOC on November 28 and requested to hold the appraisal meeting on the soonest date.

They explained the activities in December 2017. The major works in December were to complete the drainage and sewerage modelling and calibrate the established model for finalization. They planned to finish the base hydraulic/hydrological model and options in the next month. For actual work, they use the engineering software MIKE URBAN. Firstly, they established the existing sewerage network system and its plan. They studied the discharge and the design drainage volume and judged whether the drainage facility plan is appropriate.

ATI commented on the local consultant's explanation below;

- 1) Evaluation of the existing hydraulic model was important to confirm the current situation of Nam Dinh City. The monthly progress report did not mention the result and thus, the local consultant showed the progress in the report.



- 2) Relocation of the wastewater treatment plant had to be closely communicated with the Nam Dinh CPC and DOC.
- 3) Rainfall intensity, which applied a 10-year probability for the hydrological calculation, should be followed because of the legal basis regulation in Vietnam.

The local consultants replied to these comments as follows;

- 1) The local consultant showed the existing hydraulic model on screen and explained the work progress. They also showed the draft Progress Report mentioned in the current situation of the drainage system.
- 2) The local consultant had understood this matter and had already informed Nam Dinh CPC and DOC. Nam Dinh agreed to the relocation of the site for the wastewater treatment plant.
- 3) The local consultant explained that it followed TCVN 7959:2008 and calculated 227.4 mm/day applying the 216 mm/day that occurred on September 9, 2003. In addition, they calculated the one-hour design rainfall of 65.6 mm/h to be used for the facility design.

The JICA Expert Team mainly played the role to chair the meeting and requested ATI to provide comments and requests ATI to be the main player. They positively participated in the meeting and played their role at this time.

The JICA Expert Team focused on the management of the of study schedule in November. The local consultant progressed to follow their principle plan. The hydraulic modelling was behind schedule due to the delay of data collection for the irrigation canal. They had an alternative plan in case that they could not collect the remaining data in the next month, they planned to catch up with the original schedule by the end of December 2017.

### **(3) Activities in December 2017**

The monthly meeting was held on December 29, 2017 among ATI, the local consultant, and the JICA Expert Team. The local consultant explained the activities in December 2017. The major works in December were to complete the drainage and sewerage modelling and calibrate the established model for finalization. They planned to finish the base hydraulic/hydrological model and options in the next month.

The local consultant explained the work progress of main activities as below.

- Water quality data of Dao River had not been provided by the Department of Natural Resources and Environment, DONRE. The local consultant continued to request for the provision and planned to visit to Nam Dinh City on January 4, 2018.
- The drainage model had been established. However, it had not been calculated yet due to a calculation error. They planned to complete it in January 2018.
- The locations of the two wastewater treatment plants were determined, but one of them was changed from the original planned location. They discussed this matter with CPC and DOC

and the three parties agreed with it. This issue was intended to be mentioned in the progress report.

Regarding the Task Planning, the additional meeting with the appraisal council was held on December 21. The local consultant revised it based on the comments and resubmitted on December 25. Then, the final Task Planning was submitted to PPC on December 28 for approval. It was planned to be approved within January 2018.

The local consultant presented the work schedule in January 2018.

- Data on water quality of Dao River must be collected the soonest to complete the establishment of the water quality model.
- Formulation of the drainage master plan should be accelerated to catch up to the original schedule.
- Treatment method should be designed in January 2018.
- The progress report should be submitted on January 10, 2018 as originally scheduled.

ATI commented to the local consultant;

- The local consultant was requested to closely follow up on the approval of the Planning Task
- All works on the preparation of the master plan should be accelerated to catch up to the schedule.
- The local consultant should select the suitable technology with low operation cost for wastewater treatment method in the sewerage plan.

The JICA Expert Team was instructed to propose alternative sewerage treatment methods in the draft final report.

The JICA Expert Team continued to monitor and manage the work schedule, and coordinate among the three parties. Although the delay of data collection affected the formulation of the master plan, the submission date of the Progress Report was kept on January 10, 2018 as the original scheduled as of the end of December 2017. The JICA Expert Team communicated with the local consultant closely as they would not delay the submission of the Progress Report.

#### **(4) Review meeting on the Progress Report**

The local consultant submitted the Progress Report on January 10, 2018 as originally scheduled. It was the first submission. The report was carefully reviewed by ATI and the JICA Expert Team. The review meeting was held on January 19, 2018.

The local consultant mentioned the work progress on the formulation of the master plan. First, they completed the data collection, which was the bottleneck of the work progress in December 2017. DONRE provided the water quality data of the Dao River in December so that the local consultant could complete the modelling of water quality for the Dao River. On the other hand, the elevation data of

manholes did not match with the existing elevation due to mis-recording of the elevation data and so on. They had to adjust the elevation data to establish the hydraulic model. It took about ten days to complete it. The final output could not be mentioned in the report and was intended to be shown in the revised progress report.

At the meeting, ATI did not issue any comments on the Progress Report. The JICA Expert Team issued the written comments on the Progress Report for reference. The major contents of the comments were to make the report so that readers could understand the content easily and to describe the structure and sentences of the report logically.

ATI issued their comments on January 22, 2018. Their comments were almost similar to the comments from the JICA Expert Team. Their positive attitude and effort on the drainage and sewerage master planning can be read from the comments.

This meeting was the opportunity that the local consultant explained in the first draft of the Progress Report. Here, the JICA Expert Team and the ATI issued comments on the report. The JICA Expert Team instructed the local consultant to revise the Progress Report reflecting today's comments and submit the final version of the report to Nam Dinh CPC within January 2018.

#### **(5) Monthly meeting in January 2018**

The monthly meeting was held on January 30, 2018. ATI, the local consultant, and the JICA Expert Team participated in the meeting. The major topics of the meeting were the explanation of the revised Progress Report based on the meeting on January 18, 2018, and the presentation schedule in Nam Dinh City.

The local consultant explained the following points of the revised Progress Report.

- The result of the population forecast up to 2050 including population growth rate was mentioned in the report.
- Wastewater volume at the target year was calculated by a small community unit (WARD). The calculation result was mentioned in the report.
- Flood forecast map was completed and attached to the report.
- Hydrological model was completed with the following TCVN7957-2008. Daily rainfall volume with a 10-year probability was 227.4 mm/day.
- Water quality modeling of the Dao River was completed. However, it was under-analyzed.
- Selection reasons of the layout plan for the wastewater plant layout were fully explained from the viewpoint of technical and economic aspects.

ATI commented on the above explanation.

- It was quite an important concern for Nam Dinh side on the explanation and evaluation of water quality because the discharge point was located at the upstream of the water supply intake. Therefore, this point should be explained clearly in the master plan report.

- The local consultant should send the final Progress Report to ATI before the presentation with Nam Dinh.

The local consultant explained the schedule for presentation of the Progress Report at Nam Dinh CPC. The presentation was scheduled to be implemented at the second week of February 2018 before the Tet holidays. They were preparing the presentation material at that moment.

The JICA Expert Team chaired the meeting and mainly coordinated among the three parties. They supported the local consultant and ATI proceeded the meeting as the main player. Regarding work schedule on the explanation of the Progress Report for the Nam Dinh side, the schedule might be affected if it would be conducted after the Tet holidays. Therefore, the JICA Expert Team strongly requested the local consultant to set the presentation before the Tet holidays and it was held in the beginning of February 2018.

#### **(6) Presentation of the Progress Report**

It was held on February 6, 2018 at the meeting room of Nam Dinh CPC. Participants were Nam Dinh CPC, ATI, the local consultant, and the JICA Expert Team.

The local consultant explained the progress for the formulation of the sewerage and drainage master plan;

- Sewerage and drainage planning model was prepared.
- Planned wastewater volume was the input to the model and analysis was conducted.
- Detailed results of the analysis were mentioned in the report.
- The planning parameters for each facility would be determined based on the results in the next step.

The sewerage planning model calculated the wastewater volume at the target years and analysed whether the wastewater treatment plant can satisfy the effluent water quality standard. The drainage planning model is to design using a 10% probability rainfall and flows storm water for the present situation and after the planning condition. Then, they analysed the flood deduction level for both cases.

The chairman of Nam Dinh CPC commented on the explanation of the local consultant.

- Urban Management and Natural Resource departments should check the data and review contents of the report.
- In case data correction and further analysis is required after the checking by the both organizations, they should coordinate with the local consultant closely.

For the future schedule, Nam Dinh CPC would review the Progress Report and provide their comments to the local consultant. The local consultant would reflect the comments issued by Nam Dinh CPC to the Draft Final Report.

The presentation was proceeded and lead by Nam Dinh CPC. The JICA Expert Team updated the work schedule after preparation of the Progress Report and major activities by the local consultant to Nam

Dinh City. ATI was also required to increase their experience on the management of the study schedule by participating in the meetings. The local consultant was the main presenter and utilized the comments at the meeting for their next works.



Comments from the head of Nam Dinh PPC

Comment from the Japanese Chief Adviser

Explanation by the Local Consultant -1

Explanation by the Local Consultant -1

Source: JICA Consultant Team

**Figure 5.6.2 Presentation of the Progress Report**

**5.6.4 Activities from the Submission of the Progress Report to the Submission of the Draft Final Report**

**(1) Monthly meeting in February 2018**

The monthly meeting in February was held on March 2, 2018. Participants were ATI, the local consultant, and the JICA Expert Team. The local consultant reported that they completed the sewerage and drainage master plan in principle. They explained the contents of the master plan below;

- Basic sewerage and drainage plans were completed.
- Construction cost was under estimation.

The JICA Expert Team coordinated that the meeting was focused on the technical points because the formulation of the sewerage and drainage master plan would be the main work after March 2018. ATI commented on the explanation of the local consultant below.

- Location of the wastewater treatment plant must be selected carefully. When the location was relocated from the site determined in the general master plan, the local consultant had to indicate

the appropriateness and necessity for the relocation of the site and discuss it with Nam Dinh side.

- The determination of population growth should be carefully done because the number of population is an important parameter to decide the on the wastewater treatment capacity.
- The wastewater treatment method should be selected through a conducted comparative study on the alternatives.
- Construction, operation and maintenance costs should be estimated in each phase.

The ATI counterpart staff pointed out the significance of the Revised General Master Plan in his comment. Because each sector master plan must be formulated to follow the general master plan content, which is the upper plan. If the concerned master plan is different from the general master plan, it must be requisite to get approval from the general master plan. In this sense, ATI commented that the revised general master plan contents should be reflected on the sewerage and drainage master plan.

The three parties confirmed that the local consultant would modify the sewerage and drainage master plan reflecting the above comments.

## **(2) Activities in March 2018**

The formulation stage of the master plan was done after the presentation of the Progress Report since data collection and site surveys were completed. In order to monitor the quality and progress level of the master plan, the JICA Expert Team conducted the meeting with the local consultant once every two weeks after March 2018.

The progress meetings in March 2018 were held on the 15<sup>th</sup> and 30<sup>th</sup>, respectively. Participants were ATI, the local consultant, and the JICA Expert Team. The meeting was conducted to follow the same style before the Tet holidays. The local consultant explained their progress. ATI and the JICA Expert Team commented on the explanation and the local consultant would reflect on them on their next works.

### **1) Progress Meeting of March 15, 2018**

The local consultant reported and explained below;

- Formulation of the sewerage and drainage modelling were completed,
- Estimation of construction cost was completed. Each work item was applied to MOC unit price and total cost was estimated. Cost estimate on the wastewater treatment plant followed the unit prices of Yen Xa project in Hanoi, which was under preparation,
- Operation and maintenance costs were under preparation, and
- Comparison of wastewater treatment methods were not always required for the Vietnamese sewerage master plan study. It was conducted to follow the contract and was attached as an Appendix.

ATI commented on the cost estimation of the wastewater treatment plant and explanation for sludge treatment below;

- Cost estimate on the wastewater treatment plant was regulated in Decision No.451/QD-BXD on May 21, 2015 and unit prices were decided. The local consultant should refer to it, and
- The local consultant should discuss with the Nam Dinh side for the proposal about sludge disposal method and recycle method after sludge concentration.

The local consultant planned to submit the first Draft Final Report in the 4<sup>th</sup> week of March as reflected in the next work schedule.

The JICA Expert Team requested the local consultant to prepare a summary document for the explanation for March 2018 because the local consultant always explained the contents with only a PC monitor and it was difficult to confirm the points with every participant. The local consultant should distribute the first Draft Final Report to the JICA Expert Team, ATI and Nam Dinh CPC before the deadline of April 20, 2018. The local consultant revised the report after receiving all the comments and submitted the Final Report.

## 2) Progress Meeting on March 30, 2018

The local consultant explained the points below;

- Sewerage and Drainage Master Plan was completed.
- Cost for construction, operation and maintenance were completed.
- Drawings, which are required in the contract, were completed.
- The first Draft Final Report in the Vietnamese language was submitted to Nam Dinh CPC and ATI. The English version of the report would be submitted to the JICA Expert Team shortly.

Secondly, the three parties confirmed the schedule up to the presentation on the sewerage and drainage master plan contents at Nam Dinh CPC.

- Nam Dinh CPC and ATI would provide the comment on the Draft Final Report by April 10, 2018.
- The JICA Expert Team would provide the comment soon after receiving the report.
- The presentation for Nam Dinh CPC would be held before April 20, 2018.

The JICA Expert Team requested the local consultant to prepare the summary report, because it is easy to review and confirm contents of the Draft Final Report. Furthermore, it was normal to prepare the summary in the case of the JICA project.

## **(3) Activities in April 2018**

The JICA Expert Team reviewed the English version of the first Draft Final Report from the local consultant. The Vietnamese version was reviewed by ATI. The review results were compiled as the comments from the JICA Expert Team, and they corresponded with the local consultant in several times. The final comments were provided to them on April 9, 2018. The final comment on the Vietnamese version was provided by ATI to the local consultant on April 13, 2018.

The following are the main comments on the Draft Final Report that were given by the JICA Expert Team;

- To improve table and figure expression for easy understanding,
- To describe the reason for the selection of the location and area in the master plan,
- To explain the evaluation and planning method applied to the master plan, and
- To provide the comparison figures for the simulation results before and after the plan.

The report prepared by the local consultant had some parts that are difficult for reader to understand. Particularly, there was no explanation, reason and method in which the planning was done, it might affect the appropriateness and trustworthiness of the master plan. Besides, they did not show the simulation result map before and after the planning. The JICA Expert Team commented that the local consultant should indicate the results as well as appeal the planning appropriateness using visual maps. The revised report should be easier to understand after the revision by the JICA Expert Team comments.

The presentation of the Draft Final Report for Nam Dinh CPC was held on April 17, 2018. The meeting dealt with the following topics:

- Presentation of the sewerage and drainage master plan for Nam Dinh City
- Work schedule up to the Final Report submission
- Deadline of the Final Report submission
- Other topics

The Nam Dinh side would provide their comments on the Draft Final Report after the presentation. It would be quite important to get the approval of the appraisal committee before the submission of the Final Report.







Source: JICA Consultant Team

**Figure 5.6.3 Presentation of the Draft Final Report in Nam Dinh City**

### 5.6.5 Activities from the Submission of the Draft Final Report to the Approval of the Final Report

Activities from May 2018 were summarized in Table 5.6.3 on a monthly basis. The Nam Dinh side issued the comments on the Draft Final Report, which was submitted on April 17, 2018, on July 2018. The study could not proceed to the next step as far as the issuance of all the comments from the Nam Dinh side concerned organizations. Some organizations did not relate to DOC or CPC so that coordinating organizations could not manage the implementation schedule consistently. As the result, it took a longer time than the original schedule during the report finalization stage.

The Final Report was completed in August 2018 after the issuance of all the comments and their reflection into the report. The Vietnamese consultant submitted the report to Nam Dinh CPC, who was in charge of the master plan study. In addition, the Final Report was provided to each appraisal committee member and the report was reviewed for the final evaluation. The issuance of comments from each committee member took more than two months. This included the explanation of comments, and the discussions. The appraisal committee approved the Final Report in the middle of November 2018.

The Final Report was submitted to Nam Dinh CPC and was approved on November 30, 2018. It was transmitted to Nam Dinh PPC and was approved on December 4, 2018.

**Table 5.6.3 Major Monthly Activities from May to December 2018 by the Local Consultant**

Month	Activities
May	1. Collection of comments on the Draft Final Report from concerned organizations 2. Correction of the Draft Final Report
June	1. Continued for collection of comments on Draft Final Report from concerned organizations 2. Correction of Draft Final Report 3. Explanation and discussion on the revision of the contents for Nam Dinh DOC
July	1. Continued the collection comment on the Draft Final Report from concerned organizations 2. Correction of the Draft Final Report 3. Explanation and discussion on the revision of the contents for Nam Dinh DOC
August	1. Submission of the Final Report
September	1. Collection of comments on the Final Report from each appraisal committee member
October	1. Explanation on the Final Report comments for Nam Dinh CPC and DOC

<b>Month</b>	<b>Activities</b>
November	1. Discussion with the Appraisal Committee for the approval of the Final Report 2. Approval of the Final Report by the Appraisal Committee 3. Submission of the Final Report to Nam Dinh CPC and approval on November 30.
December	1. Submission of the Final Report to Nam Dinh PPC and approval on December 4.

Source: JICA Consultant Team

In the original implementation schedule, it was planned that the comments would be issued by the counterpart organizations one month after the Draft Final Report submission, then the revision of the Draft Final Report and the submission of the Final Report would be executed just as a normal JICA study report. However, the Vietnamese consultant had to support Nam Dinh PPC from the Draft Final Report submission to the final approval in order to follow Vietnamese procedures. Overall, it needed two to three months respectively.

### **5.6.6 Issues on the Pilot Project**

#### **(1) Particular issues on PIS**

This activity shall be conducted as one achievement method that the JICA technical assistance project seeks for. It shall prioritize the capacity development of the Vietnamese counterparts through the pilot activities. In other words, it judges that activities are successful if the sewerage and drainage master plan can be formulated by the local consultant under the leadership of ATI and the staff in charge of the PIS after the VSC establishment supported by the JICA Expert Team.

On the other hand, the sewerage and drainage master plan in Nam Dinh City is formulated as one of their future plans. Each formulated plan has to follow Vietnamese laws and should sought for planning approval. The approval procedures deeply relate to the social custom of Vietnam and it normally takes quite a long time to secure approval. Under such circumstance, the JICA Expert Team focused on the complete sewerage and drainage master plan formulation within the work schedule. The PIS owned the capacity development by technical cooperation and master plan formulation, it emphasized the master plan formulation for the actual work.

VSC cannot be established within the time frame. There is no implementing agency to be in charge of the Project Implementation Support function and no staff was arranged to transfer the technical matters. Furthermore, the JICA Expert Team contracted with the local consultant and coordinated with the Nam Dinh side. The Vietnamese side could not build the relationship for all aspects as the main person.

The JICA Expert Team prioritized the self-sustainability and continuity of the ATI counterpart in the pilot activity for the first year. The team let the ATI counterpart staff act as the main player in the master plan report contents, mainly following the task planning. It was not easy to understand the master plan contents for the JICA concerned staff.

The following items shall be required for the second year's PIS based on the first year's issues.

- The PIS method does not stick to the schedule as actual work
- Work contents that ATI has responsibility and can act as main player

Achievement of PIS work activities in the first year is summarized in the table below.

**Table 5.6.4 Achievement of PIS Work Activities**

No.	Work Item	Indicator	Achievement	Reason
A	Work Plan			
1	Review, confirmation and note of existing sewerage and drainage status, plans for Nam Dinh City	MP report description	Achieved	Described in MP report Chapter 3
2	Review of the ongoing projects	MP report description	Partially achieved	Although it is described in MP report Section 3.7, it is not clear that it is reflected on master plan.
3	Preparation of task planning	Prepared and submitted	Achieved	Submitted the final version in Dec. 2017 and approved by Nam Dinh PPC
4	Field investigations	MP report description	Achieved	Described in MP report Chapters 2 and 5
5	Hydraulic study	MP report description	Achieved	Described in MP report Chapters 5 and 6
6	Preparation of sewerage and drainage master plan	MP report description	Achieved	Described in MP report Chapters 5 and 6
7	Preparation of operation and maintenance planning	MP report description	Failure	Although it is described in Chapter 8 of the MP report, it describes the Vietnamese regulations only. No concrete description on organization, institution, and operation and maintenance method, etc.
8	Cost estimate	MP report description	Partially achieved	It estimated only construction cost. No other project costs are estimated.
9	Preparation of implementation schedule	MP report description	Failure	No implementation schedule is prepared even though priority projects are selected.
10	Strategic environmental assessment	MP report description	Achieved	Described in MP report Chapter 9
11	Evaluation of the priority project	MP report description	Partially achieved	Evaluated on plan, cost, and environment aspects. However, it is not describe in the same chapter. It is not easy to understand.
12	Preparation of rough design of two wastewater treatment plants	MP report description	Partially achieved	Though it is prepared, it is for reference purposes and attached to the appendix.
B	Output schedule			
1	Inception Report	2017/10/10	Achieved	Received on 2017/10/02
2	Progress Report	2018/01/10	Achieved	Received on 2018/01/10
3	Draft Final Report	2018/04/20	Achieved	Received on 2018/03/31
4	Final Report	2018/07/31	To be Achieved	To be completed from 2018/May to July

Source: JICA Consultant Team

## (2) Idea on the PIS

The scheduled coordination such as the progress meeting and explanation in Nam Dinh City was conducted to consider ATI's participation at all times on proceeding with the PIS activities.

As mentioned, the JICA Expert Team mainly worked on the schedule management and coordination regarding the sewerage and drainage master plan formulation. The JICA Expert Team focused on the role of ATI on the master plan content quality.

## 5.7 Reflection of Experience and Knowledges Derived from the Pilot Support into the Training Function

Experience and knowledge derived from the pilot support for Nam Dinh City were reflected into the training function in the second year and third year below.

### 5.7.1 Activity Report in the Pilot Training (Planning Courses)

Outline of the sewerage sector master plan of Nam Dinh City and the issues understood through the pilot support were reported during the pilot training (planning course) so that the public officers of local governments can use the information as a reference in their sewerage projects. The activity report was implemented three times in July, October, and December 2018 as described in Table 5.7.1.

**Table 5.7.1 Date and Place for the PIS Activity Report in the Pilot Training**

No.	Date	Lecturer	Place
1	July 10, 2018	Mr. Do Manh Quan (ATI)	Nha Trang
2	October 10, 2018		Ho Chi Minh City
3	December 5, 2018		Can Tho

Source: JICA Consultant Team





Source: JICA Consultant Team

**Figure 5.7.1 Situation of Activity Report in the Pilot Training Course of Second Year**

### **5.7.2 Reflection of the Sewerage Sector Master Plan into the Textbook of the Training Course**

Work contents to prepare the sewerage sector master plan were confirmed through the pilot support. The main report of the master plan of Nam Dinh City was based on the contents of the master plan report instructed usually by MOC at the time of approval. However, the contents of the master plan report of Nam Dinh did not correspond with the textbook of pilot training (planning course) because the textbook was prepared in reference to the Japanese guideline of sewerage planning and design. Therefore, the additional materials including the summary table of parameters of sewerage planning were prepared and inserted into the textbook. Also, another material derived from the master plan of Nam Dinh City was prepared for the class of the pipe design supporting system in the preliminary design course and utilized in the pilot training courses organized from July to October 2019.

## CHAPTER 6 RECOMMENDATION TO ACHIEVE THE OVERALL GOAL

### 6.1 Status of the Achievement of Project Purpose

The status of the achievement of project purpose and outputs are summarized in Table 6.1.1, which are based on the latest PDM updated in April 2019.

**Table 6.1.1 Status of Achievement of the Project Purpose and Outputs**

Project Purpose	Objectively Verifiable Indicator	Means of Verification	Status of the Achievement
<b>Project Purpose</b>			
MOC and its capacity to implement the training in the field of sewerage is enhanced.	Organization structure to implement trainings (CUWC)	<ul style="list-style-type: none"> <li>● Document about the organization to implement trainings</li> <li>● Financial document related to the implementation of trainings</li> </ul>	<ul style="list-style-type: none"> <li>● The “Proposal on Sustainable Training Organization in Sewerage Sector of Vietnam” was prepared by the Japanese side, however, the official document was not prepared and submitted to the public agency including MOC.</li> <li>● CUWC intends to incorporate the training function of the sewerage field into the existing CNEE now and establish a new training center of sewerage field in CUWC in the future. It is expected that CUWC will prepare the official document related to the organization structure and the financial plan of newly-established training center in the future.</li> </ul>
	Quality of contents for training	<ul style="list-style-type: none"> <li>● Survey on Training Implementation (i.e. Questionnaire to trainees)</li> <li>● Textbooks of trainings</li> </ul>	<ul style="list-style-type: none"> <li>● Six training courses of sewerage planning and three training courses of preliminary design were executed in the Implementation Phase. The questionnaire survey for trainees was implemented in each training course, and the contents and materials of training, class hours and the presentation of the lecture was improved.</li> <li>● Textbooks were prepared by the Japanese side firstly, however, the lectures assigned to the Vietnamese side was improved using the textbooks by themselves.</li> <li>● CUWC is expected to continue to improve the quality of the training course even after project completion.</li> </ul>
<b>Output</b>			
1: Comprehensive needs of human resource development for the sewerage sector is identified.	Needs survey of human resource development is implemented.	<ul style="list-style-type: none"> <li>● Needs survey reports</li> </ul>	<ul style="list-style-type: none"> <li>● The needs survey was executed during the detailed planning phase and the survey results were summarized in the completion report of the detailed planning phase.</li> </ul>
2: Structure and establishment plan of the organization to implement training in the field of sewerage are	Structure and establishment plan of the organization to implement training in the field of sewerage are submitted.	<ul style="list-style-type: none"> <li>● Structure and establishment plan of the organization to implement training in the field of sewerage</li> </ul>	<ul style="list-style-type: none"> <li>● CUWC intends to incorporate the training function of the sewerage field into the existing CNEE now and establish a new training center of sewerage field in CUWC in the future. Therefore, the official document was not prepared and submitted to the public agency during the project period.</li> </ul>

drafted and submitted to the competent authority.			
3: The basic training are implemented based on the comprehensive curriculum.	<ul style="list-style-type: none"> <li>● Comprehensive training curriculum and textbook for each basic training course are developed.</li> <li>● Each basic training course is conducted at least three times (North, Center, South)</li> </ul>	<ul style="list-style-type: none"> <li>● Training implementation report</li> <li>● Comprehensive training curriculum</li> <li>● Training textbook</li> </ul>	<ul style="list-style-type: none"> <li>● General curriculum of five training courses related to sewerage planning and design were prepared in the detailed planning phase. And then in the Implementation Phase, the curriculum was revised and the necessity of household connection and pipe collection system were focused in the training courses after 2018.</li> <li>● A total of 11 training courses were organized (two times in the detailed planning phase, nine times in the implementation phase). Textbook and training implementation report was prepared in each training course.</li> </ul>
4: Sewerage and Drainage Master Plan (MP) in a specific city is developed and the experience through the development of the MP is shared/reflected in the basic training.	<ul style="list-style-type: none"> <li>● Approval of the Sewerage and Drainage Master Plan (MP) in a specific city</li> <li>● Contents of the basic training reflecting the experience through the development of the MP</li> </ul>	<ul style="list-style-type: none"> <li>● Information provision from a specific local city</li> </ul>	<ul style="list-style-type: none"> <li>● Sewerage and drainage MP for Nam Dinh City was prepared and approved by Nam Dinh People's Committee in December 2018.</li> <li>● The outline of Nam Dinh MP was introduced in the training courses organized in July, September and December, 2018.</li> <li>● The data of the Nam Dinh MP was utilized as reference material of the textbook in the training for the design of pipe network organized in July and October 2019.</li> </ul>

Source: JICA Consultant Team

## **6.2 Problems and Solutions on Project Implementation**

Problems, solutions, and lessons learned by the JICA Expert Team, which were considered and obtained during the project implementation are summarized below.

JICA long-term expert and JICA consultant team made effort to communicate with CUWC which is the training implementation organization by supporting them with implementing of pilot training course during the entire project period, so that they can cooperate to conduct training course and training of trainer smoothly. On the other hand, it was difficult to communicate and cooperate with ATI, which is the project manager, to operate this project together.

The first half period of this phase, Japanese side took initiative to prepare the textbook and conduct training courses, however gradually it was taken over to CUWC. Most of the lecturers were from CUWC in the pilot training courses which were conducted after July 2019.

Initially, contents of training course were general topics about sewerage planning and design method which were decided in the detailed planning phase. The contents were revised. The main subject was set to sewer pipe installation and house connection which prevent the sewerage system in Vietnam from being improved. The revised contents are more concrete and meeting the needs in each place of Vietnam.

The training course were mostly lecture style at the beginning, but later, site visit and exercise by using note PC were included to attract trainees and increase attendance rate. Also, rehearsals of lectures for the lecturers of CUWC were conducted to improve the quality of lectures.

About the organization of training course, the problems of sustainability after the completion of this project are finance and organization. Tuition fee tried to be collected from private consultant firms and the possibility to spread the target of training course was investigated. Moreover, various equipment which can contribute to make the training course more fascinate was donated to CUWC. However, the discussion about organization structure and budget planning were not executed in the Project. It will be spontaneously done by CUWC in the future.

**Table 6.2.1 Problems, Solutions, and Lessons Learned**

Item	Problem	Solution and Lesson Learned
Whole Project	To communicate with ATI, the project directing organization, and share the necessary information	<ol style="list-style-type: none"> <li>1) The JICA Expert Team tried to have periodical communication with ATI, however, they could not communicate enough because of the difficulty in coordination.</li> <li>2) The JICA Expert Team should have clarified the roles of counterpart members of ATI at the initial stage of the Project and promoted the participation of ATI's counterparts.</li> </ol>
Preparation for training courses	To prepare the implementation plan of training course and textbook on the initiative of Vietnamese side	<ol style="list-style-type: none"> <li>1) Most of the lectures were assigned by CUWC to promote the independence of the Vietnamese side.</li> <li>2) The implementation plan, including the timetable, course hour, and content of course were prepared based on the Vietnamese custom.</li> </ol>
Contents of training courses	<ol style="list-style-type: none"> <li>1) To involve the development of household connection and sewer network in the training course, which is one of the biggest problems in spreading the concept of a proper sewerage system in Vietnam</li> <li>2) And to promote understanding of the importance to solve the above-mentioned problem among the implementation organizations of sewerage projects in Vietnam</li> </ol>	<ol style="list-style-type: none"> <li>1) In the training in Japan organized in January 2019, the themes of development of a sewer network, household connection, and the management of a sewer network with the use of a database system were focused on. This lead to promote the understanding of trainees and counterparts.</li> <li>2) Two sewerage seminars were organized in July and November 2019, focusing on household connection, which lead to promote understanding within organizations in concepts related to sewerage projects in Vietnam.</li> </ol>
Implementation method of training courses	<ol style="list-style-type: none"> <li>1) To improve the attendance rate of each class</li> <li>2) How to attract more people for the class</li> <li>3) Training of trainer</li> </ol>	<ol style="list-style-type: none"> <li>1) Time schedule of training course was announced emphatically in advance.</li> <li>2) Practical training was executed with the use of laptop computers distributed to trainees to promote their interest.</li> <li>3) Number of days and class hours were shortened to maintain the concentration and participation rate of trainees.</li> <li>4) Rehearsal was executed before the training course to improve the way of speaking of lecturers.</li> </ol>



Item	Problem	Solution and Lesson Learned
Implementation organization of training course	To secure the sustainability of training function from the aspects of finance and organization	<ol style="list-style-type: none"> <li>1) Tuition fee tried to be collected from private consultant firms and the possibility to spread the target of training course was investigated.</li> <li>2) Various types of equipment were donated so that CUWC can implement attractive training courses.</li> <li>3) To establish an implementing organization in the training for the new legal system necessary to be constituted in Vietnam, which is designated by law and supported financially by the central government such as Japan Sewage Works Agency (JS). However, the discussion about the legal system was not executed in the Project. If the Vietnamese side desires to establish a new organization like JS, additional support is necessary including the dispatch of an expert for the legal system.</li> </ol>

Source: JICA Consultant Team

### 6.3 Expectations and Recommendations to Achieve the Overall Goal

As stated in Chapter 1, the overall goal of the Project is “To enhance the planning, implementation and management capacity of the sewerage sector to meet the future needs in Vietnam”. It is necessary for the Vietnamese related organizations to continue their required tasks after the Project completion with maximal use of experience and knowledge derived from the Project.

Expectations and recommendations from the JICA Expert Team to CUWC regarding the implementation organization of the training function, ATI, who is the regulatory agency of sewerage works in the central government of Vietnam, and the local government of Vietnam, who is the implementation and managing organization of sewerage projects are listed below.

#### (1) Expectations and Recommendations to CUWC

- 1) As of 2019 the coverage ratio of the sewerage treatment in the urban area is around 20% in Vietnam, with the central government setting a goal of 50% before 2025 and 100% before 2050 (No.589/QD-TTg, Decision by the Prime Minister in April 2016). Thus, the demand for training on sewerage planning and design will increase more and more from now. Also, there is no organization who covers the trainings of sewerage planning and design. Therefore, CUWC is expected to become the only organization who implements the training on sewerage planning and design.
- 2) It is necessary for CUWC to ensure the self-support accounting of the training courses on sewerage planning and design to sustain these target trainings. Therefore, CUWC is expected to collect the necessary tuition fee and the number of trainees steadily by improving the attractiveness of training courses and enhancing the PR activity as follows.
  - (a) Improvement of the Attractiveness of Training Courses

According to the Personnel Department of MOC, MOC subsidizes the local governments every year using the budget of human resources development. Therefore, if CUWC’s training courses are

attractive for the local governments, it is possible to collect the tuition fee from the local governments as well as private firms even though the tuition fee was not collected from the local governments in the pilot training courses of the Project. JICA Expert Team suggests that CUWC starts the following specific activities promptly to improve the attractiveness of training courses.

- CUWC will implement the periodical needs survey to local governments and improve the curriculum, contents and textbooks continuously.
- Additionally, CUWC will make maximal use of equipment and displays donated in the Project. Especially, the model of house connection, the sewer pipe design supporting system software and note PC which were used in the pilot training of preliminary design course shall be utilized at an early date, because they can be utilized even right after the completion of this project and contribute to accelerate house connection work which was specified as the main problem in the study of this project.
- Moreover, CUWC will develop a small sewerage system as an experienced-based training facility based on the development plan of small sewerage system prepared in the Project, accordingly, the attractiveness of the training courses can be improved more.

(b) Enhancement of PR Activity

JICA Expert Team suggests that CUWC starts the following specific activities promptly to enhance the PR activity of training course.

- CUWC will prepare a brochure on which training contents and photos of training facilities are described. This should be distributed to the local governments periodically. Especially, it will be beneficial to describe the importance of household connection and tertiary sewer that is focused in the Project and highlight that CUWC has specialized training courses and equipment. With the use of the brochure, CUWC will conduct continuous PR activity by going directly to local governments.
- Additionally, CUWC will create new page exhibiting the training courses of sewerage planning and design on the website of CUWC and periodically deliver the information to the attendees of the pilot training courses by e-mail.
- Moreover, CUWC will update the Facebook page continuously and periodically announce the information to the attendees of pilot training courses by e-mail.

**(2) Expectations and Recommendations to ATI (Central Government)**

JICA Expert Team suggests that ATI focuses on the following activities as the regulatory agency of sewerage works of the central government of Vietnam to raise the coverage ration of sewerage treatment and realize authentic sewerage system.

- 1) It is difficult to rely on the ODA funds for sewerage projects in Vietnam as before. ATI is necessary for the subsidy of local governments for sewerage projects to achieve the goal of the coverage ratio of sewerage treatment in urban area to 50% before 2025 and to 100% before 2050. This is mainly

because it is difficult to rely on private investment for sewerage projects. Therefore, ATI will have the tenacity to request MOC to grant the subsidies to local governments for sewerage projects to expand the sewerage system to the urban areas of whole Vietnam.

- 2) In the Project, one of the biggest reasons for the commonly-noted situation in the existing sewerage system of Vietnam became obvious that both the amount and quality of inflow to the STP are much less than the planned values. The issue was identified as the defectiveness of household connection, and the solution to promote the improvement of household connection is highlighted in the pilot training courses organized after October 2018. Therefore, ATI will encourage the local governments to consider the household connection for the project formulation, and direct the local governments to promote the household connection.
- 3) Additionally, ATI will support the continuous implementation of training on sewerage planning and design and the development of authentic sewerage planning with household connection from the institutional aspect by developing the certification system for the engineer and manager of sewerage planning, design and the household connection plumber worker.
- 4) Moreover, ATI will support CUWC's training courses continuously as a counterpart of the Project by offering the recommendation of ATI on the brochure, website, and application document of CUWC. This is because ATI's recommendation to the training course will be very effective in collecting trainees.

### **(3) Expectations and Recommendations to the Local Governments of Vietnam**

As stated above, one of the biggest reasons for the commonly-noted situation in the existing sewerage system of Vietnam is that both the amount and quality of inflow to STP are much less than the planned values and the main issue was identified as the defectiveness of household connection. Each local government unit of Vietnam is necessary to focus on the following works as well as the development of STP and a trunk main sewer to solve the obvious problem and realize an authentic sewerage system.

- 1) The preparation or update of the sewerage MP considering the household connection and tertiary pipe development with facility grand map and flow calculation sheet.
- 2) As mentioned in chapter 4, it was found that Buon Me Thuot City, Da Lat City and Binh Duong Province have worked on the PR activity to residents to accelerate house connection in the fact-finding survey. This activity should be also done in other cities and provinces to promote the understanding of sewerage works and accelerate house connection.
- 3) Improvement of existing interceptor sewerage system by considering household connection and tertiary pipe development.
- 4) Understanding the current conditions of existing pipe networks and structures with use of sewerage a database system to achieve the development of authentic sewerage system.