SOCIALIST REPUBLIC OF VIETNAM
MINISTRY OF CONSTRUCTION

LOCAL WATER SUPPLY AND WASTEWATER SECTOR SURVEY

TECHNICAL REPORT ON WATER SUPPLY PROJECT IN PHU QUOC ISLAND

FINAL REPORT

January 2015

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

NIPPON KOEI CO. LTD.
SEWERAGE BUSINESS MANAGEMENT CENTRE
DOGAN, INC.
WATER AGENCY INC.
NIHON SUIDO CONSULTANTS CO., LTD.

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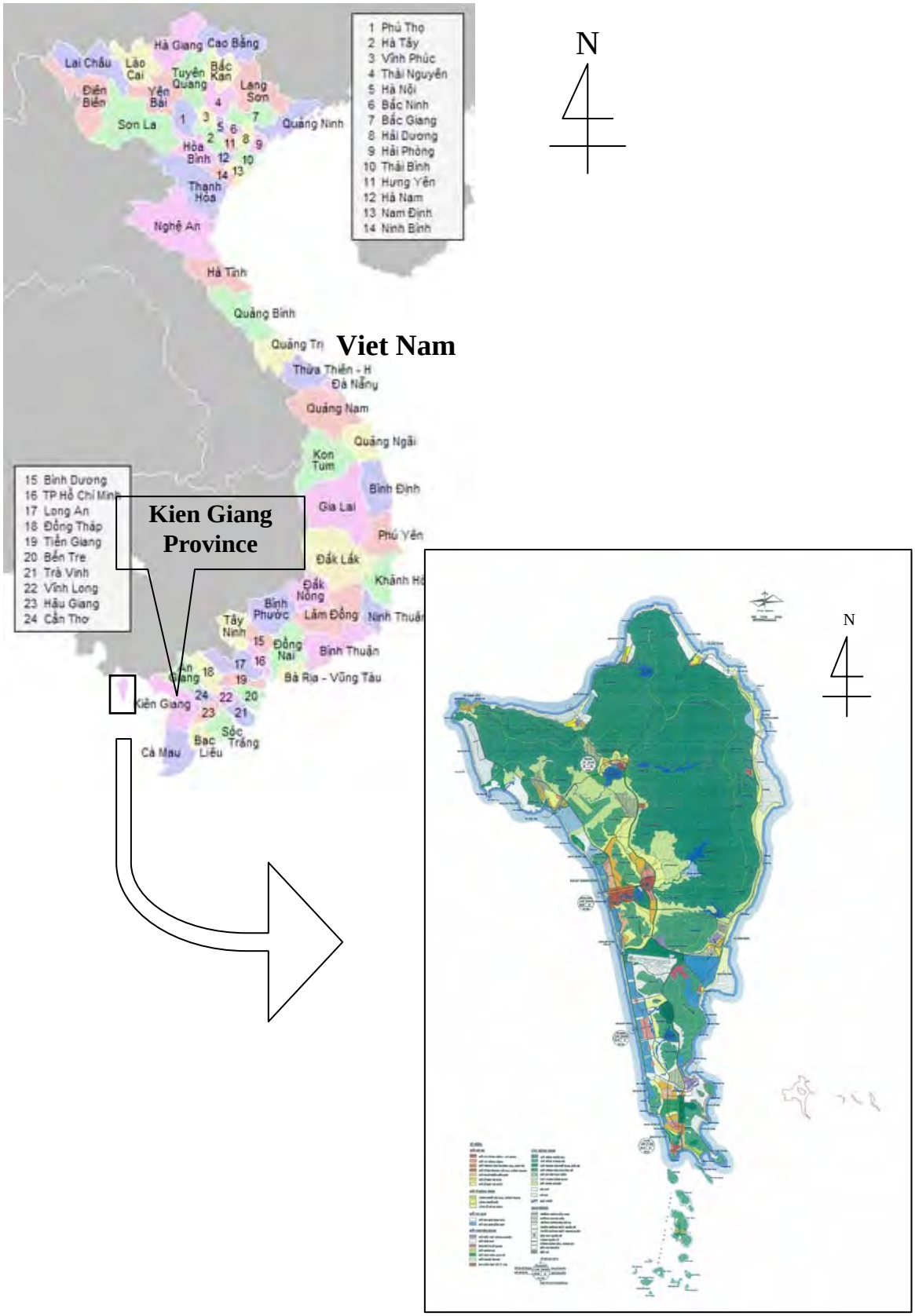
EXCHANGE RATE (Fact Finding Mission for FY 2014 Japanese ODA Loan Projects)

USD 1 = JPY 102.6
USD 1 = VND 21,036



Location Map of Project Area

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ABBREVIATIONS

BOO	Build, Operate and Own
BOT	Build, Operate and Transfer
DARD	Department of Agriculture and Rural Development
DIP (DCIP)	Ductile Cast Iron Pipe
DPC	District People's Committee
FC	Foreign currency
FS (F/S)	Feasibility Study
GOJ	Government of Japan
GOV	Government of Viet Nam
HDPE	High Density Polyethylene Pipe
JICA	Japan International Cooperation Agency
KIWACO	Kien Giang Water Supply and Drainage One Member Limited Company
KGPPC	Kien Giang Provincial People's Committee
LC	Local Currency
MP (M/P)	Master Plan
O&M	Operation and Maintenance
PC	People's Committee
PPC	Provincial People's Committee
PPP	Public Private Partnership
PQDMB	Phu Quoc Development Management Board
PVC	Polyvinyl Chloride Pipe
SPC	Special Purpose Company
SS	Suspended Solids
STP	Sewage Treatment Plant
S/V	Construction Supervision
VAT	Value Added Tax
VND	Vietnamese Dong
WB	World Bank
WTP	Water Treatment Plant

1. Background of the Project

Phu Quoc Island, located in the Gulf of Thailand is the largest island (593 km^2) in Viet Nam. The island is part of Kien Giang Province in the southern part of Viet Nam, about 18 km from the Cambodian coast. In 2005, Phu Quoc Development Master Plan was formulated focusing on the island's geographical advantages, rich natural environment and tourism potentials. The GDP grew from 16% in 2005 to 23% in 2009. Phu Quoc is expected to contribute to the regional economy as well as play an important role in the country's economic development. Subsequently the 2005 Master Plan was revised in 2010. The "Amended General Construction Master Plan for Phu Quoc Island, Kien Giang by 2030"was approved as the "Adjusted Master Plan of Construction of Phu Quoc Island, Kien Giang in 2030" by Prime Minister Decision No. 633/QD-TTG in May 2010. (This adjusted master plan is hereinafter referred to as the Master Plan.)

Table 1 Population Forecast by Master Plan

Year	Total Population	Urban Population	Rural Population	Tourist Number Equivalent to Population	Number of Tourists
2020	340,000 – 380,000	200,000 - 230,000	80,000 – 90,000	50,000 – 65,000	2 – 3 million
2030	500,000 – 550,000	320,000 – 370,000	90,000 – 100,000	80,000 – 85,000	5 – 7 million

Source：Master Plan

Duong Dong, An Thoi and Cua Can townships are designated as urban development areas, and their development policies are summarized in **Table 2**.

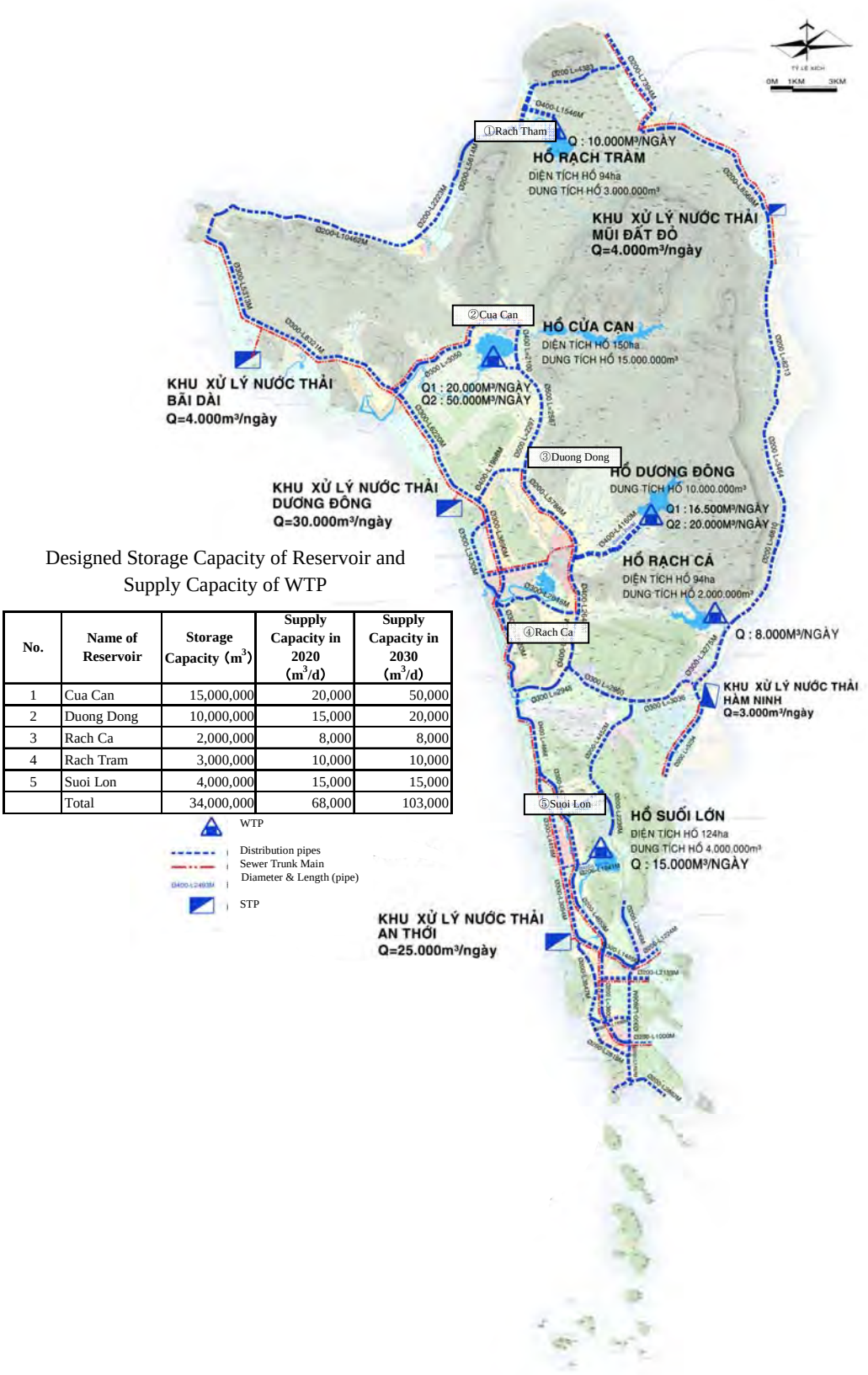
Table 2 Development Policies of the Three Designated Urban Areas

Urban Area	Urban Function	Target Population (Y2030)	Development Area (ha)
Duong Dong Urban Center	Government services, public services, business center, tourist service center.	240,000	2,502 ha
An Thoi	International port, tourist services, light industry, cultural center.	71,000	1,020 ha
Cua Can	Forest/Marine Protection, Agriculture, Tourist Center	26,500	329 ha

Source：Master Plan

The new international airport opened in December 2012. Other major infrastructure development projects, such as the construction of the main road and electricity supply from the mainland, are underway.

The water demands on the main island of Phu Quoc for 2020 and 2030 are estimated to be 70,000 and 120,000 m^3/d respectively. Four new water impounding reservoirs would be required to meet these water demands. The water supply system to be developed would provide 68,000 m^3/d by 2020 and 103,000 m^3/d by 2030 (equivalent to 65% and 85% of the projected demands), with the balance to be supplemented by rain water and reclaimed water. The water supply plan is shown in **Figure 1**.



Designed Storage Capacity of Reservoir and Supply Capacity of WTP

No.	Name of Reservoir	Storage Capacity (m^3)	Supply Capacity in 2020 (m^3/d)	Supply Capacity in 2030 (m^3/d)
1	Cua Can	15,000,000	20,000	50,000
2	Duong Dong	10,000,000	15,000	20,000
3	Rach Ca	2,000,000	8,000	8,000
4	Rach Tram	3,000,000	10,000	10,000
5	Suoi Lon	4,000,000	15,000	15,000
	Total	34,000,000	68,000	103,000

Figure 1 Water Supply Plan in Master Plan

This Technical Report is prepared to facilitate the formation of a Japanese Loan project for implementation of the Water Supply Project in Phu Quoc Island. The contents of this Technical Report are prepared based on the water supply parts of "Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island, July, 2013, JICA".

2. Objective of the Project

Phu Quoc will be developed into a tourist resort and the population is expected to increase substantially. It is expected that private funds would be needed for the massive infrastructure investments because the government budget is rather limited. Therefore the water supply system in Phu Quoc will be developed as a public private partnership.

3. Development Need as PPP Infrastructure Project

By 2020 the island population of 91,000 would almost double to around 200,000 - 230,000, and the number of tourists would increase more than ten times from 200,000 to 2 - 3 million. This scenario, together with such a rapid change of socio-economic conditions, would require significant and intensive investments in infrastructure and developments in the tourist industry sector.

A new international airport opened recently, and construction of main roads and sea ports are underway. Some of the construction projects are delayed due to the shortage of government budget to cover the sharp increase the infrastructure developments across the country. Therefore, the government is shifting its policy to utilize private capital.

It is well-established that the water supply business can be financially independent, and the introduction of private funds in BOT and BOO schemes are encouraged. Thus, the water supply business is open to foreign companies.

Water supply infrastructure development should be synchronized with tourism development. Investment in the former would attract investment in the latter. It is advisable to consider private funding to ensure timely and early implementation of water infrastructure development projects.

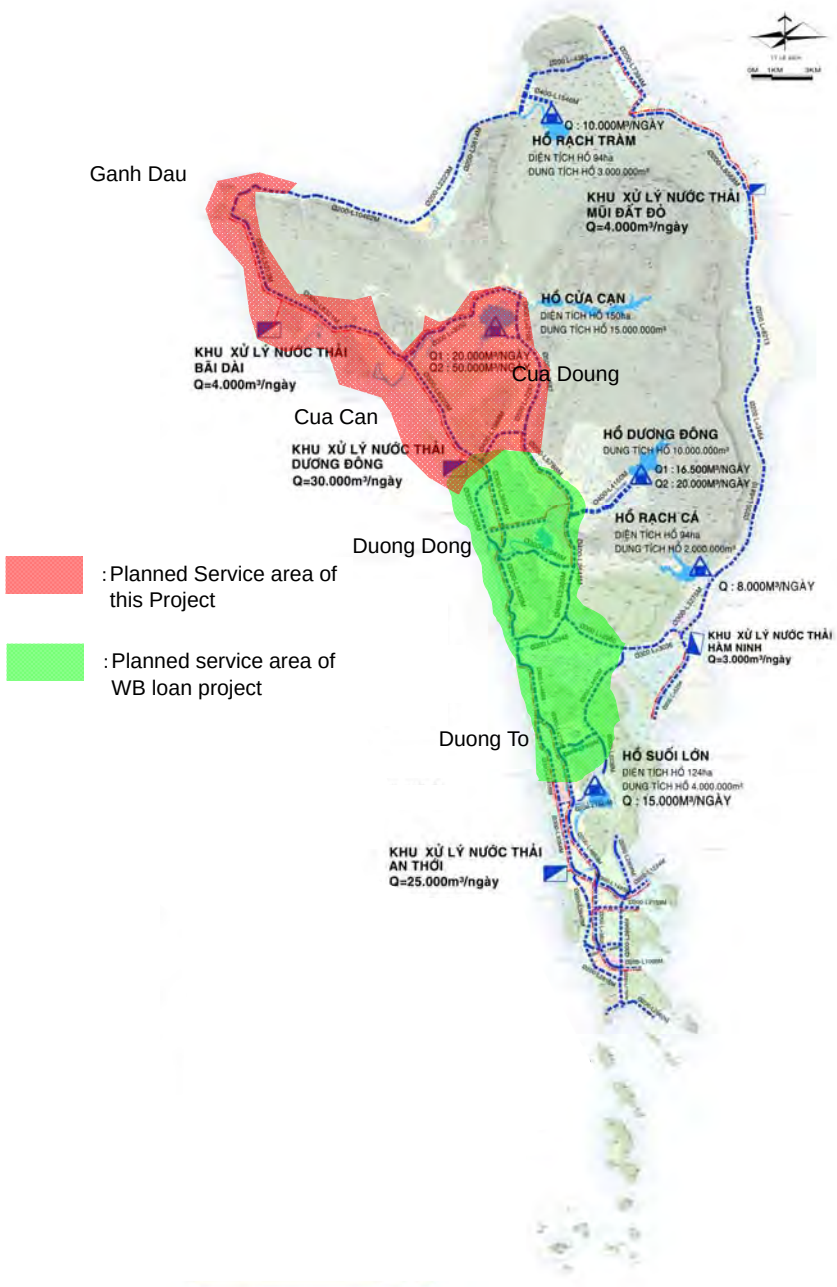
4. Water Supply System Planning

4.1 Planned Service Area

Phu Quoc Island has a water supply system (capacity 5,000 m^3/d) that targets the Duong Dong area (center of the Island). It has been operated since the year 2006. On the other hand, construction of new airport and new resort development are on the way in the suburbs of the area. A water supply expansion project is promoted by World Bank (WB) loan to supply water to the Duong Dong area and its southward Duong To area. This project would expand the existing capacity to 16,500 m^3/d.

A lot of tourist resort and housing development projects were proposed and approval procedures were carried on at Cua Can area, at the north of Duong Dong area, and western seaside of Ganh Dau area. This Project will supply water mainly to these areas.

Figure 2 shows the planned service area of this Project and that of WB project. However, in the service area of the WB project, shortage of water supply volume is a concern in the future because of restrictions in the volume of raw water. Therefore, this insufficient water volume is expected to be supplemented by bulk water supply of this Project.



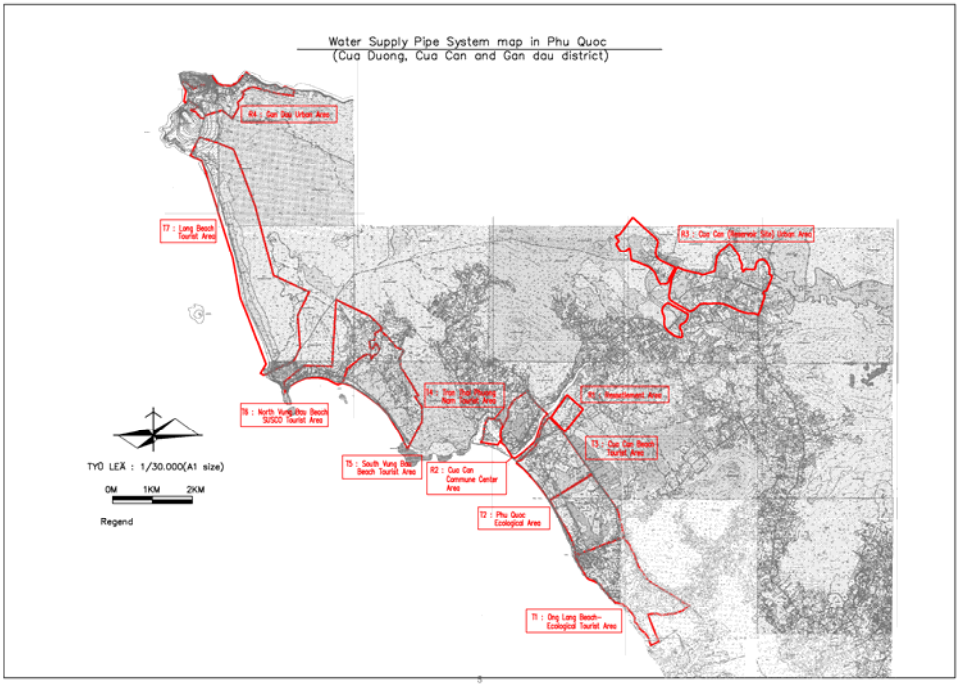
Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

Figure 2 Planned Service Area

4.2 Water Demand

The population of the Cua Can, Cua Doung, and Ganh Dau areas was 15,903 persons in 2008 and the annual growth rate is around 3% in recent years. A lot of resort development projects are proposed for these areas. Therefore, water demand is estimated by considering the water demand trend in terms of urban development, as well as the additional demand from the resort development projects. The projected water demand was submitted by developers and approved by Kien Giang Province.

Figure 3 shows the locations of resort development and urban development areas. Water demand projections for Phase 1 and Phase 2 are shown in **Table 3** and **Table 4**, respectively.



Note） T1 - T7: Tourist resort development area
R1 - R4: Urban development and housing development area
Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

Figure 3 Locations of Resort Development and Urban Development Areas

Table 3 Water Demand Projection in the year 2020

				Domestic				Resort								Urban Area & Resettlement Area					total	Distribute	Total
				Cua Can	Cua Duong	Ganh Dau	Total < A >	T1	T2	T3	T4	T5	T6	T7	Total < B >	R1	R2	R3	R4	Total < C >	<D>	Other Area < E >	<A>+<D>+<E
Person	Calculation	(1)	(person)	4,889	11,543		16,432												4,659				
	resettlement	(2)	(person)	※1 2,330	※1 2,329		4,659																
	Total	(3)=(1)-(2)	(person)	2,559	9,214	0	11,773																
per capita demand		(4)	(l/pcd)	120	120	120																	
Domestic Water Consumption		(5)=(3)x(4)/1000	(m3/day)	307	1,106	0	1,413	785 (1,570)	1,214 (1,214)	2,950 (2,950)	960 (960)	0 (2,200)	0 (3,960)	0 (7,000)	5,909 (19,854)	1,346 (1,819)	639 (1,278)	0 (3,975)	0 (1,782)	1,985 (8,854)	7,894 (28,708)	5,682	14,989
Commercial		(6)=(5)x0.03	(m3/day)	9	33	0	42																42
Institutions		(7)=(5)x0.05	(m3/day)	15	55	0	71																71
Total		(8)=(5)+(6)+(7)	(m3/day)	332	1,194	0	1,526	785	1,214	2,950	960	0	0	0		1,346	639	0	0		7,894	5,682	15,102
Leaking		(9)=(8)*0.10	(m3/day)	33	119	0	153	79	121	295	96	0	0	0		135	64	0	0		790	568	1,511
Total		(10)=(8)+(9)	(m3/day)	365	1,314	0	1,678	864	1,335	3,245	1,056	0	0	0		1,481	703	0	0		8,684	6,250	16,612
Peak factor		(11)		1.2	1.2	1.2		1.2	1.2	1.2	1.2	1.2	1.2	1.2		1.2	1.2	1.2	1.2			1.2	
Max daily demand		(12)=(10)*(11)	(m3/day)	438	1,576	0	2,014	1,037	1,602	3,894	1,267	0	0	0		1,777	844	0	0		10,421	7,500	19,935
Peak factor		(13)		1.5	1.5	1.5		1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.5	1.5	1.0	1.5			1.0	
Max hourly demand		(12)*(13)	(m3/day)	656.7	2,364.4	0.0	3,021	1,037.0	1,602.0	3,894.0	1,267.0	0.0	0.0	0.0	7,800	2,665.5	1,266.0	0.0	0.0	3,931.5	11,731.5	7,500	22,253
		(14)=(12)*(13)/24	(m3/hr)	27	99	0	126	43	67	162	53	0	0	0		111	53	0	0		489	313	928
		(12)*(13)/86400	(m3/s)	0.0076	0.0274	0.0000	0.0350	0.0119	0.0186	0.0450	0.0147	0.0000	0.0000	0.0000		0.0308	0.0147	0.0000	0.0000		0.1358	0.0869	0.2577

Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

Table 4 Water Demand Projection in the year 2030

				Domestic				Resort								Urban Area & Resettlement Area					total	Distribute	Total
				Cua Can	Cua Duong	Ganh Dau	Total < A >	T1	T2	T3	T4	T5	T6	T7	Total < B >	R1	R2	R3	R4	Total < C >	<D>	Other Area < E >	<A>+<D>+<E
Person	Calculation	(1)	(person)	6,570	15,513	8,389	30,472																
	resettlement	(2)	(person)	3,130	3,131		6,261																
	Total	(3)=(1)-(2)	(person)	3,440	12,382	8,389	24,211																
per capita demand		(4)	(l/pcd)	150	150	150																	
Domestic Water Consumption		(5)=(3)x(4)/1000	(m3/day)	516	1,857	1,258	3,632	1,570	1,214	2,950	960	2,200	3,960	7,000	19,854	1,819	1,278	3,975	1,782	8,854	28,708	5,682	38,022
Commercial		(6)=(5)x0.03	(m3/day)	15	56	38	109																109
Institutions		(7)=(5)x0.05	(m3/day)	26	93	63	182																182
Total		(8)=(5)+(6)+(7)	(m3/day)	557	2,006	1,359	3,922	1,570	1,214	2,950	960	2,200	3,960	7,000	19,854	1,819	1,278	3,975	1,782	8,854	28,708	5,682	38,312
Leaking		(9)=(8)*0.10	(m3/day)	56	201	136	392	157	121	295	96	220	396	700	1,985	182	128	398	178	886	2,871	568	3,831
Total		(10)=(8)+(9)	(m3/day)	613	2,206	1,495	4,314	1,727	1,335	3,245	1,056	2,420	4,356	7,700	21,839	2,001	1,406	4,373	1,960	9,740	31,579	6,250	42,144
Peak factor		(11)		1.2	1.2	1.2		1.2	1.2	1.2	1.2	1.2	1.2	1.2		1.2	1.2	1.2	1.2			1.2	
Max daily demand		(12)=(10)*(11)	(m3/day)	736	2,648	1,794	5,177	2,072	1,602	3,894	1,267	2,904	5,227	9,240	26,206	2,401	1,687	5,248	2,352	11,688	37,894	5,000	48,072
Peak factor		(13)		1.5	1.5	1.5		1.0	1.0	1.0	1.0	1.0	1.0	1.0		1.5	1.5	1.0	1.5	6	6	1.0	
Max hourly demand		(12)*(13)	(m3/day)	1,103	3,972	2,691	7,766	2,072	1,602	3,894	1,267	2,904	5,227	9,240	26,206	3,602	2,531	5,248	3,528	14,908	41,114	5,000	53,880
		(14)=(12)*(13)/24	(m3/hr)	46	165	112	324	86	67	162	53	121	218	385	1,092	150	105	219	147	621	1,713	208	2,245
		(12)*(13)/86400	(m3/s)	0.0128	0.0460	0.0311	0.0899	0.0239	0.0186	0.0450	0.0147	0.0336	0.0606	0.1069	0.3033	0.0417	0.0292	0.0608	0.0408	0.1725	0.4758	0.0578	0.6235

Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

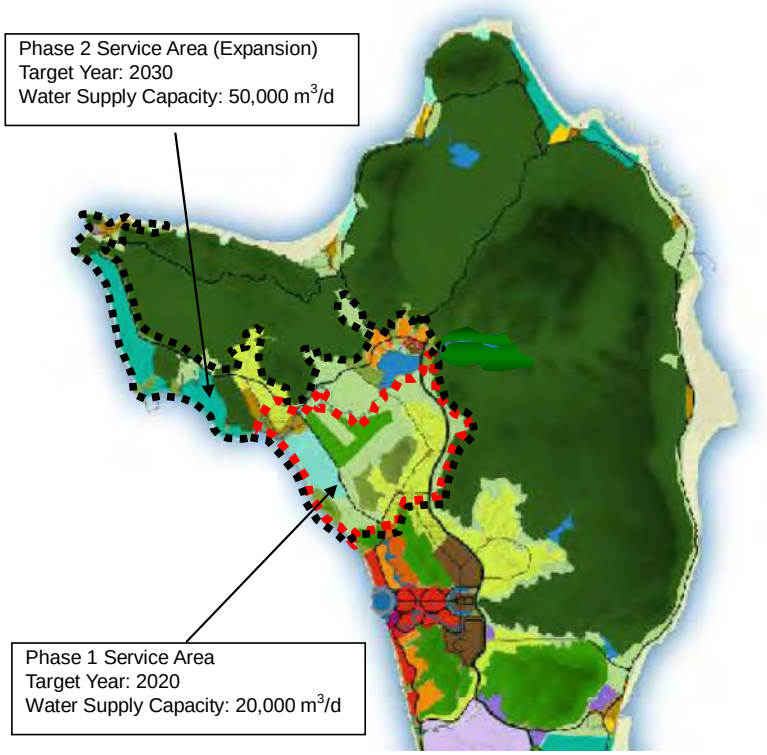
4.3 Water Supply Facilities

4.3.1 Phased Development Plan

The water supply facility will be developed in two phases. The phased development plan takes into consideration the time required for licensing process for the developers, for road construction, what is happening with other infrastructure developments, as well as meeting the increasing water demand and the need to expand service areas. The first phase to be completed by 2020 will deal with higher priority areas where the developments are more advanced.

Figure 4 shows the water supply service area of Phase 1 and Phase 2, respectively.

- Phase 1
  - Target Year: 2020
  - Service Area: Cua Can, Cua Duong, Duong Dong (Bulk Supply)
  - Supply Capacity（Day Max）: 20,000 m^3/d
- Phase 2
  - Target Year: 2030
  - Service Area: Phase 1 Area plus Ganh Dau
  - Supply Capacity（Day Max）: 50,000 m^3/d



Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

Figure 4 Service Areas for Phase 1 and Phase 2

4.3.2 Cua Can Impounding Reservoir

The Cua Can impounding reservoir would be the raw water source for this Project. The reservoir about 200 ha would be constructed along the mid section of the Cua Can River with the National Park located upstream. The site of the reservoir at 10 m elevation is low and flat. **Table 5** summarizes the proposed reservoir storage and capacity.

Table 5 Planned Reservoir Capacities

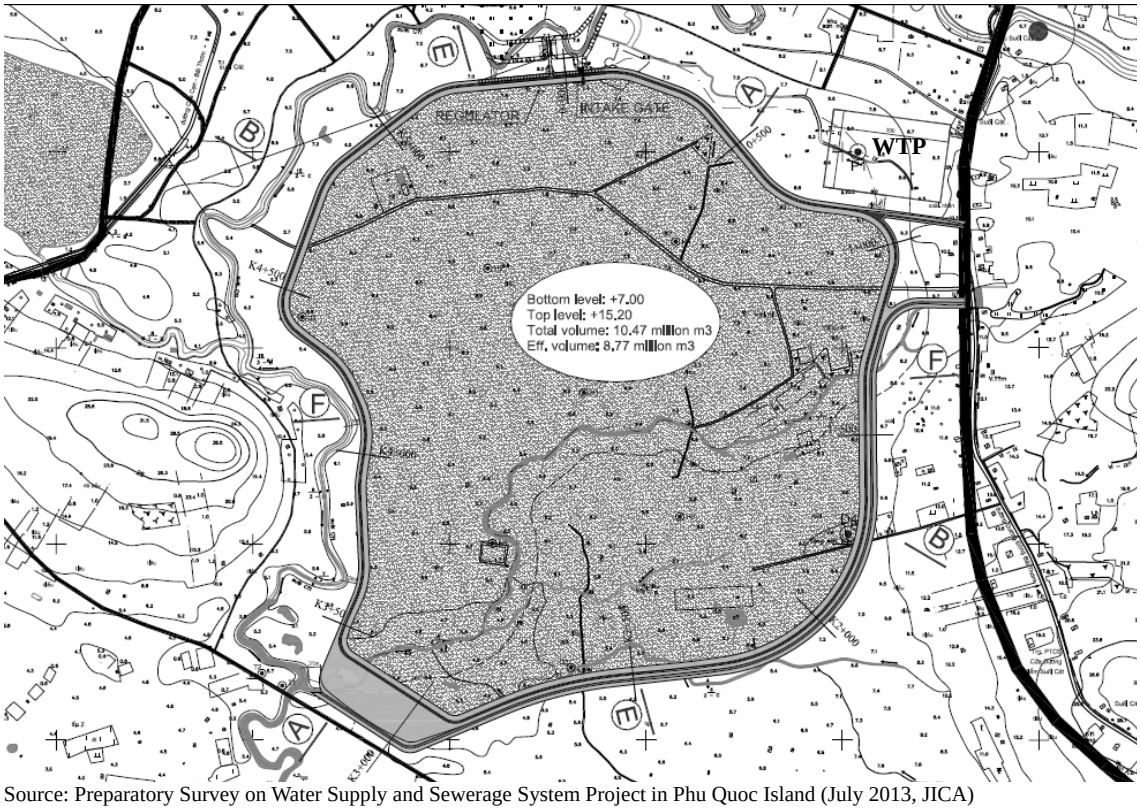
No	Parameters	Unit	Phase 1	Phase 2
1	Reservoir bottom elevation	m	7.0	7.0
2	Deposit Level	m	7.07	7.36
3	Minimum Water Level	m	7.6	7.9
4	Maximum Water Level	m	9.2	12.5
5	Dead Volume	10^6 m^3	1.13	1.69
6	Effective Capacity	10^6 m^3	3.02	8.77
7	Total Capacity	10^6 m^3	4.15	10.47

Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

Water will be pumped from the river to the reservoir which is dug into the ground as a holding pond.

The reservoir bottom should be lower than the river bottom in order to draw water from the river by gravity. The finished elevation of the reservoir bottom should also be lower than the flood level. Unfortunately at the desired level for the reservoir bottom, the soil is sandy-clay and is thus too permeable. In addition, the cost of disposing the excavated soil to achieve this reservoir depth is also prohibitive. A more practical solution would be setting a higher elevation for the reservoir bottom where there is a clay layer, which would require that water be pumped from the river to the reservoir.

The top of the dam surrounding the reservoir is at 14 m elevation. This is almost the same or a little higher than the ground level of the urban area of the Cua Can area to be developed north of the reservoir. Therefore, there is no significant impact in terms of visual aesthetics.

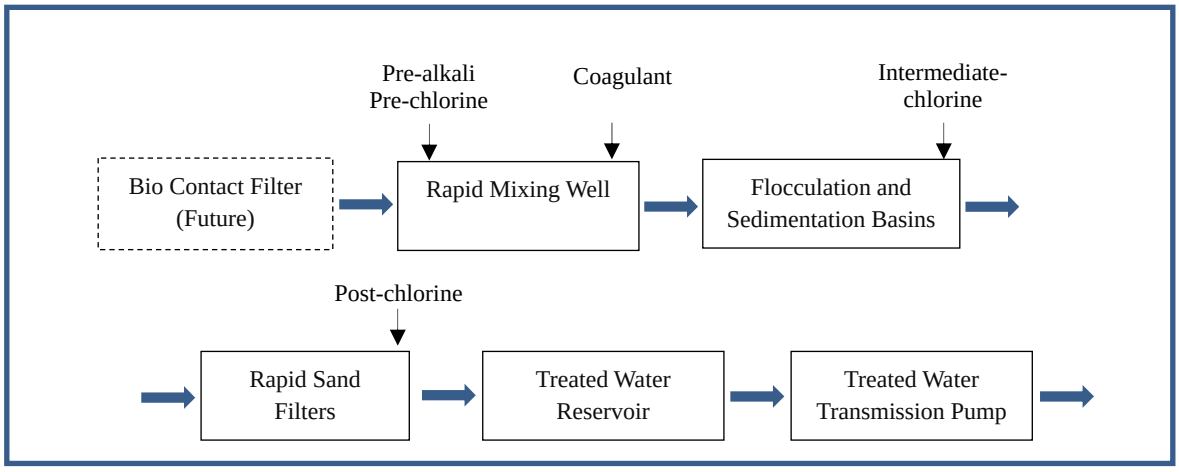


Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

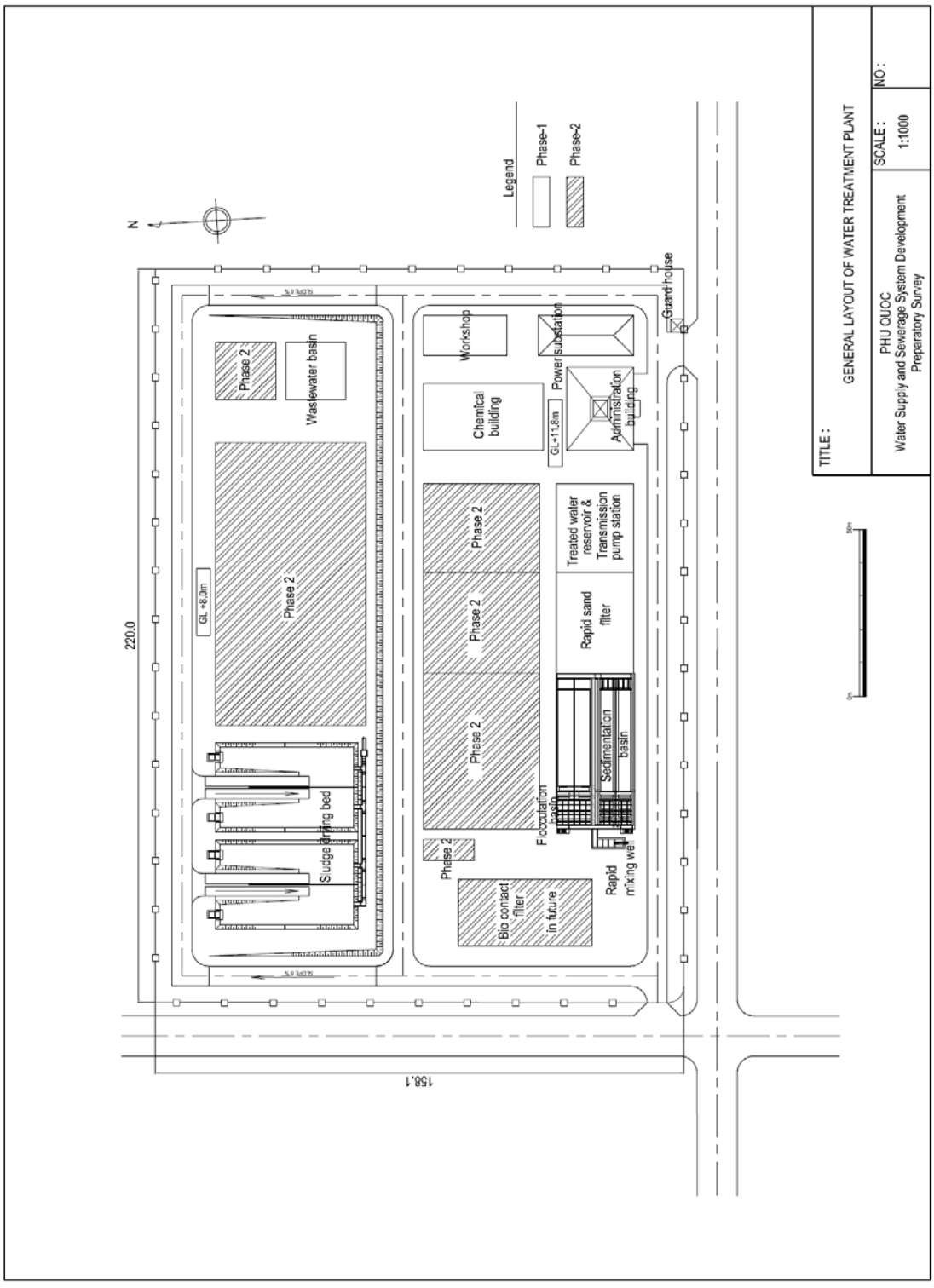
Figure 5 Cua Can Impounding Reservoir Layout and Location of WTP

4.3.3 Water Treatment Plant

At the water treatment plant to be constructed near the raw water reservoir, raw water would be treated by a rapid sand filtration system as shown below:

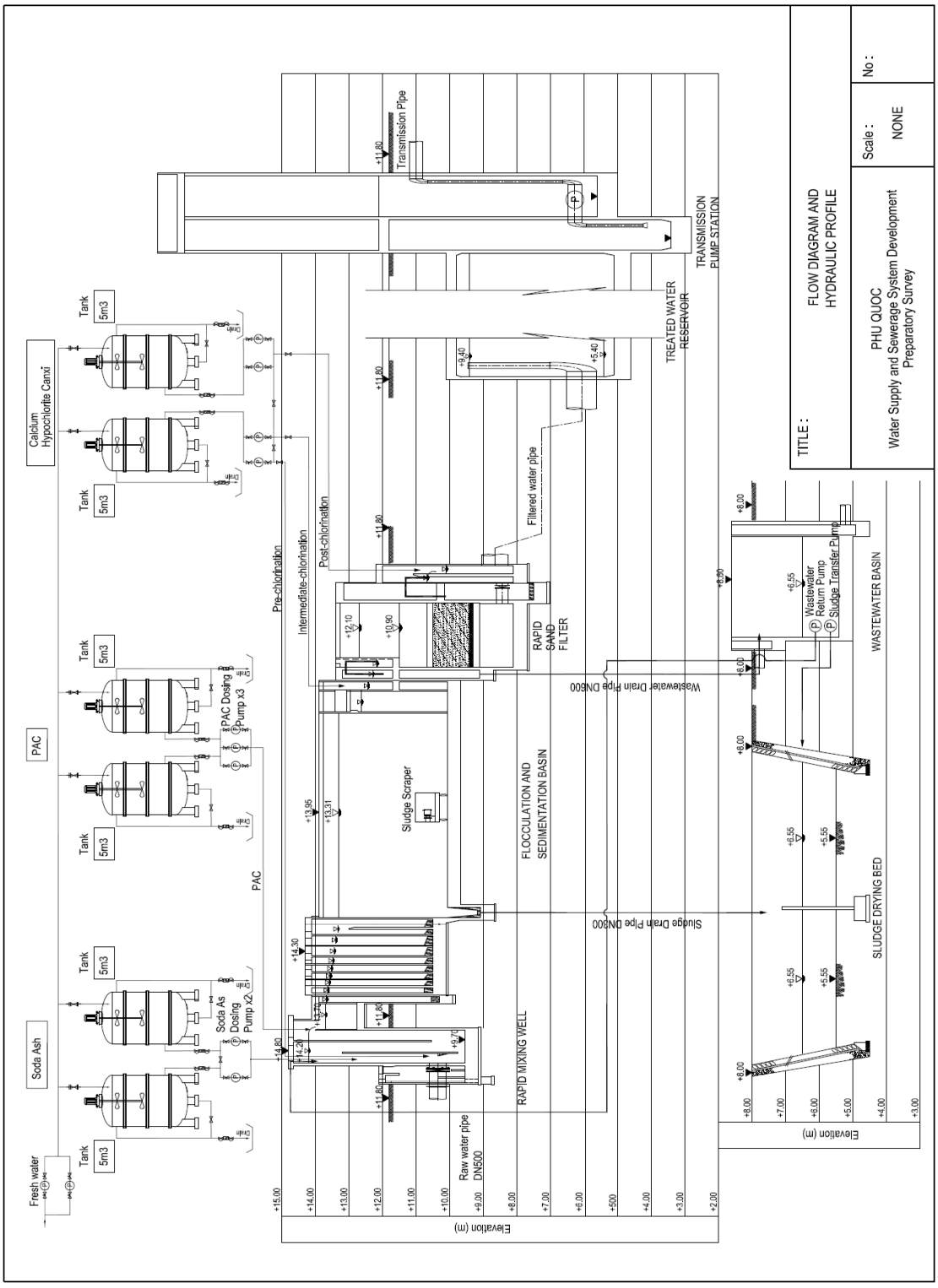


The WTP construction site is at 11.8 m elevation and would occupy 3.5 ha. **Figure 6** shows the WTP layout. **Figure 7** shows the Hydraulic Profile of the WTP.



Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

Figure 6 WTP Layout



Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

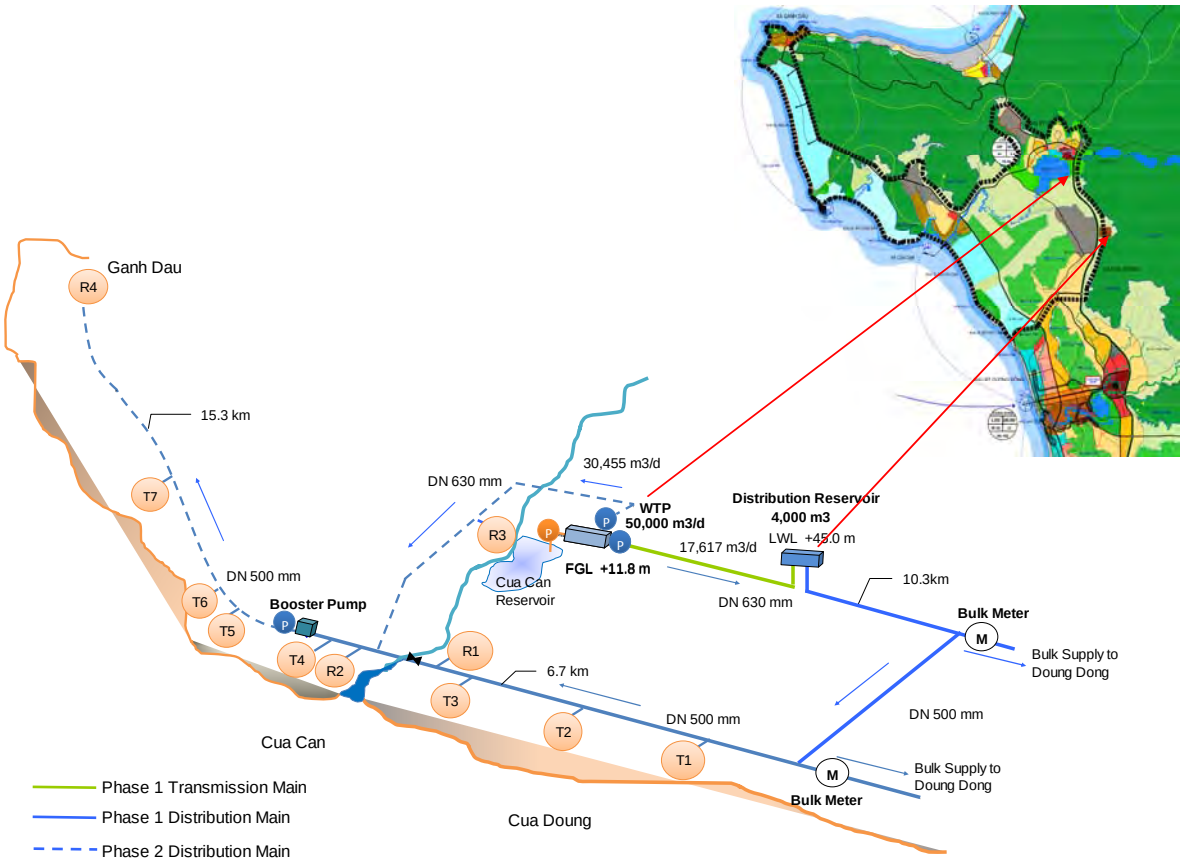
Figure 7 Hydraulic Profile of WTP

4.3.4 Water Transmission and Distribution

In Phase 1, treated water at the WTP would be pumped to the new distribution reservoir via a southern route and then distributed by gravity. In Phase 2, treated water would be distributed directly by pump via a northern route.

Figure 8 outlines the transmission and distribution system.

Bulk water would be supplied to the tourist resort area (T1 to T7 in **Figure 8**). Distribution pipelines in each development area would be installed by the developers at their own expense. HDPE pipe would be used for transmission and distribution.



Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

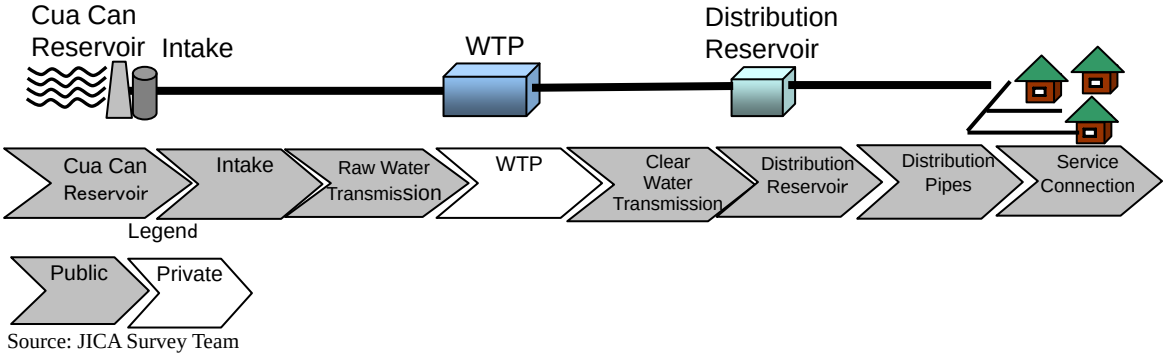
Figure 8 Transmission and Distribution System Layout

5. Candidate Components of ODA Loan Project

5.1 Sharing of Responsibilities

This project is proposed to be undertaken through a partnership of public sector authority (Government) and a private party. The three business areas of this project are raw water supply (Cua Can impounding reservoir), water treatment plant, and distribution system. At the meeting with KGPPC on 17 April, 2012, held at Rach Gia, it was agreed that the impounding reservoir would be constructed

using government funds therefore raw water supply would remain public. Furthermore, it has been also agreed by July, 2014 that distribution system would be constructed by KGPPC. And then, sharing of responsibilities was decided as indicated in **Figure 9**.



Source: JICA Survey Team

Figure 9 Construction Responsibilities of Water Supply System

The Special Purpose Company (SPC), would construct the WTP, and operate and maintain the facilities from intake to WTP. The public sector authority would construct, operate, and maintain the other water supply facilities. This option is generally recognized as the build-own-operate (BOO) scheme.

The public sector authority would supply raw water to the SPC under a raw water bulk supply agreement. The SPC would supply the treated water to KIWACO from the WTP or from the distribution reservoir under a bulk water supply agreement. KIWACO would construct, operate and manage distribution facilities and service connections with its own financing and collect water tariff from customers.

With above business arrangement, GOV requested Japanese ODA loan for construction of raw water supply system including impounding reservoir and distribution system with following arrangement.

- Line Agency : KGPPC
- Executing Agency : DARD (Raw water supply :Cua Can impounding reservoir)
  KIWACO (Distribution system)

5.2 Scope of Work of the Project

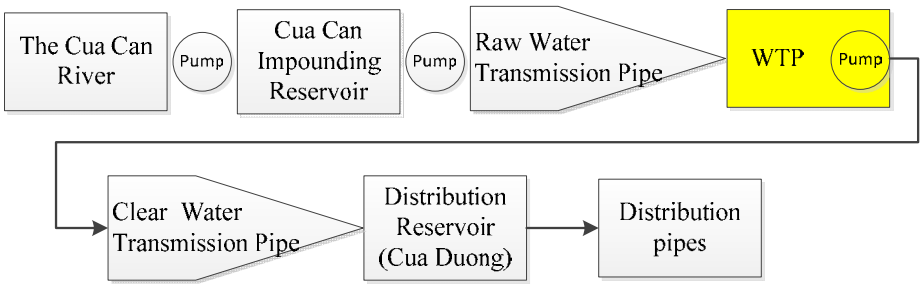
Phase 1 of Water Supply Project in Phu Quoc Island consists of Cua Can impounding reservoir, raw water intake and transmission pipe, clear water transmission, distribution reservoir, and distribution pipes and service connection as summarized in **Table 6** and **Figure 10**.

Table 6 Components of Phase 1 of Water Supply Project in Phu Quoc Island

Facility	Description	Quantity	Remarks
Cua Can impounding reservoir	4,150,000m^3	1	
Pumping Facilities to lift river water into	Pump (PL 7065/735)	1	
Cua Can Reservoir	Pump (LL 3300 LT)	2	
	Pump (NL 3300 LT)	1	
	Pump (PL 7065/735)	1 (Stand-by)	
Raw water intake and transmission pipe			
Intake Structure	Intake gate width：9.0 m	1	
Submersible motor pumps	10,500 m^3/day x 16.5 m x 37 kW	2+1(Stand-by)	
Raw Water Transmission Pipe	DN 700 mm (HDPE)	250m	

Clear water transmission	DN 560mm (HDPE)	4,240m	To Cua Duong/Cua Can Distribution Reservoir
Distribution Reservoir (Cua Duong)	4,000m^3	1	RC
Distribution pipes and service connection			
Distribution Pipe	DN 140mm(HDPE)	3,940m	
	DN 400mm(HDPE)	5,050m	
	DN 500mm(HDPE)	2,000m	
	DN 630mm(HDPE)	7,240m	
Secondary Pipe	DN 63mm	18,230m	
House Connection		2,617 houses	

Source: JICA Survey Team



Note : WTP is responsibility of private sector, and thus the WTP is not included in Table 6
Source: JICA Survey Team

Figure 10 Facility Diagram of Phase 1

5.3 Implementation Schedule and Base Cost

5.3.1 Implementation Program

Phase 1 of Water Supply Project in Phu Quoc Island comprises three components: A. Construction Work B. Engineering Services, and C. Preparations by project owner. These components and their related activities are summarized below.

A. Construction Work

A1: Construction of Cua Can impounding reservoir

A2: Construction of pipeline system (including raw water intake, Raw water transmission pipe, clear water transmission pipe, distribution reservoir, and distribution pipes, and service connection

B. Engineering Services

B1: Detailed design (D/D, including surveys), tender assistance and supervision (SV)

B2: Capacity building (C/B)

C. Preparatory Works by Project Owner

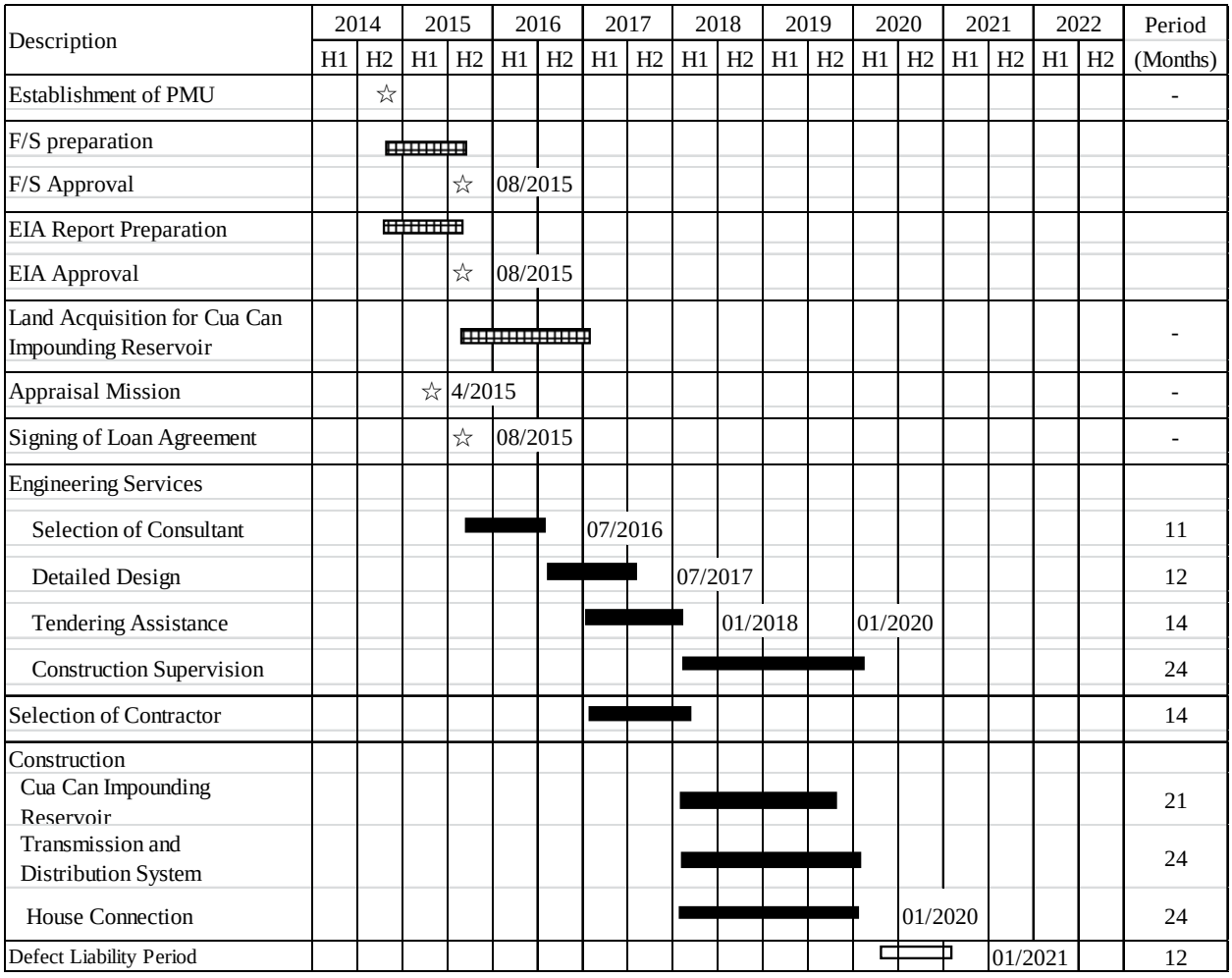
C1: Preparation of EIA and F/S reports and obtaining implementation permit

C2: Establishment of PMU as implementation agency

C3: Land acquisition for Cua Can impounding reservoir

The proposed schedule for the above activities is presented in **Figure 11**. The schedule is based on the following timeframes for completion:

(1)	Selection of consultants	:	11	Months
(2)	Detailed Design including surveys	:	12	Months
(3)	Tender Assistance for Local Competitive Bidding (LCB)	:	14	Months
	Preparation of tender document and JICA concurrence	:	4	Months
	Tender period	:	3	Months
	Evaluation of bids	:	2	Months
	JICA approval of bid evaluation	:	1	Months
	Contract negotiation	:	2	Months
	JICA Approval of contract		1	Months
	Opening of Letter of credit and issuance of letter of commitment		1	Months



Source: JICA Survey Team

Figure 11 Implementation Schedule for Construction

5.3.2 Engineering Services

(1) Detailed Design

The engineering services for detailed design include the following:

- Review all documents relating to the project including F/S and Preparatory Study reports
- Discuss and clarify the requirements of the project with PMU and PPC
- Prepare base maps in digital, GIS compatible format, covering Phase 1 project area
- Carry out topographic and geological survey for detailed design in Phase 1 project area
- Carry out detailed design and preparation of tender documents for Phase 1 project

(2) Tender Assistance

Under this component the engineers would assist with the following:

- Pre-qualification tasks
- Clarification and modification of tender document
- Evaluation of bid
- Contract negotiation.

(3) Construction Supervision

The engineering services for construction supervision include the following:

- Review the construction schedule proposed by the contractor
- Monitor the progress of work and instruct the contractor to update the schedule when required
- Assist PMU with progress meetings
- Review construction shop drawings submitted by the contractor
- Process contractor's progress and final payment requisitions and issue progress certificates for PMU/JICA approval
- Monitor and advise PMU of the financial progress of the work
- Advise PMU on contract variations and claims issues
- Provide quality assurance during construction phase through supervision of civil and geotechnical engineering works and M&E plant installation work
- Check and approve contractor's O&M manual and as-built drawings
- Prepare engineering, progress, and project completion reports

5.3.3 Cost Estimate

(1) Construction Cost

Construction base cost of Cua Can Impounding Reservoir and water Supply system excluding WTP estimated in Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)(Preparatory Survey) is shown in Table 7**.Table 7Table 7 Construction Base Cost Estimated Preparatory Survey (February 2012 Price Level)**

Item		Total		
		FC 1,000 Yen	LC Million VND	Total 1,000 Yen
1	Cua Can Impounding Reservoir Procurement / Construction	64,010	184,391	746,257

	Preparing Work Site	0	9,804	36,275
	Reservoir Earth Dam	0	148,867	550,808
	River Regulating Weir	0	17,463	64,613
	Pumping Station	64,010	8,257	94,561
	Land Acquisition & Compensation	0	262,000	969,400
	Sub Total	64,010	446,391	1,715,657
2	Water Supply System			
	Procurement/ Construction	65,948	164,668	675,220
	Water Intake	40,776	8,188	71,072
	Raw Water Transmission	7,725	2,923	18,540
	Water Treatment Plant	0	0	0
	Clear Water Transmission	0	31,580	116,846
	Distribution Reservoir	17,447	11,003	58,158
	Distribution Main	0	97,854	362,060
	Secondary Main & Service Pipe	0	13,120	48,544
	Land Acquisition & Compensation	0	0	0
	Sub Total	65,948	164,668	675,220
Total		129,958	611,059	2,390,876

US$ 1.0 = 76.6 Japanese Yen, US$ 1.0 = VND 20,703, VND 1.0 = JPY 0.0037
Source: Preparatory Survey on Water Supply and Sewerage System Project in Phu Quoc Island (July 2013, JICA)

Construction base cost was estimated with the price level of February 2012 and cost adjustment is made to cater for the price level of June 2014. Consumer Price Indexes available in Kien Giang Province, Mekong Delta, and whole country of Viet Nam are collected and analyzed to adjust the local currency portion and 110 % of escalation rate from February 2012 to June 2014 as discussed in **Annex 5-A**. While foreign currency portion is reminded as that of February 2012 level, as foreign currency, especially Japanese yen has not escalated remarkably since the year 2012. Adjusted construction base cost is show in **Table 8**. For the adjustment, the following exchange rates are applied in the cost estimate in accordance with ODA loan in 2014 for Viet Nam:

- US$ 1.0 = JPY 102.6
- US$ 1.0 = VND 21,036
- VND 1.0 = JPY 0.0048774

Table 8 Construction Base Cost Adjusted (June 2014 Price Level)

Item		Total		
		FC 1,000 Yen	LC Million VND	Total 1,000 Yen
1	Cua Can Impounding Reservoir Procurement / Construction	64,010	1,053,294	1,053,284
	Preparing Work Site	0	10,784	52,599
	Reservoir Earth Dam	0	163,754	798,685
	River Regulating Weir	0	19,209	93,691
	Pumping Station	64,010	9,083	108,310
	Land Acquisition & Compensation	0	1,405,667	1,405,653
	Sub Total	64,010	491,030	2,458,937
2	Water Supply System			
	Procurement/ Construction	65,948	949,415	949,406
	Water Intake	40,776	9,007	84,705
	Raw Water Transmission	7,725	3,215	23,407
	Water Treatment Plant	0	0	0
	Clear Water Transmission	0	34,738	169,429
	Distribution Reservoir	17,447	12,103	76,479
	Distribution Main	0	107,639	524,995
	Secondary Main & Service Pipe	0	14,432	70,390

	Land Acquisition & Compensation	0	0	0
	Sub Total	65,948	181,135	949,406
Total		129,958	672,165	3,408,375

(2) Engineering Service Cost

Base cost of engineering service is estimated separating in two stages, such as detailed design and tender assistance stage and construction supervision stage, with price level of June 2014 as shown in **Table 9**. Detailed estimate and background information are presented in **Annex 5-B**.

Table 9 Base Cost of Engineering Service (June 2014 Price Level)

Stage	Cost		
	Foreign Portion (JPY)	Local Portion (VND)	Total (JPY)
Detailed Design and Tender Assistance	336,580,000	21,755,514,000	442,690,344
Construction Supervision	345,705,000	20,409,200,000	445,248,832
Total	682,285,000	42,164,714,000	887,939,176

5.4 Operation and Maintenance

(1) Present Status of Operation and Maintenance

The water supply service in Phu Quoc started by KIWACO in 2006 covers only the Duong Dong township area. The raw water source is the Duong Dong impounding reservoir, located approximately 5 km northeast of Duong Dong. The raw water is treated at the Duong Dong water treatment plant (WTP). The supply capacity of the existing system is 5,000 m^3/d, and 41% of the population of Duong Dong township is connected to the system.

The Duong Dong impounding reservoir is owned and operated by DARD (Department of Agriculture and Rural Development, Kien Giang Province). The facilities from raw water transmission to distribution networks are operated and maintained by KIWACO.

(2) Operation and Maintenance for the Project

In this project, DARD would supply raw water to the SPC under a raw water bulk supply agreement. The SPC would supply the treated water to KIWACO from the WTP or from the distribution reservoir under a bulk water supply agreement.

Cua Can impounding reservoir, would be operated and maintained by the Department of Agriculture and Rural Development (DARD) of Kien Giang Province, which is now operating the existing Duong Dong reservoir.

O&M of the impounding reservoir is necessary for the purpose of sustainable abstraction of raw water for water supply and to secure the safety of the reservoir.

Table 10 shows the O&M work items for the Cua Can River regulating weir and impounding reservoir.

Table 10 O&M Work Items of Cua Can River Regulating Weir and Impounding Reservoir

Items	Goals	Actions Required
Safety control of weir	Keep track of changes and conditions (leakage or crack) of weir, ground, and hills	Evaluate the results of measurement / monitoring data.

	around the connecting point.	Conduct detailed investigation, repair, as needed.
Maintenance of equipment of river water intake	Ensure good working conditions of water intake pump and unhintered access to electricity and transformation equipment.	Regular check, extra check, inspection and maintenance at accident, detailed inspection and repair.
Safety control of Cua Can River regulating weir and impounding reservoir	Preserve the environment of the catchment basin.	Periodically remove sediment sand, driftwood, implement measures to preserve the natural environment in the upstream reaches of the river.
Operation of impounding reservoir	Secure the required amount of raw water for water supply and control of outflow water volume.	Measure water inflow volume, reserved water volume, and reserved water level, decide on raw water volume and outflow volume.
Preservation of water quality and water volume	Preserve the environment of catchment basin and impounding reservoir.	Periodically collect water samples and test water quality,
Response to disasters and accidents	Ensure adequate capability to respond to heavy rain, flood, earthquake, contamination by toxic substances, and any other accidents	Educate and train staff and prepare manual for disaster and accident response.
Data management	Ensure proper collection, sorting and storage of basic data and measurement and inspection record.	Keep a record of the general information of the impounding reservoir, geographical information, hydrological & meteorological data, drawing of completion of construction, water volume, rainfall, weir measurement, inspection record, sediment sand, water quality data, etc.

KIWACO is managed based on the self-supporting financial system. KIWACO's costs including operation and maintenance costs, loan repayment, and depreciation costs, are basically covered by water tariff revenue. Facility construction is funded mainly by loan including foreign ODA loan as sub-loan from the central government.

KIWACO's financial condition is excellent with stable high profitability for the 2006 - 2010 periods, but the share of liabilities is increasing. Therefore, KIWACO would need to assess carefully its capability of taking on new loans to make sure that the organization stays profitable.

Water tariff in Viet Nam is basically calculated to cover all of the necessary cost of water supply; such as, electricity, chemicals, staff salary and allowances, depreciation, materials & equipment, repairs, management costs, sales cost.

The same conditions apply to KIWACO. Water tariff is calculated to cover all the necessary costs including depreciation costs of all the facilities. Depreciated water supply facilities cover all of the facilities from raw water reservoir to distribution pipe owned by KIWACO. Tariff revision plan is proposed to the Kien Giang Provincial PC (KGPCC) for approval.

Annex 5-A Escalation Ratio

(1) Objective to apply CPI

Construction cost of Phu Quoc Island water supply project was calculated with the price level at February 2012 and Binh Duong water supply project was calculated with the price level at March 2013. Since the price level of FY 2014 Japanese ODA loan projects is indicated with the price level at June 2014,, it requires to adjust the estimated construction costs of the projects by considering escalation ratio during the designated periods. Cost adjustment is made for only local currency portion (VND). While foreign currency portion of JPY is not adjusted, as JPY has not escalated significantly since 2012.Exchange rates are also replaced from the estimated times of the projects to the rate applied for FY 2014 Japanese ODA loan projects

The escalation ratios are calculated by Consumer Price Index (CPI) available in Vietnam in July 2014.

(2) Collection data

CPIs in Vietnam are available for whole country, major cities, and each area such of Red River Delta, North East, South East, Mekong River Delta, and province. Collected data of CPIs are shown in **Table 1**. Escalation ratio to be applied for the projects are estimated by these data.

Table 1 Collected data on CPI

District/Province	Data Source	Remarks
Whole country	Homepage of GENERAL STATISTICS OFFICE OF VIETNAM	http://www.gso.gov.vn
South East	Same with above	Including Binh Duong
Mekong Delta	Same with above	Including Kien Giang
Binh Duong	Statistical Year Book 2013 (Binh Duong)	Only 2013 data
Kien Giang	Statistical Year Book 2012 (Kien Giang)	Only 2012 data

(3) Escalation rate

CPIs in Vietnam cover representative value of whole items and specific items such as food, beverage and cigarette, and housing and construction materials. The collected CPIs of representative value and housing and construction materials related to Phu Quoc Island and Binh Duong province are shown in **Table 2**.

Table 2 Collected CPIs

Year	Month	All items					housing and construction materials				
		Whole country	South East	Mekong Delta	Binh Duong	Kien Giang	Whole country	South East	Mekong Delta	Binh Duong	Kien Giang
2012	Jan	101	101.06	100.58	100.77	100.76	101.71	101.81	101.86		103.39
	Feb	101.37	101.39	101.41	101.66	101.17	102.47	102.73	102.39		103.17
	Mar	100.16	100.26	99.77	100.59	100.36	102.31	102.88	102.2		102.99
	Apr	100.05	100.09	99.84	100.2	99.99	99.56	99.77	99.16		97.90
	May	100.18	100.15	100.35	100.48	99.91	99.03	98.41	98.82		97.18
	Jun	99.74	99.65	99.89	99.75	100.11	98.79	98.27	98.41		97.57
	Jul	99.71	99.51	99.43	99.54	99.2	99.07	98.18	98.99		98.50
	Aug	100.63	100.54	100.69	100.4	100.53	102.03	102.25	101.69		103.80
	Sep	102.2	101.67	102.46	101.81	102.56	102.18	102.55	102.62		102.48
	Oct	100.85	100.9	100.89	100.51	101.58	101.09	101.45	101.46		102.58
	Nov	100.47	100.11	100.47	100.11	100.02	100.53	100.51	100.66		102.03
	Dec	100.27	100.19	100.4	100.49	100.46	100.15	100.06	100.27		100.31
2013	Jan	101.25	100.93	100.96	107.29		100.36	100.06	100.37	99.28	
	Feb	101.32	101.09	101.31	101.18		100.45	100.29	100.4	101.69	
	Mar	99.81	99.82	99.8	100.05		100.09	99.96	100.16	98.17	
	Apr	100.02	99.9	99.76	99.99		99.56	99.28	99.71	100.48	
	May	99.94	99.82	100.05	99.97		99.47	98.95	99.39	100.45	
	Jun	100.05	100.15	99.99	100.19		100.02	99.65	99.97	100.15	
	Jul	100.27	100.27	100.35	100.38		100.43	100.22	100.3	100.47	
	Aug	100.83	100.46	100.74	100.69		100.88	100.93	100.8	101.84	
	Sep	101.06	102.14	100.72	100.67		100.91	100.98	101.05	100.89	
	Oct	100.49	100.34	100.43	100.2		100.5	100.28	100.37	99.53	
	Nov	100.34	100.28	100.38	100.22		100.41	100.47	100.59	99.16	
	Dec	100.51	100.51	100.55	100.57		102.31	103.03	102.2	103.39	
2014	Jan	100.69	100.56	100.7			101.02	101.35	100.9		
	Feb	100.55	100.41	100.62			99.36	98.72	99.38		
	Mar	99.56	99.51	99.25			99.26	99.07	99.26		
	Apr	100.08	100	100.12			99.44	98.97	99.36		
	May	100.2	100.26	100.28			100.03	99.68	99.96		
	Jun	100.3	100.52	100.43			100.61	100.39	100.55		

The escalation ratios to be applied for adjustment are estimated based on and the above related data for Phu Quoc Island and Binh Duong province for each specified period and shown in **Table 3** and **Table 4**.

Table 3 Escalation Ratio for Phu Quoc Island (from February 2012)

Year	Month	All items			housing and construction materials		
		Whole country	Mekong Delta	Kien Giang[1)]	Whole country	Mekong Delta	Kien Giang[1)]
2012	Jan						
	Feb	1.00	1.00	1.00	1.00	1.00	1.00
	Mar	1.00	1.00	1.00	1.02	1.02	1.03
	Apr	1.00	1.00	1.00	1.02	1.01	1.01
	May	1.00	1.00	1.00	1.01	1.00	0.98
	Jun	1.00	1.00	1.00	1.00	0.99	0.96
	Jul	1.00	0.99	1.00	0.99	0.98	0.94
	Aug	1.00	1.00	1.00	1.01	0.99	0.98
	Sep	1.03	1.02	1.03	1.03	1.02	1.00
	Oct	1.04	1.03	1.04	1.04	1.03	1.03
	Nov	1.04	1.04	1.04	1.05	1.04	1.05
	Dec	1.04	1.04	1.05	1.05	1.04	1.05
2013	Jan	1.06	1.05	1.06	1.05	1.05	1.06
	Feb	1.07	1.07	1.07	1.06	1.05	1.06
	Mar	1.07	1.06	1.07	1.06	1.05	1.06
	Apr	1.07	1.06	1.07	1.05	1.05	1.06
	May	1.07	1.06	1.07	1.05	1.04	1.05
	Jun	1.07	1.06	1.07	1.05	1.04	1.05
	Jul	1.07	1.07	1.07	1.05	1.05	1.05
	Aug	1.08	1.07	1.08	1.06	1.05	1.06
	Sep	1.09	1.08	1.09	1.07	1.07	1.07
	Oct	1.10	1.09	1.09	1.08	1.07	1.08
	Nov	1.10	1.09	1.10	1.08	1.08	1.08
	Dec	1.11	1.10	1.10	1.11	1.10	1.11
2014	Jan	1.11	1.10	1.11	1.12	1.11	1.12
	Feb	1.12	1.11	1.12	1.11	1.10	1.11
	Mar	1.11	1.10	1.11	1.10	1.09	1.10
	Apr	1.12	1.10	1.11	1.09	1.09	1.10
	May	1.12	1.11	1.11	1.10	1.09	1.10
	Jun	1.12	1.11	1.12	1.10	1.09	1.10

1) CPI of Mekong Delta was applied after January 2013

Table 4 Escalation Ratio for Binh Duong Province (from March 2013)

Year	Month	All items			housing and construction materials		
		Whole country	South East	Binh Duong[1)]	Whole country	South East	Binh Duong[1)]
2013	Jan						
	Feb						
	Mar	1.00	1.00	1.00	1.00	1.00	1.00
	Apr	1.00	1.00	1.00	1.00	0.99	1.00
	May	1.00	1.00	1.00	0.99	0.98	1.01
	Jun	1.00	1.00	1.00	0.99	0.98	1.01
	Jul	1.00	1.00	1.01	0.99	0.98	1.02
	Aug	1.01	0.99	1.01	1.00	0.99	1.03
	Sep	1.02	1.00	1.02	1.01	1.00	1.04
	Oct	1.03	1.02	1.02	1.02	1.00	1.04
	Nov	1.03	1.03	1.02	1.02	1.01	1.03
	Dec	1.04	1.04	1.03	1.05	1.04	1.06
2014	Jan	1.04	1.04	1.03	1.06	1.05	1.08
	Feb	1.05	1.05	1.04	1.05	1.04	1.07
	Mar	1.04	1.07	1.03	1.04	1.03	1.06
	Apr	1.04	1.06	1.03	1.04	1.02	1.04
	May	1.05	1.06	1.04	1.04	1.01	1.04
	Jun	1.05	1.06	1.04	1.04	1.02	1.05

1) CPI of South East was applied after January 2014

There are not significant differences in each estimated escalation ratio in both Phu Quoc Island and Binh Duong province. Therefore, the ratios of "housing and construction materials", which is thought to be suitable item for the object, are applied to calculate the base cost of June 2014 level for the projects as shown in **Table 5**.

Table 5 Escalation Ratio to be Applied

Target project area	Base Price Level	Escalation ratio from the base Level to June 2014
Phu Quoc Isrand	February 2012	110%
Binh Duong Province	March 2013	105%

Annex 5-B Cost Estimate for Engineering Service

(1) Detailed Design and Tender Assistance

Summary of Cost (DD/TA)

Summary of Cost								
I	**Foreign Portions**					**JPY**		**336,580,000**
II	**Local Portions**					**VND**		**21,755,514,000**
	Total					**JPY**		**442,690,344**
		US$ 1.0 =	102.6	Japanese Yen				
		US$ 1.0 =	21,036	VND				
		VND =	0.0048774	Japanese Yen				

I. Foreign Portion (DD/TA)

Summary of Foreign Portions								
1	Remunerations							275,025,000
2	Expenses							48,075,000
3	Others							13,480,000
		Total						336,580,000

Remunerations

	International Experts		Employment Status	Currency	Man-month		Home/Field Rate/month	Sub-Total
No.	Full Name	Position			Home	Field		
					MM		Yen	Yen
Total	**All**			Yen	**0**	95	2,895,000	275,025,000

Expenses

No.	Description		Unit	Quantity		Unit Price		Total Amount
1	International Flights (Fixed Rate)							
	Home Country - HCM round trip		R Trip	35	Yen	300,000	Yen	10,500,000
2	Miscellaneous travel expenses (Fixed Rate)							
	Excess baggage from HCM (10kg)		Person	12	Yen	30,000	Yen	360,000
	Incidental Travel Cost in home country.		Trip	35	Yen	30,000	Yen	1,050,000
	Establishment Allowances, Visa		Trip	35	Yen	15,000	Yen	525,000
		Sub-total					Yen	1,935,000
3	Subsistence Allowance for Foreign Experts (Fixed Rate)							
		Subsistence Allowance for foreign personnel	Day	2,850	Yen	12,000	Yen	34,200,000
4	Communication (Fixed Rate)							
		Communication and air-courier from Head Offices of Tokyo	Month	18	Yen	80,000	Yen	1,440,000
		Total of Expenses						48,075,000

Others

No.	Description		Unit	Quantity		Unit Price		Total Amount
1	Training Cost (Fixed Rate)							
		Overseas Training Costs	Ls	1	Yen	8,000,000	Yen	8,000,000
		Sub-total					Yen	8,000,000
2	Others (Fixed Rate)							
		Mobilization / Demobilization for foreign Experts	Person	12	Yen	40,000	Yen	480,000
		Insurances	Ls	1	Yen	5,000,000	Yen	5,000,000
		Sub-total					Yen	5,480,000
		Total of Others						13,480,000

II. Local Portion (DD/TA)

Summary of Local Portions								
1	Remunerations							7,678,000,000
2	Surveys							6,864,000,000
3	Expenses							7,213,514,000
		Total					**VND**	21,755,514,000

Remunerations

	Local Experts		Employm	Currency	Man-month		Home/Field	Sub-Total
No.	Full Name	Position	ent Status		Home	Field	Rate/Month	
Local Engineer & Experts							VND	VND
	B1	Expert		VND	0	15	54,000,000	810,000,000
	B2	Sub Expert		VND	0	119	40,000,000	4,760,000,000
	C	Support staff		VND	0	124	17,000,000	2,108,000,000
		Total				258	**VND**	7,678,000,000

Surveys

No.	Description	Unit	Quantity		Unit Price		Total Amount
	Detailed Investigation (Lump Sum)						
	Topographic Survey	Ls	1	VND	2,080,000,000	VND	2,080,000,000
Surveys	Geological Investigation	Ls	1	VND	4,160,000,000	VND	4,160,000,000
	Hydrographic Survey & Data Collection	Ls	1	VND	624,000,000	VND	624,000,000
	Total					**VND**	6,864,000,000

Expenses

1	Subsistence Allowance for Local Experts (Fixed Rate)						
	Subsistence Allowances for Local Experts	Month	129.0	VND	2,000,000	VND	258,000,000
	(Assume Half staff comes from HCM)						
2	Local Transportation Costs (Fixed Rate)						
	Incidental Travel Cost in VN	RT	30	VND	1,600,000	VND	48,000,000
	Domestic Airfare (HCM/Hanoi -Kien Gian/Phu Quoc)	RT	30	VND	6,500,000	VND	195,000,000
	Sub-total					VND	243,000,000
3	Communication (Fixed Rate)						
	Communication & Air Courier from PQ to Tokyo	Month	18	VND	1,500,000	VND	27,000,000
4	Office Supply (Fixed Rate)						
	Office Supplies, stationary and consumables	Month	18	VND	15,000,000	VND	270,000,000
	Utilities (electricity, water and cleaning)	Month	18	VND	10,000,000	VND	180,000,000
	Internet charges	Month	18	VND	3,000,000	VND	54,000,000
	Telephone charges (Including Mobiles)	Month	18	VND	3,000,000	VND	54,000,000
	Office Setting/De-setting	Ls	1	VND	208,000,000		208,000,000
	Sub-total					VND	766,000,000
5	Local Transportation Rental Costs (Lump Sum)						
	4-W drive Car	Month	42	VND	50,000,000	VND	2,100,000,000
6	Office Space (Fixed Rate)						
	Office Space for the area of 150 m2 US$20/m2	Month	18	VND	63,000,000	VND	1,134,000,000
7	Reporting'	Ls	1				
	Sub-total					VND	1,000,000,000
8	Office Equipment (Lump Sum)	Ls	1				
	Sub-total					VND	226,880,000
9	Computer System (Lump Sum)	Ls	1				
	Sub-total					VND	1,425,384,000
10	Cafeteria Equipment (Lump Sum)	Ls	1				
	Sub-total					VND	33,250,000
	Total					**VND**	**7,213,514,000**

III. Staff Assignment Schedule (DD/TA)

GRP	Position	Scope of Works	2016						2017												2018						Total
			7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	
						DD									TA												
Group A																											
A-1	**Project Manager**	**Overall Project/Technical Management**		1	1	1	1		1	1	1	1	1	1	1			1		1	1						14.0
A-2	**Water Supply Engineer**	**Pipeline design, tendering,**		1	1	1	1		1	1	1	1	1	1	1			1		1	1						14.0
A-3	**Water Resources Engineer**	**Reservoir design, tendering**		1	1	1					1	1	1	1						1	1						9.0
A-4	**Civil Engineer**	**Pump station design, utility coordination**		1	1	1	1	1			1	1	1	1	1												10.0
A-5	**Mechanical Engineer**	**Mechanical design of pump station**			1	1					1	1						1									5.0
A-6	**Electrical Engineer**	**Electrical design of pump station**			1	1					1	1						1									5.0
A-7	**Structural Engineer**	**Structural design of reservoir and pump station**								1	1	1	1	1	1												6.0
A-8	**Topographic/Geographic Engineer**	**Topographic/geographic surveys instruction**		1	1	1	1	1																			5.0
A-9	**Contract Specialist/ Document Specialist**	**Reports, Tender Documents, Tendering**										1	1	1	1						1						5.0
A-10	**Environmental Specialist**	**Environmental Study**			1	1					1			1													4.0
A-11	**Social Management Specialist**	**Social Impact Study/RAP**			1						1			1													3.0
A-12	**Cost Estimate/Construction Planner**	**Cost estimation, construction scheduling**			1						1	1	1	1	1						1						7.0
A-13	**PPP Coordinator**	**PPP Coordinate**		1	1	1	1			1	1	1	1														8.0
A	**Total of the Group A**		**69**												**18**												95.0
Group B																											
B-1	**Deputy Project Manager**	**Overall Project/Local Management**		1	1	1	1	1	1	1	1	1	1	1	1		1	1			1						15
B-2	**Water Supply Engineer 1**	**Distribution Pipeline design, tendering,**		1	1	1	1	1	1	1	1	1	1	1	1		1	1			1						15
B-3	**Water Supply Engineer 2**	**Distribution Pipeline design,**		1	1	1	1	1	1	1	1	1	1	1	1												12
B-4	**Water Resources Engineer**	**Reservoir design, tendering**		1	1	1	1	1	1	1	1	1	1	1	1												12
B-5	**Civil Engineer**	**Pump station design, utility coordination**		1	1	1	1	1	1	1	1	1	1	1	1		1	1			1						15
B-6	**Mechanical Engineer**	**Mechanical design of pump station**			1	1					1	1	1														5
B-7	**Electrical Engineer**	**Electrical design of pump station**			1	1					1	1	1														5
B-8	**Structural Engineer**	**Structural design of reservoir and pump station**			1	1	1	1	1	1	1	1	1	1	1												11
B-9	**Topographic/Geographic Engineer**	**Topographic/geographic surveys instruction**		1	1	1	1	1																			5
B-10	**Contract Specialist/ Document Specialist**	**Reports, Tender Documents, Tendering**										1	1	1	1			1			1						6
B-11	**Environmental Specialist**	**Environmental Study**			1	1				1	1	1															5
B-12	**Social Management Specialist**	**Social Impact Study/RAP**			1	1					1	1															4
B-13	**Cost Estimate/Construction Planner 1**	**Cost estimation, construction scheduling**			1	1					1	1	1	1	1												7
B-14	**Cost Estimate/Construction Planner 2**	**Cost estimation, construction scheduling**			1	1					1	1	1	1	1												7
B-15	**Architect**	**Architectural Design of Pump Stations**				1					1																2
B-16	**PPP Coordinator**	**PPP Coordinate**		1	1	1	1			1	1	1	1														8
B-17																											0
B-18																											0
B	**Total of the Group B**		**114.0**												**20.0**												134
Supporting Staff																											
C-1	**AutoCAD draftsman/Technician 1**	**Drawings, Engineering support**		1	1	1	1	1	1	1	1	1	1	1	1		1										13
C-2	**AutoCAD draftsman/Technician 2**	**Drawings, Engineering support**		1	1	1	1	1	1	1	1	1	1	1	1												12
C-3	**AutoCAD draftsman/Technician 3**	**Drawings, Engineering support**							1	1	1	1	1	1	1												7
C-4	**AutoCAD draftsman/Technician 4**	**Drawings, Engineering support**							1	1	1	1	1	1	1												7
C-5	**AutoCAD draftsman/Technician 5**	**Drawings, Engineering support**							1	1	1	1	1	1	1												7
C-21	**Office Manager**	**Management of Administration Staff**		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						18
C-22	**Secretary**	**Secretarial Management**		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						18
C-23	**Accountant**	**Accounting/invoicing**		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						18
C-24	**Interpreter/Secretary**	**Interpretation/report typing/secretarial work**		1	1	1	1	1	1	1	1	1	1	1	1												12
C-25	**Administration Staff**	**General office work/typing/Misc. work**		1	1	1	1	1	1	1	1	1	1	1	1												12
C	**Total of the Group C**		**95**												**29**												124
B/C	**Total of the Group B&C**		**209.0**												**49.0**												258
	Total of Groups A, B & C		**278.0**												**67.0**												353.0

(2) Construction Supervision

Summary of Cost (SV)

Summary of Cost								
I	**Foreign Portions**					**JPY**		**345,705,000**
II	**Local Portions**					**VND**		**20,409,200,000**
	Total					**JPY**		**445,248,832**
		US$ 1.0 =	102.6	Japanese Yen				
		US$ 1.0 =	21,036	VND				
		VND =	0.0048774	Japanese Yen				

II. Foreign Portion (SV)

Summary of Foreign Portions								
1	Remunerations							280,815,000
2	Expenses							49,530,000
3	Others							15,360,000
		Total						345,705,000

Remunerations

	International Experts		Employment Status	Currency	Man-month		Home/Field Rate/month	Sub-Total
No.	Full Name	Position			Home	Field		
					MM		Yen	Yen
		Total of Remunerations		Yen	**0**	97	2,895,000	280,815,000

Expenses

No.	Description	Unit	Quantity		Unit Price		Total Amount
1	International Flights (Fixed Rate)						
	Home Country - HCM round trip	R Trip	36	Yen	300,000	Yen	10,800,000
2	Miscellaneous travel expenses (Fixed Rate)						
	Excess baggage from HCM (10kg)	Person	9	Yen	30,000	Yen	270,000
	Incidental Travel Cost in home country	Trip	36	Yen	30,000	Yen	1,080,000
	Establishment Allowances, Visa	Trip	36	Yen	15,000	Yen	540,000
	Sub-total					Yen	1,890,000
3	Subsistence Allowance for Foreign Experts (Fixed Rate)						
	Subsistence Allowance for foreign personnel	Day	2,910	Yen	12,000	Yen	34,920,000
4	Communication (Fixed Rate)						
	Communication and air-courier from Head Offices of Tokyo	Month	24	Yen	80,000	Yen	1,920,000
	Total of Expenses						49,530,000

Others

No.	Description	Unit	Quantity		Unit Price		Total Amount
1	Training Cost (Fixed Rate)						
	Overseas Training Costs	Ls	1	Yen	10,000,000	Yen	10,000,000
	Sub-total					Yen	10,000,000
2	Others (Fixed Rate)						
	Mobilization / Demobilization for foreign Experts	Person	9	Yen	40,000	Yen	360,000
	Insurances	Ls	1	Yen	5,000,000	Yen	5,000,000
	Sub-total					Yen	5,360,000
	Total of Others						15,360,000

II. Local Portion (SV)

Summary of Local Portions			VND
1	Remunerations		10,116,000,000
2	Surveys		656,000,000
3	Expenses		9,637,200,000
	Total		20,409,200,000

Remunerations

No.	**Local Experts** Full Name	Position	Employment Status	Currency	Man-month Home	Man-month Field	Home/Field Rate/Month	Sub-Total
Local Engineer & Experts							VND	VND
	B1	Expert		VND	0	26	54,000,000	1,404,000,000
	B2	Sub Expert		VND	0	126	40,000,000	5,040,000,000
	C	Support staff		VND	0	216	17,000,000	3,672,000,000
		Total				368		10,116,000,000

Surveys

No.	Description	Unit	Quantity		Unit Price		Total Amount
1	Survey & PR						
	Environment Analysis		1	VND	246,000,000	VND	246,000,000
	Others		2	VND	205,000,000	VND	410,000,000
	Sub-total						656,000,000

Expenses

1	Subsistence Allowance for Local Experts (Fixed Rate)						
	Subsistence Allowances for Local Experts (Assume 1/2 staff comes from HCM/Hanoi)	Month	184.0	VND	4,000,000	VND	736,000,000
2	Local Transportation Costs (Fixed Rate)						
	Incidental Travel Cost in VN	RT	72	VND	1,600,000	VND	115,200,000
	Domestic Airfare (HCM/Hanoi)	RT	72	VND	6,500,000	VND	468,000,000
	Sub-total					VND	583,200,000
3	Communication (Fixed Rate)						
	Communication & Air Courier from KG	Month	24	VND	2,000,000	VND	48,000,000
4	Office Supply (Fixed Rate)						
	Office Supplies, stationary and consumables	Month	24	VND	15,000,000	VND	360,000,000
	Utilities (electricity, water and cleaning)	Month	24	VND	10,000,000	VND	240,000,000
	Internet charges	Month	24	VND	5,000,000	VND	120,000,000
	Telephone charges (Including Mobiles)	Month	24	VND	5,000,000	VND	120,000,000
	Office Setting/De-setting	Ls	1	VND	208,000,000		208,000,000
	Sub-total					VND	1,048,000,000
5	Local Transportation Rental Costs (Lump Sum)						
	4-W drive Car	Month	46	VND	50,000,000	VND	2,300,000,000
6	Office Space (Fixed Rate)						
	Office Space for the area of 150 m2 US$20/m2	Month	24	VND	63,000,000	VND	1,512,000,000
7	Reporting'	Ls	1				
	Sub-total					VND	410,000,000
8	Office Equipment (Lump Sum)	Ls	1				
	Sub-total				Provided	VND	0
10	Cafeteria Equipment (Lump Sum)	Ls	1				
	Sub-total				Provided	VND	0
11	HIV/AIDS Campaign		1		3,000,000,000		3,000,000,000
	Total of Expenses					**VND**	**9,637,200,000**

III. Staff Assignment Schedule (SV)

GRP	Position	Scope of Works	2018											2019												2020	2020-2021			Total
			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	-	1	
												Supervision																		
Group A																														
A-1	**Project Manager**	**Overall Project/Technical Management**	1	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	2			24.0
A-2	**Water Supply Engineer (1)**	**Distribution Pipeline**	1	1	1	1	1		1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1				22.0
A-3	**Water Supply Engineer (2)**	**Reservoir, Transmission pipe**	1	1	1	1	1	1						1	1	1		1	1	1										12.0
A-4	**Civil Engineer**	**Pump station, utility coordination**			1	1	1							1	1	1		1	1	1										9.0
A-5	**Mechanical Engineer**	**Mechanical of pump station**				1				1			1							1										4.0
A-6	**Electrical Engineer**	**Electrical of pump station**				1				1			1							1										4.0
A-7	**Structural Engineer**	**Structural of reservoir and pump station**			1	1	1			1			1	1						1	1									8.0
A-8	**Environmental Specialist**	**Environmental Study**	1	1				1						1						1					1	1				7.0
A-9	**Social Management Specialist**	**Social Impact Study/RAP**	1	1				1						1						1					1	1				7.0
A-	**Total of the Group A**		**53.0**											**42.0**												**2.0**			97.0
Group B																														
B-1	**Deputy Project Manager**	**Overall Project/Local Management**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2			26.0
B-2	**Water Supply Engineer 1**	**Distribution Pipeline**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				24.0
B-3	**Water Supply Engineer 2**	**Distribution Pipeline**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						22.0
B-4	**Water Resources Engineer**	**Reservoir**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										18.0
B-5	**Civil Engineer 1**	**Pump station, utility coordination**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1											17.0
B-6	**Mechanical Engineer**	**Mechanical of pump station**			1	1				1	1		1	1						1	1									8.0
B-7	**Electrical Engineer**	**Electrical of pump station**			1	1				1	1		1	1						1	1									8.0
B-8	**Structural Engineer**	**Structural of reservoir and pump station**			1	1	1			1	1		1	1						1	1									9.0
B-9	**Environmental Specialist**	**Environmental Study**	1	1				1	1				1	1					1	1					1	1				10.0
B-10	**Social Management Specialist**	**Social Impact Study/RAP**	1	1				1	1				1	1					1	1					1	1				10.0
B-11																														0.0
B	**Total of the Group B**		**91.0**											**59.0**												**2.0**			152.0
Supporting Staff																														
C-1	**Site Supervisor 1**	**Site Supervise-Distribution Pipes**		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					22.0
C-2	**Site Supervisor 2**	**Site Supervise-Distribution Pipes**		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					22.0
C-3	**Site Supervisor 3**	**Site Supervise-Intake/Reservoir**		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										17.0
C-4	**Site Supervisor 4**	**Site Supervise-Pump station/Tanks**		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1								19.0
C-5	**Site Supervisor 5**	**Site Supervise-Transmission pipe**						1	1	1	1	1	1	1	1	1	1	1	1											12.0
C-6	**Office Manager**	**Management of Administration Staff**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2			26.0
C-7	**Secretary**	**Secretarial Management**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				24.0
C-8	**Accountant**	**Accounting/invoicing**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2			26.0
C-9	**Interpreter/Secretary**	**Interpretation/report typing/secretarial work**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				24.0
C-10	**Administration Staff**	**General office work/typing/Misc. work**	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				24.0
C	**Total of the Group C**		**111**											**101**												**4.0**			216.0
B/C	**Total of the Group B&C**		**202.0**											**160.0**												**6.0**			368.0
	Total of Groups A, B & C		**255.0**											**202.0**												**8.0**			465.0