

ベトナム国
キエンザン省人民委員会

ベトナム国
キエンザン省フーコック島
水インフラ総合開発事業準備調査
(PPP インフラ事業)

最終報告書
第 III 部 サポートイングレポート
(添付資料)

平成 25 年 7 月
(2013 年)

独立行政法人
国際協力機構 (JICA)

株式会社 神鋼環境ソリューション
株式会社 日水コン

- 第 I 部 : 要約
第 II 部 : メインレポート
第 III 部 : サポーティングレポート (添付資料)

通貨換算率 (2012 年 2 月)

USD 1 = JPY 76.6
USD 1 = VND 20,703
VND 1 = JPY 0.0037

キエンザン省フーコック島水インフラ総合開発事業
準備調査（PPP インフラ事業）

最終報告書目次

- 第I部 要約
第II部 メインレポート
第III部 サポーティングレポート（添付資料）

第 III 部 サポーティングレポート（添付資料）

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添付資料

添付資料-1 議事録

Preparatory Survey
on
Water Supply and Sewerage System Project
in Phu Quoc Island, Vietnam

Minutes of Meeting

- 1. Objectives:** Draft Final Report to Kien Giang PPC and concerned agencies
- 2. Date & time:** 13:30 – 18:00, 24 June 2013
- 3. Venue:** Meeting Room, Kien Giang PPC
- 4. Agenda**
 - Proposed Water Supply System
 - Proposed Sewerage System
 - Project Cost
 - Reference Material
 - Necessary Actions
 - Potential ODA Loan
- 5. Participants:** As per attached
- 6. Subjects discussed**

The JICA Survey Team submitted fifteen (15) copies of Draft Final Report to KGPPC, and explained the main outputs in Draft Final Report according to the agenda.

JICA also explained the potential ODA Water Sector Program loan (WSPL) presently under preliminary discussion between the Government of Vietnam and JICA.

The vice chairman of KGPPC, Mr Hong elaborated that both water supply and sewerage are, among others, the most concerned subjects in the development of Phu Quoc Island since other infrastructure plans such as airport, road transportation and electricity have been being implemented.

Main points discussed and concluded are as follows:

1) Water Supply System Development:

It was concluded that KGPPC agreed to Option 1 of the proposed water supply business scheme.

2) Take-or-Pay:

It was confirmed that KIWACO could agree take-or-pay guarantee up to 7,000 m³/d for the bulk water supply in the year 2020. It was concluded that quantity and conditions of take-or-pay guarantee will further be discussed and agreed among the parties concerned during the detailed Feasibility Study stage.

3) Sewerage System Development

KGPPC recommended that ODA loan be utilized for sewerage development since sewerage investment cost is very high.

JICA elaborated that since the present survey was carried out to encourage private sector investment in both water supply and sewerage development JICA ODA loan will not be provided as far as there is still a possibility that private sector can participate in the investment.

KGPPC agreed the private sector to consider further alternative idea and carry out the detail FS after this survey completed.

4) Potential Japanese ODA Loan:

KGPPC requested JICA to provide Central Government with Potential Japanese ODA Loan and suggest Central Government to make it on-granting to KGPPC.

JICA elaborated that JICA will convey the request to the other section of JICA in charge of this subject. JICA also suggest that KGPPC take leadership to approach Central Government in requesting this granting and supporting the Idea of WSPL.

KIWACO shared its experience with WB: (i) water supply: a preferential commercial loan from WB to VNG (MoF) and MoF relends Kien Giang (ii) drainage and sewerage: soft loan from WB to VNG (MoF) and MOF provides a grant to Kien Giang. KIWACO requested JICA to consider this model and to propose MoF to apply this mechanism into Kien Giang province during negotiation with MPI/MoF for water sector loan program. JICA took note of it.

5) PSIF

KGPPC requested JICA to provide PSIF to Private Investor.

6) Cost for Detailed F/S

KGPPC requested JICA to bear the cost of detailed F/S.

JICA elaborated that such cost be borne by the investors.

7) Coordination between KGPPC and Private Investor after the Survey Completed

KGPPC elaborated that KIWACO and DPI will continuously coordinate with private investors

after this survey is completed.

- 8) JICA elaborated that EIA for the water supply system should be prepared in accordance with JICA guideline Category A since the water supply project includes Cua Can reservoir construction.
- 9) Steering Committee

Mr. Hong's concern is how to ensure the synchronous in implementation of three major components: (i) Reservoir (ii) WTP (iii) Distribution network and whether it is required to conduct 3 separate FSs for the three component as three independent projects or not.

JICA suggested KGPPC that KGPPC should organize a steering committee to manage the water supply system development regarding KGPPC's concern on three components of the development.

Attachment

ATTENDANCE LIST	
Nam of Meeting	Draft Final Report Meeting
Place	Kien Giang PPC
Date	June 24th 2013
Time	From 1:30 pm to 6:00 pm

No.	Name	Organization	Signature
1	(Mr.) Hong Pham Vu	Vice-chairman People's Committee	
2	(Mr.) Huy Tan Thanh	People's Committee Office	
3	(Mr.) Niem Nguyen Xuan	Deputy Director - DoST	
4	(Ms.) Phung Le Thi Minh	Director - DoF	
5	(Mr.) Hien Nguyen Duc	Director - Kiwaco	
6	(Mr.) Nhat Nguyen Thong	Deputy Director - DPI	
7	(Mr.) Tinh Tran Ngoc	Deputy Director - DoC	
8	(Mr.) Chuan Pham The	Deputy Director - PMU of DARD	
9	(Mr.) Thao Quang Trong	Deputy Director - DoNRE	
10	(Mr.) Manh Nguyen Duc	Specialist of DoC	
11	(Mr.) Son Vo Cong	Manager, Planning, Phu Quoc IDMB	
12	(Mr.) Nam Tran Hoai	Deputy manager of Cooperation and Investment Division - DPI	
13	Tomohide Oyama	Private Sector Partnership and Finance, JICA	
14	(Ms.) Phuong Tran Tuyet	Coodinator, JICA- HCM	
15	(Mr.) Liem Bui	Advisor, JICA Hanoi	
16	(Mr.) Vu Than Thanh	Director of PhuQuocLand Co.	
17	K. Motojima	Kobelco-Eco Solutions VietNam Co.	
18	Yasuo Kuwata	Kobelco-Eco Solutions Co.	
19	Yoshiaki Yokota	Nihon Suido Consultants Co. Ltd	
20	Takaaki Hirai	Kobelco-Eco Solutions Co.	
21	Koichi Doi	Kobelco-Eco Solutions Co.	
22	Tetsuo Hamaguchi	Kobe City	
23	Ayako Tada	Kobelco-Eco Solutions Co.	
24	Daizo Iwata	Nihon Suido Consultants Co. Ltd	
25	Koji Kimura	Nihon Suido Consultants Co. Ltd	
26	(Mr.) Danh Nguyen Huynh Thanh	Kobelco-Eco Solutions VietNam Co.	

Notes:

Department of science and technology - DoST
 Department of Finance - DoF
 Kien Giang Water Supply and sewerage Limited Company - Kiwaco
 Department of Plan and Investment - DPI
 Department of Construction - DoC
 Department of Agriculture and Rural Development - DARD
 Department of resources and environment - DoNRE
 Project management unit of investment and development Phu Quoc island - IDMB

Phu Quoc Island Water Supply and Sewerage System Development Project Draft Final Report Meeting

June 24, 2013

JAPAN INTERNATIONAL COOPERATION AGENCY
KORELCO ECO-SOLUTIONS CO., LTD.
NIHON SUIDO CONSULTANTS CO., LTD.

Agenda

1. Outline of Water Supply System
 2. Outline of Sewerage System
 3. Project Cost
 4. Business Scheme
 5. Reference Materials
 6. Necessary Action
- * Explanation by JICA for Potential Japanese ODA Loan Programme which is under discussion between Government of Vietnam and JICA.

1. Outline of Water Supply System

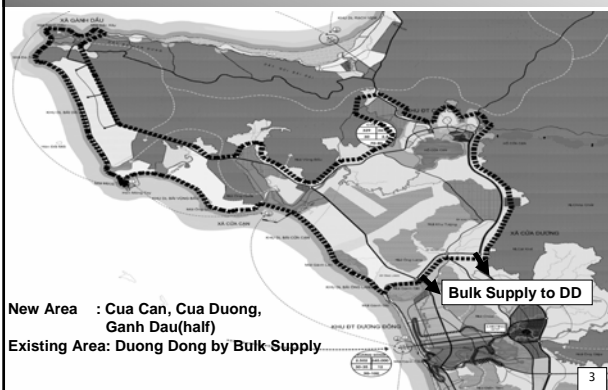
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Outline of Proposed Water Supply System

	Phase 1 Year 2020	Phase 2 Year 2030
Water Source	Cua Can Reservoir by pumping	Cua Can Reservoir by pumping
Capacity	20,000 m ³ /d	Expanded to 50,000 m ³ /d
Service Area	<ul style="list-style-type: none"> • Cua Can Tourist Area, • Cua Duong, • Duong Dong (Bulk Supply) 	Expanded to: <ul style="list-style-type: none"> • Cua Can Urban Area, • Ganh Dau,

2

Water Supply Service Area



3

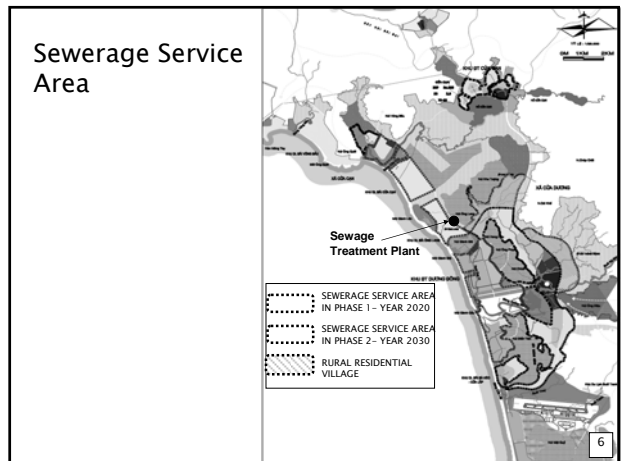
2. Outline of Sewerage System

4

Outline of Proposed Sewerage System

	Phase 1 Year 2020	Phase 2 Year 2030
Capacity	7,500 m ³ /d - 15,000 m ³ /d	Expanded to 30,000 m ³ /d
Service Area	<ul style="list-style-type: none"> • Duong Dong Town, • Cua Can Tourist Area 	Expanded to: <ul style="list-style-type: none"> • Cua Can Urban Area, • Cua Duong, • North Duong To

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3. Project Cost

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Project Cost

(VND)

Phase	Water Supply System	Sewerage System
Phase 1	Appx. 711 bil.	Appx. 2,689 bil
Phase 2	Appx. 850 bil.	Appx. 1,931 bil.

The above figures include consultant fees, price contingency, physical contingency, VAT.

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4. Business Scheme

(1) Water Supply System (2) Sewerage System

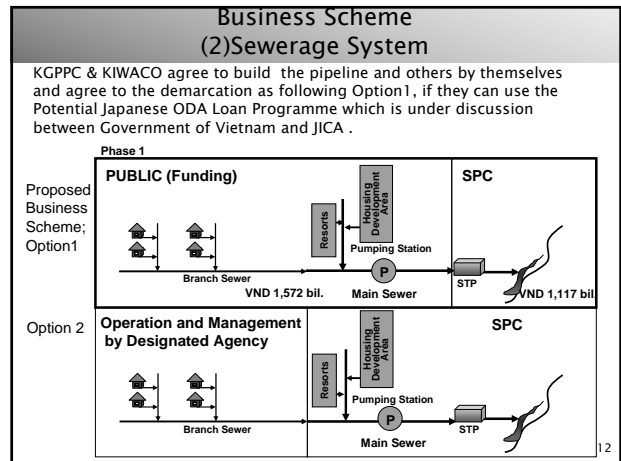
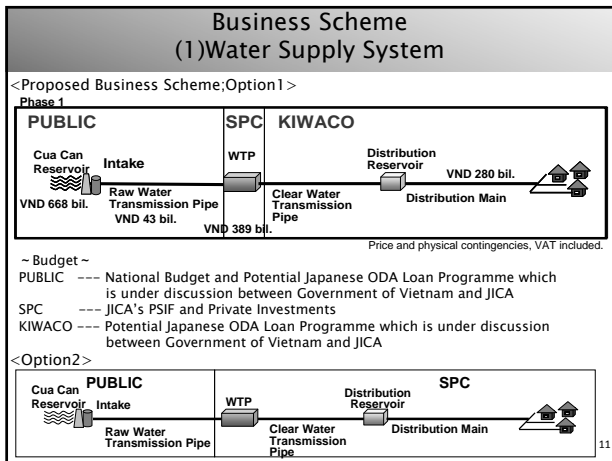
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Business Scheme (1) Water Supply System

<Proposed Business Scheme>

In order to make the project feasible and realized, private investors form a single company based on Investment license issued in accordance with Enterprise Law to construct and operate Water Treatment Plant as BOO project. KIWACO or any public body is to construct and provide piping and distribution service to all the clients.

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5. Reference Materials

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Water Tariff (Phase 1)

Option	To make SPC project financially feasible (Equity IRR for 15 yrs \geq 15.0%)	
	Bulk water tariff	Water tariff
Water Supply Option 1: BOO	15,500 VND/m ³ (incl. VAT)	2.57 times of the current tariff 14,135 VND/m ³ : Household 25,700 VND/m ³ : Commercial 19,275 VND/m ³ : Industry (Above all incl. VAT)
Water Supply Option 2: Concession	-	3.28 times of the current tariff 18,040 VND/m ³ : Household 32,800 VND/m ³ : Commercial 24,600 VND/m ³ : Industry (Above all incl. VAT)

Note: The above figures are on the constant basis. Actual figures will be adjusted by addition of inflation. VAT 5% included

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Required Subsidy for Sewerage Development

Options	To make SPC project financially feasible (Equity IRR for 15 yrs \geq 15.0%)
	Required Subsidy from Govt., or Burden on tourist (to recover the Subsidy)
Sewerage Option 1: BOO of STP	755 million JPY/year, 4.8 USD/ person
Sewerage Option 2: BOT of trunk sewer, pumping station, STP	1,068 million JPY/year, 6.8 USD/ person

Note: In all of the above cases, sewerage tariff is 10% of water tariff, and total amount of developer's contribution is 53 billion VND (about 196 million JPY).

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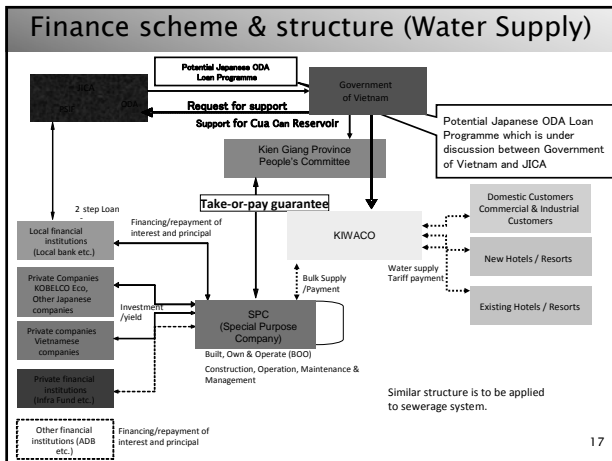
Cost allocation for Sewerage system

KGPPC and KIWACO agree that some of following schemes are necessary in order to recover the cost other than Sewerage Tariff.

- ▶ Waste Water Treatment fee for hotel
 - shall be charged through hotel bill (not directly from tourists)
- ▶ Connecting fee
 - shall be contributed by developers.

However, above schemes have never been applied so that more discussions shall be required in order to make it realized.

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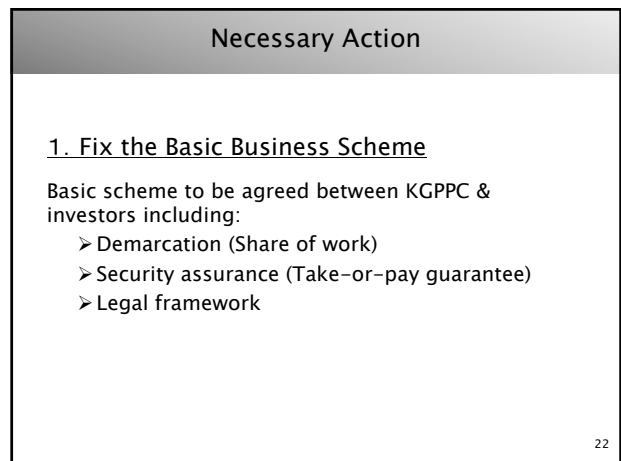
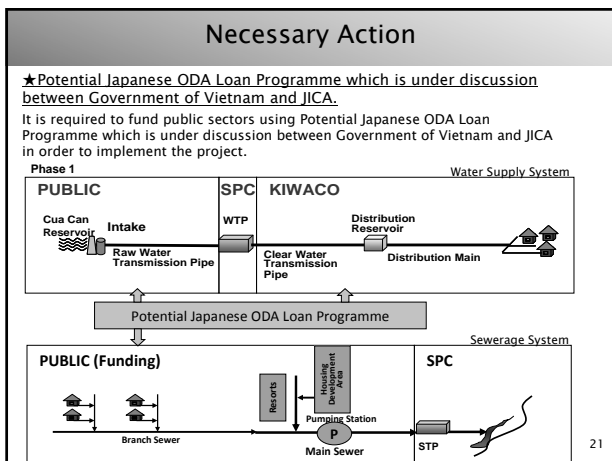
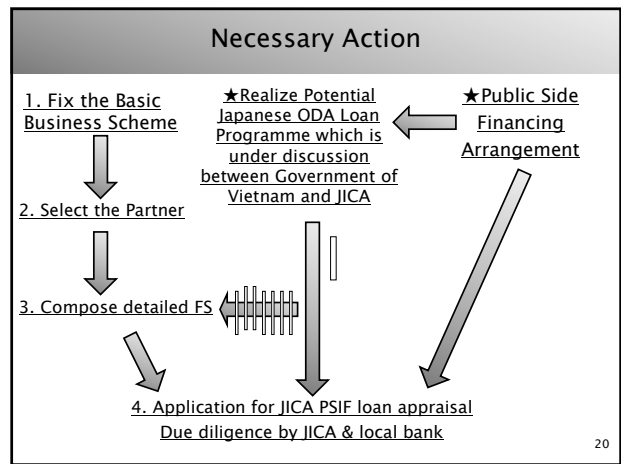
Implementation Schedule

Component	Work	2012		2013		2014		2015		2016		2017		2018				
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
General Procurement	Preparatory Survey Report																	
	Due Diligence																	
	EIA Public Disclosure																	
	SPC Negotiation & Contract Signing																	
	Application for Investment License																	
Cua Can Reservoir	Approval of Investment License																	
	Loan Agreement																	
	SPC Contract Signing																	
	Pre-Construction																	
	Construction																	
Water Supply System	Pre-Construction																	
	Construction																	
	Pre-Construction																	
	Construction																	
	Pre-Construction																	
Sewerage System	Pre-Construction																	
	Construction																	

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6. Necessary Action

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Necessary Action

2. Select the Partners

To form investors group among selected partners:

- Select partners and define roles of each partner (contribution and benefit)
- Form investors group
- Agree basic business structure of the project
- Agree to proceed with detailed FS

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Necessary Action

3. Compose detailed FS

Based on JICA survey team report, project conditions will be checked and confirmed to compose detailed FS including:

- Review assumptions and conditions of the project, and revise them if necessary.
- Review investment and operation, and revise amount.
- Review financial viability in connection with loan conditions and other requirements.
- Agree Bulk Water Tariff, Sewerage Treatment fee and detailed conditions of Take-or-Pay Guarantee.

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Necessary Action

★Public Side Financing Arrangement

- Secure the finance for Cua Can Reservoir construction.
- Approach to the Central Government (MPI) to promote formation of Potential Japanese ODA Loan Programme (Water Sector Programme Loan) and application for the programme.

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Preparatory Survey
on
Water Supply and Sewerage System Project
in Phu Quoc Island, Vietnam

Minutes of Meeting

1. **Objectives:** Interim Report to Kien Giang PPC and concerned agencies
2. **Date & time:** 8:30 – 12:00, 30 November 2012
3. **Venue:** Meeting Room, Kien Giang PPC
4. **Agenda**
 - Contents of Interim Report of the Preparatory Survey
5. **Participants:** As per attached

6. Subjects discussed

The main points discussed are as follows:

Mr. Yasui, JICA headquarters, mentioned the importance of deep understanding of the benefit of PPP project for public sector, the necessity of new mechanism for cost recovery and funding of water supply and sewerage project, the roles of public sector for the project where private investment is invited, and so on, before questions and answers. He expressed strong expectation for smooth and effective discussion toward successful project implementation during the remaining survey period.

Questions & Answers;

Vice Chariman, KGPPC: We confirm again that budget for Cua Can Reservoir construction will be funded by Public Sector (Government of Viet Nam), but the implementation schedule in your presentation is considered quite

tight. (After this there were discussions among Viet Nam side.)

- Director, KIWACO; If the WTP and reservoir, pipelines are separately constructed and/or managed, the scheme of the project is not a PPP anymore.
- Phu Quoc DMB; 1st; We want you to make clear the water price. Do you plan to buy raw water? How much is the raw water price?
2nd; Regarding the fee collection from tourist for sewerage project, how is the government able to collect the fee?
3rd; Regarding the implementation schedule, Land compensation and EIA are scheduled to be conducted in the year 2013. However, Master Plan must be prepared and approved first to approve the implementation of land compensation and EIA. Master plan is like a map with a scale of 1/2,000. For each project, reservoir, water supply and sewerage, master plan will be required.
- Mr. Ghi, DPI; I am concerned that this project utilize PPP scheme. Under Option 1, KIWACO shall borrow money for construction of facilities such as pipelines. That indicates that there are 2 projects for WTP and pipelines. Does this Project apply PPP or BOO?
- Mr. Kuwata, Study Team; We propose BOO scheme under Option 1, if the KGPPC allows.
- Ms. Phung, DOF; I have 6 comments. 1st; Reservoir should be separated from the other part of the project. Dept. of Agriculture will responsible for it.
2nd; Pipe and WTP should be a single project.
3rd; Take or pay guarantee is risky, I oppose to this idea.
4th; Is the proposed water tariff fixed (15,500 VND/m³) or increase every year for inflation?
5th; Fee collection from tourist for funding project is almost impossible.
6th; Sewerage tariff should not exceed 10% of water tariff.
- Study Team; Water tariff which we proposed must be adjusted for inflation every year.
- KGPPC; Developer's contribution is acceptable. Tourist fee collected from visitors is not agreeable.
- DONRE; 1st; Phu Quoc is a tourism island. Effluent quality criteria is set at level A not at level B.
2nd; Sewerage fee is regulated at 10% of water tariff. Industrial customer's contamination would be more than those of the other

customer. Therefore, sewerage charge on this should be much more than that on household.

3rd: Main sewer should be constructed first of all and earlier than branch sewer.

Study Team;

Sewerage tariff is set at 10% of water tariff in this survey. However, sewerage project requires huge investment cost, therefore, sewerage tariff is insufficient to cover necessary costs for sewerage project. We proposed developer's contribution, and fee collection from tourist to recover the necessary costs.

Dept. of Science and technology; I have 3 comments.

1st; Regarding the sewerage treatment, Study Team planned that start of construction is in the year 2015 and start of operation is from the year 2017. In this case, if some developers start operation before the year 2017, they are not able to discharge wastewater. How do you solve this problem?

2nd: Regarding the Cua Can reservoir construction, forest will be taken over. In order to protect water sources, payment should be collected as forest resource fee. Was this cost considered and included into the project cost?

3rd; Environment assessment should be conducted to calculate the reduction of downstream river water volume by constructing the reservoir. Please also consider the excessively required water. We should consider the cost to remove agriculture fertilizers from water of reservoir.

Mr. Yokota, Study Team;

Against the question, that is "If developers construct their hotels or resorts earlier than STP, how will it be solved?" Now this problem has already been happening so it is necessary to implement the project as early as possible. About Cua Can reservoir site, this is now not forest site but there are commercial trees. The construction of reservoir will not disturb the up-stream as we explained in the previous meeting. River does not flow into the reservoir. Reservoir will take water by pumping, so it will not disturb upstream of the river. For the downstream, we conducted strict calculation to maintain environmental flow volume. Of the contamination source we may have in this area according to existing MP, there is an urban area but our sewerage project covers this area. There are no farmers

in this area so fertilizer will not flow into the lake.

- Study Team; How about making Minutes of Meeting now by discussing important issues, in order to conclude the results of this meeting?
- Vice Chairman, KGPPC; It is difficult for us to settle this meeting to a certain direction now. Study team should continue investigating demarcation and investment model of the project to be able to have a certain conclusion.
- Mr. Kuwata, Study Team; We carefully designed to prepare business structure, so that risks should be allocated to relevant part properly and appropriately. Take-or-pay guarantee is necessary considering such a special nature of the island as the demand heavily depending upon the tourist development which is beyond the control of the SPC, nor private investment. This is very different from many concession contracts which have been taken place in the big cities where you can confirm how much the demand would be. Regarding the cost recovery, 10% of water tariff is not enough for necessary costs. Therefore, we have to seriously think together about how to recover the sewerage costs. Anyway, we should have more discussion focusing on the 3 major topics, business structure (incl. demarcation between public and private), risk management (incl. take-or-pay guarantee), and water tariff/sewerage charge. We need to work together to achieve the same goal.
- Mr. Yasui, JICA; We should concentrate on the important matters such as financing aspects and risk sharing, etc. other than technical matters next time. In addition to it, KGPPC is requested to consider the proposals from the survey team as partner of the project to find the way forward of the project. There need to be several new treatments to make the project feasible by inviting private investment.
- Vice Chairman, KGPPC; Regarding the Interim report, please send the Vietnamese translation of it and it will take one month to provide you our comments. After that, we had better hold a next meeting about one month later.

Attachment

Attendance List

Place : Meeting Room, KGPPC

Date : 30 November, 2012

Time : 8:30 a.m. to 12:00 a.m.

No.	Name	Duty Position	Organization
1	Takehiro Yasui	Director of PSIF	Japan International Cooperation Agency (JICA)
2	Tran Tuyet Phuong	Officer	JICA
3	Tomohide Oyama	Assistant Director	JICA
4	Tetsuo Hamaguchi		Kobe City
5	Takashi Minato	Director	Kobe City
6	Takaaki Hirai		Kobelco Eco-Solutions Co., Ltd. (KESV)
7	Yoshiaki Yokota	Team Leader	Nihon Suido Consultants Co., Ltd. (NSC)
8	Yasuo Kuwata	General Manager	KESV
9	Koichi Doi	Deputy General Manager	KESV
10	Daizo Iwata	Financial Specialist	NSC
11	Katsuhide Motojima	Deputy General Director	KESV
12	Nguyen Huynh Thanh Danh	General Manager	KESV
13	Phan Thi Mai Thao	Senior Manager	Saokhue Corp.
14	Nguyen Duc Manh	Officer	Dept. of Construction
15	Giang Thanh Khoa	Deputy Director	Dept. of Transport
16	Nguyen Duc Hien	Director/Chairman	KIWACO
17	Le Thi Minh Phung	Director	Dept. of Finance
18	Le Khac Ghi	Director	Dept. of Planning and Investment
19	Trinh Nam Trung	Deputy Director	Dept. of Construction
20	Nguyen Thanh Tung	Deputy Director	Phu Quoc Investment Development Board
21	Quan Trong Thao	Deputy Director	Dept. of Natural Resources and Environment
22	Luong Thanh Hai	Director	Dept. of Science and Technology
23	Pham Vu Hong	Vice Chairman	Kien Giang Provincial People's Committee (KGPPC)
24	Huynh Vinh Lac	Deputy Manager	KGPPC Office
25	Tan Thanh Huy	Officer	KGPPC Office
26	Nguyen Quoc Binh	Officer	KGPPC Office

Phu Quoc Water Supply and Sewerage System Development Project

Interim Meeting II

November 30, 2012

JAPAN INTERNATIONAL COOPERATION AGENCY
KOBELCO ECO-SOLUTIONS CO., LTD.
NIHON SUIDO CONSULTANTS CO., LTD.

1

Agenda

1. Outline of Water Supply System
2. Outline of Sewerage System
3. Confirmation of Interim I Meeting Conclusion
4. Project Cost
5. Preferred business scheme
6. Discussion

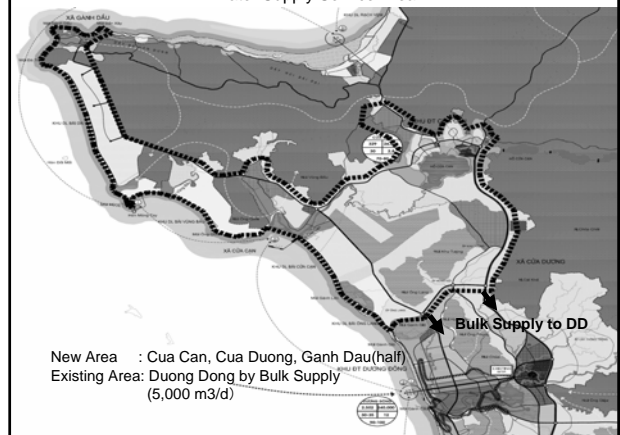
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Proposed Water Supply System

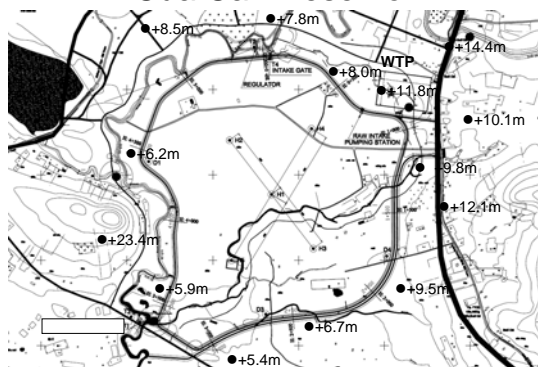
	Phase 1 Year 2020	Phase 2 Year 2030
Water Source	Cua Can Reservoir by pumping	Cua Can Reservoir by pumping
Capacity	20,000 m3/d	Expanded to 50,000 m3/d
Service Area	<ul style="list-style-type: none"> Cua Can Tourist Area, Cua Duong, Duong Dong (Bulk Supply) 	<ul style="list-style-type: none"> Expanded to: Cua Can Urban Area, Ganh Dau,

3

Water Supply Service Area

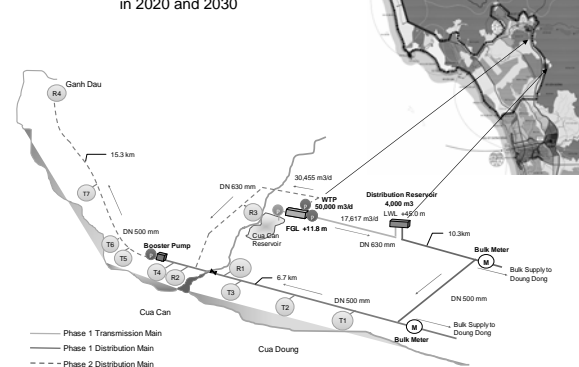


Cua Can Reservoir



5

Water Transmission and Distribution System in 2020 and 2030



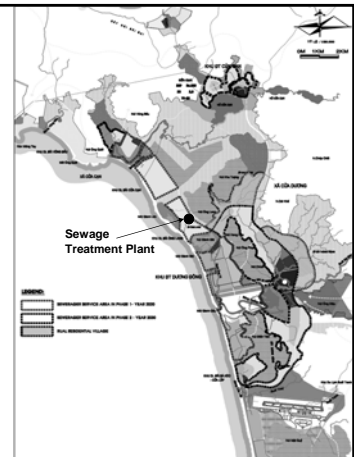
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Proposed Sewerage System

	Phase 1 Year 2020	Phase 2 Year 2030
Capacity	7,500 m ³ /d – 15,000 m ³ /d	Expanded to 30,000 m ³ /d
Service Area	<ul style="list-style-type: none"> • Duong Dong Town, • Cua Can Tourist Area 	Expanded to: <ul style="list-style-type: none"> • Cua Can Urban Area, • Cua Duong, • North Duong To

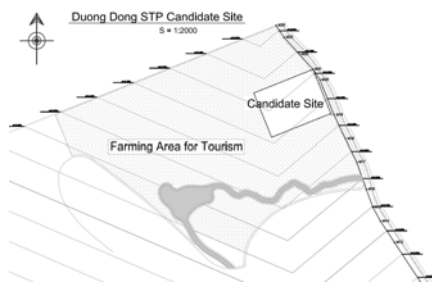
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Sewerage Service Area



Location of the Sewage Treatment Plant

North of Ong Lang Beach Resort (Result of the discussion with PQDMB)



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Target Effluent Quality of Proposed STP

Influent and Effluent Quality

(Unit: mg/L)

Quality	Influent	QCVN14: 2008_B *1	QCVN 08: 2008_B2 *2	Effluent
BOD ₅ (20°C)	230	50	25 #3	25 #3
SS	260	100	100	50
T-N	45	-	-	15
NH ₄ ⁺ -N	-	10	1	1
NO ₂ ⁻	-	-	0.05	0.05
NO ₃ ⁻	-	50	15	15
T-P	7	-	-	-
PO ₄ ³⁻	-	10	0.5	0.5

*1: National Technical Regulation on Domestic Wastewater

*2: National Technical Regulation on Surface Water Quality

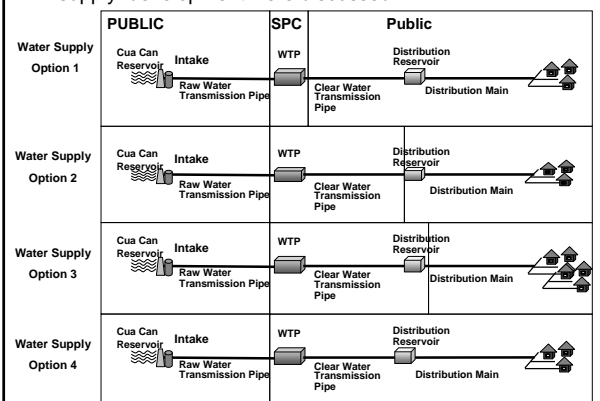
*3: Effluent quality of BOD₅ (20°C) is generally obtained less than 10 mg/L in Japan with the proposed system

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Confirmation of Conclusions of Interim Meeting I held on April 17, 2012

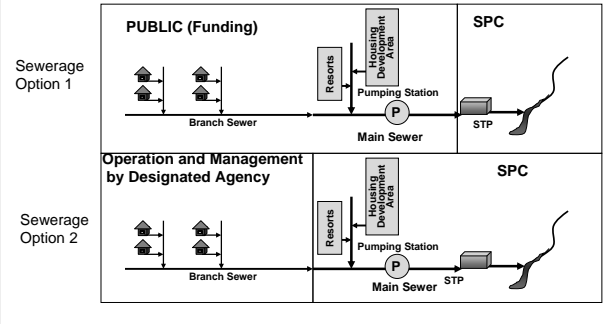
1. Cua Can Reservoir is separately funded by the national budget. Construction cost, land and compensation are funded by public sector.
2. Alternative 3 (Pumped Storage System) of the Cua Can Reservoir design was selected.
3. Estimated water tariff is high. KGPPC requested to review the cost estimates.

4. The following Public-Private demarcation options for water supply development were discussed.



- 5. KIWACO can not afford the allocated investment costs for Option 1, 2 and 3.
- 6. KIWACO prefers Option 4 (concession type) that SPC will supply water to the northern part of the island, and KIWACO will supply to the southern parts of the island. While, Private investor prefers Option 1.

7. The following options for sewerage development were discussed, and Private Investor prefers Option 1



8. Sewerage development requires large contribution of government subsidy or other source of finance. KGPPC was interested in the cost recovering by collecting special fee from tourists added on hotel charges.

Revised Project Cost

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PROJECT COST

(VND)

Phase	Water Supply System	Sewerage System
Phase 1	Appx. 711 bil.	Appx. 2,689 bil
Phase 2	Appx. 850 bil.	Appx. 1,931 bil.

The above figures include consultant fees, price contingency, physical contingency, VAT.

17

Preferred Business Scheme

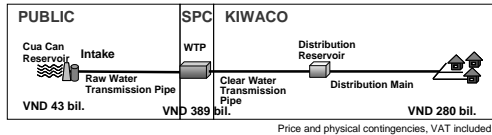
18

Preferred Business scheme (water supply)

Private investor prefers business scheme as follows:

The size of water supply business in the island is small. It will be difficult for multiple water companies operating within such a small market to achieve efficient and sound financial management of each company.

KIWACO presently provides connection services, maintenance of piping, customer services and tariff collection, and it can extend the same services to the other area of the island with less efforts than SPC. However, if SPC carries out the same function, it needs to establish the management sections with additional staff and facilities to provide such services.



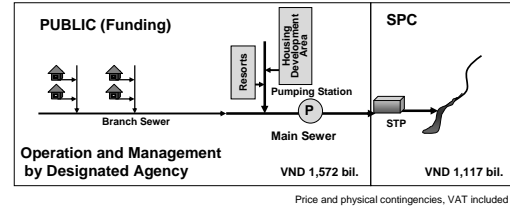
Price and physical contingencies, VAT included 19

Preferred Business scheme (sewerage system)

Private investor prefers business scheme as follows:

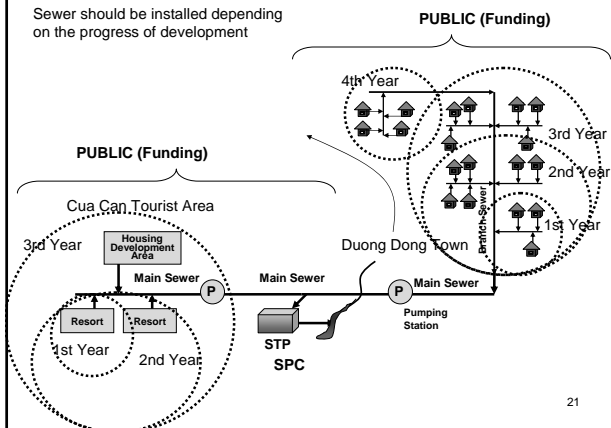
Sewer installation depends heavily on progress of development and connection to each household.

Uncertainty of such development progress is beyond the control of private company's management.



Price and physical contingencies, VAT included

Sewer should be installed depending on the progress of development



21

Water tariff

Option	To make SPC project financially feasible (Equity IRR for 15 yrs ≥ 15.0%)	
	Bulk water tariff	Water tariff
Water Supply Option 1: BOO	15,500 VND/m ³ (incl. VAT)	2.57 times of the current tariff 14,135 VND/m ³ : Household 25,700 VND/m ³ : Commercial 19,275 VND/m ³ : Industry (Above all incl. VAT)
Water Supply Option 4: Concession	-	3.28 times of the current tariff 18,040 VND/m ³ : Household 32,800 VND/m ³ : Commercial 24,600 VND/m ³ : Industry (Above all incl. VAT)

Note: The above figures are on the constant basis. Actual figures will be adjusted by addition of inflation. VAT 5% included

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Cost Recovery other than Sewerage Tariff

Developers' Contribution

Unit average Investment cost per developer's STP capacity: 12,000,000 VND/m³/d
 Expected sewage volume by developers: 4,400 m³/d (in Year 2020)
 4,400 m³/d x 12,000,000 VND/m³/d = VND 53bil.

Fee collection for Specific Purpose (collection from tourists and visitors)

Suppose collecting US\$10 per tourist visitor as special fee, and utilize 50% of it to sewerage cost recovery

The number of visitor: 2 million in 2020, 3 million in 2030

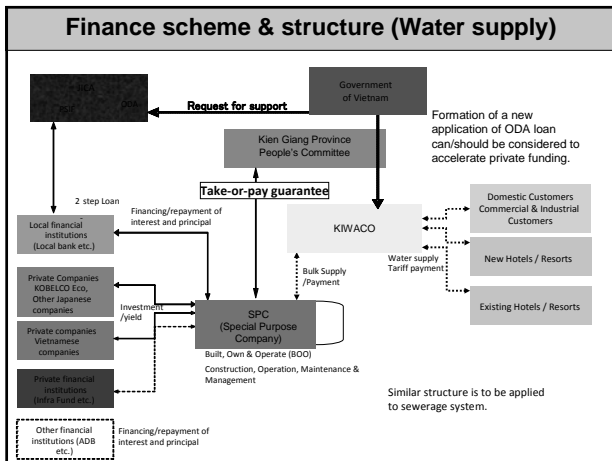
US\$10 x 21000 x 2,000,000 x 50% = VND210bil./year (in Year 2020)

23

Required Subsidy for Sewerage Development

Options	To make SPC project financially feasible (Equity IRR for 15 yrs ≥ 15.0%)
	Required Subsidy from Govt., or Burden on tourist (to recover the Subsidy)
Sewerage Option 1: BOO of STP	755 million JPY/year, 4.8 USD/ person
Sewerage Option 2: BOT of trunk sewer, pumping station, STP	1,068 million JPY/year, 6.8 USD/ person

Note: In all of the above cases, sewerage tariff is 10% of water tariff, and total amount of developer's contribution is 53 billion VND (about 196 million JPY).



Implementation Schedule

Component	Work	2012		2013		2014		2015		2016		2017		2018				
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
General Procedure	Preparatory Survey Report																	
	Due Diligence																	
	EIA Public Disclosure																	
	SPC Negotiation & Contract Signing																	
	Application for Investment License																	
Cua Can Reservoir	Pre-Construction																	
	Construction																	
	Pre-Construction																	
	Construction																	
	Pre-Construction																	
Water supply system	Pre-Construction																	
	Construction																	
	Pre-Construction																	
	Construction																	
	Pre-Construction																	
Sewerage System	Pre-Construction																	
	Construction																	
	Construction																	

Risks and Sharing

There are various possible risks for the project implementation but among others the following risks are highlighted to discuss how to share the risks between public and private.

Risks	Countermeasures to mitigate the risks
Delay of water demand growth	<ul style="list-style-type: none"> Accelerate approval process of tourist resort investment plans Accelerate land compensation process Accelerate other infrastructure construction Strict application of regulation to abandon groundwater use
Delay of Cua Can reservoir construction	<ul style="list-style-type: none"> Prompt central government budget allocation Strong government initiative and immediate guidance on the reservoir construction to the public
Degradation of Raw Water Quality	<ul style="list-style-type: none"> Protection of the reservoir from any pollution with the construction of sewerage system at the upstream urban areas Future provision be considered in the treatment plant design

- ### Issues to be discussed
- Budget allocation to water reservoir**
KGPPC is requested to confirm implementation of Cua Can reservoir and its schedule.
 - Project demarcation**
Private investor's opinion is SPC would concentrate on WTP and STP.
 - Financing to KIWACO provision**
To finance water supply piping and sewer collection piping, Formation of a new application of ODA loan can/should be considered in order to accelerate private investment to water infrastructure projects.
 - New ODA application; Request for support by Central government to JICA(Japanese government)**
In order to facilitate such a new application, official request should be necessary to be sent from Vietnamese Central Government to Japanese Government.

- ### Issues to be discussed
- Take-or-pay guarantee (minimum volume guarantee)**
Water plant and Sewerage Treatment plant are indispensable for the development of Eco-friendly Phu Quoc Island. In stead of building such facilities by provincial budget, private investors would invest such facilities through SPC but it needs mechanism for the ensured income stream to suffice security of finance.
 - Water tariff**
According to current calculation, water tariff may need to increase. However, the magnitude of such increase would slightly be more than those proposed by World Bank project (from 2009 to 2021 increase by 2.3 times).
Necessary changes of regulations to realize tariff increase are to be taken care by KGPPC.
 - Fee collection for special purposes**
To cover up gap between necessary fund and current environment protection tax, fee collection for special purposes can raise significant amount.
Necessary changes of regulations to realize fee collection are to be taken care by KGPPC.

- ### Issues to be discussed
- Legal implication**
In order to implement the project and project companies quickly and efficiently, private investors solicits KGPPC and related departments and agencies for their support especially legal implication and application including award of license.
 - Other Provisions from KGPPC**
 - land acquisition and compensation
 - raw water quality and quantity assurance
 - Possible technical assistance supported by JICA**
 - Water supply piping maintenance and management
 - Sewer collection piping maintenance and management
 - Any other areas of water and sewerage infrastructure

**Preparatory Survey on Water Supply and Sewerage System Project
in Phu Quoc Island**

Minutes of Meeting

- 1. Objectives:** Interim Report to Kien Giang PPC and concerned agencies
- 2. Date & time:** 8:30 – 11:00, 17 April 2012
- 3. Venue:** Meeting Room, Kien Giang PPC
- 4. Agenda**
 - Outline of Water Supply System & Cua Can Reservoir
 - Outline of Sewerage System
 - Project Cost
 - Demarcation among Public, KIWACO and SPC
 - Implementation Schedule
 - Issues to be confirmed with KGPPC, including
- 5. Participants:** As per attached
- 6. Subjects discussed**

The main points discussed are as follows:

Subject	Consultant	KGPPC
Cua Can Reservoir	Will Cua Can Reservoir be constructed by public sector fund?	Mr. Hong Cua Can Reservoir will be separately invested by national budget.
		Mr. Ghi Construction cost, land and compensation will be funded by public sector. Alternative 3 of the Cua Can Reservoir design will be selected.

Water and Sewerage Tariff	<p>The project is financially viable when water tariff is increased by 2.1 times of the present level. However, for private sector participation the tariff should be hiked more.</p>	<p>Mr. Hong Estimated tariff is high. High tariff may make Phu Quoc less attractive compared to other tourist areas (Thailand; Indonesia, etc) and consequently affect tourist industry.</p> <hr/> <p>Mr. Hien Current water supply tariff in Phu Quoc is low as it has been subsidized by the State and does not recover all related costs. World Bank also asked that the tariff to be increased with a specific schedule. To establish water & wastewater tariff roadmap to make it more affordable for resort urban developers, residents and business entities.</p>
Introduction of Hotel Tax or Environment Tax	<ul style="list-style-type: none"> + The development of new and advanced water supply and sewerage system is necessary to support the development of Phu Quoc Island as well as protect natural environment. + Tourists and visitors expect to have treated water and hygiene. Expectedly, almost residents and urban developer can afford higher tariff of water and sewerage service. + Contribution from urban developers; resorts; hotel; business entities in terms of tax or investment cost sharing would be considered other than the revenue from the tariff + It is reasonable to study and apply certain kinds of tax; tariff; 	<p>Mr. Hong Ten (10) % of water charge is presently collected as environmental protection fee. It is difficult to charge tariff; fee; tax other than environmental fee. Avoid overlapping charge on end users; otherwise it will be double levy on end users;</p> <hr/> <p>Mr. Hong Tax issues can be determined by National Assembly only.</p> <hr/> <p>Mr. Hong It might be possible to collect charge on hotel charge.</p> <hr/> <p>Mr. Ghi It is not appreciated to collect compensation from visitors.</p>

	<p>fee on tourists/visitors, eg. 10\$/visitor, etc.</p> <p>+ This idea comes from the fact that most of the beneficiaries of planed water and sewerage system will be visitors because they use water and discharge waste water, and the visitors should pay for the compensation to protect Phu Quoc environment accordingly.</p> <p>+ 10 US\$ for each visitor is not expensive for visitors.</p>	<p>Mr. Ghi</p> <p>For water tariff analysis, the costs for construction, land acquisition and compensation for Cua Can reservoir should be excluded as Cua Can reservoir will be invested as a separate project.</p>
<p>Demarcation between Public and Private Sectors</p>	<p>Four options for water supply and two options for sewerage were explained.</p>	<p>Mr. Hong</p> <p>It is needed to analyze the case that SPC will cover the whole parts of water supply from the raw water intake up to end users..</p> <hr/> <p>Mr. Ghi</p> <ol style="list-style-type: none"> 1) Public will construct Cua Can reservoir (alternative 3 design), and land and compensation be borne by Government. 2) Requested the survey team to analyze two cases: public sector bears 15% and 20%. 3) Requested to reconsider the technology, size and phase-wising to reduce the project cost. <hr/> <p>Mr. Hien</p> <p>KIWACO can not afford the allocated investment costs as indicated in the proposed Scheme 1, 2 and 3 for water supply, and Scheme 4 might be affordable but it is not preferred because KIWACO's role is just a retailer.</p>

		<p>Mr. Hien</p> <p>KIWACO prefers such a scenario that SPC will supply water to all the customers of northern part of the island, and KIWACO will take care of the existing Duong Dong and the remaining southern parts of the island.</p> <p>Mr. Hien</p> <p>There is also a possibility that KIWACO takes part in SPC as a shareholder.</p>
<p>Issues to be confirmed</p>	<p>+ <i>Question:</i> Are there any regulations to restrict the exploitation of groundwater and force the connection to pipe water supply system.</p>	<p><i>Answer:</i> Currently restriction is not applied since water supply and sewerage system are not available in certain areas of Phu Quoc Island. Restriction will be applied as the water supply and sewerage system are ready to service.</p>

Annex 1: Presentation by JICA Study Team

Agenda

1. Outline of Water Supply System & Cua Can Reservoir
2. Outline of Sewerage System
3. Project Cost
4. Demarcation among Public, KIWACO and SPC
5. Implementation Schedule
6. Issues to be Confirmed with KGPPC

2

Proposed Water Supply System

	Phase 1 Year 2020	Phase 2 Year 2030
Water Source	Cua Can Reservoir by pumping	Cua Can Reservoir by pumping
Capacity	20,000 m ³ /d	Expanded to 50,000 m ³ /d
Service Area	<ul style="list-style-type: none">• Cua Can Tourist Area,• Cua Duong,• Duong Dong (Bulk Supply)	Expanded to: <ul style="list-style-type: none">• Cua Can Urban Area,• Ganh Dau,

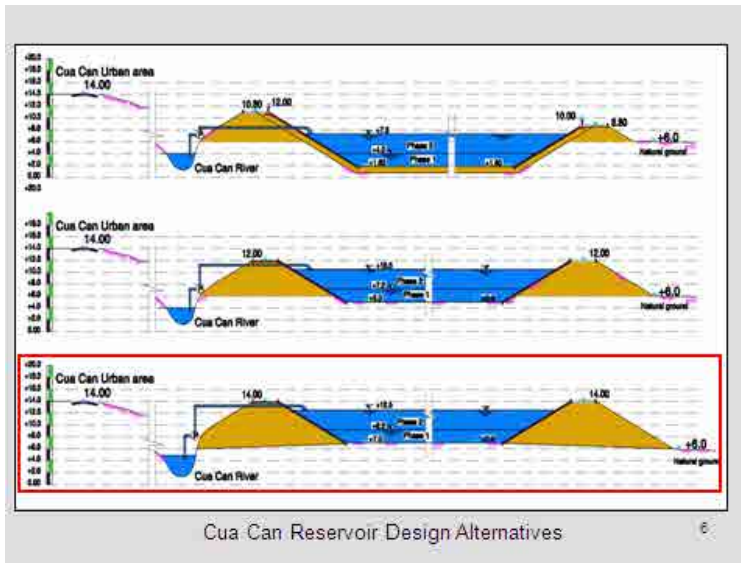
3

Water Supply Service Area



Cua Can Reservoir

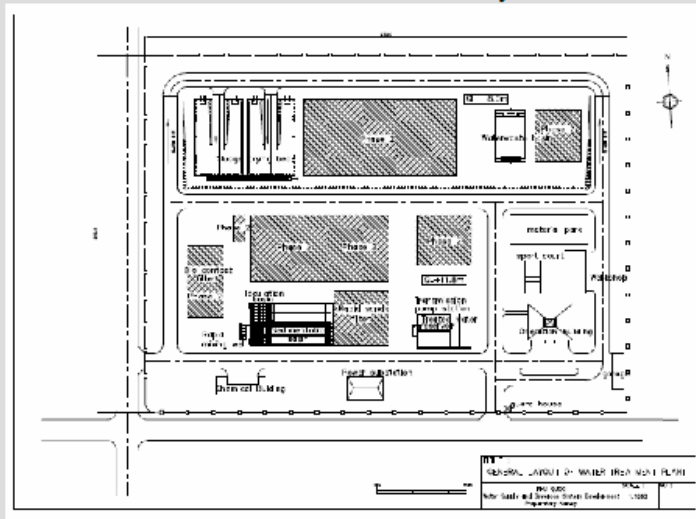




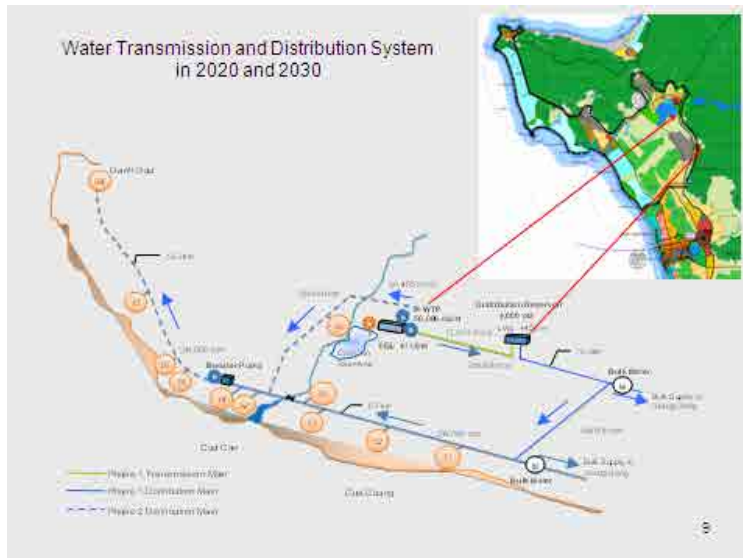
Comparison of Cua Can Reservoir Alternatives

No	Comparable items	Alternative 1	Alternative 2	Alternative 3
1	Construction cost	high cost 592.864.686.000	Medium cost 398.027.630.000	Low cost 294.424.752.000
2	Operating cost	average	high	high
3	Waterproofing for reservoir bed.	Waterproofing for reservoir bed by filling clay soil of 1m	Remaining 1 m clay layer for waterproofing	Remaining almost clay layer for waterproofing
4	Landscape	Nice because embankment level is lower than urban area	Nice because embankment level is relevant to urban area	Not nice because embankment level is higher than urban area
5	Storage area of residual soil proposed.	Filling for urban area	Filling for urban area	No need storage area, reservoir area leveled
6	Risk of construction cost if no association with urban area as storage area	Cost increased very much (maybe 4 times) due to transport and compensation increased.	Cost increased much (maybe 2 times) due to transport and compensation increased.	No risk due to no residual soil. Cut-soil is just enough for filling & leveling.
7	Time & construction progress	Long time with rapid construction progress	Average time & construction progress	Short time & low construction progress

Water Treatment Plant Layout



Water Transmission and Distribution System in 2020 and 2030



Proposed Sewerage System

	Phase 1 Year 2020	Phase 2 Year 2030
Capacity	7,500 m ³ /d – 15,000 m ³ /d	Expanded to 30,000 m ³ /d
Service Area	<ul style="list-style-type: none"> • Duong Dong Town, • Cua Can Tourist Area 	Expanded to: <ul style="list-style-type: none"> • Cua Can Urban Area, • Cua Duong, • North Duong To

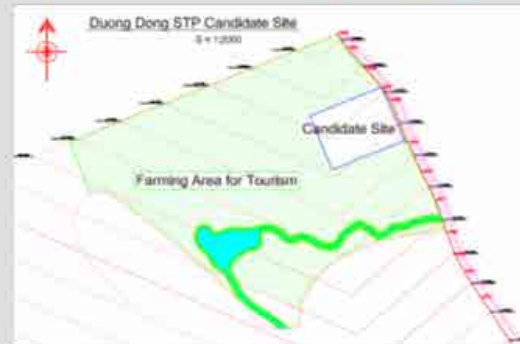
10

Sewerage Service Area



Location of the Sewage Treatment Plant

North of Ong Lang Beach Resort (Result of the discussion with PQDMB)



12

Target Effluent Quality of Proposed STP

- Influent and Effluent Quality

(Unit: mg/L)

Quality	Influent	QCVN14: 2008_B *1	QCVN 08: 2008_B2 *2	Effluent
BOD ₅ (20°C)	230	50	25	25 *3
SS	260	100	100	50
T-N	45	-	-	15
NH ₄ ⁺ -N	-	10	1	1
NO ₂ ⁻	-	-	0.05	0.05
NO ₃ ⁻	-	50	15	15
T-P	7	-	-	-
PO ₄ ³⁻	-	10	0.5	0.5

*1: National Technical Regulation on Domestic Wastewater

*2: National Technical Regulation on Surface Water Quality

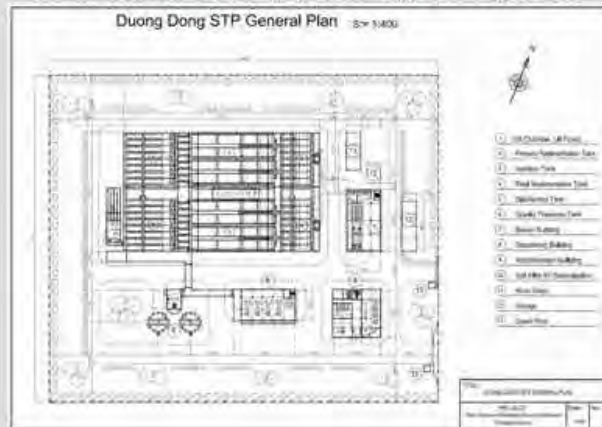
*3: Generally, effluent quality of BOD₅ (20°C) is obtained less than 10 mg/L in Japan.

13

Sewage Treatment Plant Layout

Duong Dong STP General Plan

Treatment Process: CAS (multi stage nitrification denitrification process with step feed)



Project Cost

PROJECT COST

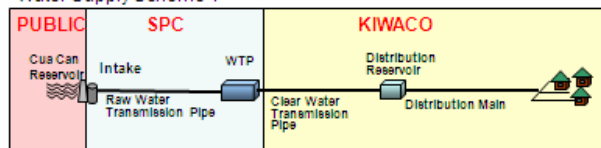
(VND)

Phase	Cua Can Reservoir	Water Supply System	Sewerage System
Phase 1	637 bil.	1,121 bil.	3,468 bil
Phase 2	6 bil.	955 bil.	2,685 bil.

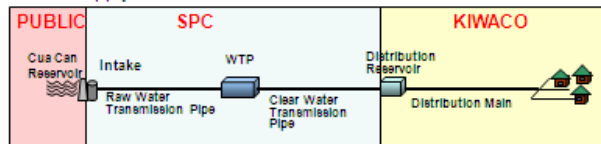
Demarcation of Project Scope among Public, KIWACO and SPC

17

Water Supply Scheme 1

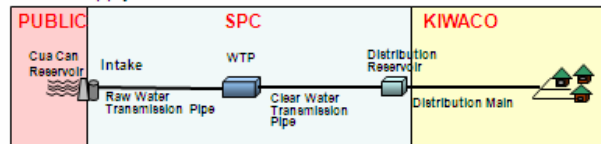


Water Supply Scheme 2

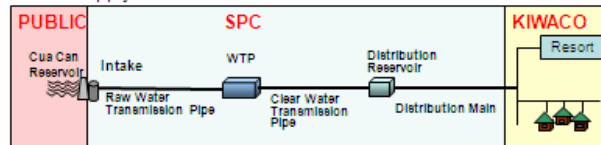


18

Water Supply Scheme 3



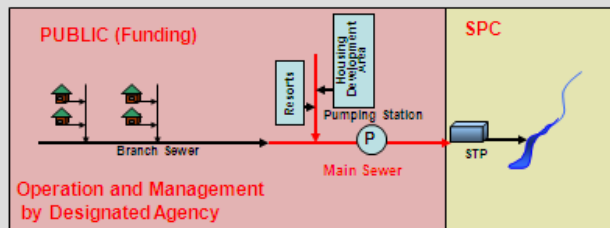
Water Supply Scheme 4



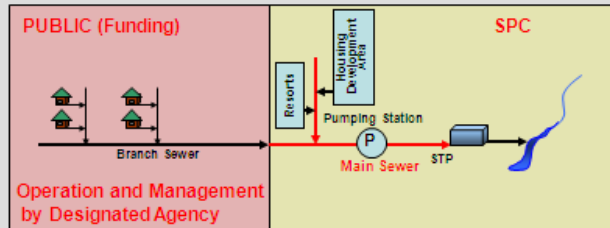
Scheme Comparison (Water Supply) (VND)

Scheme	Public Portion	Private Portion	Tariff Project Feasible (FIRR >4%)	Tariff Private can participate (Equity IRR >15%)
1	26% (289 bil.)	74% (832 bil.)	2.12 times	Bulk Water Tariff 26,700 VND/m ³ Customer Tariff 4.10 times
2	21% (230 bil.)	80% (893 bil.)	2.12 times	Bulk Water Tariff 27,800 VND/m ³ Customer Tariff 4.17 times
3	19% (208 bil.)	81% (914 bil.)	2.12 times	Bulk Water Tariff 28,100 VND/m ³ Customer Tariff 4.20 times
4	3% (32 bil.)	97% (1,087 bil.)	2.12 times	Bulk Water Tariff 34,100 VND/m ³ Customer Tariff 4.70 times

Sewerage Scheme 1



Sewerage Scheme 2



Scheme Comparison (Sewerage)

(VND)

Scheme	Public Portion	Private Portion	Sewerage Tariff	Developer Contribution	Subsidy or Special Tax Revenue (Hotel Tax or Environment Tax)
1	67% (2,329 bil.)	33% (1,156 bil.)	/	/	/
2	28% (1,015 bil.)	72% (2,601 bil.)	Domestic 5,500 VND/m ³ Industrial 7,500 VND/m ³ Commercial 10,000 VND/m ³	634 bil.	168 bil.
2	28% (1,015 bil.)	72% (2,601 bil.)	10% of Water Supply Tariff	93 bil.	294 bil. (in 2020) This increases every year.

22

Cost Recovery other than Sewerage Tariff

Developers' Contribution

Unit average Investment cost per developer's STP capacity: 12,000,000 VND/m³/d

Percentage of sewage by developers: 72% = 10,800 m³/d

10,800 m³/d x 12,000,000 VND/m³/d = 93,000,000,000 VND

Special Tax for Specific Purpose (Hotel Tax or Environment Tax)

Collecting US\$10 per tourist visitor as Hotel Tax, and utilize 70% of it to sewerage cost recovery \implies Equity IRR will be 15%.

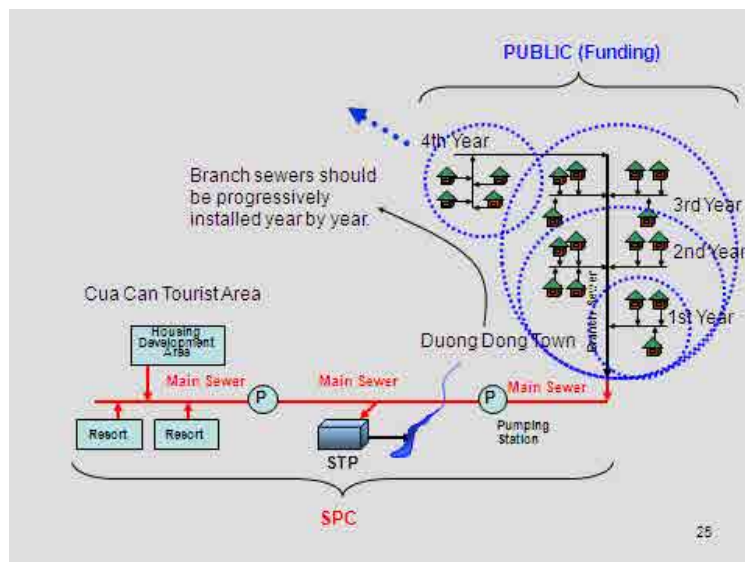
The number of visitor: 2 million in 2020, 3 million in 2030

US\$10 x 21000 x 2,000,000 x 70% = 294,000,000,000 (in Year 2020)

23

Implementation Schedule

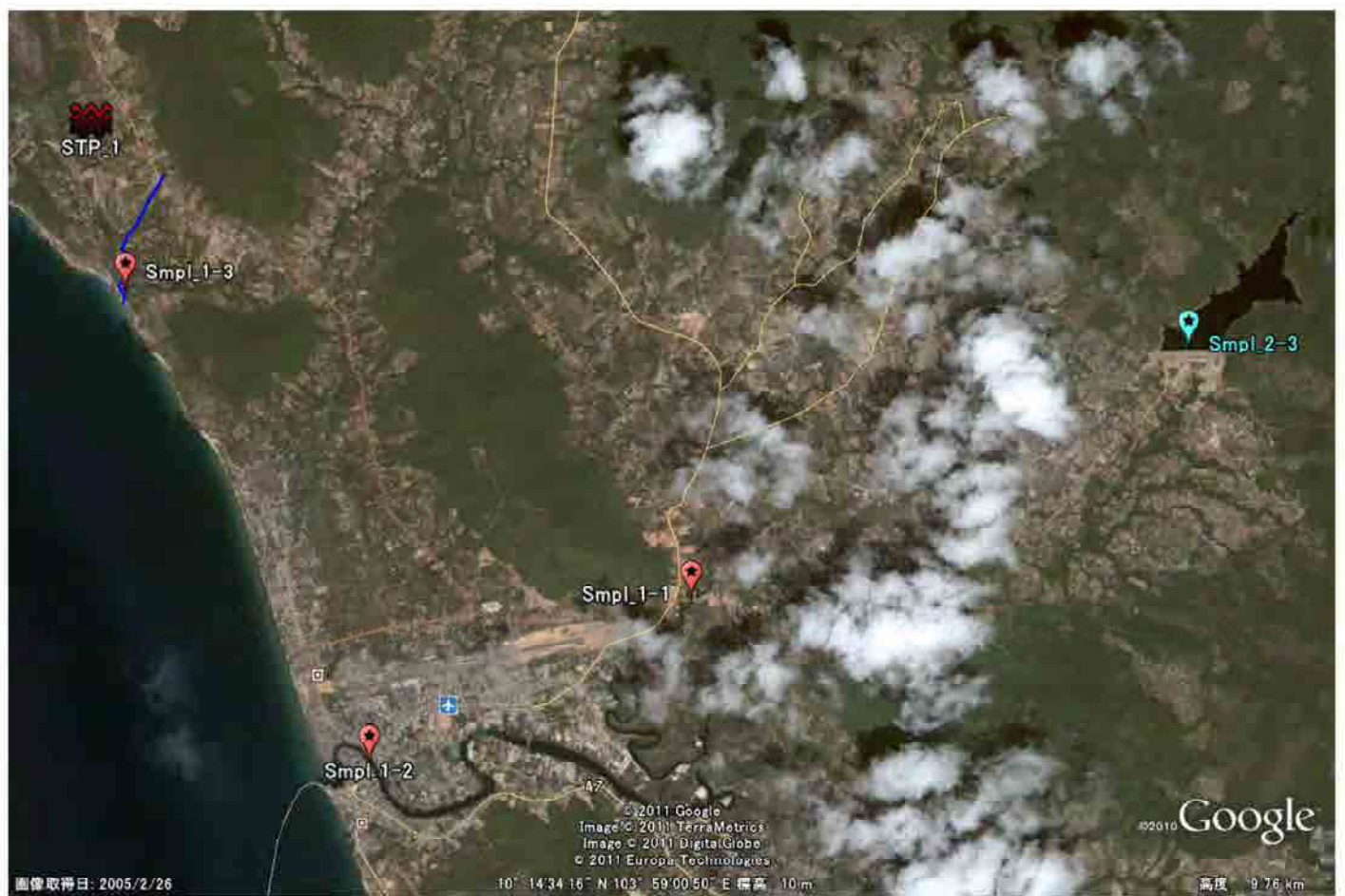
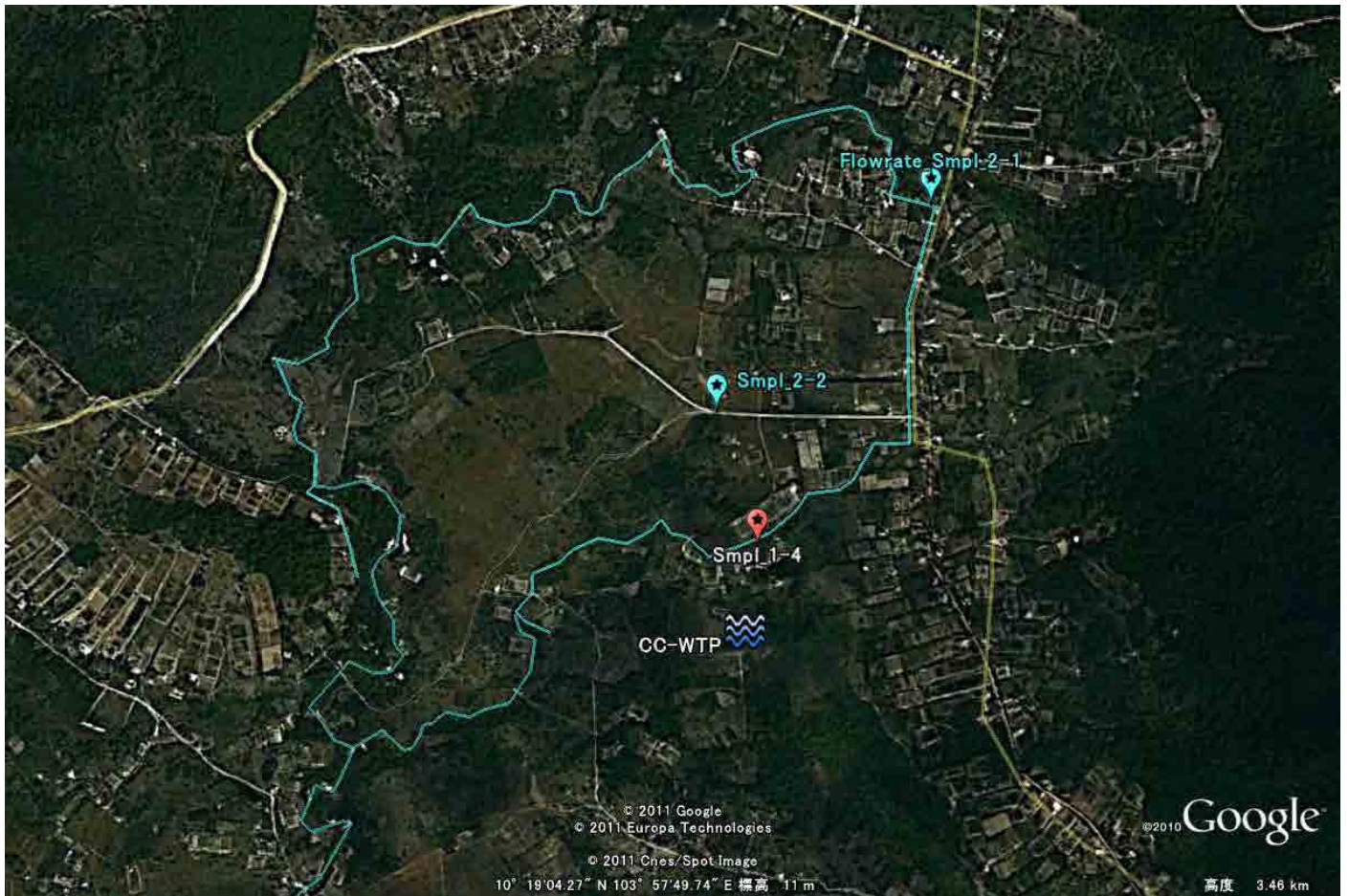
Component	Task	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Construction	SCA Procurement														
	Procurement														
	Installation														
Construction	Procurement														
	Construction														
Water supply system	Procurement														
	Installation														
	Water treatment plant														
	Construction														
Sewerage system	Procurement														
	Construction														
	Installation														



ANNEX 2: LIST OF PARTICIPANTS

No	Name	Title
1	Phạm Vũ Hồng	Vice-chairman of KG PPC (Phó Chủ tịch UBND tỉnh Kiên Giang)
2	Lê Khắc Ghi	Director of DPI (Giám đốc Sở Kế hoạch và Đầu tư)
3	Huỳnh Ngọc Tính	Vice-director of DOC (Phó Giám đốc Sở Xây dựng)
4	Quảng Trọng Thao	Vice-director of DONRE (Phó Giám đốc Sở Tài nguyên và Môi trường tỉnh Kiên Giang)
5	Nguyễn Quốc Dũng	Official of DONRE (Phòng Tài nguyên nước, Sở TN&MT tỉnh Kiên Giang)
6	Trần Công Danh	KG PPC (VP UBND tỉnh Kiên Giang)
7	Nguyễn Quốc Bình	Informatics staff KG PPC (Công thông tin UBND tỉnh Kiên Giang)
8	Nguyễn Đức Hiền	Director of KIWACO (Giám đốc KIWACO)
9	Nguyễn Đình Tâm	Deputy Head - Technical Division, KIWACO (Phó Phòng kỹ thuật KIWACO)
10	Yoshiaki Yokota	NSC
11	Ikuo Tanaka	NSC
12	Hiroshi Sugimoto	KOBELCO
13	Thân Thanh Vũ	Phú Quốc land group
14	Yasuo Kuwata	KOBELCO
15	Nguyễn Thành Danh	KOBELCO
16	Hiroyuki Mizuguchi	KOBELCO
17	Tetsuo Hamaguchi	KOBE CITY
18	Trịnh Trần Bảo Ngọc	KOBELCO
19	Keigo Hamada	KOBE CITY
20	Takashi Minato	KOBE CITY
21	Đặng Thị Kim Oanh	WASE
22	Nguyễn Văn Thọ	WASE
23	Nguyễn Trường Sơn	ICC
24	Vương Thị Quý	Phú Quốc land group
25	Ryosuke Takagi	KOBE CITY
26	Ono susumu	KOBELCO
27	Koji Kimura	NSC
28	Daizo Iwata	NSC
29	Naokata Uemura	NSC

添付資料-2 水質試験結果



RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Ben Tram Bridge
 - Type of Water : Surface Water
 - Sampling Date : 9h20 21/10/2011
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 1-1**
 Testing Date : 23/10/2011

No	Items	Unit	Results	Test methods
1	Temperature	°C	24,5	Thermometer
2	pH		5,16	SMEWW 2130-98
3	Dissolved Oxygene (DO)	mg/l	6,0	TCVN 5499-1995
4	Total Suspended Solid (TSS)	mg/l	6	TCVN 4560-88
5	COD	mg/l	36	TCVN 6491-1999
6	BOD (20°C)	mg/l	12	TCVN 6001-1995
7	Ammonia (NH ₄) as N	mg/l	0,1	TCVN 6179-96
8	Surfactants	mg/l	0,25	SMEWW 5540C-2005
9	Total Oils & Grease	mg/l	1,55	SMEWW 5520B-2005
10	E. Coli	MPN/ 100ml	4,2.10 ¹	TCVN 6187-2-1996

- **Notes** : The result is only valuable on the actual sample
- **SMEWW** : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **Marks** : Sample Water testing for Requests

Da River Water Supply & Sewerage
 Construction Consulting J.S Company



August 05, 2011

Laboratory



RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Noi Bridge
 - Type of Water : Surface Water
 - Sampling Date : 16h30 21/10/2011
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 1-2**
Testing Date : 23/10/2011

No	Items	Unit	Results	Test methods
1	Temperature	°C	24,5	Thermometer
2	pH		6,62	SMEWW 2130-98
3	Dissolved Oxygene (DO)	mg/l	4,1	TCVN 5499-1995
4	Total Suspended Solid (TSS)	mg/l	4	TCVN 4560-88
5	COD	mg/l	203	TCVN 6491-1999
6	BOD (20°C)	mg/l	60	TCVN 6001-1995
7	Ammonia (NH ₄) as N	mg/l	0,1	TCVN 6179-96
8	Surfactants	mg/l	0,48	SMEWW 5540C-2005
9	Total Oils & Grease	mg/l	1,00	SMEWW 5520B-2005
10	E. Coli	MPN/ 100ml	5,0.10 ¹	TCVN 6187-2-1996

- **Notes** : The result is only valuable on the actual sample
- **SMEWW** : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **Marks** : Sample Water testing for Requests



DA RIVER WATER SUPPLY & SEWERAGE CONSTRUCTION CONSULTING J.S COMPANY

No : 11-10-79 /PTN-TVCTNMT

RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Dinh Ba
 - Type of Water : Surface Water
 - Sampling Date : 17h00 21/10/2011
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 1-3**
Testing Date : 23/10/2011

No	Items	Unit	Results	Test methods
1	Temperature	°C	24,8	Thermometer
2	pH		5,44	SMEWW 2130-98
3	Dissolved Oxygene (DO)	mg/l	6,0	TCVN 5499-1995
4	Total Suspended Solid (TSS)	mg/l	4	TCVN 4560-88
5	COD	mg/l	21	TCVN 6491-1999
6	BOD (20°C)	mg/l	8	TCVN 6001-1995
7	Ammonia (NH ₄) as N	mg/l	0,1	TCVN 6179-96
8	Surfactants	mg/l	0,20	SMEWW 5540C-2005
9	Total Oils & Grease	mg/l	1,73	SMEWW 5520B-2005
10	E. Coli	MPN/ 100ml	5,4.10 ¹	TCVN 6187-2-1996

- **Notes** : The result is only valuable on the actual sample
- **SMEWW** : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **Marks** : Sample Water testing for Requests

Da River Water Supply & Sewerage
Construction Consulting J.S Company
Director

Eng. Nguyễn Trung Nhi

August 05, 2011
Laboratory


Eng. Ngo Trong Quoc

RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Sinh Stream
 - Type of Water : Surface Water
 - Sampling Date : 11h00 21/10/2011
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 1- 4**
Testing Date : 23/10/2011

No	Items	Unit	Results	Test methods
1	Temperature	°C	24,7	Thermometer
2	pH		5,07	SMEWW 2130-98
3	Dissolved Oxygene (DO)	mg/l	6,8	TCVN 5499-1995
4	Total Suspended Solid (TSS)	mg/l	4	TCVN 4560-88
5	COD	mg/l	6	TCVN 6491-1999
6	BOD (20°C)	mg/l	2	TCVN 6001-1995
7	Ammonia (NH ₄) as N	mg/l	0,1	TCVN 6179-96
8	Surfactants	mg/l	0,05	SMEWW 5540C-2005
9	Total Oils & Grease	mg/l	0,02	SMEWW 5520B-2005
10	E. Coli	MPN/ 100ml	15	TCVN 6187-2-1996

- **Notes :** The result is only valuable on the actual sample
- SMEWW : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **Marks :** Sample Water testing for Requests

August 05, 2011
Laboratory

Da River Water Supply & Sewerage
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RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Trang Bridge
 - Type of Water : Surface Water
 - Sampling Date : 11h50 21/10/2011
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 2-1**
Testing Date : 23/10/2011

No	Items	Unit	Results	Test methods
1	Temperature	°C	27,5	Thermometer
2	Color	Co Unit	10	TCVN 6185-96
3	Odor	Sense	0	SMEWW 2150-98
4	Turbidity	NTU	2,8	TCVN 6184-96
5	pH		5,33	SMEWW 2130-98
6	Hardness	mg/l CaCO ₃	6	TCVN 6224-96
7	Total Dissolved Solid (TDS)	mg/l	36	TCVN 4560-88
8	Aluminium (Al)	mg/l	KPH (LOD=0.02)	SMEWW 3500-2005
9	Ammonia (NH ₄ ⁺) as N	mg/l	0,1	TCVN 6179-96
10	Antimony (Sb)	mg/l	KPH(LOD=0.001)	SMEWW 3500-2005
11	Asenic (As)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
12	Barium (Ba)	mg/l	0,002	EPA-Method200.7
13	Boron (B)	mg/l	KPH(LOD=0.05)	SMEWW 3500-2005
14	Cadmium (Cd)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
15	Chloride (Cl)	mg/l	8	TCVN 6194-1996
16	Chromium (Cr)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
17	Copper (Cu)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
18	Total Phospho (TP)	mg/l	0.12	SMEWW 4500-P-D
19	Cyanide (CN)	mg/l	KPH	TCVN 6181-1996
20	Fluoride (F ⁻)	mg/l	0,15	SMEWW 4500-2005
21	Hydrogene Sulfide (H ₂ S)	mg/l	KPH (LOD=0.01)	SMEWW 4500-2005
22	Iron (Fe)	mg/l	1,20	TCVN 6177-96
23	Lead (Pb)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
24	Manganese (Mn)	mg/l	0.0	TCVN 6002-95
25	Mecury (Hg)	mg/l	KPH (LOD=0.0001)	SMEWW 3112-Hg-B
26	Molybdenum (Mo)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005

27	Nikel (Ni)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
28	Nitrite (NO ₂ ⁻) as N	mg/l	0,007	TCVN 6178-96
29	Nitrate (NO ₃ ⁻) as N	mg/l	2,2	TCVN 6180-96
30	Selenium (Se)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
31	Sodium (Na ⁺)	mg/l	0,85	SMEWW 3500-2005
32	Sulfate (SO ₄ ²⁻)	mg/l	2	TCVN 6200-96
33	Zinc (Zn)	mg/l	0,072	SMEWW 3500-2005
34	Potassium Permanganate (KMnO ₄)	mg/l O ₂	1,8	KMnO ₄ title
35	Surfactants	mg/l	0,62	SMEWW 5540C-2005
36	Total Oils & Grease	mg/l	0,50	SMEWW 5520B-2005
37	Phenol (Total)	µg/l	0,14	KTSK21-GCMS
38	E. Coli	MPN/ 100ml	4,5.10 ¹	TCVN 6187-2-1996
39	Total Coliform	MPN/ 100ml	1,9.10 ²	TCVN 6187-2-1996
40	Total Nitrogene (T-N) (Kjeldah)	mg/l	8,4	SMEWW 4500-N
41	Total P (T-P)	mg/l	0,15	SMEWW 4500-P
42	Alkalinity	mg/l	6	SMEWW 2320B-2005
43	Total Organic Carbon (TOC)	mg/l	3,78	TCVN 6634-2000
44	UV Absorption (E260)	-	0,1450	UV 1800
45	Trihalomethane (THM)	µg/l	KPH (LOD=5)	KTSK27-GCMS TK EPA 5021A

- **Notes :** The result is only valuable on the actual sample
- **SMEWW :** Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **KPH :** Not Finding
- **LOD :** Limite Finding Value
- **Marks :** Sample Water testing for Requests

August 05, 2011
Laboratory

Da River Water Supply & Sewerage
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RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Ground Water at Suoi Cat Hamlet, Team 2
 - Type of Water : Ground Water
 - Sampling Date : 11h20 21/10/2011
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 2-2**
Testing Date : 23/10/2011

No	Items	Unit	Results	Test methods
1	Temperature	°C	24,8	Thermometer
2	Color	Co Unit	5	TCVN 6185-96
3	Odor	Sense	Smell H ₂ S	SMEWW 2150-98
4	Turbidity	NTU	9,9	TCVN 6184-96
5	pH		4,53	SMEWW 2130-98
6	Hardness	mg/l CaCO ₃	6	TCVN 6224-96
7	Total Dissolved Solid (TDS)	mg/l	16	TCVN 4560-88
8	Aluminium (Al)	mg/l	KPH (LOD=0.02)	SMEWW 3500-2005
9	Ammonia (NH ₄ ⁺) as N	mg/l	0,65	TCVN 6179-96
10	Antimony (Sb)	mg/l	KPH(LOD=0.001)	SMEWW 3500-2005
11	Asenic (As)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
12	Barium (Ba)	mg/l	0,015	EPA-Method200.7
13	Boron (B)	mg/l	KPH(LOD=0.05)	SMEWW 3500-2005
14	Cadmium (Cd)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
15	Chloride (Cl)	mg/l	6	TCVN 6194-1996
16	Chromium (Cr)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
17	Copper (Cu)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
18	Total Phospho (TP)	mg/l	0.05	SMEWW 4500-P-D
19	Cyanide (CN ⁻)	mg/l	KPH (LOD=0.05)	TCVN 6181-1996
20	Fluoride (F ⁻)	mg/l	KPH (LOD=0.01)	SMEWW 4500-2005
21	Hydrogene Sulfide (H ₂ S)	mg/l	0,10	SMEWW 4500-2005
22	Iron (Fe)	mg/l	2,40	TCVN 6177-96
23	Lead (Pb)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
24	Manganese (Mn)	mg/l	KPH (LOD=0.005)	TCVN 6002-95
25	Mecury (Hg)	mg/l	KPH (LOD=0.0001)	SMEWW 3112-Hg-B
26	Molybdenum (Mo)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005

27	Nikel (Ni)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
28	Nitrite (NO ₂ ⁻) as N	mg/l	0,003	TCVN 6178-96
29	Nitrate (NO ₃ ⁻) as N	mg/l	0,1	TCVN 6180-96
30	Selenium (Se)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
31	Sodium (Na ⁺)	mg/l	0,62	SMEWW 3500-2005
32	Sulfate (SO ₄ ²⁻)	mg/l	0.0	TCVN 6200-96
33	Zinc (Zn)	mg/l	0,034	SMEWW 3500-2005
34	Potassium Permanganate (KMnO ₄)	mg/l O ₂	1,6	KMnO ₄ title
35	Surfactants	mg/l	KPH (LOD=0.06)	SMEWW 5540C-2005
36	Total Oils & Grease	mg/l	KPH (LOD=0.01)	SMEWW 5520B-2005
37	Phenol (Total)	µg/l	KPH (LOD=0.1)	KTSK21-GCMS
38	E. Coli	MPN/ 100ml	0.0	TCVN 6187-2-1996
39	Total Coliform	MPN/ 100ml	24	TCVN 6187-2-1996
40	Total Nitrogene (T-N) (Kjeldah)	mg/l	2,5	SMEWW 4500-N
41	Total P (T-P)	mg/l	0,10	SMEWW 4500-P
42	Alkalinity	mg/l	4	SMEWW 2320B-2005
43	Total Organic Carbon (TOC)	mg/l	KPH (LOD=0.3)	TCVN 6634-2000
44	UV Absorption (E260)	-	0,0670	UV 1800
45	Trihalomethane (THM)	µg/l	KPH (LOD=5)	KTSK27-GCMS TK EPA 5021A

- **Notes** : The result is only valuable on the actual sample
- SMEWW : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- KPH : Not Finding
- LOD : Limite Finding Value
- **Marks** : Sample Water testing for Requests

August 05, 2011
Laboratory

Da River Water Supply & Sewerage
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RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Duong Dong Lake
 - Type of Water : Surface Water
 - Sampling Date : 8h40 21/10/2011
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 2-3**
Testing Date : 23/10/2011

No	Items	Unit	Results	Test methods
1	Temperature	°C	23,8	Thermometer
2	Color	Co Unit	8	TCVN 6185-96
3	Odor	Sense	0	SMEWW 2150-98
4	Turbidity	NTU	1,4	TCVN 6184-96
5	pH		5,19	SMEWW 2130-98
6	Hardness	mg/l CaCO ₃	6	TCVN 6224-96
7	Total Dissolved Solid (TDS)	mg/l	12	TCVN 4560-88
8	Aluminium (Al)	mg/l	KPH (LOD=0.02)	SMEWW 3500-2005
9	Ammonia (NH ₄ ⁺) as N	mg/l	0,1	TCVN 6179-96
10	Antimony (Sb)	mg/l	KPH(LOD=0.001)	SMEWW 3500-2005
11	Asenic (As)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
12	Barium (Ba)	mg/l	0,002	EPA-Method200.7
13	Boron (B)	mg/l	KPH(LOD=0.05)	SMEWW 3500-2005
14	Cadmium (Cd)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
15	Chloride (Cl)	mg/l	6	TCVN 6194-1996
16	Chromium (Cr)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
17	Copper (Cu)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
18	Total Phospho (TP)	mg/l	0.10	SMEWW 4500-P-D
19	Cyanide (CN)	mg/l	KPH (LOD=0.05)	TCVN 6181-1996
20	Fluoride (F ⁻)	mg/l	0,37	SMEWW 4500-2005
21	Hydrogene Sulfide (H ₂ S)	mg/l	KPH (LOD=0.01)	SMEWW 4500-2005
22	Iron (Fe)	mg/l	1,80	TCVN 6177-96
23	Lead (Pb)	mg/l	0,0012	SMEWW 3500-2005
24	Manganese (Mn)	mg/l	KPH (LOD=0,005)	TCVN 6002-95
25	Mecury (Hg)	mg/l	KPH (LOD=0.0001)	SMEWW 3112-Hg-B
26	Molybdenum (Mo)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005

27	Nikel (Ni)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
28	Nitrite (NO ₂ ⁻) as N	mg/l	0,003	TCVN 6178-96
29	Nitrate (NO ₃ ⁻) as N	mg/l	1,9	TCVN 6180-96
30	Selenium (Se)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
31	Sodium (Na ⁺)	mg/l	0,65	SMEWW 3500-2005
32	Sulfate (SO ₄ ²⁻)	mg/l	1	TCVN 6200-96
33	Zinc (Zn)	mg/l	0,061	SMEWW 3500-2005
34	Potassium Permanganate (KMnO ₄)	mg/l O ₂	1,8	KMnO ₄ title
35	Surfactants	mg/l	0,57	SMEWW 5540C-2005
36	Total Oils & Grease	mg/l	0,46	SMEWW 5520B-2005
37	Phenol (Total)	µg/l	0,13	KTSK21-GCMS
38	E. Coli	MPN/ 100ml	3,4.10 ¹	TCVN 6187-2-1996
39	Total Coliform	MPN/ 100ml	9,3.10 ¹	TCVN 6187-2-1996
40	Total Nitrogene (T-N) (Kjeldah)	mg/l	7,8	SMEWW 4500-N
41	Total P (T-P)	mg/l	0,12	SMEWW 4500-P
42	Alkalinity	mg/l	4	SMEWW 2320B-2005
43	Total Organic Carbon (TOC)	mg/l	3,35	TCVN 6634-2000
44	UV Absorption (E260)	-	0,1121	UV 1800
45	Trihalomethane (THM)	µg/l	KPH (LOD=5)	KTSK27-GCMS TK EPA 5021A

- **Notes :** The result is only valuable on the actual sample
- SMEWW : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- KPH : Not Finding
- LOD : Limite Finding Value
- **Marks :** Sample Water testing for Requests

August 05, 2011
Laboratory

Da River Water Supply & Sewerage
Construction Consulting J.S Company



RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
- From : KOBELCO ECO-SOLUTIONS CO., LTD.
- Source of Water : Kien Giang Province – Phu Quoc Island
- Location : Water at Ben Tram Bridge
- Type of Water : Surface Water
- Sampling Date : 13h30 09/03/2012
- Name of Collector : Eng. Ngo Trong Quoc

Sample Sign : **Sample 1-1**

Testing Date : 10/03/2012

No	Items	Unit	Results	Test methods
1	Temperature	°C	31	Thermometer
2	pH		6,62	SMEWW 2130-98
3	Dissolved Oxygene (DO)	mg/l	5,7	TCVN 5499-1995
4	Total Suspended Solid (TSS)	mg/l	8	TCVN 4560-88
5	COD	mg/l	28	TCVN 6491-1999
6	BOD (20°C)	mg/l	12	TCVN 6001-1995
7	Ammonia (NH ₄) as N	mg/l	0,32	TCVN 6179-96
8	Surfactants	mg/l	0,28	SMEWW 5540C-2005
9	Total Oils & Grease	mg/l	1,00	SMEWW 5520B-2005
10	E. Coli	MPN/ 100ml	1,5.10 ¹	TCVN 6187-2-1996

- **Notes** : The result is only valuable on the actual sample
- SMEWW : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **Marks** : Sample Water testing for Requests

Da River Water Supply & Sewerage
Construction Consulting J.S Company

Director



Eng. Nguyễn Trung Nhi

March 29, 2012

Laboratory



Eng. Ngô Trọng Quốc

RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Cau Noi Bridge
 - Type of Water : Surface Water
 - Sampling Date : 16h30 09/03/2012
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 1-2**
Testing Date : 10/03/2012

No	Items	Unit	Results	Test methods
1	Temperature	°C	32	Thermometer
2	pH		7,70	SMEWW 2130-98
3	Dissolved Oxygene (DO)	mg/l	3,2	TCVN 5499-1995
4	Total Suspended Solid (TSS)	mg/l	8	TCVN 4560-88
5	COD	mg/l	440	TCVN 6491-1999
6	BOD (20°C)	mg/l	148	TCVN 6001-1995
7	Ammonia (NH ₄) as N	mg/l	1,73	TCVN 6179-96
8	Surfactants	mg/l	0,64	SMEWW 5540C-2005
9	Total Oils & Grease	mg/l	0,80	SMEWW 5520B-2005
10	E. Coli	MPN/ 100ml	0,9.10 ¹	TCVN 6187-2-1996

- **Notes** : The result is only valuable on the actual sample
- **SMEWW** : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **Marks** : Sample Water testing for Requests

Da River Water Supply & Sewerage
Construction Consulting J.S Company



Director

Eng. Nguyen Trung Nhi

March 29, 2012

Laboratory



Eng. Ngo Trong Quoc

RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Dinh Ba
 - Type of Water : Surface Water
 - Sampling Date : 16h00 09/03/2012
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 1-3**
 Testing Date : 10/03/2012

No	Items	Unit	Results	Test methods
1	Temperature	°C	32	Thermometer
2	pH		7,20	SMEWW 2130-98
3	Dissolved Oxygene (DO)	mg/l	5,9	TCVN 5499-1995
4	Total Suspended Solid (TSS)	mg/l	10	TCVN 4560-88
5	COD	mg/l	26	TCVN 6491-1999
6	BOD (20°C)	mg/l	10	TCVN 6001-1995
7	Ammonia (NH ₄) as N	mg/l	0,28	TCVN 6179-96
8	Surfactants	mg/l	0,24	SMEWW 5540C-2005
9	Total Oils & Grease	mg/l	1,45	SMEWW 5520B-2005
10	E. Coli	MPN/ 100ml	2,9.10 ¹	TCVN 6187-2-1996

- **Notes** : The result is only valuable on the actual sample
- SMEWW : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **Marks** : Sample Water testing for Requests

Da River Water Supply & Sewerage
 Construction Consulting J.S Company



March 29, 2012
 Laboratory



RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Water at Trang Bridge
 - Type of Water : Surface Water
 - Sampling Date : 10h30 09/03/2012
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 2-1**
 Testing Date : 10/03/2012

No	Items	Unit	Results	Test methods
1	Temperature	°C	28,5	Thermometer
2	Color	Co Unit	12	TCVN 6185-96
3	Odor	Sense	0	SMEWW 2150-98
4	Turbidity	NTU	3,0	TCVN 6184-96
5	pH		5,20	SMEWW 2130-98
6	Total Hardness	mg/l CaCO ₃	8	TCVN 6224-96
7	Total Dissolved Solid (TDS)	mg/l	12	TCVN 4560-88
8	Aluminium (Al)	mg/l	KPH (LOD=0.02)	SMEWW 3500-2005
9	Ammonia (NH ₄ ⁺) as N	mg/l	0,15	TCVN 6179-96
10	Antimony (Sb)	mg/l	KPH(LOD=0.001)	SMEWW 3500-2005
11	Asenic (As)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
12	Barium (Ba)	mg/l	KPH (LOD=0.001)	EPA-Method200.7
13	Boron (B)	mg/l	KPH(LOD=0.05)	SMEWW 3500-2005
14	Cadmium (Cd)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
15	Chloride (Cl)	mg/l	8	TCVN 6194-1996
16	Chromium (Cr)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
17	Copper (Cu)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
18	Phosphate (PO ₄ ³⁻)	mg/l	0.15	SMEWW 4500-PO ₄ -D
19	Cyanide (CN)	mg/l	KPH (LOD=0.05)	TCVN 6181-1996
20	Fluoride (F ⁻)	mg/l	KPH (LOD=0.01)	SMEWW 4500-2005
21	Hydrogene Sulfide (H ₂ S)	mg/l	KPH (LOD=0.01)	SMEWW 4500-2005
22	Iron (Fe)	mg/l	1,80	TCVN 6177-96
23	Lead (Pb)	mg/l	0,0013	SMEWW 3500-2005

24	Manganese (Mn)	mg/l	KPH (LOD=0.005)	TCVN 6002-95
25	Mecury (Hg)	mg/l	KPH (LOD=0.0001)	SMEWW 3112-Hg-B
26	Molybdenum (Mo)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
27	Nikel (Ni)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
28	Nitrite (NO ₂ ⁻) as N	mg/l	0,006	TCVN 6178-96
29	Nitrate (NO ₃ ⁻) as N	mg/l	2,3	TCVN 6180-96
30	Selenium (Se)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
31	Sodium (Na ⁺)	mg/l	1,25	SMEWW 3500-2005
32	Sulfate (SO ₄ ²⁻)	mg/l	2	TCVN 6200-96
33	Zinc (Zn)	mg/l	0,018	SMEWW 3500-2005
34	Potassium Permanganate (KMnO ₄)	mg/l O ₂	1,6	KMnO ₄ title
35	Surfactants	mg/l	0,21	SMEWW 5540C-2005
36	Total Oils & Greasé	mg/l	1,00	SMEWW 5520B-2005
37	Phenol (Total)	µg/l	0,08	KTSK21-GCMS
38	E. Coli	MPN/ 100ml	4,0	TCVN 6187-2-1996
39	Total Coliform	MPN/ 100ml	4,6.10 ²	TCVN 6187-2-1996
40	Total Nitrogene (T-N) (Kjeldah)	mg/l	5,5	SMEWW 4500-N
41	Total P (T-P)	mg/l	0,06	SMEWW 4500-P
42	Alkalinity	mg/l	6	SMEWW 2320B-2005
43	Total Organic Carbon (TOC)	mg/l	2,72	TCVN 6634-2000
44	UV Absorption (E260)	-	KPH	UV 1800
45	Trihalomethane (THM)	µg/l	KPH (LOD=5)	KTSK27-GCMS TK EPA 5021A

- **Notes :** The result is only valuable on the actual sample
- **SMEWW :** Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- **KPH :** Not Finding
- **LOD :** Limite Finding Value
- **Marks :** Sample Water testing for Requests

Da River Water Supply & Sewerage
Construction Consulting J.S Company



Eng. Nguyễn Trung Nhi

March 29, 2012
Laboratory



Eng. Ngô Trung Quốc

RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Ground Water at Suoi Cat Hamlet, Team 2
 - Type of Water : Ground Water
 - Sampling Date : 11h00 09/03/2012
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : **Sample 2-2**
Testing Date : 10/03/2012

No	Items	Unit	Results	Test methods
1	Temperature	°C	27,0	Thermometer
2	Color	Co Unit	5	TCVN 6185-96
3	Odor	Sense	0	SMEWW 2150-98
4	Turbidity	NTU	2,4	TCVN 6184-96
5	pH		5,58	SMEWW 2130-98
6	Total Hardness	mg/l CaCO ₃	16	TCVN 6224-96
7	Total Dissolved Solid (TDS)	mg/l	23	TCVN 4560-88
8	Aluminium (Al)	mg/l	KPH (LOD=0.02)	SMEWW 3500-2005
9	Ammonia (NH ₄ ⁺) as N	mg/l	0,76	TCVN 6179-96
10	Antimony (Sb)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
11	Asenic (As)	mg/l	KPH (LOD=0.0005)	SMEWW 3500-2005
12	Barium (Ba)	mg/l	0,010	EPA-Method200.7
13	Boron (B)	mg/l	KPH(LOD=0.05)	SMEWW 3500-2005
14	Cadmium (Cd)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
15	Chloride (Cl)	mg/l	10	TCVN 6194-1996
16	Chromium (Cr)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
17	Copper (Cu)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
18	Phosphate (PO ₄ ³⁻)	mg/l	0.1	SMEWW 4500-PO ₄ -D
19	Cyanide (CN ⁻)	mg/l	KPH(LOD=0.05)	TCVN 6181-1996
20	Fluoride (F ⁻)	mg/l	KPH(LOD=0.01)	SMEWW 4500-2005
21	Hydrogene Sulfide (H ₂ S)	mg/l	0,12	SMEWW 4500-2005
22	Iron (Fe)	mg/l	1,20	TCVN 6177-96
23	Lead (Pb)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
24	Manganese (Mn)	mg/l	KPH (LOD=0.005)	TCVN 6002-95

25	Mecury (Hg)	mg/l	KPH (LOD=0.0001)	SMEWW 3112-Hg-B
26	Molybdenum (Mo)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
27	Nikel (Ni)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
28	Nitrite (NO ₂ ⁻) as N	mg/l	0,005	TCVN 6178-96
29	Nitrate (NO ₃ ⁻) as N	mg/l	0,5	TCVN 6180-96
30	Selenium (Se)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
31	Sodium (Na ⁺)	mg/l	0,51	SMEWW 3500-2005
32	Sulfate (SO ₄ ²⁻)	mg/l	0.0	TCVN 6200-96
33	Zinc (Zn)	mg/l	0,029	SMEWW 3500-2005
34	Potassium Permanganate (KMnO ₄)	mg/l O ₂	1,4	KMnO ₄ title
35	Surfactants	mg/l	KPH (LOD=0.06)	SMEWW 5540C-2005
36	Total Oils & Grease	mg/l	KPH (LOD=0.01)	SMEWW 5520B-2005
37	Phenol (Total)	µg/l	KPH (LOD=0.1)	KTSK21-GCMS
38	E. Coli	MPN/ 100ml	0,0	TCVN 6187-2-1996
39	Total Coliform	MPN/ 100ml	28	TCVN 6187-2-1996
40	Total Nitrogene (T-N) (Kjeldah)	mg/l	1,5	SMEWW 4500-N
41	Total P (T-P)	mg/l	0,04	SMEWW 4500-P
42	Alkalinity	mg/l	8	SMEWW 2320B-2005
43	Total Organic Carbon (TOC)	mg/l	KPH (LOD=0.3)	TCVN 6634-2000
44	UV Absorption (E260)	-	0,0570	UV 1800
45	Trihalomethane (THM)	µg/l	KPH (LOD=5)	KTSK27-GCMS TK EPA 5021A

- **Notes** : The result is only valuable on the actual sample
- SMEWW : Standard Method for The Examination of Water And WasteWater (APHA), Edition 20th
- KPH : Not Finding
- LOD : Limite Finding Value
- **Marks** : Sample Water testing for Requests

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RESULTS OF WATER SAMPLE ANALYSIS

- Works : Water Supply And Sewewage Treatment System Project in Phu Quoc Island, VN
 - From : KOBELCO ECO-SOLUTIONS CO., LTD.
 - Source of Water : Kien Giang Province – Phu Quoc Island
 - Location : Duong Dong Lake
 - Type of Water : Surface Water
 - Sampling Date : 12h30 09/03/2012
 - Name of Collector : Eng. Ngo Trong Quoc
- Sample Sign : Sample 2-3
Testing Date : 10/03/2012

No	Items	Unit	Results	Test methods
1	Temperature	°C	32	Thermometer
2	Color	Co Unit	8	TCVN 6185-96
3	Odor	Sense	0	SMEWW 2150-98
4	Turbidity	NTU	1,9	TCVN 6184-96
5	pH		5,68	SMEWW 2130-98
6	Total Hardness	mg/l CaCO ₃	8	TCVN 6224-96
7	Total Dissolved Solid (TDS)	mg/l	10	TCVN 4560-88
8	Aluminium (Al)	mg/l	KPH (LOD=0.02)	SMEWW 3500-2005
9	Ammonia (NH ₄ ⁺) as N	mg/l	0,15	TCVN 6179-96
10	Antimony (Sb)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
11	Asenic (As)	mg/l	KPH (LOD=0.0005)	SMEWW 3500-2005
12	Barium (Ba)	mg/l	KPH (LOD=0.001)	EPA-Method200.7
13	Boron (B)	mg/l	KPH(LOD=0.05)	SMEWW 3500-2005
14	Cadmium (Cd)	mg/l	KPH(LOD=0.0005)	SMEWW 3500-2005
15	Chloride (Cl ⁻)	mg/l	8	TCVN 6194-1996
16	Chromium (Cr)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
17	Copper (Cu)	mg/l	KPH(LOD=0.005)	SMEWW 3500-2005
18	Phosphate (PO ₄ ³⁻)	mg/l	0.14	SMEWW 4500-PO ₄ -D
19	Cyanide (CN ⁻)	mg/l	KPH (LOD=0.05)	TCVN 6181-1996
20	Fluoride (F ⁻)	mg/l	KPH (LOD=0.01)	SMEWW 4500-2005
21	Hydrogene Sulfide (H ₂ S)	mg/l	KPH (LOD=0.01)	SMEWW 4500-2005
22	Iron (Fe)	mg/l	1,60	TCVN 6177-96
23	Lead (Pb)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
24	Manganese (Mn)	mg/l	KPH (LOD=0.005)	TCVN 6002-95

25	Mecury (Hg)	mg/l	KPH (LOD=0.0001)	SMEWW 3112-Hg-B
26	Molybdenum (Mo)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
27	Nikel (Ni)	mg/l	KPH (LOD=0.005)	SMEWW 3500-2005
28	Nitrite (NO ₂ ⁻) as N	mg/l	0,008	TCVN 6178-96
29	Nitrate (NO ₃ ⁻) as N	mg/l	2,0	TCVN 6180-96
30	Selenium (Se)	mg/l	KPH (LOD=0.001)	SMEWW 3500-2005
31	Sodium (Na ⁺)	mg/l	0,60	SMEWW 3500-2005
32	Sulfate (SO ₄ ²⁻)	mg/l	1,0	TCVN 6200-96
33	Zinc (Zn)	mg/l	0,049	SMEWW 3500-2005
34	Potassium Permanganate (KMnO ₄)	mg/l O ₂	1,4	KMnO ₄ title
35	Surfactants	mg/l	0,20	SMEWW 5540C-2005
36	Total Oils & Grease	mg/l	0,72	SMEWW 5520B-2005
37	Phenol (Total)	µg/l	0,07	KTSK21-GCMS
38	E. Coli	MPN/ 100ml	18	TCVN 6187-2-1996
39	Total Coliform	MPN/ 100ml	2,9.10 ²	TCVN 6187-2-1996
40	Total Nitrogene (T-N) (Kjeldah)	mg/l	1,1	SMEWW 4500-N
41	Total P (T-P)	mg/l	0,05	SMEWW 4500-P
42	Alkalinity	mg/l	6	SMEWW 2320B-2005
43	Total Organic Carbon (TOC)	mg/l	2,18	TCVN 6634-2000
44	UV Absorption (E260)	-	KPH	UV 1800
45	Trihalomethane (THM)	µg/l	KPH (LOD=5)	KTSK27-GCMS TK EPA 5021A

- **Notes :** The result is only valuable on the actual sample
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Eng. Ngo Trung Quoc