
APPENDIX 10

**ENVIRONMENTAL EFFECT STUDY
REPORT**

APPENDIX 10 ENVIRONMENTAL EFFECT STUDY REPORT

This appendix is prepared as requested in the M/M between Indonesian Government and JICA dated on December 1, 2010. This environmental effect study report includes the results of the Initial Environmental Examination (IEE) conducted during the preparatory survey. More specifically, this report includes the results of:

- environmental screening (see 10.a),
- five alternative analyses for environmental and social considerations (see 10.b),
- comprehensive environmental scoping (see 10.c),
- preliminary evaluation of identified potential negative impacts of medium significance and consideration of their mitigation measures (see 10.d),
- considerations on required environmental monitoring (see 10.e), and
- public consultation and discussion with related organizations (see 10.f).

These results of the IEE are used not only to evaluate social and environmental feasibilities of the project but also to prepare a draft TOR for the EIA which is attached as Appendix 11. The readers of this appendix may read Chapter 14 and Appendix 9 first to fully understand the contents of this appendix.

10.a Environmental Screening

Prior to the implementation of this survey, this reclaimed water supply project was categorized as Category B in JICA's project categorization for deciding the level of required environmental and social considerations. Category B projects have potential adverse impacts on the environment and society which are less adverse than those of Category A projects. Generally, they are site-specific; few if any are irreversible; and in most cases, normal mitigation measures can be designed more readily. This category has not been changed because no major irreversible negative impacts such as large scale involuntary settlement and loss of endangered species will be caused by the project. However, the project has several potential negative impacts of medium significance, mainly on social environments, such as degradation of traffic flow due to the installation of transmission and distribution pipes. The results of environmental screening with a modified JICA's screening form are shown in the following.

< Results of Environmental Screening >

Name of Proposed Project: Reclaimed Water Supply Project in Southern Bali (Tentative Name)
Investment Company: Toyota Tsusho Corporation and Metawater Co., Ltd.

Check Items

Question 1: Address of project site : Suwung WWTP, Ngurh Rai By-pass Road, Nusa Dua, Sawangan and Benoa (see Appendix 9 for details)

Question 2: Scale and contents of the project

- 2-1. Project profile: The planned capacity of the wastewater reclamation plant is 9,000m³/day. See Section 7.1 of the main report and Appendix 9 for details.
- 2-2. How was the necessity of the project confirmed? : The demand of the reclaimed water at the targeted hotels will be confirmed before the signing of the PPP contract.
- 2-3. Did the proponent consider alternatives before this request? : Alternative analyses were conducted in this preparatory study.
- 2-4. Did the proponent implement meetings with the related stakeholders before this request? : A stakeholder meeting was conducted in this preparatory study.

Question 3: Is the project a new one or an ongoing one? : New

Question 4: Is an Environmental Impact Assessment (EIA) is required for the project according to a law or guidelines of a host country? : EIA is necessary because the new transmission pipeline to be constructed is more than 10km and this project is a PPP project)

Question 5: If the project requires a certificate regarding the environment and society other than an EIA, please indicate the title of said certificate. Was it approved? : Land use permission from the Ministry of Forestry for the proposed wastewater reclamation plant site. Not yet applied (the previous land use permission for the construction of Suwung WWTP which covered the proposed plant site has been expired).

Question 6: Are any of the following areas present either inside or surrounding the project site? : Yes as marked with ✓ .

- ✓ National parks, protection areas designated by the government (coastline, wetlands, reserved area for ethnic or indigenous people, cultural heritage)
- Primeval forests, tropical natural forests
- ✓ Ecologically important habitats (coral reefs, mangrove wetlands, tidal flats, etc.)
- Habitats of endangered species for which protection is required under local laws and/or international treaties
- Areas that run the risk of a large scale increase in soil salinity or soil erosion
- Remarkable desertification areas
- Areas with special values from an archaeological, historical, and/or cultural points of view
- Habitats of minorities, indigenous people, or nomadic people with a traditional lifestyle, or areas with special social value
- Involuntary resettlement (scale: 0 person)
- Groundwater pumping (scale: 0 m³/year)
- ✓ Land reclamation, land development, and/or land-clearing (scale: 1 hector)
- ✓ Logging (scale: 1 hector)

Question 8: Please mark related environmental and social impacts, and describe their outlines.

- Air pollution
- Water pollution
- Soil pollution
- Waste
- Noise and vibrations
- Ground subsidence
- Offensive odors
- Geographical features
- Bottom sediment
- Biota and ecosystems
- Water usage
- Accidents
- Global warming
- Involuntary resettlement
- Local economies, such as employment, livelihood, etc.
- Land use and utilization of local resources
- Social institutions such as social infrastructure and local decision-making institutions
- Existing social infrastructures and services
- Poor, indigenous, or ethnic people
- Misdistribution of benefits and damages

- Local conflicts of interest
 - Limitation of accessibility to information, meetings, etc. on a specific person or group
 - Gender
 - Children's rights
 - Cultural heritage
 - Infectious diseases such as HIV/AIDS
 - Other (Traffic Congestion)
- Outline of related impact: Please refer to 10.b of this appendix.

Question 9: Regarding information disclosure and meetings with stakeholders, if JICA's environmental and social considerations are required, does the proponent agree to information disclosure and meetings with stakeholders through these guidelines? : Yes

10.b Alternative Analysis for Environmental and Social Considerations

Five alternative analyses were conducted for environmental and social considerations in this preparatory survey, which are about (1) Type of Reclaimed Water Use (only for toilet flushing (Case 1) or including bath, shower and pool (Case 2)), (2) Type of Reclaimed Water Delivery System (through pipes or by water tank trucks), (3) Route of the Transmission Pipes to Nusa Dua (along the existing main road, along new bridge roads to be constructed or through mangrove forest), (4) Route of the Construction Access Road around Suwung WWTP (four different routes), and (5) Comparison with Zero Alternative. As the results of alternative analysis, it was proposed to supply the reclaimed water from Suwung WWTP to the targeted hotels in Nusa Dua, Sawangan and Benoa through the transmission pipes installed along the existing main road for their water uses including bath, shower and pool. Each of these alternative analyses is explained in the following.

(1) Types of Reclaimed Water Use in this Project

In the alternative analysis on the types of reclaimed water use, two alternative combinations of reclaimed water uses were defined first as follows.

- 1) Conventional reclaimed water uses: only for toilet flushing, cleaning of cars, cooling, landscaping and gardening (but not for drinking, cooking, dish washing, clothe washing, bathing, shower or pool)
- 2) Advanced reclaimed water uses: conventional reclaimed water uses + cloth washing, bathing, shower and pool (but not for drinking, cooking and dish washing)

The reclaimed water for the advanced reclaimed water uses should not be used for drinking and cooking even after boiling unlike Indonesian "Clean Water" which can be used for drinking and cooking in its definition in the Regulation of the Ministry of Health No.416/1990 on Standards and Supervision of Water Quality. The survey team tentatively named the reclaimed water for the advanced reclaimed water uses as "New Clean Water".

Then, two service pipe systems (for supplying the two types of reclaimed water to hotels) were named as "Case 1: Conventional Reclaimed Water Supply System" and "Case 2: New Clean Water Supply System" and designed as shown in Figures 10.b.1 and 10.b.2, respectively. These two alternatives were compared from technical, financial, environmental and social points of view as already explained in Section 6.4 of the main report. Table 10.b.1 shows the part of the comparison regarding environmental and social differences between Case 1 and Case 2. As seen in this table, Case 1 is preferable in terms of environmental and social considerations. However, it was found at the early stage of the planning that Case 1 is not financially feasible. Case 1 requires the expensive installation of new service pipes for flushing toilets in hotel rooms although the reclaimed water demand in Case 1 is more limited than that in Case 2. As result, Case 2 was selected in this alternative analysis. The IEE conducted in this preparatory

survey includes the preliminary evaluation of these adverse aspects of Case 2 and the proposal of their mitigation measures.

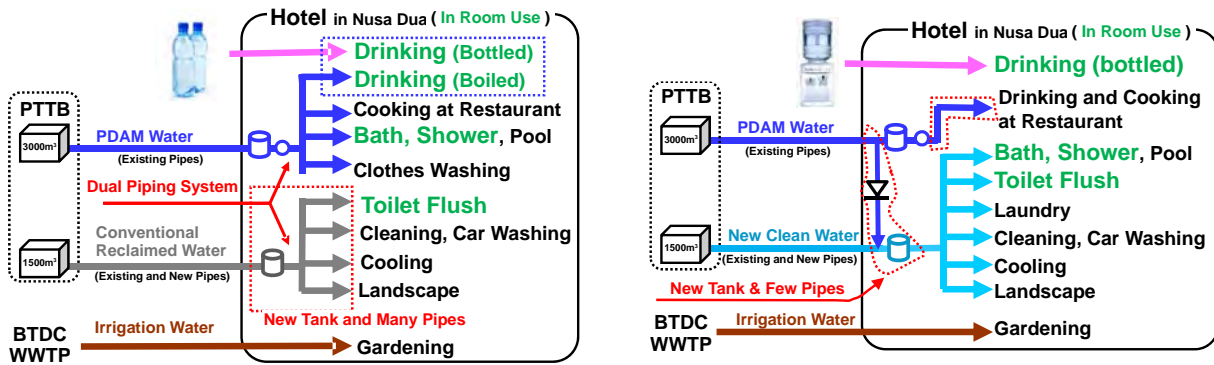


Figure 10.b.1 Case 1: Conventional Reclaimed Water Supply System

Figure 10.b.2 Case 2: New Clean Water Supply System

Table 10.b.1 Comparison of the Two Cases from Environmental and Social Points of View

Aspect	Case 1: Conventional Reclaimed Water Supply System	Case 2: New Clean Water Supply System
Health Risk related to Accidental Ingestion	Risks related to accidental ingestion of reclaimed water are avoidable as long as service pipes are not cross-connected with the existing pipes for drinking/clean water.	Accidental ingestion of New Clean Water could not be avoided perfectly in hotel rooms. Enough notification measures should be taken to minimize the accidental ingestion. An effective water quality monitoring system should be established for water quality control. The possibility of adverse impacts such as the infusion of heavy metals and persistent organic pollutants cannot be denied, but the raw wastewater flowing into the Suwung WWTP does not include much industrial wastewater. The risks of persistent organic pollutants would be limited because the main users of the reclaimed water are tourists who usually stay in the hotels for short periods.
Users' Cultural Acceptance	Because the users have no chance to touch the reclaimed water, tourists and hotel staff can accept the use of reclaimed water easily.	Because the users use the mixed water of PDAM water and New Clean Water and touch the water directly when they use it for bath, shower, and swimming pool, it would be not easy to obtain their understandings.

(2) Types of Reclaimed Water Delivery System

Two alternatives of reclaimed water delivery system, which use pipes or water tank trucks to supply the reclaimed water to the target hotels in Nusa Dua, Benoa and Swangan, were compared from environmental and social points of view. Both alternatives need to use public roads. In the case of using pipes, negative impacts of the installation of transmission and distribution pipes on traffic conditions can be mitigated by installing the pipes during nights or using a jacking method. The maintenance of the installed pipes may cause minor disturbance to the traffic during the operation of reclaimed water supply.

On the other hand, the other alternative, which delivers the reclaimed water by water tank trucks, requires a large number of long-distance round-trips every day during the operation of reclaimed water supply. In order to supply 7,400 m³/day (9,000 m³/day minus water losses) of the reclaimed water using water tank trucks having a capacity of 6m³, 1,234 round trips is required. Water tank trucks usually use diesel and cause air pollution. The large number of round-trips will cause not only serious air pollution, but also

serious noise problems and traffic jams throughout the operation period of the reclaimed water supply. Moreover, the water delivery using water tank trucks is inconvenient for the hotels because staff of the hotels have to confirm every day whether the water tank trucks have delivered enough water.

As the result of this alternative analysis, the alternative using pipes for the delivery is selected for the project.

(3) Route of the Transmission Pipeline to the Distribution Reservoir in Nusa Dua

Three alternatives were set for deciding the optimum route for the transmission pipeline from the wastewater reclamation plant to the existing distribution reservoir in Nusa Dua. Alternative 1 is along the existing main road, Ngurah Rai By-pass Road, as seen in Figure 10.b.3 (Red Line). Alternative 2 is along the planned road bridge from Benoa Harbor to Nusa Dua as seen in Figure 10.b.4 (Blue Line). Alternative 3 is through part of Ngurah Rai Mangrove Forest Area (along the eastern coast line like the example shown in Figure 10.b.5 (White Line)).

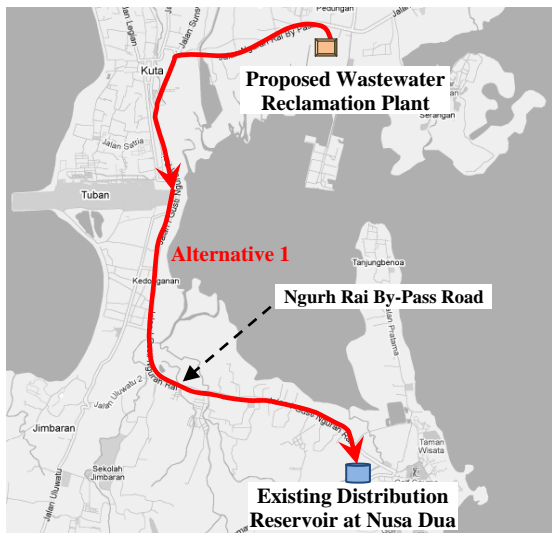


Figure 10.b.3 Alternative 1: Route along Ngurah Rai By-pass Road

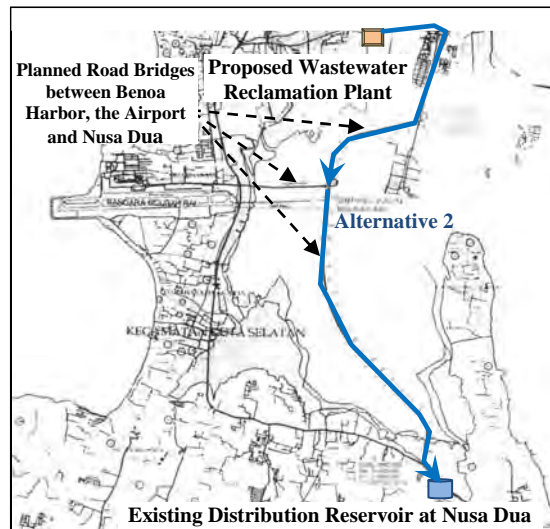


Figure 10.b.4 Alternative 2: Route along the Planned Bridge Roads over the Bay

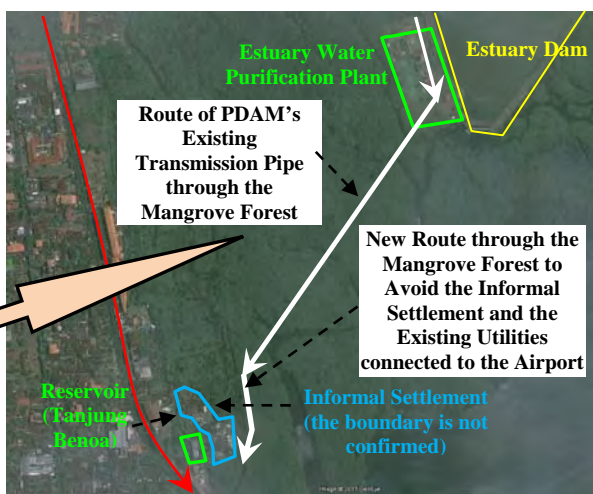
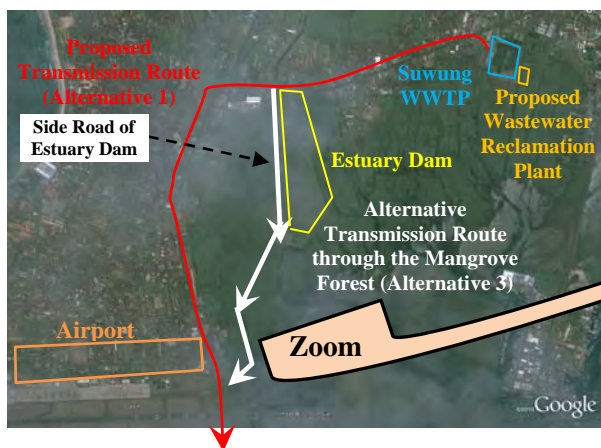


Figure 10.b.5 Alternative 3: Example Route through the Mangrove Forest

As for Alternative 1, although this alternative may cause major negative impacts on the traffic, it will not go through the Ngurah Rai Mangrove Forest Area.

As for Alternative 2, currently the project for the construction of new bridge roads linking Benoa Harbor and Airport to Nusa Dua is planned to start its operation in 2013. The local environmental expert of the survey team suggested that the space for the installation of the reclaimed water transmission pipe should be considered in the design of the bridge roads during the discussion about the EIA documents on the project held on September 23, 2011. Although Alternative 2 is preferable from the aspects of environmental and social considerations, further discussion and cooperation between the proponent of this road project and the proponent of this reclaimed water project (Bali Provincial Government and SPC) are required to study this alternative further.

As for Alternative 3, the installation of transmission pipes through the mangrove forest may be possible since PDAM's existing transmission pipeline from Estuary Water Purification Plant is installed through the mangrove forest. Figure 10.b.6 shows the existing transmission pipeline going through the mangrove forest at the route of Alternative 3 and available space for the installation of another pipeline.

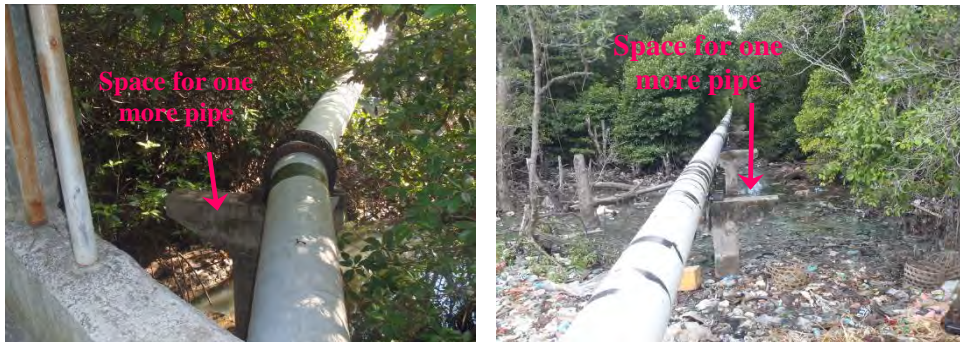


Figure 10.b.6 View of the Existing Transmission Pipeline from Estuary Water Purification Plant and the Space for the Installation of Another Pipe on the Bridge Support Structure

In this alternative analysis, the possibility to use the space shown in the above figure was checked for the installation of the reclaimed water transmission pipeline through the mangrove forest. It was found in a hearing to the technical director in PDAM Badung that the space will be used for installing another transmission pipeline to transmit the water production increased by the capacity expansion of Estuary Water Purification Plant (300 to 500 L/sec). The capacity expansion is planned to complete at the beginning of 2012. Therefore, the existing space for another pipeline along with the existing transmission pipeline is not available for the reclaimed water project.

In this survey, Alternative 1 is selected for the basic facility design. However, further analysis is required to compare the three alternatives in the EIA and the detailed design. In the EIA, the construction of small bridge structures, onto which a new transmission pipeline for the reclaimed water can be installed, along with the PDAM's existing transmission pipeline can be another example of Alternative 3. In that case, the alternative route should avoid the informal settlement found at the end of the existing transmission pipeline near the reservoir at Tanjung Benoa as illustrated in Figure 10.b.5 in order to minimize its social impacts. According to the Forestry Agency of Bali Provincial Government, the permission of installing a pipeline through the mangrove forest can be provided by the Forestry Agency but an embanked foot path cannot be constructed in the mangrove forest for the maintenance of the transmission pipes.

(4) Route of the Construction Access Road around Suwung WWTP

The proposed wastewater reclamation plant site (1 hectare) is within the mangrove forest. The construction of the wastewater reclamation plant needs to cut down mangrove trees, excavate muddy soil

at the bottom and level the land up to the ground level of the existing WWTP by filling soil as already explained in Section 8.3 of the main report. The total amount of the muddy soil to be excavated and the soil required for filling is around 31,000m³. Around 4,000 round trips of 10t trucks (8m³ of soil on average) are required to transport this amount of soil. Therefore, the construction requires a construction access road having at least 5m in width for at least 5 months between Ngurah Rai By-pass Road and the proposed wastewater reclamation plant site (around Suwung WWTP).

As already explained in (1) of 8.3.2, four alternative routes of the construction access road were set as seen in Figure 10.b.7 and compared from various standpoints including environmental and social standpoints.

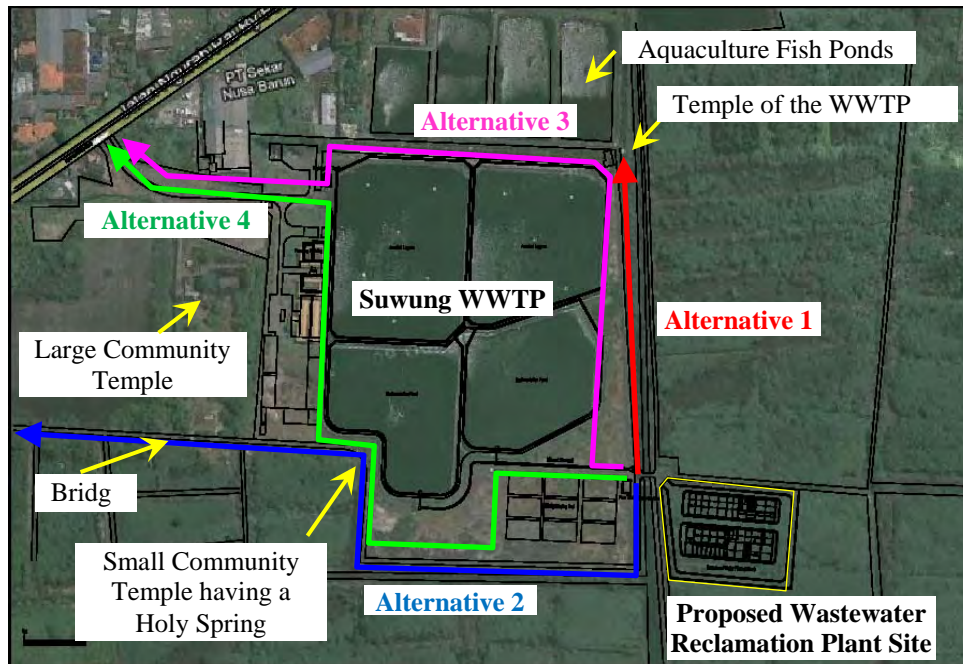


Figure 10.b.7 Alternative Route of the Construction Access Road across Suwung WWTP

As the result of the comparison, Alternative 3 was selected. Alternative 2 and Alternative 4 were not selected because of their impacts on the small community temple having a holy spring and the operation of Suwung WWTP.

(5) Comparison with Zero Alternative

Zero Alternative, in which no reclaimed water project will be implemented, will cause no negative environmental and social impacts but there will be no benefits neither. The benefits of implementing the reclaimed water supply project include:

- ✓ mitigation of the water shortage
- ✓ reduction of the salinity intrusion caused by the extraction of groundwater (this needs a coordinated approach with the regulation of groundwater use and tax on groundwater usage), and
- ✓ recycle of treated wastewater

The results of economic analysis shown in Chapter 13 confirmed that the total benefit of this project is higher than the total cost of this project. Moreover, this project unlikely causes any major irreversible negative impacts (such as the loss of endangered spices and large-scale involuntary settlement) although

it may cause medium scale negative impacts (such as traffic jams due to pipe installation and discomfort to tourist due to their cultural perceptions on reclaimed water). Regarding the traffic jam, pipe installation during nights and the use of a jacking method can mitigate the impact. Regarding the discomfort to tourists, it is planned to confirm the raised acceptance of the reclaimed water by the target hotels and their guests after conducting promotion activities as a precondition of the signing of PPP contract.

As the result of these environmental and social considerations, Zero Alternative was not selected.

10.c Environmental Scoping

In this preparatory survey, the possibility of formulating a wastewater reclamation project for the provision of holy water, drinking water and cooking water was strategically excluded from the beginning. Domestic water users were also excluded from the target customers of the reclaimed water project in order to avoid their misuses of the reclaimed water for drinking and cooking. Moreover, in order to reduce the negative impacts on traffic during the installation of transmission and distribution pipes, the proposed reclamation project primarily targets Nusa Dua having an existing distribution network available for the delivery of the reclaimed water. The project also targets Benoa and Sawangan where groundwater salination and/or depletion are happening in order to maximize the positive impact of the project on the necessary reduction of groundwater extraction in these areas.

In addition, the five alternative analyses were conducted as explained in 10.b to minimize the adverse impacts of the reclaimed water supply project. For these reasons, potentially significant negative impacts of the project are rather limited. Table 10.c.1 shows the grouping of the potential major, medium scale and minor negative impacts and positive impacts (during pre-construction, construction, operation and post-operation stages) identified by using a comprehensive environmental scoping matrix. Each group of the identified impacts is separately explained in the following.

(1) Pre-Construction Stage

As illustrated in Table 10.c.1, during the pre-construction stage, the project may face with some substantial difficulties regarding land use permit and cultural perceptions on the reclaimed water. On the other hand, the project has positive impacts on local job opportunities, growth of eco-mind and search of alternative water sources in Southern Bali. Each of the identified positive and negative impacts is described briefly in the following. The identified medium scale potential negative impacts are further explained in Section 10.d (Evaluation of Potential Negative Impacts and Mitigation Measures).

1) Land Use (*Minor Impacts and a Medium Negative Impact* → **[1])**

During the permission process of land use for the proposed wastewater reclamation plant site and the socialization process of EIA, the project probably causes minor impacts on existing land uses, area development plan and future land uses as illustrated in Table 10.c.1. The proposed site for the wastewater reclamation plant is in the segmented mangrove forest in the northern part of Ngurah Rai Mangrove Forest Area (a protected area of the Ministry of Forestry). Since the previous land use permit of 17.5 ha in Ngurah Rai Mangrove Forest Area for Suwung WWTP (including the proposed wastewater reclamation plant site) from the Ministry of Forestry has already been expired, the reclaimed water supply project needs a new land use permit from the ministry. Moreover, although the proposed route for the water transmission pipe is along the main road (Ngurah Rai By-pass Road) going by the airport to Nusa Dua, the installation of transmission pipeline through the mangrove forest needs to be further examined in the coming EIA and detailed design study as explained in 10.c (3). The potential impacts regarding the land uses for the construction of these facilities are further evaluated in **[1]** of Section 10.d in this appendix. Required mitigation measures for the potential negative impacts are also explained in **[1]** .

Table 10.c.1 Results of the Environmental Scoping using a Comprehensive Scoping Matrix

		(1) Pre-Construction Stage				(2) Construction Stage										(3) Operation Stage										(4) Post-Operation Stage	
		1. Acquisition of Land Use Permit	2. Other Approvals & Agreements	3. Studies & Field Surveys	4. Public Consultation & Socialization	1. Personal Mobilization	2. Base Camp Operation	3. Material/Equipment Mobilization	4. Land Clearing	5. Excavation/Embankment	6. Structures/Equipment	7. Landscaping	8. Installation of Pipe Facilities	9. Equipment Demobilization	10. Personal Demobilization	1. Personal Mobilization	2. Water Treatment Operation	3. Backwash Water Management	4. Rotating Machinery Operation	5. Reclaimed Water Supply & Use	6. Pipe Maintenance	7. Office Management	8. Tariff Collection	1. Land Rehabilitation	2. Personal Demobilization		
I. Geophysical-Chemistry	1. Climate	a. Micro Climate																									
		b. Air Quality					C	C	C	C	C	C	C	C	C												
		c. Noise & Vibration					C	C	C	C	C	1]	C	C													
	2. Physiography	a. Topography														2]											
		b. Soil Stability							C																		
		c. Uniqueness of Land Form							C	C																	
	3. Hydrology & Water Sources	a. Appearance							C	C		2]															
		b. Water Flow							C	C																	
		c. Sedimentation & Erosion							C	C																	
		d. Water Quality							C	C																	
		e. Water Quantity							C																		
	4. Hydro-oceanography	a. Tide																									
		b. Beach Morphology					1) → [1]																				
		c. Coastal Erosion																									
		d. Sea Pollution																									
5. Land Use	a. Existing Land Use	C	C		C																						
	b. Area Development	C	C		C																						
	c. Land Use Right Conflict	C	B		C																						
	d. Nature Aesthetics																										
II. Biology	1. Flora	a. Nature Vegetation																									
		b. Protected Ecosystems																									
		c. Abundance																									
	2. Fauna	a. Abundance																									
		b. Protected Species																									
		c. Deployment																									
III. Social	1. Demography	a. Population structure																									
		b. Population Density																									
		c. Mobility																									
	2. Economy	a. Income																									
		b. Job Opportunity																									
		c. Tourism																									
	3. Culture	a. Traditional Practice																									
		b. Cultural Asset																									
		c. Social Class																									
		d. Power & Authority																									
		e. Cultural Perception																									
		f. Eco Mind																									
	4. Defense & Security	a. Community Conflict																									
		b. Security Compromise																									
	5. Health	a. Sanitary Condition																									
b. Occurrence of Disease																											
c. Nutritional Status																											
d. Occupational Safety																											
6. Transportation	a. Traffic Flow																										
	b. Traffic Accidents																										
	c. Road Quality																										
7. Public Utilities	a. Water																										
	b. Wastewater																										
	c. Electricity																										
	d. Telecommunication																										

Note: A: potential major impact, B: potential medium impact, C: potential minor impact, P: positive impact and D: difficult to classify

2) Income & Job Opportunity (*Positive Impacts and an Unclassified Impact*)

This preparatory survey and its sub-contracted surveys have provided job opportunities to local people. In addition, the required EIA process and detailed facility design will provide further job opportunities to local EIA specialists and engineers. However, some activities such as SPC's recruitment of operational staff from existing organizations such as BLUPAL may have not only positive impacts on local job opportunities but also negative impacts on the operation of existing organizations if the recruitment process and salary system are not transparent. It is important to make sure that the recruitment from the existing organization will not cause any significant impacts on the operation of these organizations.

3) Growth of Tourism (*A Positive Impact and a Minor Negative Impact*)

In the preparatory survey, treated wastewater was considered as an alternative water source. Since the tourism in Southern Bali is facing with water shortage, this preparatory survey can be beneficial for the tourism. However, if any permit or transaction procedure for the project such as the PPP construct poses any restrictions to the targeted hotels such as further restriction on groundwater extraction, restriction on the use of PDAM's drinking water, etc., the project may cause a negative economic impact on the hotels.

4) Cultural Perception, Eco Mind and Community Conflict (*Positive, Minor and Medium Negative Impacts → [3]*)

During the preparatory survey, cultural perceptions of local people and tourists on conventional reclaimed water and the proposed reclaimed water were considered. Major conflicts with/among related stakeholders including the targeted hotels may occur (due to their cultural perceptions and sense of mistrust towards the related local authorities and SPC, etc.) during the promotion activities to be conducted before the signing of PPP contract and the socialization after the signing. This conflict may continue throughout the process of EIA and the establishment of a new tariff for the reclaimed water supply. On the other hand, this preparatory survey, coming promotion activities, and the EIA have positive impacts on the improvement of Eco mind among the stakeholders. These important aspects are further evaluated in [3] of Section 10.d in this appendix. Required mitigation measures for these potential negative impacts are also explained in [3].

5) Drinking Water Supply (*A Positive Impact*)

Since this preparatory survey considers the wastewater reclamation as an alternative water source, it may be beneficial for the sustainable development of water resources in Bali. An intention of this preparatory survey is to find a way, through wastewater reclamation, to reduce the extraction of groundwater and to avoid unsustainable intake of excessive amount of surface water in the future.

(2) *Construction Stage*

Although the project may cause a number of potential negative impacts during the construction stage as shown in Table 10.c.1, only the impacts on traffic flow are considered as potential medium scale negative impacts. The minor potential negative impacts include air pollution, noise and vibration from construction machines and trucks, physiographical, hydrological, biological and social (land use) impacts of land clearing and embankment at the wastewater reclamation plant site, and negative impacts related to the inflow of construction workers to Bali. The project also has positive impacts on the income and job opportunities of local people. Each of the identified positive and negative impacts is described briefly in the following. The identified potential medium scale negative impacts are further evaluated and their mitigation measures are proposed in Section 10.d.

1] Air Quality, Noise & Vibration (*Minor Negative Impacts*)

During the construction of the wastewater reclamation plant and installation of pipes, the construction machines and trucks cause some degree of air pollution, noise and vibration. The mitigation measures of these minor impacts should also be considered in the EIA process for this project.

2] Influences of the Earthwork on the Physiography and Hydrology (*Minor Negative Impacts*)

The land clearing and the embankment (required to raise the ground level up to the ground level of the existing WWTP) at the wastewater reclamation plant site may degrade the soil stability and the uniqueness of land form. These construction works may change the flow and quality of tidal flow in the streams going through the mangrove forest around the construction site. Construction methods should be carefully selected especially for the rainy season when the soil for the embankment may run off into the streams.

3] Land Use and Nature Aesthetics (*Minor Negative Impacts*)

Although any potential conflicts regarding land use should be solved in the preconstruction stage (including the permission process of land use and the socialization in the EIA), minor conflicts with existing land users at the project sites may occur when starting the construction of the wastewater reclamation plant and the installation of the transmission and distribution pipes. The construction works may also have negative impacts on the nature aesthetics of the green belts along roads, parks and gardens around these project sites. The required changes of service pipes and other water supply related facilities within the targeted hotels may also cause negative impacts on the nature aesthetics of the parks and gardens around and/or within the hotels. The degradation of nature aesthetics should be mitigated especially when installing distribution pipes around the targeted hotels. In comparison, the nature aesthetics at the wastewater reclamation plant site during the construction is less important because the wastewater reclamation plant site is located in the mangrove forest next to the existing WWTP where the access of residents and tourists is restricted.

4] Flora and Fauna (*Minor Negative Impacts*)

As seen Figure 10.c.1, the mangrove forest at the proposed site is segmented. These segmented lands had been used as fish ponds until a JICA project for mangrove conservation started in Bali in 1993. After the demolishment of the fish ponds, the Forest Agency of Bali Provincial Government and JICA planted mangrove trees in the segmented lands.



Figure 10.a.1 Location of the Proposed Wastewater Reclamation Plant Site

The segmented mangrove forest at the proposed site is located in the northern part of Ngurah Rai Mangrove Forest Area. The land uses in Nagurah Rai Mangrove Forest Area are controlled by the Ministry of Forestry and managed by the Forestry Agency. Although the land uses within Ngurah Rai Mangrove Forest Area are controlled by the Ministry of Forestry, the area is neither registered as a protected area in the world database on protected areas nor a Ramsar site in the Ramsar sites information service as seen in Figures 10.c.2 and 10.c.3.



Figure 10.c.2 Protected Areas in Bali
 (Source: the world database on protected areas < <http://protectedplanet.net/> >)



Figure 10.c.3 Ramsar Sites around Bali Island
 (Source: Ramsar Sites Information Service < <http://ramsar.wetlands.org/> >)

There are many mangrove species, birds and marine creatures including colorful fiddler crabs, mudskipper, mud lobster, archer fish, water snake and monitor lizard in Ngurah Rai Mangrove Forest Area. However, according to Mangrove Information Center in Denpasar and the Forest Agency, there are neither

endangered species, rare species nor species having high economic values in the mangrove forest. The impacts of the land clearing at the wastewater reclamation plant site should be further studied in the EIA. The route of the transmission pipeline might be changed to a route going through the mangrove forest during the EIA and/or the detailed design study of facilities. In this case, the impacts of installing the transmission pipeline on the mangrove forest should also be evaluated in the EIA.

5] Demography (*Minor Negative Impacts*)

The project may cause small scale inflow of construction workers from the outside of Bali Island. This may cause minor impact on the population structure and demographical mobility of Bali Island. The inflow may also compromise the security in Bali especially when the construction workers from the outside of Bali stay without jobs in Bali after the end of construction works of the wastewater reclamation project.

6] Income and Job Opportunity (*Positive Impacts and Minor Negative Impacts*)

The construction works of the project will create many job opportunities for Indonesian people especially for Balinese. However, at the end of the construction stage, the construction workers may lose their job and income.

7] Disturbance and Extra Costs to Tourism (*Minor Negative Impact*)

The installation of distribution and service pipes and the plumbing inside the targeted hotels may disturb their attraction in appearance and services to their guests. Moreover, each hotel needs to install new pipes to the kitchen and restaurants, a water tank for receiving the reclaimed water and water dispensers in each guest room (if necessary) at their own expense.



8] Traditional Practice and Cultural Asset (*Minor Negative Impacts*)

Many households in Bali have their house temples on the road sides within their land. Community temples may also be located along the roads which will be used for the transportation of construction machines, materials and excavated soil and the installation of transmission and distribution pipes. Therefore, annoyance (noise, vibration, air pollution, etc.) from the transportation and the pipe installation may damage and/or disturb cultural assets and traditional practices along the roads.

9] Social Class (*A Minor Negative Impact*)

During the preparatory survey, no informal settlement has been identified along the proposed routes of transmission pipes and distribution pipes. However, one informal settlement is identified along the existing route of the transmission pipeline going through the mangrove from Estuary Water Purification Plant near the distribution reservoir. When reviewing the alternative analysis of transmission pipeline route (see 10.b (3)) during the EIA and/or the detailed design study, the impacts on the informal settlement need to be analyzed if the same route going through the mangrove (Alternative 3) is considered for the transmission of the reclaimed water.

10] Community Conflict (*Minor Negative Impacts*)

Community conflicts may occur at the beginning of the construction stage due to the possible disturbances on traffic and traditional practices along the roads. In Denpasar Sewerage Development Project, the local community in Kuta opposed the installation of sewer pipes in Kuta after the construction started due to the contractor's improper management of the construction. Community conflicts may also

occur due to the lack of notification on the construction schedule, methods, etc. to the residents who will be affected.

11] Health (*Minor Negative Impacts*)

Improper operation of the base camp during the construction stage may deteriorate the mental and physical health of construction workers due to bad sanitary conditions, spread of disease and bad nutritional support. During the land clearing in the mangrove forest, the sanitary conditions of construction workers may become especially deteriorated. When constructing the intake facilities of the wastewater reclamation plant, the construction workers may touch the treated wastewater of the WWTP. When constructing the building structures and installing the transmission and distribution pipes, accidental falling of workers and traffic accidents may occur, respectively.

12] Transportation (*Minor Negative Impacts and Medium Negative Impacts → [2])*

The transportation of construction machines, materials and excavated soil and the installation of transmission and distribution pipes may cause serious disturbance of traffic, increase the number of traffic accidents and damage the pavement quality of existing roads. Since the amount of soil required for the embankment of the reclamation plant site is large, the increase in traffic between the main road (Ngrah Rai By-pass Road) passing near the WWTP and the proposed wastewater reclamation plant site may cause traffic congestion and traffic accidents. The installation of transmission pipes may also cause serious traffic congestion since there are several points where traffic is already congested during commuting hours. These potential impacts on traffic are further evaluated in [2] of Section 10.d in this appendix. Required mitigation measures for these potential negative impacts are also explained in [2] .

13] Disturbance of Other Utilities (*Minor Negative Impacts*)

The construction of the building structures (including the wastewater reclamation plant and water tanks at the targeted hotels) may disturb the existing operation of water supply, sewerage and electricity facilities. As for water supply facilities, the rehabilitation of the existing reservoir at Nusa Dua and construction of new water tanks at the hotels should be carefully implemented not to disturb or damage the current water supply services and facilities. As for sewerage, the construction of the intake and backwash water returning facility and the transportation of construction machines, materials and excavated soil across the WWTP should be carefully planned and implemented not to disturb the operation of WWTP. As for electric facility, the location of the raw water pumping station of the wastewater reclamation plant within the WWTP should be planned to avoid the underneath space of the high voltage transmission lines which go over the WWTP. This is important for both the wastewater reclamation facilities and the electricity facilities.

The installation of transmission, distribution and service pipes including the new pipe arrangement inside the hotels may also cause disturbance to other utilities including water supply, sewerage, electricity and telecommunication facilities. Therefore, the coordination with the other utilities (installed along the roads under which the pipes for the reclaimed water will be installed) is quite important. The rearrangement of the water pipes inside the hotels is considered in the alternative analysis on the types of reclaimed water uses as explained in Case 2 of (1), 10.b.

(3) Operation Stage

As illustrated in Table 10.c.1, the potential minor negative impacts during the operation stage include air pollution, noise and vibration from the installed equipment, impact of the backwash water from the wastewater reclamation plant on the treatment process of the WWTP and the increase of burden to the target hotels in terms of facility maintenance cost and water charge. The potential medium scale negative

impacts during the operation stage include potential complaints from the tourists staying in the hotels due to their negative perceptions on reclaimed water and their health-related and cosmetic concerns. On the other hand, the project also has positive impacts on the quantity and quality of the effluent from the WWTP, local job opportunities, growth of eco-mind, and the reduction of ground water and river water extraction. Each of the identified positive and negative impacts is described briefly in the following. The identified potential medium scale negative impacts are also further explained in Section 10.d.

1) Air Quality, Noise & Vibration (*Minor Negative Impact*)

During the operation of the reclaimed water supply, the ozone used for the wastewater reclamation may leak into the atmosphere. This aspect is later explained in 8) Health Risk. The emergency power generator at the wastewater reclamation plant may cause minor air pollution (due to its exhaust gas), vibration and noise only for limited times of power failures. The blowers, raw water intake pumps, transmission pumps and distribution pumps may also cause minor noise and vibration problems during the operation stage. These problems won't be serious because the proposed wastewater reclamation plant site and the pumping station near the existing distribution reservoir in Nusa Dua are away from residential buildings.

2) Influences of the Wastewater Reclamation Treatment on the Water Environment (*Positive Impact*)

The operation of the wastewater reclamation plant has positive impacts on the surrounding water environmental (a stream within the mangrove forest) into which the treated wastewater from Suwung WWTP is currently discharged. Since the wastewater reclamation project uses part of the treated wastewater, the amount of effluent from the WWTP decreases once the operation starts. Moreover, water quality control required for the wastewater reclamation project includes operational improvements of the WWTP for the stabilization of its effluent quality. This means that the quality of the effluent to be discharged into the stream in mangroves will be also improved.

3) Influences of the Wastewater/Sludge Disposal on the Water Environment (*Minor Negative Impact*)

It is planned to send the backwash water from the wastewater reclamation plant (from its bio-filter and ceramic filter) back to the inlet of the WWTP for its treatment. Therefore, neither wastewater nor sludge will be disposed into the surrounding water environment from the wastewater reclamation plant.

4) Influences of the Reclaimed Water Supply on the Groundwater in the Targeted Areas and Influences of the Pipe Maintenance on the Utilization of the Treated Wastewater (*Positive Impact*)

The use of the reclaimed water in the target areas (Nusa Dua, Benoa and Sawanagan) can reduce the amount of groundwater intake and mitigate the salination and depletion of the groundwater. Moreover, by maintaining the pipes for the reclaimed water and keeping the leakage from the pipes low, the treated wastewater from the WWTP can be utilized efficiently.

5) Income and Job Opportunity (*Positive Impacts and Unclassified Impacts*)

During the operation stage, local people will be continuously employed as operators, administrators and/or managers. Since wastewater reclamation is a new subject in Indonesia, the capacity development of the local employees through the operation can be quite beneficial for the future development of more wastewater reclamation projects in Indonesia. However, SPC's recruitment of local people for the operation should be carefully conducted in a transparent manner to avoid conflicts among related government agencies such as DIANS PU and BLUPAL.

6) Tourism (*An Unclassified Impact and Minor Negative Impacts*)

The supply of the reclaimed water has not only positive impacts but also some negative impacts on the tourism. The potential negative impacts on the tourism include the increase of maintenance costs due to the additional pipes, water tank and water dispensers in each guest room. Although the tariff of the reclaimed water charge will be set lower than that of PDAM water, the tariff of the reclaimed water charge will probably be set higher than the tax on ground water use. Therefore, the hotels, which will partially or totally switch their secondary source of water from their own groundwater to the reclaimed water, will need to pay more money to secure enough water for their activities.

7) Cultural Perception and Eco-mind (*A Positive Impact, Minor Impacts and a Medium Impact → [3]*)

The guests staying in the target hotels may complain about the uses of reclaimed water for showing, bathing, washing hands, etc. at each guest room. Since the guests vary in nationality, cultural background and language, winning the understanding and support of all the guests can be very difficult.

The guests need to use the drinking water from water dispensers and/or water bottles in their guest rooms for drinking, cooking, boiling water for coffee or tea and brushing of teeth. Each of the targeted hotels would be responsible for deciding if they install a water dispenser in each guest room. It can be convenient for the guest to drink water from the water dispensers because they don't have to be worried about the number of remaining complementally water bottles provided by the hotel each day. They can also stop going out only to buy water bottles at a nearby shop. If the installed water dispensers can serve both cold and hot water, the guests can drink cold and hot safe drinking water any time as much as they want without paying extra money or waiting for water being boiled in an electric kettle. These aspects can be quite appealing to the guests. On the other hand, the hotels have to maintain the water dispensers including the purchase of special large water bottles for the dispensers instead of buying many small water bottles for their guests.

The hotels may advertise their use of the reclaimed water as their significant eco activity. The reclaimed water may help the hotels attract more guest having eco-oriented minds and inspire the movement towards "Clean and Green Bali".

These important aspects on cultural perception and eco mind are further evaluated in [3] of Section 10.d in this appendix. Required mitigation measures for these potential negative impacts are also explained in [3].

8) Health Risk (*Minor Negative Impacts and a Medium Negative Impact → [4]*)

During the operation of the reclaimed water supply, the ozone used for the wastewater reclamation may leak into the atmosphere or stay in the reclaimed water. Of course, it is planned to install a device to remove the remaining ozone from the water after the ozonization. Ozone gas can be harmful especially for the operators in the wastewater reclamation plant if it leaks into the air. However, the risk of inhaling ozone is low as long as proper devices and safety control measures for the operators are in place.

Since it is planned to use sodium hypochlorite or calcium hypochlorite (instead of chlorine gas) for the colorization in this project, its health risk is low. However, if the concentration of residual chlorine in the reclaimed water at the hotels is high, the guests may complain the smell of chlorine and its breaching effects on their colored hair.

It is planned to send the used backwash water from the wastewater reclamation plant back to the inlet of the WWTP for its treatment without any sludge treatment. Therefore, the operators of the wastewater reclamation plant don't have to handle with sludge or effluent from the wastewater reclamation plant. However, the operators should be trained to minimize their direct contact with the treated wastewater from the WWTP and

the backwash water in order to minimize their health risks.

If the alternative of installing the transmission pipeline through the mangrove forest is selected in the review during the EIA and the detailed design study, the safety of the operational staff in charge of maintaining the water transmission pipeline should be well considered especially when a footway is not constructed along with the transmission pipeline.

There is a risk of cross-connections between the pipes for PDAM's drinking water and the pipes for the reclaimed water within the hotels. This risk should be avoided by conducting proper construction supervision and periodical water quality monitoring at each hotel.

The health risk of the reclaimed water to the employees working at the hotels may be more significant in comparison to the risk to the guests because the employees use the reclaimed water for a long time. However, the notification and awareness training for the employees (who usually have a common language) to avoid missuses of the reclaimed water for drinking and cooking can be easier than the required measures for the guests (including children) who vary in language and manners of water use.

These important aspects on the health risk of the reclaimed water are further evaluated in **[4]** of Section 10.d. Required mitigation measures for these potential negative impacts are also explained in **[4]**.

9) Positive Impacts on Conventional Water Supply and Sewerage (*Positive Impacts*)

The use of the reclaimed water in the target areas increase the amount of available water for the other users (mainly domestic users) in the areas where clean water is currently supplied from Estuary Water Purification Plant. It may also reduce the cost of developing water sources and constructing new water supply facilities for Southern Bali in the future. The wastewater-reclamation-related technologies and skills transferred during the project can be also beneficial for the planning and implementation of more wastewater reclamation projects in the future.

As already explained in 2}, this wastewater reclamation project would also improve the quality of the effluent from Suwung WWTP indirectly.

10) Negative Impacts on Other Utilities (*Minor Negative Impacts*)

This wastewater reclamation plant also has minor negative impacts on other utilities including PDAM's existing water supply, sewerage, electricity and telecommunication. The backwash water from the wastewater reclamation plant may negatively affect the wastewater treatment process of Suwung WWTP. The construction of the raw water intake facility within the WWTP for the wastewater reclamation may affect the high voltage power transmission lines going above the WWTP if the location of the raw water intake facility is not appropriate (In the basic design of the wastewater reclamation plant, the raw water intake facility was located away from the power lines).

Since the bulk supply of the reclaimed water to PDAM Badung is planned, PDAM Badung's planned retail supply of the reclaimed water (including related maintenance, billing and revenue collection activities) may disturb its existing operation of drinking/clean water supply. Moreover, the supply of the reclaimed water to the hotels may increase the amount of the wastewater from the hotels. This increase may affect on BTDC's existing WWTP and/or existing wastewater treatment facilities in the hotels.

The maintenance of the installed transmission, distribution and service pipes may disturb the operation of other utilities and/or damage these facilities especially when excavating the ground for pipe maintenance including leakage repairs. Moreover, the cross connections between the pipes for the reclaimed water and the pipes for drinking/clean water should be avoided as already explained.

(4) Post-Operation Stage

As shown in Table 10.c.1, potential minor negative impacts during the post-operation stage include the increase of the effluent from the WWTP, loss of job opportunities, degradation of sanitary conditions due to abandoned facilities and materials.

1) Quantity of the Effluent from the WWTP (*A Minor Negative Impact*)

The cease of the reclaimed water supply will increase the amount of the effluent from Suwng WWTP because the treated wastewater won't be reused any more for the wastewater reclamation.

2) Income, Job Opportunity and Tourism (*Minor Negative Impacts*)

The jobs and income of the operators, administrator and managers working for the project will be lost. The hotels will also loose the opportunities of receiving the reclaimed water and may have to extract more underground water from their wells after the end of the reclaimed water supply.

3) Sanitation Conditions at the Wastewater Reclamation Plant Site (*A Minor Negative Impacts*)

After the cease of the wastewater reclamation plant, the remaining of chemicals used for the operation should be disposed properly. The remaining structures should not be neglected in order to prevent any accidents or illegal activities in the abundant buildings.

10.d Evaluation of Moderately Significant Negative Impacts and Mitigation Measures

Since the preparatory survey was limited in time. The minor negative impacts identified and briefly explained in 10.c are not further evaluated in this IEE. The IEE focused on the evaluation of the four identified medium scale impacts (no irreversible major impacts were identified) and the consideration of their mitigation measures as explained respectively in the following [1] to [4]. In the EIA, the identified minor negative impacts should be further evaluated and their mitigation measures should be proposed. The EIA should also cover the review of the following evaluation of medium impacts and their mitigation measures.

[1] Land Acquisition for the Wastewater Reclamation Plant

The potential impacts of the land use for the proposed wastewater reclamation plant are briefly described in 1) of (1), 3) of (2) and 4) of (2) in 10.c. Further points considered in the evaluating of the impacts and mitigation measures regarding the land use are explained in the following.

1. Identification of Current Land Uses and Users

As seen in the following photographs, there are paths inside the mangrove forest at the proposed site. Some of the paths have deteriorated concrete base structures.



Front View of the Mangrove Forest



Path inside the Mangrove Forest



Path with a Deteriorated Concrete Base Structure



Polluted Stream behind the Site



Storage of Crab Traps



Space for Keeping a Small Boat

The streams around the site do not have much aesthetic value due to the color of water and scattered trashes. However, the mangrove forest at the proposed site seems to be used for catching crabs and keeping a small boat as shown in the photographs above. All the current land uses and users at the site should be identified and the current users should be consulted in the EIA.

2. Management Plan of Ngurah Rai Mangrove Forest Area

Ngurah Rai Mangrove Forest Area is a conservation area owned by the Ministry of Forestry. Figure 10.d.1 shows the land categorization within Nagurah Rai Mangrove Forest Area prepared by the Forestry Agency of Bali Provincial Government in 2007 and the proposed wastewater reclamation plant site.

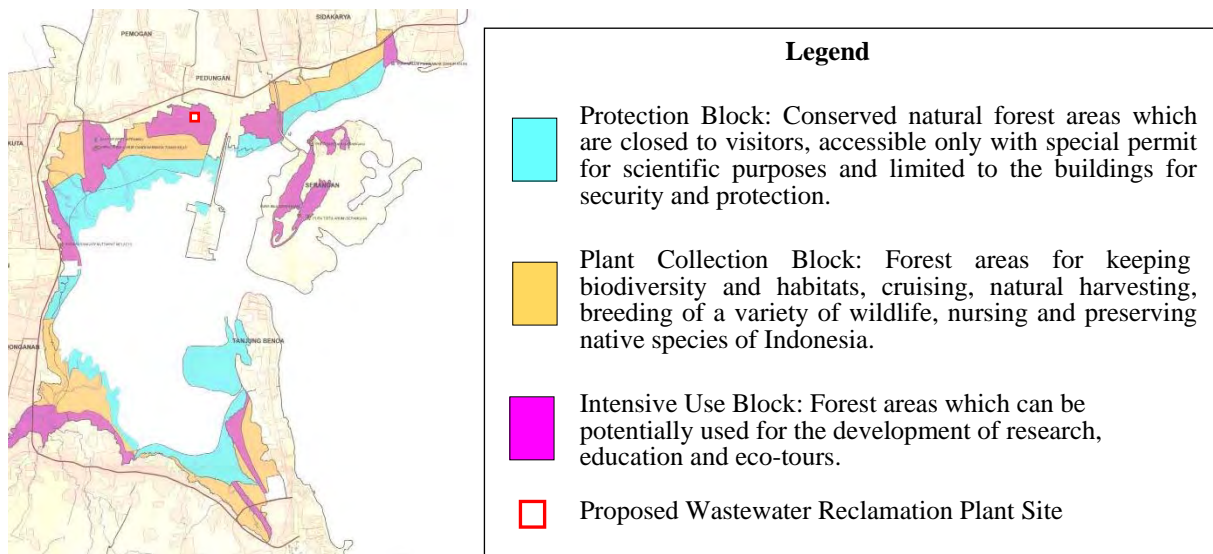


Figure 10.d.1 Land Categorization of Nagurah Rai Mangrove Forest Area

(Source: Management Plan of Nagurah Rai Forest Area (2007), Forestry Agency of Bali Provincial Government)

According to the land categorization shown in this figure, the proposed location of the wastewater reclamation plant site is in an Intensive Use Block where land can be used for research, education and eco-tourism. The land use for the wastewater reclamation plant is not for research, education or eco-tourism. However, it seems to be possible to use the land for the wastewater reclamation plant because there have been examples of constructing public facilities in Intensive Use Blocks. The examples include Suwung WWTP, Pesanggaran Solid Waste Dumping Site and Estuary Dam. The project needs to acquire permission on the land use for the wastewater reclamation plant from the Ministry of Forestry as explained in the following.

3. Permission of Land Use from the Ministry of Forestry

In 1999, the Forestry Agency of Bali Provincial Government received the permission for using a land of 17.5 ha in the mangrove forest for Denpasar Sewerage Development Project with several conditions from the Ministry of Forestry. 10 ha out of the 17.5 ha has been used by Bali Provincial Government for Suwung WWTP in exchange of providing a compensation land of 10 ha to the Ministry of Forestry. However, the permission of using the remaining 7.5 ha was expired in 2004.

Therefore, the reclaimed water supply project needs to acquire new land use permission for the one hector of land necessary for the wastewater reclamation plant. The related regulations which should be followed to acquire the land use permission from the Ministry of Forestry includes the below regulations.

- ① Regulation of the Minister of Forestry No. P.19/Menhut-II/2004 on Collaborative Management of Nature Reserves and Nature Conservation Area
- ② Regulation of the Minister of Forestry No. P.43/Menhut-II/2008 on Guidelines for the Use of Forest Area Lending
- ③ Indonesian Government Regulation No. 10/2010 regarding the Procedure for Changing the Designation and Functions of Forests
- ④ Regulation of the Minister of Forestry No. P.18/Menhut-II/2011 on Guidelines for Use of Forest Area Lending

Other laws and regulations related to land acquisition are also shown in Table 3.2.4 of the main report. Article 7 of above ④ states that the ratios of compensation land to be provided for commercial land use and non-commercial use are 1:2 and 1:1 respectively. This provision of compensation land is a mitigation measure against the negative impacts of the land use. Other possible mitigation measures should also be considered in the EIA.

In order to acquire the land use permission, first, Dinas PU have to prepare an application form attached with a Bali governor's recommendation letter on the project. The preparation of the application form for the land use permission may take a long time if the application form has to be prepared not only for the reclaimed water supply project, but also for the expansion of Suwung WWTP and the establishment of a large-scale water quality testing laboratory in the mangrove forest next to the existing WWTP.

The Forestry Agency of Bali Provincial Government would coordinate the permission process between Dinas PU and the Ministry for Forestry. According to the Forest Agency, it probably takes around 5 months after the submission of the application form to get the land use permission.

Regarding the land of existing Suwung WWTP, the right to use this land has to be extended because its land use permission was also expired in 2004. The right can be restored if Dinas PU sends its application letter attached with a Bali governor's recommendation to the Minister of Forestry.

[2] Installation of the Transmission and Trunk Distribution Pipes

The potential impacts of the installation of transmission and distribution pipes are described in 12] of (2), in 10.c. Further points considered in the evaluating of the impacts and mitigation measures regarding the pipe installation are explained in the following. Figure 10.d.2 shows the route of new transmission pipes, existing trunk distribution pipes and new trunk distribution pipes and congested traffic points. The following photos show the traffic at these points.

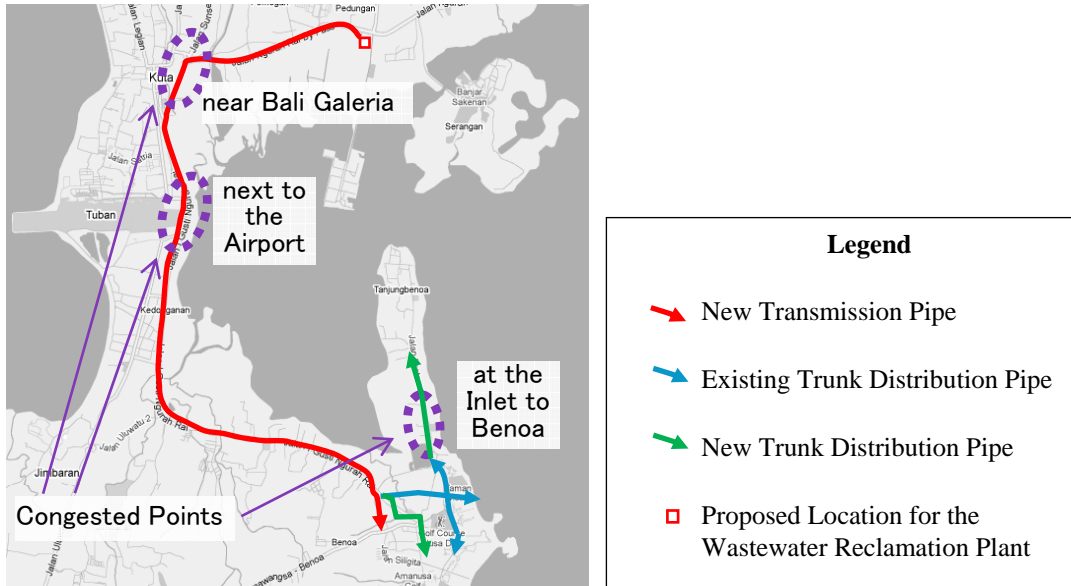
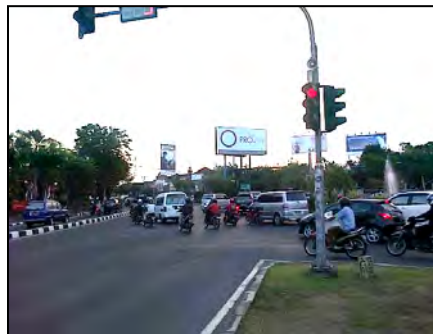


Figure 10.d.2 Congested Traffic Points on the Routes of Pipe Installations



Close to the Circle near Bali Galeria



At the Circle near Bali Galeria



Next to the Airport



At the Inlet to Benoa

In the EIA, the locations which may have significant traffic congestion due to the pipe installation should be reviewed.

In this IEE, the following mitigation measures are considered to minimize the impacts of the pipe installation on the traffic.

Mitigation Measure 1): Pipe installation during nights at busy parts of the roads

Mitigation Measure 2): Jacking method for the road next to the airport to avoid conflicts with the drainages and power cables connected to the airport



Jacking Method used for the Installation of Sewer Pipes in Kuta Area in Denpasar Sewerage Development Project

Mitigation Measure 3): Traffic control at the pipe installation sites

Mitigation Measure 4): Socialization including early notification to the residents around the pipe installation sites

Mitigation Measure 5): Changing the route of the transmission pipeline if necessary

Regarding Mitigation Measure 5), the alternative routes for the transmission pipeline were considered as explained in (3) of 10.b. The alternative analysis on the transmission pipeline route should be reviewed in the EIA.

【3】 Cultural Acceptance of the Reclaimed Water

The cultural aspects of the reclaimed water uses in the target hotels are described in 4) of (1) and 7) of (3) in 10.c. Further points considered in the evaluation of the cultural acceptance and mitigation measures regarding to raise the acceptance are explained in the following.

Assessing the cultural acceptance of local people and tourists for the reclaimed water supply is quite important. In the demand survey conducted in the preparatory survey, many interviewees at the targeted hotels answered that Level 2 reclaimed water would be difficult to use because it would require dual piping in each guest room. But, some interviewees answered that there is no problem as long as its water quality meets corresponding water quality standards.

The cultural acceptance of the reclaimed water was also checked by conducting a questionnaire survey at the opening ceremony of the pilot wastewater reclamation plant at Suwung WWTP. Figure 10.d.3 shows the result of the questionnaire survey (acceptance of the reclaimed water among 47 respondents) and a photo of the opening ceremony.

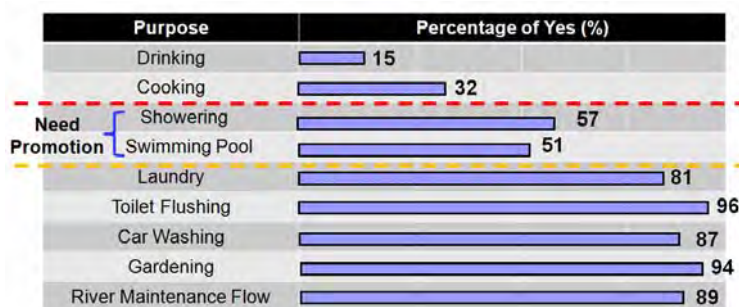


Figure 10.d.3 Results of the Questionnaire Survey and a Photo of the Opening Ceremony

Promotional activities are required before the signing of PPP contract in order to raise the cultural acceptance among the targeted hotels. The reclaimed water demand at these hotels should also be confirmed quantitatively before the PPP contract.

An interview survey to the domestic and international tourists staying in the hotels may be necessary to confirm the cultural acceptance for the reclaimed water among the tourists. The risk of customer complaints and harmful rumors should also be evaluated in the EIA.

In this IEE, the following mitigation measures are considered to raise the cultural acceptance of the reclaimed water.

- Mitigation Measure 1): Information disclosure of the results of monthly and daily water quality tests on the web page of SPC
- Mitigation Measure 2): Socialization during the EIA, construction and operation
- Mitigation Measure 3): Providing reclaimed water better than drinking water in terms of color, odor and turbidity
- Mitigation Measure 4): Promotion activities (study tour to the pilot plant and/or full-scale water reclamation plant, issuing of eco certificate and eco advertisement using posters, stickers, etc.) before the demand confirmation and after the start of the reclaimed water supply
- Mitigation Measure 5): Demand confirmation targeting the hotels before the signing of PPP contract

【4】 Health Risks of the Reclaimed Water

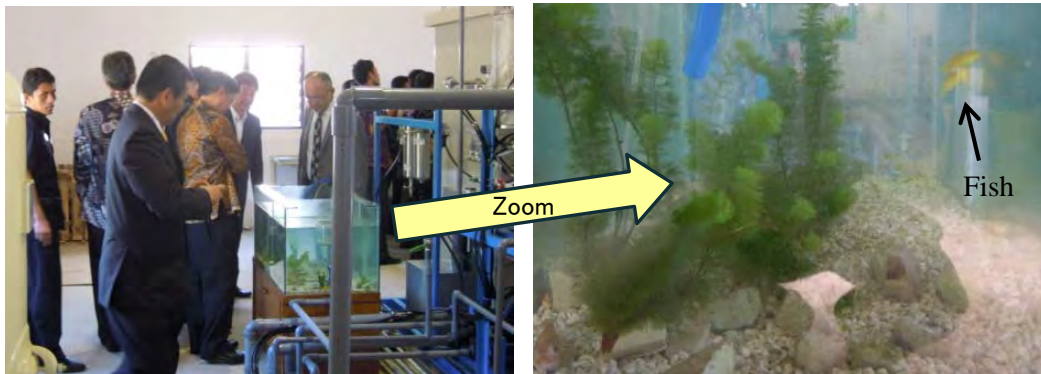
The health risks of the reclaimed water are explained in 15.3 of the main report and 8} of (3) in 10.c of this appendix. Unfortunately, it is not yet confirmed that the proposed wastewater reclamation process can meet the existing Indonesian water quality standards for pool and public bath. The technical feasibility of the proposed wastewater reclamation process in regard to the existing water quality standards should be confirmed before the signing of PPP contract. The health risks (including the impacts of drinking by mistake and cross-connections with the pipes for PDAM's drinking/clean water) and the legal compliance of the reclaimed water in comparison with the existing water quality standards should be reassessed in the EIA. In case that new Indonesian water quality standards for reclaimed water is established before the implementation of the EIA, the reassessment of the risks and the legal compliance should be based on the new water quality standards.

In this IEE, the following mitigation measures are considered to reduce the health risks of the reclaimed water.

- Mitigation Measure 1): Monthly and daily measurements of water parameters (at external and internal water quality testing facilities)

Mitigation Measure 2): Controlling the residual chlorine concentration of the reclaimed water at the hotels

Mitigation Measure 3): Fish monitoring at the planned wastewater reclamation plant for risk management



Fish Monitoring at the Pilot Wastewater Reclamation Plant

Mitigation Measure 4): Training for the operation & maintenance staff for the water quality control

Mitigation Measure 5): Clear demarcation of the responsibilities regarding water quality control between BLUPAL, SPC and PDAM Budung

Mitigation Measure 6): Stabilization of the effluent quality of Suwung WWTP

Mitigation Measure 7): Cleaning of the existing distribution pipes in Nusa Dua

Mitigation Measure 8): Inspection and enforcement of the compliance of wastewater discharge standards for domestic and industrial sewerage users

Mitigation Measure 9): Construction supervision on the rearrangement of water supply facilities within the target hotels to avoid cross-connections between the reclaimed water supply system and the drinking water supply system

Mitigation Measure 10): Clear notification to the guests staying in the hotels about the proper uses of the reclaimed water

Regarding Mitigation Measure 1), a tentative plan of the water quality monitoring for the water quality control is explained in the following section.

10.e Environmental Monitoring

In the EIA, SPC have to prepare an environmental monitoring plan report. The environmental monitoring plan report should include monitoring plans for the construction stage and the operation stage of this project.

The environmental monitoring required for the construction stage includes the monitoring of: 1) the traffic congestions at pipe installation sites. It may also include the monitoring of: 2) the air pollution, noise and vibration, 3) the impacts of earth works, and 4) the rearrangement of the pipes inside the hotels.

The environmental monitoring required for the operation stage includes 5) water quality monitoring for the water quality control of the reclaimed water. It may also include the monitoring of: 6) the notifications about proper use of the reclaimed water in the hotels and 7) the complaints on the reclaimed water from the hotels and their guests.

Table 10.e.1 shows the summary of the proposed tentative water quality monitoring plan. BLUPAL, SPC and PDAM Badung should be responsible for the water quality tests at different monitoring points (from the sewerage users to the reclaimed water users).

Table 10.e.1 Proposed Tentative Water Quality Monitoring Plan

Responsible Body	BLUPAL			SPC			PDAM Badung
Monitoring Point	At Sampled Industrial Sewerage Users	At the Inlet of Suwung WWTP	At the Outlet of Suwung WWTP / the Inlet of the Wastewater Reclamation Plant		At the Outlet of the Wastewater Reclamation Plant	At the Existing Reservoir in Nusa Dua	At Sampled Hotels in Nusa Dua, Sawangan and Benoa
Target water	Industrial Effluent	Raw wastewater	Treated wastewater		Reclaimed water	Reclaimed Water	Reclaimed water Drinking water
Purpose	To avoid the interfusion of toxic materials	To control the wastewater treatment process	To confirm that the treated wastewater meets its corresponding effluent standards & to improve the effluent quality		To confirm that the reclaimed water meets its corresponding water quality standards	To check if it is polluted in the transmission pipeline	To check the final water quality of the reclaimed water and the drinking water
Testing Laboratory	External	Internal	External	Internal	External	External	External
Frequency	Quarterly	Daily	Monthly	Daily	Monthly	Semiannually	Monthly to Quarterly
Water Quality Parameters	According to the discharge standards *1	Around 5 parameters *2	Around 25 parameters *3	Around 8 parameters *4	Around 14 parameters *5	Around 31 parameters *6	

Note

- *1: the discharge standards for textile industry, metal coating industry, soft drink industry and hospital activities are shown in Regulation of Bali Province No.8/2007 on environmental quality standards and criteria.
- *2: the around 5 water quality parameters may include BOD, TSS, DO, Temperature and pH.
- *3: the around 25 water quality parameters may include those listed in the sewage effluent standards.
- *4: the around 8 water quality parameters may include Smell, Clarity, Color, Oil, Turbidity, BOD, pH and Cl.
- *5: the around 14 water quality parameters may include 6 physical parameters, 6 chemical parameters and 2 microbiological parameters as listed in Table 10.e.2.
- *6: the around 31 water quality parameters may include 7 physical parameters, 22 chemical parameters and 2 microbiological parameters as listed in Table 10.e.2.

Regarding the monitoring at the sewerage users, all of the industrial sewerage users which have risks of discharging toxic chemicals should be identified prior to the monitoring. The effluent from some of these industrial sewerage users can be sampled in rotation for the quarterly monitoring of industrial effluent. Bali's discharge standards for textile industry, metal coating industry, soft drink industry and hospital activities (Regulation of Bali Province No.8/2007) can be referred in this monitoring. .

Regarding the monitoring at the reclaimed water users, the targeted hotels can be grouped by area in order to sample hotels from each area in rotation for the monthly water quality monitoring at the hotels. As shown in Table 10.e.1, the frequency of water quality tests at the hotels can be reduced from monthly to quarterly if the number of hotels sampled at the each time is large. The drinking water and the reclaimed water are mixed at the water receiving tanks of the hotels. Therefore, the monthly water quality monitoring at the hotels should target not only on the reclaimed water but also PDAM's drinking water in order to identify real causes in case that guests in the hotels complain on the quality of piped water in their guest rooms. The 31 water quality parameters shown in Table 10.e.2 may be used for this water quality monitoring.

This tentative water quality monitoring plan should be revised in the EIA based on the agreement between BLUPAL, SPC and PDAM Badung regarding the demarcation of responsibilities in the water quality control. This agreement should be made in the PPP contract.

The environmental monitoring plans for other environmental items such as traffic congestion should be proposed in the EIA.

Table 10.e.2 Tentative Water Quality Parameters to be Measured in the Monitoring

Category	Water Quality Parameters	Unit	Measurement	
			Monthly	Semiannual
A. Physical Parameter	1) Smell		✓	✓
	2) Floating Objects		✓	✓
	3) Clarity		✓	✓
	4) Color	TCU	✓	✓
	5) Oil	mg/l	✓	✓
	6) Turbidity	NTU	✓	✓
	7) TDS	mg/l		✓
B. Chemical Parameter	1) Al	mg/l		✓
	2) Hardness	mg/l	✓	✓
	3) Oxygen absorbed (O ₂)	mg/l	✓	✓
	4) pH		✓	✓
	5) Residual Chlorine	mg/l	✓	✓
	6) Cu	mg/l		✓
	7) Detergent (MBAS)	mg/l		✓
	8) BOD	mg/l	✓	✓
	9) Dissolved Oxygen (O ₂)	mg/l	✓	✓
	10) As	mg/l		✓
	11) F	mg/l		✓
	12) Cr	mg/l		✓
	13) Cd	mg/l		✓
	14) Nitrite (NO ₂)	mg/l		✓
	15) Nitrite (NO ₃)	mg/l		✓
	16) CN	mg/l		✓
	17) Se	mg/l		✓
	18) Fe	mg/l		✓
	19) Mn	mg/l		✓
	20) Zn	mg/l		✓
	21) SO ₄	mg/l		✓
	22) Ammonia (NH ₃)	mg/l		✓
C. Microbiological Parameters	1) Total Coliform	CFU/100ml	✓	✓
	2) Number of Germs	Colonies/ml	✓	✓
Number of Water Parameters to be Measured			14	31

10.f Public Consultations

In accordance with BAPENSA's General Guidelines for Cooperation between Government and Business Enterprise in the Provision of Infrastructure (June, 2010), a stakeholder meeting was held by the Indonesian side (DINAS PU of Bali Provincial Government and BLUPAL) on September 27, 2011 in Denpasar, Bali for public consultation. Table 10.f.1 shows the agenda of the stakeholder meeting. The JICA survey team supported the implementation of the stakeholder meeting in accordance with JICA's Guidelines for Environmental and Social Considerations (April, 2010).

Table 10.f.1 Agenda of the Stakeholder Meeting

Time	Presentation / Q&A / Site Tour	Presenter
Morning (Main Program)	Opening Remark & Background of the Preparatory Survey on Application of Wastewater Reclaiming in Southern Bali	Chairman (Mr. Dewa Punia Asa), DINAS PU
	Process of Environmental and Social Considerations in this Project	Dr. Dharma / Mr. Mori, JICA Survey Team
	Tentative Facility Plan for the Wastewater Reclamation Project	Dr. Uchida, Team Leader of JICA Survey Team
	Water Quality Control and Proposed Treatment Process	Mr. Kanto, JICA Survey Team
	Evaluation of Potential Impacts and Mitigation Measures	Dr. Dharma / Mr. Mori, JICA Survey Team
	Q&A for the Confirmation on the Contents of the Presentations and the Reception of Opinions from Participants	-
	Closing Remark	Acting Chairman (Mr. I G Wenten Mahayasa), DINAS PU
Afternoon	Site Tour of the Pilot Wastewater Reclamation Plant	METAWATER / BLUPAL

The presentations used in this stakeholder meeting (English and Indonesian versions) are attached at the end of this appendix.

Through the stakeholder analysis for the meeting and discussions with counterparts, around one hundred stakeholders including several stakeholders from Jakarta are invited to the stakeholder meeting. As shown in Table 10.f.2, seventy (70) stakeholders from various organizations participated in the stakeholder meeting as a result. However, many invited stakeholders closely related to hotels and tourists were absent from the stakeholder meeting as seen in Table 10.f.3. Their absence seems to be partly related to the unfortunate coincidence of JATA Tourism Forum and Travel Showcase held in Tokyo from September 29, 2011. Photo 10.f.1 and Photo 10.f.2 show some photographs taken during the presentations and discussion in the stakeholder meeting and those taken during the site tour to the pilot wastewater reclamation plant scheduled in the afternoon.

Table 10.f.4 shows the suggestion, comments and questions given by the participants of the stakeholder meeting. The remarks during the discussion are shown with underline and the others written in the suggestion sheets collected at the end of the meeting are shown without underline. The answers from the survey team are also written in the table.

Since the participants jointed in the previous workshops for the explanation of the inception report and interim report are important stakeholders, their remarks in the workshops which are related to social and environmental considerations (but not included in Table 10.f.4) are separately summarized in Table 10.f.5 with corresponding answers from the survey team. Table 10.f.6 shows the results of the interview to Bali Tourism Board held on October 7, 2011. This interview was conducted after a brief explanation of the project to make up for the shortage of perspectives from hotels and tourists in the stakeholder meeting. The participants of this interview from the Bali Tourism Board include Mr. Ida Bagus Ngurah Wijaya (Chairman of Bali Tourism Board), Mr. Perry Markus (Secretary General of Bali Hotel & Restaurant Association), Mr. I. B. Purwa Sidemen (Executive Director of Denpasar Hotel & Restaurant Association) and Mr. N. Wardawan (Promotion Department Head of Tourism Agency, Bali Provincial Government).

Tables 10.f.4, 10.f.5 and 10.f.6 can be utilized in the further promotion, public consultation and socialization required for the implementation of the project after this preparatory survey.

Table 10.f.2 Participant List of the Stakeholder Meeting (1/2)

Category / Organization	Position	Name of Participant	Participant No.	
Central Government – Jakarta	Facility and Infrastructure Division, Ministry of National Development Planning/BAPPENAS	First Planner	Mohammad Taufiq Rinaldi, ST	
	Settlement Environmental Sanitation, DGHS, Ministry of Public Works	Section Head of Development and Facility of Area I, Waste Water Division, DGHS	Emah Sudjimah	
Bali Province	Drinking Water Development, DGHS, Ministry of Public Works	Technical Team	Firdaus Latief	
	Assitant Economy, Development and Welfare Regional Secretariat of Bali Province	Head of Controlling and Development Division	I Gede Supada	
	Finance Bureau of the Regional Secretariat of Bali Province	Head of Revenue Development Division	I G N Semawa	
	Governance Bureau of the Regional Secretariat of Bali Province	Head of KS Division	I Kt. Sukra Negara	
	BAPPEDA of Bali Province	Head of Sub-Section	Made Sudiarasa	
	Public Works of Bali Province	Head of Public Works of Bali Province	Dewa Purnia Asa	
	Human Settlement Division, Public Works of Bali Province	Head of Spatial Planning and Human Settlement Division, of Public Works, Bali Province	I G Wenten Mahayasa	
	Forestry Agency of Bali Province	Head of Data collection and management section	Luh Krisnaningsih	
	Living Environment Board of Bali Province	Staf	Ida Ayu Astiti	
	Bali Government Tourism Office	Head of Data collection and management section	Endang Kusumawati	
Work Unit – Central Government	Health Agency Bali Province	Staf of P2PL of Healthy Department, Bali Province	I Nyoman Sujana, SKM	
	Working Unit of Environmental Sanitation Development Bali, Public Works of Bali	Planning Staff	I G A Ariwibawa	
	Working Unit of Drinking Water Management Performance Development Project in Bali Province	Head of the Working Unit of Drinking Water Management Performance Development Project	Ida Bagus Lanang Suardana	
	Secretary of Badung Regency	Representative	A A Bgs Juana Putra	
	Public Works of Badung Regency	Junior Arrangement III A	I Ketut Sukadana, ST	
	Living Environment Board of Badung Regency	Representative	Ida Ayu Angraeni Pudja	
	Tourism Office of Badung Regency	Head of Information Section	Ni Luh Gnd Tirtawati	
	Finance Section of Badung Regency	Representative	Putu Dwipayanti	
	Asset Section of Badung Regency	Representative	IB Ketut Wiryadi	
	Health Agency of Badung Regency	Head of Environmental Sanitary Section	I Gusti Ngurah Surantaja, ST	
	PDAM Badung	Technical Director	Komarudin	
	Engineering Division of PDAM Badung	Head of Production Division	Ida Bgs Wimbardi	
	Engineering Division of PT Tirta Arta Buana Mulia	Technical Division	I Made Suardika, ST	
	BAPPEDA of Denpasar City	Head of Spatial Planning Section	I Gede Radika	
Denpasar City	Public Works of Denpasar City	Head of Environment Management Section	I Ketut Sartono	
	Living Environment Board of Denpasar City	Head of Environment Management Division	A A Gd Risnawa	
	Tourism Office of Denpasar City	Head of Accomodation Section	Ni Luh Gd Tirtawati	
	Health Agency of Denpasar City	Head of Environment Sanitary Division	Tri Indarti, SKM	
	Legal Section of Denpasar City	Head of Sub-Division of Regulation and Law Formulation	Km Agus Budiayas	
	Asset Section of Denpasar City	Head of subpdvisio	Yudi	
	PDAM Denpasar	Head of Research dan Development	I Made Sudiantara	

Table 10.f.2 Participant List of the Stakeholder Meeting (2/2)

Category / Organization	Position	Name of Participant	Participant No.	
Bali Level Organization	Udayana University	Prof. Wayan Redana	34	
	Tri Hita Karana Bali Foundation	I G N Wisnu Wardana	35	
	Power Plant	I G A N Subawa Putra	36	
	State Electrical Company	Sabam	37	
	State Electrical Company	Dianarko G	38	
	South Denpasar District	Ni Kadek Mariani	39	
	Kuta District	Ni Nvoman A. Wiratmi	40	
	South Kuta District	I Ketut Geria	41	
	Pedungan Village	I Nyoman Suriawan	42	
	Serangan Village	Poniman	43	
District	Sanur Village	I B. Alit Surya Antara	44	
	Legian Village	I Made Madia Suryanatha	45	
	Kuta Village	I Wayan Darnyana, AP, MAP	46	
	Tuban Village	Gd Raka	47	
	Jimbaran Village	Drs. I Md Tarip Widarta	48	
	Benoa Village	I Nyoman Wirnata	49	
	Officially Assigned Counterparts	Tiok Bagus Budiana	50	
		Dewa Ayu Puspa Dewi	51	
		Drs. I Nyoman Wardika	52	
		Drs. I Wayan Mager	53	
Counterpart	Supporting Counterparts for the Stakeholder Meeting	I Nengah Tinggen SH	54	
		Ari Olivia, ST	55	
		I Ngr Kade Dwitva A.D.SS	56	
		I Gede Perdana Yosa, SH	57	
		I Gst Bagus Harjanto Kurniawan, S	58	
		I Gst Ngr Gede Marhaendra Jaya	59	
		Sayu Putu Puspa Rasi Astuti, S.Sc	60	
		A A Wiradharma	61	
		A A Anom Ardana	62	
		AG Putra	63	
Japanese Side JICA Survey Team	Team Leader	H Uchida	64	
	Water Quality	Y Kanto	65	
	Environmental and Social Consideration	S Mori	66	
	Organization	T Yazawa	67	
	Environmental and Social Consideration	K G Dharna Putra	68	
	O & M Specialist	N Takato	69	
	Secretary	Yustina	70	
	Total			70

Table 10.f.3 List of Invitees absent from the Stakeholder Meeting (excluding counterparts)

Category / Organization	
Central Government – Jakarta	Human Settlement, Ministry of Public Works
Bali Province	Bali Province Parliament/Council
	Secretary of Bali Provincial Government
	Legal and Human Rights Secretariat of Bali Province
	Asset Bureau of the Regional Secretariat of Bali Province
Badung Regency	Transportation, Information and Communication Agency Bali Province
	Badung Regency Parliament
	BAPPEDA of Badung Regency
	PT Tirta Arta Buana Mulia
Denpasar City	Hotel and Restaurant Association Badung
	Parliament Denpasar
	Secretary of Denpasar City
	Engineering Division of PDAM Denpasar
Bali Level Organization	Hotel and Restaurant Association Denpasar
	Hindu Parisada Bali
	Indonesian Consumer Association
	Hotel and Restaurant Association Bali
	Bali People High Assembly
	Bali Tourism Board
	Association of Chief Engineering Bali
	PT Pelabuhan Indonesia III (Benoa Harbour)
PT Angkasa Pura I (Ngurah Rai Airport)	
Village	PT BTDC
	Sawangan Sub-Village

Note: Organizations in bold and italic are strongly related to hotels and tourists.



Photo 10.f.1 Stakeholder Meeting for Public Consultation



Photo 10.f.2 Site Tour to the Pilot Wastewater Reclamation Plant after the Stakeholder Meeting

Table 10.f.4 Suggestions and Comments given in the Stakeholder Meeting and Answers from the Survey Team (1/5)

Category	Sub-category	Suggestion / Comment from the Participants	Answer
Public Consultation (General)	Support of Stakeholders	1) We support the project to implement. [16, 18, 19, 20, 23, 26, 39, 41]	We appreciate your understandings and support.
	EIA Process	1) The project should follow EIA process. [24] 2) Who will prepare KA-ANDAL? Bali Province/Dinas PU? [2] 3) EIA process should be implemented before starting the project. [4] 4) Consider the impact of the project and need focused analysis to avoid impact. [37]	As for 1), the project will follow the explained EIA process. As for 2), according to the BAPENAS's new general guidelines for cooperation between government and business enterprise in the provision of infrastructure (June 2010), PJKP (i.e. contracting agency), which is Bali Provincial Government in case of this project, is responsible from the delivery of the project activity plan to the environmental agency in Bali to the preparation and stipulation of the draft KA-ANDAL. The survey team has prepared a project activity plan (see Appendix 9) and an initial draft TOR of EIA in English (see Appendix 11) to support the PJKP. As for 3), according to the BAPENAS's new guidelines, EIA should be implemented by the SPC after the PPP contract. As for 4), potential impacts of the project have been considered. Identified significant potential impacts will be further analyzed in the EIA.
	Further Promotion, Public Consultation & Socialization	1) Need further socialization, public consultation or promotion to improve understandings among hotels, communities and local leaders around project sites. [4, 15, 19, 21, 25, 26, 33, 39, 42, 44, 47, 48] 2) Need demand confirmation between promotion using printed and electronic media and the PPP contract. [1, 5] 3) Need market sounding to investors. [1] 4) Need detail information about the 47 respondents in the opening ceremony of the pilot plant. [45] 5) Need detailed maps of the construction sites including the transmission line for the public consultation and socialization. [44, 10, 11, 17]	As for 1), it is planned that the SPC (proposing company at this stage) will conduct promotion activities before confirming the demand of the reclaimed water prior to the PPP contract. The SPC will also be responsible to conduct socialization during the EIA, construction and operation. The Indonesian side will be responsible to conduct more public consultation before the PPP contract. The hotels in Nusa Dua, Benoa and Sawangan, communities and local leaders around the project sites are the targets of these activities. As for 2), it is planned to confirm the demand of the reclaimed water in the target areas after conducting promotion activities using printed and electronic media prior to the PPP contract. As for 3), opinions of the two potential investors in the survey team (Toyota Tsusho Cooperation and Metawater) have been reflected in the planning. As for 4), the recipients of the questionnaire at the opening ceremony of the pilot wastewater reclamation plant include many officials from Bali Provincial Government, several officials from each of Central Government, Bandung Regency and Denpasar City, several news media including TV and radio stations and newspapers, local organizations such Hotel and Restaurant Association of Bali and Hindu Association of Bali. As for 5), detailed maps of the construction sites are included in the final report of this preparatory survey. These maps would be used for the further public consultation and socialization.
Further coordination with Forest Agency	1) Need further coordination with Forestry Agency. <u>If the pipe route across the mangrove forests should have permit from Forestry Agency. [10]</u> 2) <u>Mangrove forest is conserved under Regulation of the Ministry of Forestry No P-19 while Government Regulation No. 10/2010 states the mangrove forest can be used as ecotourism areas under the permission of Governor of Bali. [10]</u>	As for 1), <u>in the current facility plan, the transmission pipe will be constructed along the existing road from Pesanggaran to Nusa Dua (not across the mangrove area because the need of regular inspection and maintenance during the operation). The possibility to use the new road or bridge from Benoa Harbor – Airport –Nusa Dua or install the transmission pipe across mangrove area will be re-evaluated during the detailed design and EIA as alternatives.</u> As for 2), the explained two regulations will be referred during the EIA, especially for the land acquisition at the wastewater reclamation plant site.	

Table 10.f.4 Suggestions and Comments given in the Stakeholder Meeting and Answers from the Survey Team (2/5)

Category	Sub-category	Suggestion / Comment from the Participants	Answer
Conditions of Facility Planning	Type of Reclaimed Water Use	<ol style="list-style-type: none"> 1) Need further explanation about Level 1, 2 and 3 reclaimed water. [45] 2) Need detail specification of water uses. [42] 3) The use of reclaimed water should focus on irrigation use (Level 1). [46] 4) The reclaimed water proposed should only for irrigation purpose (not Level 2) to minimize the production cost. [2] 	<p>As for 1) and 2), the three levels of reclaimed water uses are explained more clearly in this report of this preparatory survey.</p> <p>As for 3) and 4), most of the irrigation water demand in hotels in the target areas is already met by using their wastewater treated at the hotels or at BTDC's WWTP. Therefore, it is not possible to formulate a business of selling irrigation water although the production cost of Level 3 reclaimed water for irrigation would be lower than the production cost of Level 2 reclaimed water.</p>
	Targets	<ol style="list-style-type: none"> 1) We agree to target hotels. [26, 40, 43] It will reduce the use of groundwater and PDAM water in hotels. [26] 2) However, need to consider the negative impacts if the hotels complain. [43] 3) Need further explanation why Nusa Dua is chosen as a target area. [14] 4) If possible, please target other areas in South Kuta District too. [17] There are six village at South Kuta District, which are Jimbaran, Bena, Tanjung, Bena, Pecatu, Ungasan and Kutuh. Sawangan was a sub-village within Bena Village. All of these areas are suffering from water shortage because PDAM have difficulties to distribute water to these areas due of the need to pump the water strongly. [41] Especially, higher areas in South Kuta District such as Kutuh, Ungasan and Pecatu need to be targeted in the future. [41] 5) Why the transmission pipe is not installed for Kuta, Legian, Seminyak and Tuban areas. [45] 	<p>As for 1), the depletion and salination of groundwater and shortage of PDAM water is serious in the target areas. Therefore, supplying the reclaimed water to the hotels will mitigate these problems.</p> <p>As for 2), potential negative impacts have been considered and will be mitigated whether or not the hotels complain. The EIA process will make sure that the project will be socially and environmentally acceptable to the hotels.</p> <p>As for 3), Nusa Dua was selected as one of the target areas because that there is a PDAM's existing distribution network (not used for PDAM's current water supply) which can be used for the reclaimed water and that the use of groundwater is restricted at the hotels in Nusa Dua. As for 4), the <u>reclaimed water should not be distributed to domestic customers through PDAM water supply system</u>. Therefore, it is difficult for this project to distribute the reclaimed water to other areas of South Kuta District where the density of hotels is lower and the distance from the existing network in Nusa Dua is longer. <u>If the hotels in the target areas use the proposed reclaimed water, then PDAM can increase their water supply to domestic customers because the use of PDAM water at the hotels will be reduced by the introduction of Level 2 reclaimed water.</u></p> <p>As for 5), Kuta, Legian, Seminyak and Tuban are closer to the proposed reclamation plant site in comparison to Nusa Dua. However, large and dense water demand is not expected in these areas because many hotels in these areas are small and scattered. Fortunately, none of these areas has any existing distribution network usable for the reclaimed water. Moreover, most of the main roads going by the hotels in these areas are too narrow or too congested to install <u>new distribution pipes without significantly worsening the traffic jams.</u></p>
Wastewater Reclamation Plant Site	Land acquisition	<ol style="list-style-type: none"> 1) The location of reclaimed water plant at Denpasar Wastewater Treatment Plant needs further analysis because Denpasar Sewerage Development Master Plan needs 17.5 ha excluding the area for the wastewater reclamation plant. [2] 	<p>The permission of using the land of 17.5 ha given by Ministry of Forestry in 1999 has been expired. Therefore, Bali Provincial Government needs a new permission for the land use at the proposed reclamation plant site. DINAS PU needs to apply for the permission from Ministry of Forest in coordination with the Forestry Agency of Bali Provincial Government.</p>
	Power Transmission Line	<ol style="list-style-type: none"> 1) To avoid high electricity from the power transmission line (150 kV), the building should be constructed more than about three m from the power line. [36] 	<p>In the basic design of the wastewater reclamation plant, its raw water pump station will be constructed around 20m away from the existing high voltage electric cables in plain view. Required safe distance between these facilities will be re-examined in the detailed design of the raw water pump station.</p>

Table 10.f.4 Suggestions and Comments given in the Stakeholder Meeting and Answers from the Survey Team (3/5)

Category	Sub-category	Suggestion / Comment from the Participants	Answer
Water Transmission & Distribution System	Installation of Pipes	<ol style="list-style-type: none"> 1) Need coordination with other utilities (telecommunication, PLN, PDAM, DSDP, etc.) during the installation of transmission and distribution pipes. [4, 23, 37, 40] 2) Need careful mitigation for traffic congestion during construction. [20, 47, 51] 3) The transmission pipe can be installed along the planned new road between Benoa Harbor, the airport and Nusa Dua. [14] 	<p><u>As for 1), during the detailed design of the pipe facilities, information on the existing lines of telecommunication, electricity, water, sewer, drainage, etc. and planned future installation of these types of utility lines will be considered. Sufficient coordination with these utilities will be established by the contracting agency and the contractor for the smooth installation of the transmission and distribution pipes.</u></p> <p>As for 2), mitigation measures for traffic congestion during the construction has been carefully considered in this IEE and will be further considered and evaluated in the EIA.</p> <p>As for 3), the alternative plan of installing the transmission pipe along the planned new road between Benoa Harbor, the airport and Nusa Dua will be considered in the detailed design study and the EIA. The survey team has already made a suggestion regarding this matter in the public consultation of the new road project.</p>
	Type of pipe	<ol style="list-style-type: none"> 1) <u>The specification of HDPE pipe is high and very hygiene.</u> However, HDPE pipe is expensive. <u>The survey team should consider other kinds of pipes</u> such as PVC pipe to reduce production cost. [15] 	<p>HDPE is cheaper than ductile iron and steel pipes and strong enough against pressure and shock unlike PVC pipe.</p>
	Separate System	<ol style="list-style-type: none"> 1) The pipe, meter and reservoir for the reclaimed water should different with PDAM as proposed. [7, 25] 2) Need agreement with PDAM about the pipe arrangement inside hotels to avoid dispute. [1] 	<p>As for 1), the separation from the distribution system of PDAM water is essential part of this wastewater reclamation project, which should not be changed in the following stages of this project.</p> <p>As for 2), basic ideas regarding the pipe arrangement inside hotels have been presented several times in the presence of PDAM Badung. However, further discussions are required regarding the demarcation of responsibilities between PDAM, hotels and SPC in the construction, operation and maintenance of the facilities inside the hotels.</p>
PPP Framework	Preparatory Survey	<ol style="list-style-type: none"> 1) Under the PPP framework, the preparatory survey should analyze legal, institutional, technical, economical, financial, environmental and social aspects. After that, the proposal should give to the local government. [7] 	<p>This preparatory survey includes the evaluation of legal, institutional, technical, economical, financial, environmental and social feasibility of the proposed project. The final report of this preparatory survey will be submitted to Bali Provincial Government as a proposal.</p>
	PPP Project	<ol style="list-style-type: none"> 1) Who will choose the SPC? [2] 	<p>The SPC should be selected by the contracting agency which is Bali Provincial Government in case of this project.</p>
Organization	Organization	<ol style="list-style-type: none"> 1) If the reclaimed water plant is operated by BLUPAL staff, it will disturb the BLUPAL management. It is required to make a new institution (at PDAM or BLUPAL) and need institutional analysis. [2, 51] 	<p>As for 1), institutional arrangement for the operation and maintenance of the facilities is proposed based on institutional analysis in the main report of this preparatory survey.</p>
	Job Opportunity	<ol style="list-style-type: none"> 1) Priority to local people when employing new staff for the operation of the wastewater reclamation plant. [11] 	<p>The employment of skilled local staff is essential for the sustainable operation of the reclaimed water bulk supply. Since the service period of the project is long, the local people who can work for the project continuously will be valued in the recruitment process.</p>

Table 10.f.4 Suggestions and Comments given in the Stakeholder Meeting and Answers from the Survey Team (4/5)

Category	Sub-category	Suggestion / Comment from the Participants	Answer
Financial	Water Dispenser in Hotels	<ol style="list-style-type: none"> 1) Who will be responsible to provide water dispensers to hotels? [2, 7, 51] 2) Hotel will not agree to buy the water dispensers themselves, and SPC should have authorized contract with hotel to provide the dispensers. [7] 	As for 1) and 2), the hotels need to decide how to provide drinking water to each guest room. In the presentation at the stakeholder meeting, we proposed the installation of small water dispensers in guest rooms as an idea since it may improve the hotels' services and attract guests.
	Price	<ol style="list-style-type: none"> 1) The price of the reclaimed water should be lower than the price of PDAM water. [40] 	The survey team also understands that the price of reclaimed water should be competitive in comparison to PDAM water.
Water Quality	Standard and Monitoring	<ol style="list-style-type: none"> 1) The quality of the reclaimed water should meet water quality standards [22] <ul style="list-style-type: none"> - Japanese water quality standards [49] - Indonesian drinking water quality standard [24] - Indonesian clean water quality standard [30]. 2) New reclaimed water standard is needed to support the project implementation [11] 3) Water quality monitoring parameters should include bacteriological, physical and chemical parameters [13] 	<p>As for 1), this preparatory survey set the target water quality of the reclaimed water based on the existing Indonesian water quality standards for pool and public bath and Japanese reclaimed water quality standards and additional target values used in Tokyo. Since the proposed reclaimed water is not for drinking, applying the existing Indonesian water quality standards for drinking water and clean water (which is for drinking after boiling by definition) to the reclaimed water is considered to be overstrict.</p> <p>As for 2), the survey team also consider that establishment of a new reclaimed water standard can be helpful for the operation of the reclaimed water service.</p> <p>As for 3), the water quality monitoring considered for the project includes the periodical measurements of bacteriological, physical and chemical water quality parameters.</p>
	Performance of BLUPAL	<ol style="list-style-type: none"> 1) High quality effluent is required as the raw water of the wastewater reclamation plant. This will increase the operational cost of BLUPAL, Bali Government. Especially BLUPAL should consider this matter. [2] 2) The effluent quality of Suwung WWTP should be evaluated for improvement. [10, 21, 50] 3) Guidelines and a standard operation procedure (SOP) are required to keep the good effluent quality of the WWTP. [50] 4) <u>What is the standard quality of secondary effluent from WWTPs for wastewater reclamation in Japan.</u> [3] 	<p>As for 1), the cost increase for the stabilization of effluent quality is inevitable while trying to meet the Indonesian wastewater effluent standards continuously.</p> <p>As for 2), the effluent quality of Suwung WWTP has been preliminarily analyzed in comparison to the Indonesian wastewater standards based on the results of water quality tests on the effluent. For the water quality tests, the effluent was sampled periodically during a dry season. For further analysis of the effluent, more water quality tests are required under different conditions (longer sampling period, different aeration time in the WWTP, different target water quality parameters) after this preparatory survey.</p> <p>As for 3), The responsible consulting company in charge of the second phase of Denpasar Sewerage Development Project is preparing the SOP of the WWTP.</p> <p>As for 4), 20mg/L in BOD is applied to most of the wastewater treatment plants in Japan as effluent water quality standard of secondary effluent. In case of the wastewater reclamation plant in Tokyo, the effluent from the WWTP is around 10mg/L in BOD.</p>
	Risk	<ol style="list-style-type: none"> 1) Minimize the risk of consuming the reclaimed water. [22] 2) Need quality assurance for the use of reclaimed water. [anonymous] 3) Who pay compensation if adverse damage happens? [anonymous] 	<p>As for 1), water quality control measures and mitigation measures against potential drinking by mistake have been considered in this IEE. Water quality control measures will be future studied before the PPP contract and the mitigation measures will be planned in detail in the EIA.</p> <p>As for 2), the certainty of constantly meeting the existing Indonesian water quality standards will be confirmed before the PPP contract. The PPP contract will clarify the water quality assurance.</p> <p>As for 3), the PPP contract will also cover the responsibilities related to the compensation.</p>

Table 10.f.4 Suggestions and Comments given in the Stakeholder Meeting and Answers from the Survey Team (5/5)

Category	Sub-category	Suggestion / Comment from the Participants	Answer
Other Alternatives	Desalination	1) Why not to use sea water desalination to decrease the use of ground water? [anonymous]	Sea water desalination is more expensive since it requires a special filtering process called reverse osmosis (RO) which requires a large amount of electricity.
	RO	1) <u>How high is the electricity consumption of reverse osmosis per m³ in Japanese experiences?</u> [3]	The electricity consumption of a desalination plant in Okinawa is about 5 kwh/m ³ . Current RO technologies can desalinate sea water at the electronic consumption of around 3 kwh/m ³ .
Others	WWTP in Nusa Dua	1) Need information regarding the similar service of BTDC which use the effluent of BTDC WWTP to produce irrigation water and distribute it to the same target area. [10] 2) Need further assessment of using the WWTP in Nusa Dua for producing Level 2 and 3 reclaimed water. [anonymous]	<u>As for 2) the survey team has carefully studied BTDC's irrigation water supply through the interviews to BTDC and hotels within the BTDC area. BTDC's irrigation water is Level 3 reclaimed water, which is quite different in quality from the Level 2 reclaimed water proposed in this preparatory survey.</u> The report of this preparatory survey includes information about BTDC's WWTP. As for 2), although BTDC has interest to improve their wastewater reclamation facilities to supply reclaimed water of better quality, their vision has not been materialized.
	Groundwater	1) Need law enforcement to reduce the use of groundwater. [40] 2) The supply of reclaimed water will decrease the use of ground water and this is very good for the environment. [23]	As for 1), effective regulations are required to reduce excessive groundwater intake and to protect the groundwater in Southern Bali as a precious resource. The tax on groundwater use was increased dramatically (around 1000%) by Bali Provincial Government in 2009. However, this groundwater tax has already been reduced (around 300%) by Denpasar municipality and some regencies in Bali after the decentralization of tax collection for groundwater use. As for 2), the reduction of groundwater extraction is important for environmental sustainability, which is one of the expected effects of this wastewater reclamation project.

Table 10.f.5 Suggestions and Comments given by Stakeholders in the Workshops on the Inception and Interim Reports (1/2)

Meeting	Organization	Suggestion / Comment from the Organization	Answer
Inception Report Meeting (March 3, 2011)	PDAM (Badung)	<ol style="list-style-type: none"> 1) The existing distribution network for irrigation water in the BTDC area of Nusa Dua may be used for this project. 2) It is also possible to extend the existing distribution network to the surrounding areas of the BTDC area. 3) The corrosion of the pipes should be mitigated since the past sample water quality data of the reclaimed water in Tokyo has acidic property (pH 6.2~6.4). 	<p>As for 1) and 2), the facility plan of the project has been prepared base on these suggestions from PDAM Badung.</p> <p>As for 3), the proposed transmission pipe is HDPE which has high corrosion resistance against acid water. Moreover, addition of alkaline agent will be considered to meet the Indonesian water quality standards and to protect distribution and service pipes from corrosion as part of the water quality control.</p>
	Economic and Development Bureau (Bali)	<ol style="list-style-type: none"> 1) The wastewater reclamation business is subjected to the taxation on the use of water source like other others which use water sources. 	<p>The survey team understands the necessity of paying tax to Bali Provincial Government regarding the use of wastewater effluent which is a type of surface water. More discussion with the authorities is required to find out if a special tax rate can be applied to SPC like PDAM.</p>
First Interim Report Meeting (August 10, 2011)	BPPSPAM, DGHS, Public Works (Jakarta)	<ol style="list-style-type: none"> 1) If the PPP scheme of the project is BOT or bulk water supply, the demand risk is in Bali Provincial Government. Therefore, demand confirmation is very important. 	<p>Promotion activities to the hotels in the targeted areas and the confirmation of their demand for the reclaimed water are planned to implement after this preparatory survey.</p>
	BAPPENAS (Jakarta)	<ol style="list-style-type: none"> 1) If the reclaimed water is sold as bulk water to PDAM, information on the price, water quality and value of reclaimed water is very important for PDAM. 2) It would require a purchase agreement between SPC and PDAM. 3) If the project will use BLUPAL facility, then BLUPAL should be a part of SPC. 4) The newspaper article says about the potential water crisis in Bali in 2015. So, the result of the survey should provide a solution to this issue. The start of service from 2016 in the implementation plan is too late. 5) The PPP contract should be signed before 2013, because the Governor of Bali will resign at 2014. The survey team should revise the implementation schedule. 	<p>As for 1), the price information is being discussed with PDAM Badung based on the results of the financial analysis on the project. The confirmation of the demand and the achievable water quality of the proposed wastewater reclamation process (in consideration of the effluent quality from the WWTP) takes time. These matters will be confirmed before the PPP contract.</p> <p>As for 2), the PPP contract may include the purchase agreement between SPC and PDAM Badung. Otherwise, it should be made separately.</p> <p>As for 3), an institutional arrangement, in which related BLUPAL staff can work as part of SPC, has been proposed in the preparatory survey.</p> <p>As for 4) and 5), the implementation schedule has been revised in order to follow these comments. Although the signing of the PPP contract is scheduled by 2013, the earliest possible timing of the start of the reclaimed water supply is considered to be 2016.</p>
	DINAS PU (Bali)	<ol style="list-style-type: none"> 1) The study should not only focus on Nusa Dua area but expand to Bena Harbor. 	<p>It has been confirmed in our demand survey and meetings with PDAM Denpasar that more water is required in Bena Harbor to clean fish (mostly after cutting for food processing) and supply multipurpose water to ships. But, the reclaimed water, which is not for holy water, drinking nor cooking, cannot be used very much in Bena Harbor.</p>

Table 10.f.5 Suggestions and Comments given by Stakeholders in the Workshops on the Inception and Interim Reports (2/2)

Timing	Sub-category	Suggestion / Comment from the Participants	Answer
Second Interim Report Meeting (August 25, 2011)	DINAS PU (Bali)	<ol style="list-style-type: none"> 1) The use of reclaimed water from BLUPAL is required as an alternative water source. 2) The interview survey should also target the hotel costumers or tourists. 3) It should be confirmed that the impact of using the reclaimed water at hotels for shower and bathing will not decrease the number of tourist visit Bali. 4) The use of reclaimed water in Japan does not include bathing and shower, but the proposed uses of the Level 2 reclaimed water in Bali includes them. Since it is imaginable that the tourists staying in the hotels expects high quality water, bad reputations from the tourists should be avoided if the Level 2 reclaimed water is used in the hotels. 	<p>As for 1), the survey team also recognizes the importance of this survey for the search of new alternative water sources.</p> <p>As for 2), the interview survey to tourists at this stage is difficult. Understandings of local organizations related to tourism should be obtained first. Then, understandings among the targeted hotels are required before explaining the project to the tourists staying in the hotels.</p> <p>As for 3), the negative impact of using the reclaimed water at the hotels will be further evaluated and sufficient mitigation measures will be proposed in the EIA.</p> <p>As for 4), The color, turbidity and odor of water are most recognizable and sensuous water quality parameters for the guests staying hotels. Therefore, it was proposed in this preparatory survey to supply the reclaimed water having water quality better than the Indonesian drinking water quality standards in terms of these important water quality parameters. Moreover, the amount of chlorine to be added to the reclaimed water at the wastewater reclamation plant will be control to make the chlorine concentration at the hotels suitable and preferable for the guests.</p>
	Human Settlement and Drinking Water Work Unit (Bali)	<ol style="list-style-type: none"> 1) Under the regulation (PP No 16/2005), all the water supplied by PDAM should be drinking water. Therefore, PDAM cannot supply drinking water (PDAM water) and the new clean water (the reclaimed water) separately. 2) Since HDPE pipe, which is preferable to keep good water quality, is proposed as transmission pipes in this project, it worries that the reclaimed water will be used as drinking water in the future. 	<p>As for 1), the Indonesian law firm commissioned by the survey team has tried to investigate. However, further discussions with related authorities are required to confirm the regality of the reclaimed water supply through PDAM.</p> <p>As for 2), both the PPP contract between Bali Provincial Government and SPC and the purchase contract between PDAM Badung and SPC should clarify that it is not acceptable to supply the reclaimed water for drinking, cooking nor holy water. The survey team has clearly explained this point to stakeholders.</p>

Table 10.f.6 Results of the Interview to Bali Tourism Board

Category	Question from the Survey Team	Answer from Bali Tourism Board
General Information about Bali Tourism Board	<ol style="list-style-type: none"> 1) How does Bali Tourism Board represent the hotels in Bali? 2) What kind of relationship does Bali Tourism Board have with Tourism Agency of Bali Provincial Government? 3) How long is the term of the chairman at Bali Tourist Board? 	<p>As for 1), Bali Tourism Board is an independent organization which is funded by the 11 member associations. The biggest association among them is Bali Hotel and Restaurant Association to which hotel and restaurant associations in Badung and Denpasar belong. BTDC is a member of Badung Hotel and Restaurant Association. Chief engineering associations belong to the hotel and restaurant associations at corresponding levels.</p> <p>As for 2), the relationship between Bali Tourism Board and Tourism Agency of Bali Provincial Government is partnership.</p> <p>As for 3), the term of the chairman is 5 years. The current chairman is in the first year of his third term.</p>
Expected Reactions from the Hotels in the Target Areas regarding the Wastewater Reclamation Project	<ol style="list-style-type: none"> 1) What does Bali Tourism Board think about the responses from the hotels in Nusa Dua, Benoa and Sawangan to this unconventional wastewater reclamation project which supply Level 2 water for shower, bath, toilet flush, etc.? (This question was asked after the explanation of proposed pipe arrangement and installation of water dispenser within the hotels). 2) Do you have any other concerns regarding the water quality of the reclaimed water? 3) What do you think about the possibility of facing harmful rumor about the reclaimed water? 	<p>As for 1), the hotels will accept the reclaimed water as long as the water quality of the reclaimed water meets international water quality standards and its price is reasonable. The price of the reclaimed water has to be at least less than the price of PDAM water. (The survey team explained that there are no international standards for reclaimed water quality and this preparatory survey set the target water quality based on the local water quality standards for pool and public bath and others.) The pipe system for the reclaimed water (to industries) has to be separated from the pipe system for PDAM water (to domestic users). Comparing to the domestic users, industries do not concern about the source of reclaimed water but concern more about whether or not the reclaimed water meets international water quality standards.</p> <p>As for 2), it is important for the reclaimed water not to cause itchy skin and other skin disorders to the customers staying in the hotels. The concentration of chlorine should be carefully controlled because chlorine may bleach colored hair or damage hair. Moreover, the building up of scale in boilers should be avoided by controlling the water quality of the reclaimed water. It is important because about 30% of the water used in hotels is hot water.</p> <p>As for 3), since the use of the reclaimed water is a recycle activity, the hotels can advertise it as ECO. Therefore, there is no need to worry about the harmful rumor. The hotels can sell the image of ECO well.</p>
Communication Strategy for Future Promotion, etc.	<ol style="list-style-type: none"> 1) What do you think is the best way of communicating with the hotels in the promotion of the reclaimed water? 2) What do you think about inviting the organizations related to the hotels to a site tour at the pilot wastewater reclamation plant inside Denpsar Wastewater Treatment Plant? 3) Do you think it is good idea to interview the tourists staying in the hotels directly in order to listen to their opinions regarding this reclaimed water project? 	<p>As for 1), first, it is necessary to explain more about the project to the organizations related to the hotels in the target areas including Housekeeping Association in Bali, Bali Hotel & Restaurant Association, Badung Hotel & Restaurant Association, Chief Engineering Association, etc.</p> <p>As for 2), it is a good idea to invite them to the pilot wastewater reclamation plant. Since the site tour is for the organization related to hotels, it is another idea to prepare good food for invitees.</p> <p>As for 3), Bali Tourism Board and Bali Hotel & Restaurant Association can assist the implementation of interviews to the tourists staying in the hotels.</p>
Others	<ol style="list-style-type: none"> 1) Do you have any suggestions regarding the reclaimed water project? 2) What is the background of Bali Tourism Board's strong opposition against the groundwater tax increase by Bali Provincial Government in 2009? Would you oppose a groundwater tax increase if the reclaimed water is available as an alternative water sources? 3) Do you think the hotels in the target areas already know about the water supply project being studied by K-Water? 	<p>As for 1), it seems better to improve the quality of the reclaimed water to meet the international water quality standards for drinking water and sell the reclaimed water as drinking water. (In response, the survey team explained that it was agreed between the Indonesian Government and JICA that the reclaimed water should not be used as drinking water and holy water.</p> <p>As for 2), Bali Tourism Board opposed the groundwater tax increase because it was not reasonable to increase the tax while PDAM were not supply enough water to hotels and there is no alternative water source other than groundwater. If the reclaimed water is available as an alternative water source, Bali Tourism Board would not oppose a groundwater tax increase.</p> <p>As for 3), K-Water has visited Bali Tourism Board. But they have not invited Bali Tourism Board to any public consultation meeting of their project. Therefore, it seems that the hotels in the target areas don't know about their project very much.</p>

**PowerPoint Presentations used in the Stakeholder Meeting
and the Interview to Bali Tourism Board**

< English Version >

Stakeholder Meeting in the Preparatory Survey on Application of Wastewater Reclaiming in Southern Bali Water Supply System in the Republic of Indonesia

Background of the Preparatory Survey on Application of Wastewater Reclaiming in Southern Bali

September 27, 2011

DINAS PU

1

Water Shortage in Southern Bali

Surface Water: Limited Water Intake Volume, Delay in the Development of Water Supply Facilities

Groundwater: Salination, Depletion

Serious Water Shortage in Southern Bali

Limiting the Area Coverage of Piped Water Supply, Limiting Domestic Water Usages, Limiting Economic Activities, Raising the Price of Water

2

Needs of Various Approaches

Past Plans of Water Supply Projects in Southern Bali

Water Recycle in Each Facility, Efficient Water Usages, Water Reclamation Projects, Reduction of Leakage, Restrictions on Groundwater Use

Solving the Water Shortage in Southern Bali

Legend:
 ① Klungkung Recovery (Lined Lines) Water Supply --- WTP 1000US at Prater ①
 ② Southern Bali Water Supply Project --- WTP 2000US at Prater ②
 --- WTP 3000US at Prater ③
 ③ Bali Southern Water Treatment Facility --- WTP 1000US at Prater ③
 --- WTP 3000US at Prater ④

3

Requests to JICA Survey Team on the Preparatory Survey

1. Formulating a Feasible Wastewater Reclamation Project using the Effluent of Denpasar Wastewater Treatment Plant
2. Planning It as a Public-Private-Partnership (PPP) Project
3. Not Considering Central Government Budget (APBN)
4. Reclaimed Water should be Clean and Ready to Use, but not "Drinking Water" and/or "Holly Water"
5. Considering the Cultural Background of Bali

4

Progress of the Survey and Discussions between the Indonesian and JICA Sides

Discussion on the Scope and Implementation Arrangements of the Survey, Dec. 2010

Discussion on the Inception Report, Feb. to Mar. 2011

Discussion on the Interim Report, Aug. 2011

This Stakeholder Meeting/ Public Consultation, Sep. 2011

Discussion on the Draft Final Report, Dec. 2011

Submission of Final Report, Feb. 2012

Many Interviews and Further Discussions (Internal and External) on Each Subject

5

The Following Presentations from the JICA Survey Team

- 1) Process of Environmental and Social Considerations in this Water Reclamation Project
- 2) Tentative Facility Plan for the Water Reclamation Project
- 3) Water Quality Control and Treatment Process
- 4) Evaluation of Potential Impacts and Mitigation Measures

6

Thank you for your attention.



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Process of Environmental and Social Considerations in this Project

September 27, 2011

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Steps of Environmental and Social Considerations



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EIA Requirements of PPP Projects in Indonesia

EIA-related Regulations in Indonesia

Main Points

1. This project should go through the EIA process because a new water transmission pipe which is more than 10km will be installed.

EIA (AMDAL) Procedure

- ① Preparation and Submission of a draft TOR (KA-ANDAL) by Proponent
- ② Review of the TOR by AMDAL Commission
- ③ Preparation and Submission of EIA Documents (ANDAL, RKL, RPL and Executive Summary) by Proponent
- ④ Detailed Review of the EIA Documents by AMDAL Commission
- ⑤ Approval of EIA, RKL and PRL documents by Appraiser Committee of EIA

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BAPENAS's New General Guidelines for Cooperation between Government and Business Enterprise in the Provision of Infrastructure (June 2010)

Main Points

2. The Indonesian side needs to prepare a draft KA-ANDAL in Indonesian based on the draft TOR of EIA to be prepared by the survey team.
3. The Indonesian side should conduct public consultations before the PPP contract.
4. The contractor of the PPP contract needs to implement EIA including socialization and get EIA approval.
5. The contractor have to conduct environmental management including socialization during the implementation of the project as well.

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Requirements from the JICA Side

JICA's New Guidelines for Environmental and Social Considerations (April 2010)

Main Points

1. Based on Related Indonesian Regulations
2. Information Disclosure by the Indonesian Side
3. Reflect Opinions of Stakeholders
4. Comparing Alternatives
5. Mitigating Negative Impacts

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Thank you for your attention.



Tentative Facility Plan for the Water Reclamation Project

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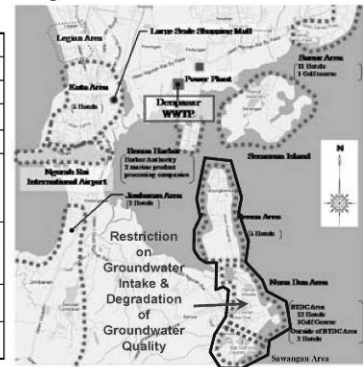
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Important Points of the Facility Plan

1. Based on an Interview Survey on Reclaimed Water
 - a. Target Area
 - b. Target Water Quality Level
 - c. Potential Supply Volume
2. Proposed Transmission and Distribution System
3. Alternative Reclaimed Water Supply Systems
4. Necessary of Promotion and Confirmation of Reclaimed Water Demand

Interview Survey on Reclaimed Water

Target
(1) Power Plant
(2) Airport
(3) Benoa Harbor
(4) Golf Courses
(5) Large-scale (four and five star) Hotels in Nusa Dua, Sawangan, Benoa, Sanur, Kuta and Jimbaran.
(6) New Resort Development (Serangan Island)
(7) Large Scale Shopping Mall
(8) Green Belt and Parks (DINAS DKP)



Target Levels for Reclaimed Water

Level 1 Reclaimed Water: drinking water and cooking water. ← Not Acceptable!

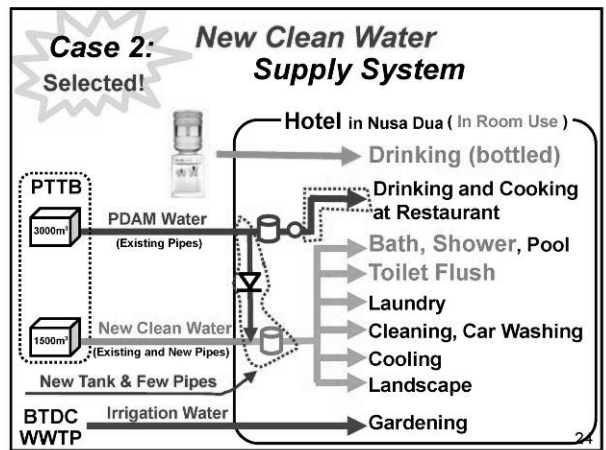
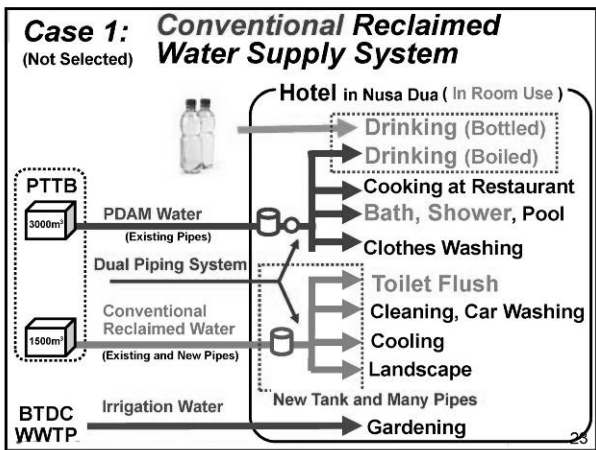
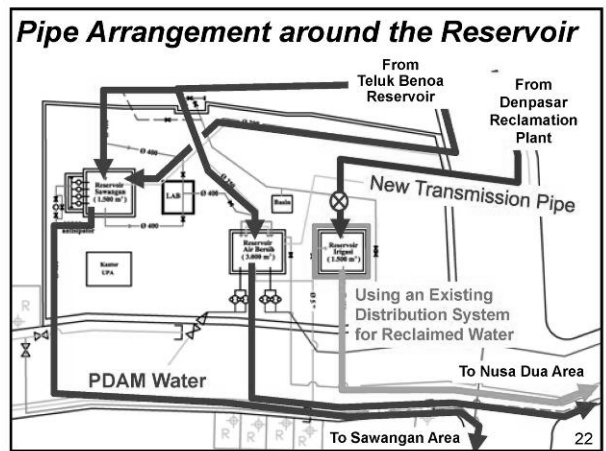
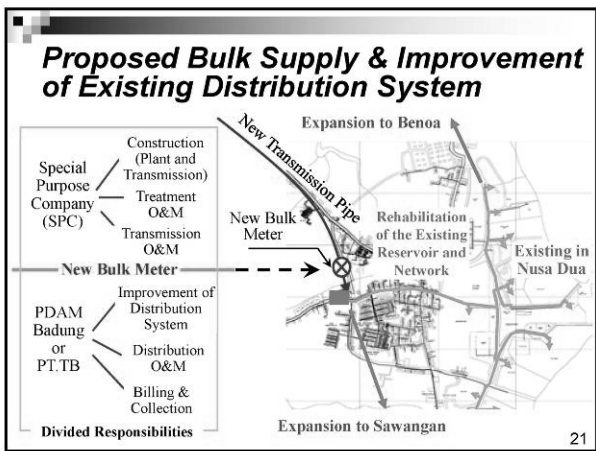
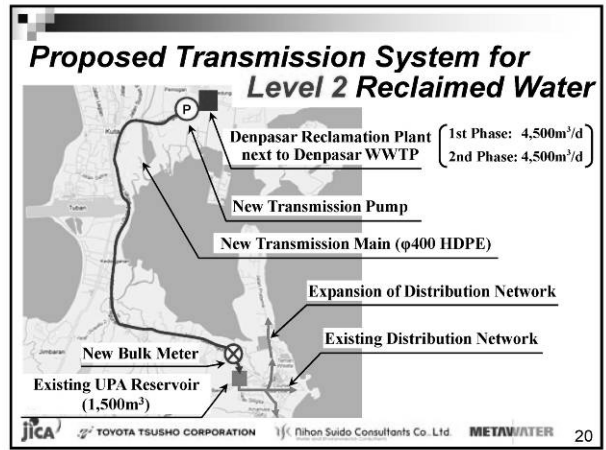
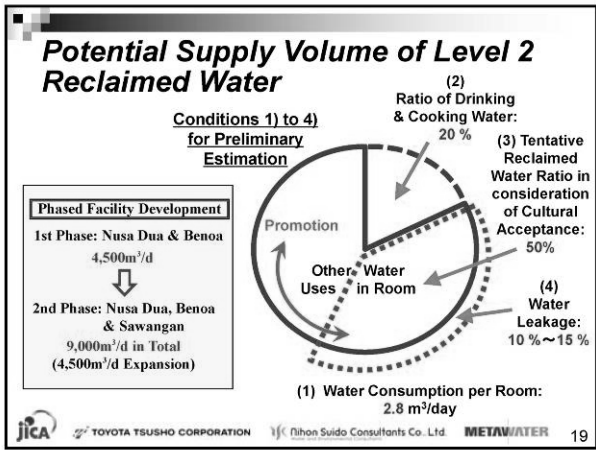
Level 2 Reclaimed Water: shower, bath, pool, hand washing, laundry, toilet flushing, etc. ← Interested, but dual piping is probably required.

Level 3 Reclaimed Water: landscaping and sprinkling only. ← Acceptable, but can buy it only for good price.

Questionnaire Survey at the Opening Ceremony of Pilot Water Reclamation Plant (47 respondents)



Purpose	Percentage of Yes (%)
Drinking	15
Cooking	32
Need	
Showering	57
Promotion	
Swimming Pool	51
Laundry	81
Toilet Flushing	96
Car Washing	87
Gardening	94
River Maintenance Flow	89



Promotion and Demand Confirmation

1. Promotion will be conducted after this preparatory survey (before the PPP contract)
2. The promotion targets hotels in Nusa Dua, Benoa and Sawangan
3. Enhanced demand should be confirmed quantitatively before the PPP contract (after the promotion).
4. Socialization to the hotels is also essential during the implementation of EIA

Thank you for your attention.



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Water Quality Control and Proposed Treatment Process

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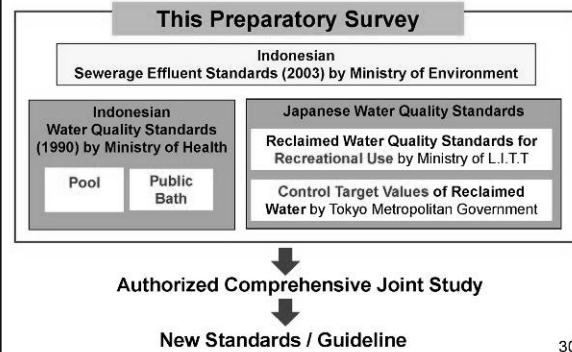
Measures of Water Quality Control

1. Water Quality Parameters
2. Proposed Cost-effective Reclamation Process
3. Water Quality Monitoring and Risk Management
4. Training Programs for Operation and Maintenance Staff

Current Situation of Water Quality Standard

1. Presently No Indonesian water quality standards or guidelines for reclaimed water
2. New standard/guideline, including administration procedure would be established by Indonesian government. Japanese government would cooperate and support for authorized comprehensive joint study.
3. Tentative target would be Indonesian water quality standards for pool and public bath and Japanese water quality standards of reclaimed water (central government's recreational and Tokyo's additional / extra)
4. Pilot testing is in operation. And detailed target, process control, and quality control should be discussed from testing results

Related Water Quality Standards



Water Quality Standard Reference Recreational Use (Japan)

Parameter	Toilet flushing	Sprinkling	Landscape use	Recreational use
E. Coli	Not detected / 100 mL	Not detected / 100 mL	Total coliform: 1000CFU/100mL	Not detected / 100 mL
Turbidity	2 or less (target value) ¹⁾			2 or less ¹⁾
pH	5.8 – 8.6			
Appearance	Good			
Color	N.A.	N.A.	40 or less	10 or less
Odor	Not offensive			
Residual Chlorine	free: 0.1 mg/L or combined: 0.4 mg/L	free: 0.1 mg/L or combined: 0.4 mg/L	N.A.	free: 0.1 mg/L or combined: 0.4 mg/L

Notes
1) Unit: mg-kaolin equivalent/L
2) Source: Manual on the Reclaimed Wastewater Quality Criteria (April 2005)

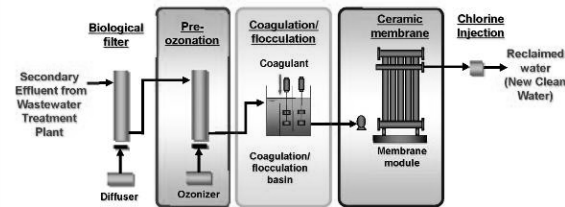
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Control Target Values of Reclaimed Water Quality (Tokyo Metropolitan Government)

Parameter	More stringent target by TMG
E.Coli	Undetected
Turbidity	1 degree or less
pH	in a rage of between 5.8 and 8.6
Appearance	Good
Color	3 degree or less
Odor	Not offensive
Residual Chlorine	Free residual chlorine 0.1mg/L or Combined residual chlorine more than 0.4 mg/L
Facility Standard	Same or higher level of treatment facility of coagulation, sedimentation and sand filtration processes shall be applied.

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Proposed Flow of Cost-effective Reclamation Process (METAWATER)



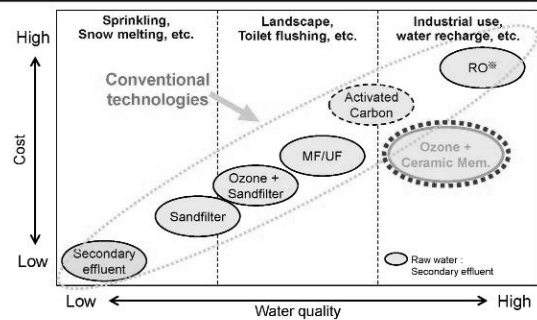
*Co-Developed with Bureau of Sewerage of Tokyo Metropolitan Government (TMG)

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Position of Proposed Reclamation Process

Production of "high quality" & "low cost" reclaimed water



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Pilot Plant for Water Reclamation



Denpasar WWTP



Pilot Water Reclamation Plant



Inside the Pilot Water Reclamation Plant (METAWATER's Process)

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Example Reclaimed Water Quality

		Reclaimed Water Standard		Raw water (Secondary Effluent)	Reclaimed Water (METAWATER)
		Japan recreational water	CA, USA unrestricted recreational		
SS	mg/L	---	---	0 - 2	<1
COD _{Mn}	mg/L	---	---	6 - 13	2 - 6
DOC	mg/L	---	---	3 - 8	3 - 6
T-P	mg/L	---	---	0.1 - 0.8	<0.1
Color	unit	<10	---	10 - 22	0 - 2
Turbidity	NTU	<2	2 (ave.)	1 - 3	<0.1
Coliform	/100mL	N.D.	2.2 (ave.)	150 - 4600	N.D.

Reclaimed water quality satisfies Japanese recreational standard and California's unrestricted recreational standard.

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Water Quality Monitoring and Risk Management

The following would be considered and discussed with related organization (ex. government, municipalities, etc.):

1. Making an fail safe system in case of water source accident
2. As a method of risk management, fish monitoring will be introduced.
3. External monthly water sampling and water quality tests for specific water quality parameters
4. Internal daily water quality tests on important water parameters using the laboratory in the Denpasar wastewater treatment plant
5. Information disclosure regarding the results of water quality tests through SPC's homepage
6. Water quality monitoring at the reclamation treatment plant and the distribution reservoir in Nusa Dua.



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Training of Operation & Maintenance Staff for Water Quality Control

The following would be considered and discussed with related organization (ex. government, municipalities, etc.):

1. The full-scale water reclamation plant can be operated by the staff of BLUPAL who have been involved in the operation of the pilot plant.
2. Intensive training after the construction of full-scale water reclamation plant
3. Continuous training during the operation of facilities
4. Clear work responsibilities of each staff
5. Issuing certificates of work quality control for technical staff by certain organization (ex. government)



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Evaluation of Potential Impacts and Mitigation Measures

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Topics of this Last Presentation

- I. Positive Impacts
- II. Sufficient Mitigation of Potential Impact
- III. Pre-conditions & Items of the EIA
- IV. Reflecting Your Opinions



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I. Positive Impacts

1. Less and better effluent from the WWTP
 - a. Less effluent discharged into the environment due to the use of effluent for the water reclamation project
 - b. Better effluent quality due to required stabilization of sewerage effluent quality
2. Less depletion and salination of ground water
3. More water for domestic water users



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4. Bottle water dispenser attracts tourists

- Cold and hot water any time as much as they want
- No need to worry about buying extra bottle water outside
- Safer for making coffee and tea

5. Creation of job opportunities

6. Technology transfer on water reclamation

7. Alternative water supply for the future



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II. Sufficient Mitigation of Potential Impacts


(1) Land Acquisition and Construction of the Water Reclamation Plant

Potential Impacts

- Current temporally land uses
- The power lines over the WWTP

Possible Mitigation Measures

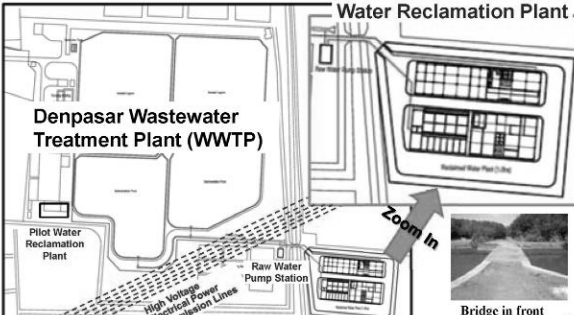
- Early identification of land uses and users for consultation and compensation (if necessary)
- Not designing any facilities under the power lines



44

Layout of the Water Reclamation Plant

Proposed Layout of Water Reclamation Plant



Denpasar Wastewater Treatment Plant (WWTP)

Pilot Water Reclamation Plant

Raw Water Pump Station

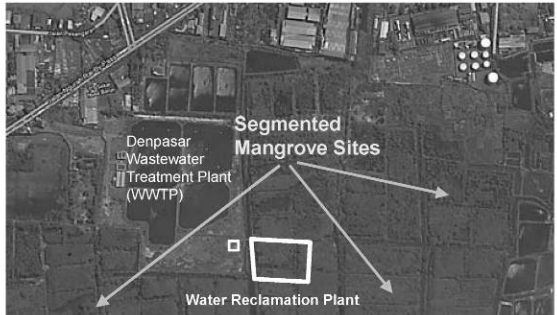
Full-scale Water Reclamation Plant

High Voltage Electrical Power Transmission Lines

Bridge in front of the Mangrove

45

Surrounding Environment of the Water Reclamation Plant



Denpasar Wastewater Treatment Plant (WWTP)

Segmented Mangrove Sites

Water Reclamation Plant

46


(2) Installation of the Water Transmission and Distribution Pipes

Potential Impacts

- Traffic congestion

Possible Mitigation Measures

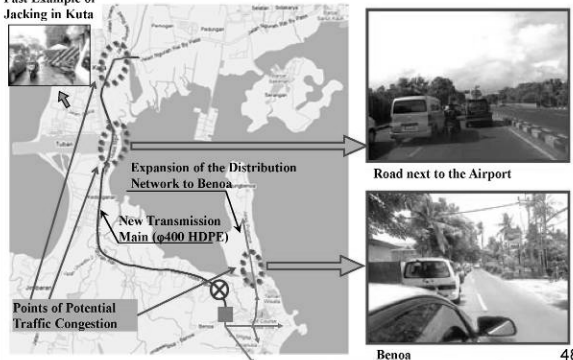
- Pipe installation during night
- Jacking method
- Pipes easy to install (HDPE)
- Traffic control at the site
- Socialization including early notification
- Changing the route of transmission line if necessary



47

Points of Potential Traffic Congestion

Past Example of Jacking in Kuta



Expansion of the Distribution Network to Benoa

New Transmission Main (ø400 HDPE)

Points of Potential Traffic Congestion

Road next to the Airport

Benoa

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(3) Legal, Technical and Organizational Aspects of the Reclaimed Water

Potential Impacts

1. Water quality

Possible Mitigation Measures

1. Setting reclaimed water quality standards (if required)
2. Monthly and daily measurement of water parameters
3. Controlling residual chlorine concentration at reclaimed water users
4. Fish monitoring for risk management
5. Training for the operation & maintenance staff for water quality control



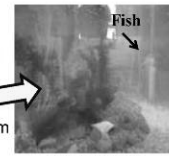
49

Possible Mitigation Measures (Continued)

6. Clear responsibilities of BLUPAL, SPC and PDAM
7. Stabilization of the effluent quality of Denpasar WWTP
8. Cleaning of the existing distribution pipes
9. Inspection and enforcement of the compliance of wastewater discharge standards for domestic and industrial water users (manly for tourism).



Fish Monitoring at the Pilot Plant



Fish in the Tank



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(4) Cultural and Commercial Aspects of the Reclaimed Water

Potential Impacts

1. Complains
2. Harmful Rumor

Possible Mitigation Measures

1. Information disclosure of the results of monthly and daily water quality tests on the web page of SPC
2. Socialization during the EIA, construction and operation.



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Possible Mitigation Measures (continued)

3. Providing better water than drinking water in terms of color, odor and turbidity.
4. Promotion (study tour to the pilot plant and/or full-scale water reclamation plant, issuing of eco certificate, eco advertisement, usage of posters, stickers, paintings, etc.)
5. Demand confirmation targeting the hotels before the signing of PPP contract



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III. Preconditions & Items of the EIA

Pre-conditions

1. Confirmation of the feasibility of the project by the Indonesian side
2. Quantitative demand confirmation after the promotion
3. Stabilizing the effluent quality from Denpasar WWTP
4. New reclaimed water standards (if necessary)
5. Submission of KA-ANDAL after reviewing the draft TOR for EIA & Public Consultation by the Indonesian side



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Work Items

1. Re-confirmation of the legal compliance regarding valid Indonesian water quality standards and others.
2. Evaluation of target water quality
3. Review of the risk evaluation on drinking by mistake
4. Socialization
5. EIA summary report and main report
6. Environmental Management Report
7. Environmental Monitoring Report
8. Implementation of the Environmental Management and Monitoring

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IV. Reflecting Your Opinions

1. The Interviews to Potential Reclaimed Water User during the Preparatory Survey
2. The Continuous Discussions between the Indonesian Side (Central & Bali) and JICA Side
3. Questionnaire Responses at the Opening Ceremony
4. Discussions & Suggestion Sheet Responses in this Stakeholder Meeting
5. Discussions during the Coming Promotion
6. Public Consultation before Signing the PPP Contract
7. Socialization during the EIA

Thank you for your attention.



Question & Answer



< Indonesian Version >

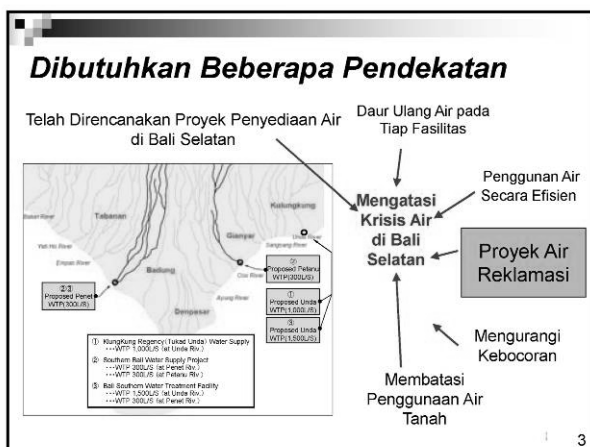
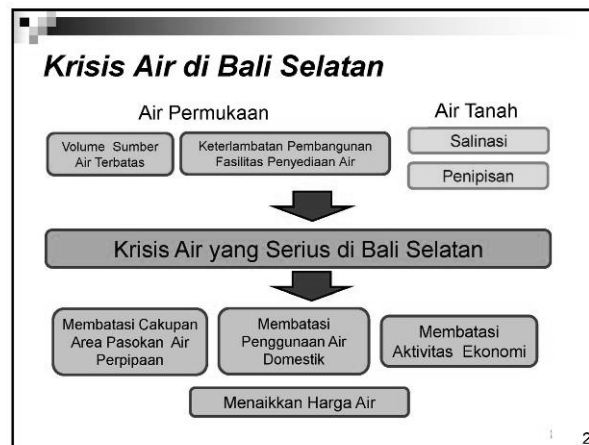
Pertemuan Para Pemangku Kepentingan terkait Survei Persiapan Penerapan Penggunaan Kembali Air Limbah pada Sistem Penyediaan Air di Bali Selatan di Republik Indonesia

Latarbelakang Survei Persiapan Penerapan Penggunaan Kembali Air Limbah pada Sistem Penyediaan Air di Bali Selatan

27 September 2011

DINAS PU

1



- ### Permintaan kepada Tim Survei JICA untuk Survei Persiapan
1. Mempersiapkan Proyek Penggunaan Kembali Air Limbah yang Layak dengan Menggunakan Efluen Instalasi Pengolahan Air Limbah Denpasar
 2. Perencanaan ini sebagai Proyek Kerjasama Pemerintah Swasta (KPS)
 3. Tidak Menggunakan Anggaran Pemerintah (APBN)
 4. Air Reklamasi harus Bersih, Siap Digunakan, tetapi Tidak Untuk Air Minum dan/atau Air Suci
 5. Mempertimbangkan Latar Belakang Budaya Bali
- 4



- ### Presentasi Tim Survei JICA Selanjutnya
- 1) Proses Pertimbangan Lingkungan dan Sosial dari Proyek Reklamasi Air Limbah ini
 - 2) Fasilitas Tentatif dari Rencana Proyek Air Reklamasi
 - 3) Kontrol Kualitas Air dan Usulan Proses Pengolahan
 - 4) Evaluasi Dampak Potensial dan Tindakan Mitigasi
- 6

Terimakasih Atas Perhatiannya.






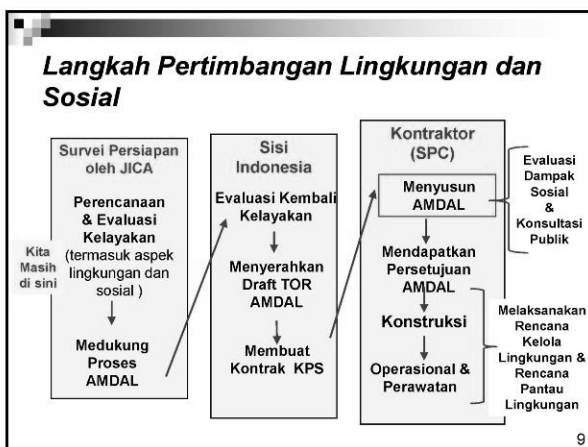
Pertemuan Para Pemangku Kepentingan terkait Survei Persiapan Penerapan Penggunaan Kembali Air Limbah pada Sistem Penyediaan Air di Bali Selatan di Republik Indonesia

Proses Pertimbangan Lingkungan dan Sosial dari Proyek.

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Persyaratan AMDAL Proyek KPS di Indonesia

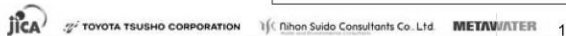
Peraturan tentang AMDAL dan yang terkait di Indonesia

Poin Utama

1. Proyek ini harus melalui proses AMDAL karena akan membangun jaringan pipa air dengan panjang lebih dari 10 Km

Prosedur AMDAL


- ① Penyusunan dan Penyerahan draft TOR (KA-ANDAL) oleh Pemrakarsa
- ② Penilaian TOR(KA-ANDAL) oleh Komisi AMDAL
- ③ Penyusunan dan Penyerahan dokumen AMDAL (ANDAL, RKL, RPL dan Ringkasan Eksekutif) oleh Pemrakarsa
- ④ Pembahasan Detail Dokumen AMDAL oleh Komisi AMDAL
- ⑤ Rekomendasi Kelayakan Lingkungan ANDAL, RKL, RPL oleh Komisi AMDAL



Panduan Umum BAPPENAS tentang Pelaksanaan Kerjasama antara Pemerintah dan Badan Usaha dalam Penyediaan Infrastruktur (Juni 2010)

Poin Utama

2. Pihak Indonesia perlu menyusun draft KA-ANDAL dalam bahasa Indonesia berdasarkan draft TOR (KA-ANDAL) yang disiapkan Tim Survei JICA
3. Pihak Indonesia harus melaksanakan Konsultasi Publik Sebelum dilaksanakan Kontrak KPS
4. Kontraktor KPS perlu melaksanakan penyusunan AMDAL termasuk Sosialisasi dan mendapatkan Rekomendasi AMDAL.
5. Kontraktor harus melaksanakan Rencana Kelola dan Pantau Lingkungan termasuk Sosialisasi saat implementasi Proyek



Persyaratan dari Sisi JICA


Pedoman Baru JICA tentang Pertimbangan Lingkungan dan Sosial (April 2010)

Poin Utama

1. Berdasarkan Peraturan Indonesia yang terkait
2. Keterbukaan Informasi oleh pihak Indonesia
3. Mempertimbangkan Pendapat Para Pemangku Kepentingan
4. Membandingkan Beberapa Alternatif
5. Mitigasi Dampak Negatif



Terimakasih Atas Perhatiannya.



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Pertemuan Para Pemangku Kepentingan terkait Survei Persiapan Penerapan Penggunaan Kembali Air Limbah pada Sistem Penyediaan Air di Bali Selatan di Republik Indonesia

Rencana Fasilitas Tentatif Proyek Instalasi Air Reklamasi

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Poin Penting dari Rencana Fasilitas

- Berdasarkan Survei Wawancara tentang Air Reklamasi
 - Sasaran Areal
 - Sasaran Tingkat Kualitas Air
 - Volume Penyediaan Potensial
- Usulan Sistem Transmisi dan Distribusi
- Sistem Penyediaan Air Reklamasi Alternatif
- Diperlukan Promosi dan Konfirmasi Permintaan Air Reklamasi

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Survei Wawancara tentang Air Reklamasi

Sasaran
(1) Pembangkit Listrik
(2) Bandara
(3) Pelabuhan Benoa
(4) Lapangan Golf
(5) Hotel skala besar (bintang lima dan empat) di Nusa Dua, Sawangan, Benoa, Sanur, Kuta dan Jimbaran.
(6) Pengembangan Resor Baru (Kawasan Serangan)
(7) Pusat Perbelanjaan Skala Besar
(8) Kawasan Ruang Hijau dan Taman (DINAS DKP)



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Tingkat Sasaran Air Reklamasi

Tingkat 1 Air Reklamasi: Air Minum dan Air Memasak ← Tidak Diterima!

Tingkat 2 Air Reklamasi: bilas, mandi, kolam, cuci tangan, laundry, siram toilet, dll. ← Tertarik, tetapi memerlukan pemasangan pipa ganda.

Tingkat 3 Air Reklamasi: hanya pertamanan dan penyiraman. ← Diterima, tetapi akan membeli dengan harga yang baik.

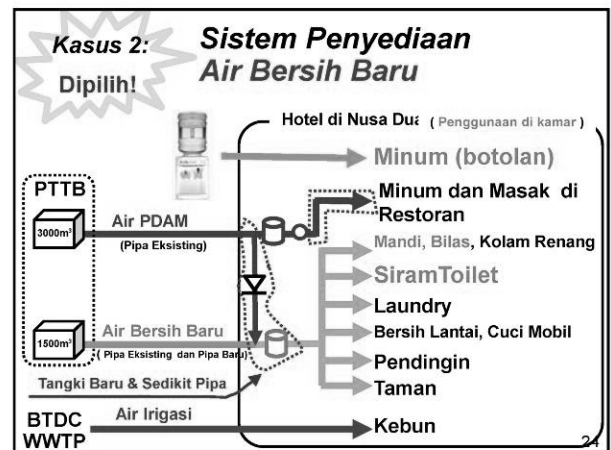
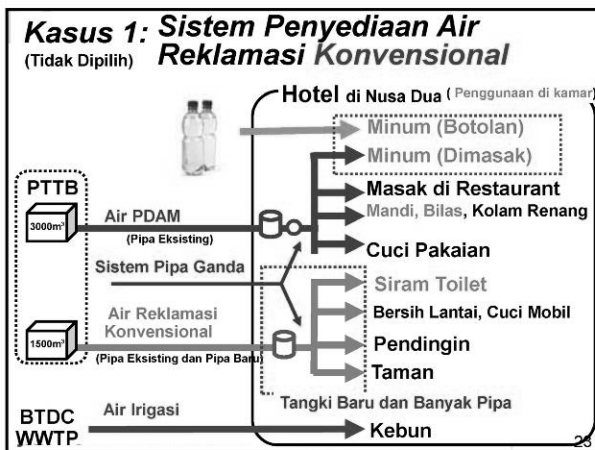
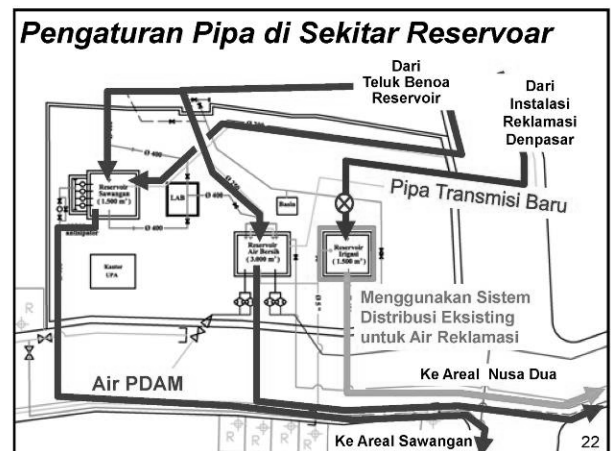
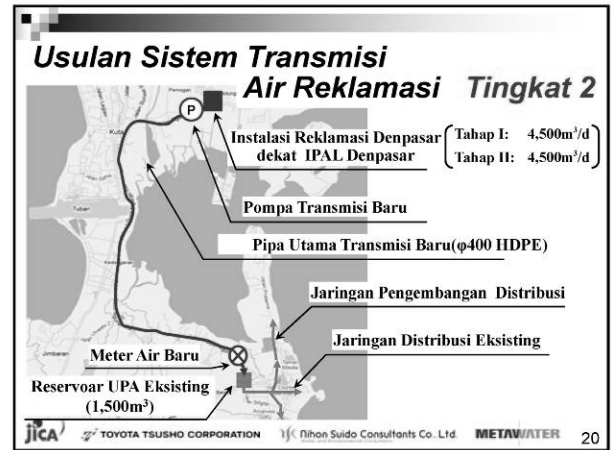
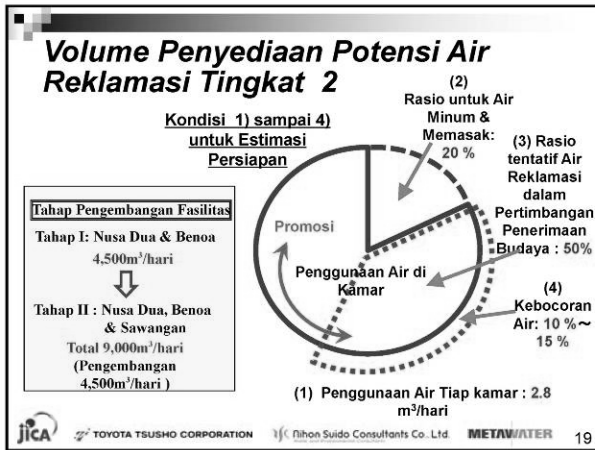
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Survei Kuisisioner saat Upacara Pembukaan Unit Pilot Test (47 responden)



Penggunaan	Persentase (%)	
Minum	15	
Masak	32	
Perlu Promosi	Mandi	57
	Kolam Renang	51
Laundry	81	
Siram Toilet	96	
Cuci Mobil	87	
Pertamanan	94	
Pemeliharaan Arus Sungai	89	

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Promosi dan Konfirmasi Permintaan

1. Promosi akan dilaksanakan setelah survei persiapan ini (sebelum kontrak KPS)
2. Sasaran promosi adalah hotel di Nusa Dua, Benoa dan Sawangan
3. Peningkatan permintaan harus dikonfirmasi secara kuantitatif sebelum kontrak KPS (sesudah pelaksanaan promosi).
4. Sosialisasi ke hotel-hotel sangat penting selama pelaksanaan AMDAL

Terimakasih atas perhatiannya.



Pertemuan Para Pemangku Kepentingan terkait Survei Persiapan Penerapan Penggunaan Kembali Air Limbah pada Sistem Penyediaan Air di Bali Selatan di Republik Indonesia

Kontrol Kualitas Air dan Usulan Proses Pengolahan

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Tindakan Kontrol Kualitas Air

1. Parameter Kualitas Air
2. Usulan Biaya Efektif Proses Reklamasi
3. Pemantauan Kualitas Air dan Pengelolaan Resiko
4. Program Pelatihan Staf Operasi dan Pemeliharaan

Situasi Terkini tentang Standar Kualitas Air

1. Saat ini belum ada pedoman atau standar kualitas air untuk air reklamasi di Indonesia
2. Pedoman/standar baru, termasuk prosedur administrasi akan dibuat oleh pemerintah Indonesia. Pemerintah Jepang akan bekerjasama dan membantu dalam melaksanakan studi gabungan yang komprehensif dan resmi.
3. Sasaran tentatif akan menggunakan standar kualitas air untuk kolam renang dan permandian umum di Indonesia dan standar kualitas air untuk air reklamasi di Jepang (standar pemerintah pusat untuk rekreasi dan tambahan untuk penggunaan di Tokyo)
4. Unit Pilot Test sedang dioperasikan. Dan target terperinci, kontrol proses, dan kontrol kualitas akan didiskusikan dari hasil pengujian.

Standar Kualitas Air Yang terkait



Referensi Standar Kualitas Air untuk penggunaan Rekreasi (Jepang)

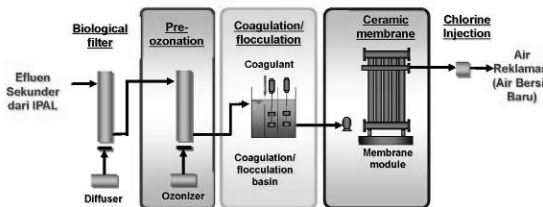
Parameter	Siram Toilet	Penyiraman	Pertamanan	Rekreasi
E. Coli	Tidak terdeteksi / 100 mL	Tidak terdeteksi / 100 mL	Total coliform: 1000CFU/100mL	Tidak terdeteksi / 100 mL
Kekeruhan	2 atau kurang (sasaran nilai) ¹⁾			2 atau kurang ¹⁾
pH	5,8 – 8,6			
Penampilan	Baik			
Warna	N.A.	N.A.	40 atau kurang	10 atau kurang
Bau	Tidak Berbau			
Sisa Chlorine	free: 0.1 mg/L or combined: 0.4 mg/L	free: 0.1 mg/L or combined: 0.4 mg/L	N.A.	free: 0.1 mg/L or combined: 0.4 mg/L

Catatan
 1) Satuan: mg-kaolin equivalent /L
 2) Sumber: Manual on the Reclaimed Wastewater Quality Criteria (April 2005)

Kontrol Sasaran Nilai untuk Kualitas Air Reklamasi (Pemerintah Kota Tokyo)

Parameter	Lebih ketat dari sasaran TMG
E.Coli	Tidak terdeteksi
Kekeruhan	1 derajat atau kurang
pH	Antara 5.8 dan 8.6
Penampilan	Baik
Warna	3 derajat atau kurang
Bau	Tidak menyengat
Residu Chlorine	Sisa bebas chlorine 0.1mg/L atau kombinasi residu chlorine lebih dari 0.4 mg/L
Standar Fasilitas	Tingkat yang sama atau lebih tinggi dari fasilitas pengolahan proses filtrasi koagulasi, sedimentasi dan saringan pasir harus diterapkan

Usulan Alur Biaya Efektif Proses Reklamasi (METAWATER)

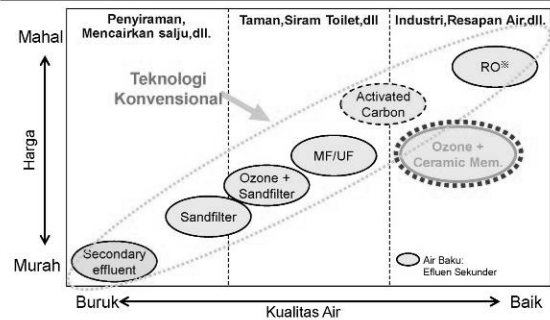


*Co-Developed with Bureau of Sewerage of Tokyo Metropolitan Government (TMG)

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Posisi Instalasi Pengolahan yang Diusulkan

Produksi air reklamasi "kualitas tinggi" & "harga murah"



Unit Test Instalasi Air Reklamasi



Unit Test Instalasi Air Reklamasi

Didalam Unit Test Instalasi Air Reklamasi (Proses oleh METAWATER)

Contoh Kualitas Air Reklamasi

		Standar Air Reklamasi		Raw water (Efluen Sekunder)	Air Reklamasi (METAWATER)
		Jepang Air Rekreasi	CA, USA Rekreasi yang Diperbolehkan		
SS	mg/L	---	---	0 - 2	<1
COD _{1h}	mg/L	---	---	6 - 13	2 - 6
DOC	mg/L	---	---	3 - 8	3 - 6
T-P	mg/L	---	---	0.1 - 0.8	<0.1
Warna	unit	<10	---	10 - 22	0 - 2
Kekeruhan	NTU	<2	2 (ave.)	1 - 3	<0.1
Coliform	/100mL	N.D.	2.2 (ave.)	150 - 4600	N.D.

Kualitas air reklamasi memenuhi standar air rekreasi di Jepang dan standar air untuk rekreasi yang diperbolehkan di California

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Pemantauan Kualitas Air dan Manajemen Resiko

Berikut ini akan di pertimbangkan dan didiskusikan dengan instansi terkait (misalnya: pemerintah, pemkot,dll)

1. Membuat sistem yang aman dari kesalahan dalam kasus kecelakaan sumber air
2. Sebagai metode manajemen resiko, akan diperkenalkan pemantauan menggunakan ikan
3. Pengujian mutu air oleh instansi eksternal setiap bulan untuk beberapa parameter yang spesifik
4. Pengujian mutu air setiap hari secara internal menggunakan laboratorium di IPAL Denpasar untuk beberapa parameter yang penting.
5. Keterbukaan informasi mengenai hasil pengujian mutu air melalui situs SPC
6. Pemantauan kualitas air di instalasi pengolahan air reklamasi dan reservoar distribusi di Nusa Dua.

Pelatihan Staf Operasional & Pemeliharaan untuk Pemantauan Kualitas Air

Berikut ini akan di pertimbangkan dan didiskusikan dengan instansi terkait (misalnya: pemerintah, pemkot,dll)

1. Instalasi air reklamasi secara penuh akan dioperasikan oleh staf BLUPAL yang terlibat dalam operasional pilot plant.
2. Pelatihan intensif dilaksanakan setelah konstruksi keseluruhan instalasi pengolahan air reklamasi
3. Pelatihan secara terus menerus saat instalasi sudah dioperasikan
4. Kejelasan terhadap tanggung jawab pekerjaan setiap staf
5. Penerbitan sertifikat kontrol kualitas kerja bagi staf teknis oleh organisasi tertentu (misalnya: dari pemerintah)

Terimakasih atas perhatiannya.



Pertemuan Para Pemangku Kepentingan terkait Survei Persiapan Penerapan Penggunaan Kembali Air Limbah pada Sistem Penyediaan Air di Bali Selatan di Republik Indonesia

Evaluasi terhadap Dampak Potensial dan Tindakan Mitigasi

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Topik untuk Presentasi Terakhir

- I. Dampak Positif
- II. Tindakan Mitigasi untuk Dampak Potensial
- III. Pra-kondisi & Produk dari AMDAL
- IV. Refleksi Opini Anda

I. Dampak Positif

1. Efluen dari IPAL berkurangnya jumlahnya dan meningkat mutunya.
 - a. Berkurangnya efluen yang dibuang ke lingkungan akibat pemanfaatan efluen untuk proyek air reklamasi
 - b. Kualitas efluen semakin baik karena diperlukan kestabilan kualitas efluen
2. Mengurangi penipisan dan salinasi air tanah
3. Tambah air untuk penggunaan domestik




4. Dispenser Air Botolan menarik perhatian wisatawan

- Air panas dan dingin tersedia kapan saja sebanyak yang diinginkan
- Tidak perlu khawatir membeli air botolan/kemasan tambahan di luar
- Aman untuk membuat kopi dan teh

5. Peluang lowongan pekerjaan

6. Alih teknologi tentang air reklamasi

7. Penyediaan sumber air alternatif bagi masa depan



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II. Tindakan Mitigasi Yang Sesuai untuk Dampak Potensial

(1) Pengadaan Lahan dan Konstruksi Instalasi Air Reklamasi

Dampak Potensial

- Pemanfaatan lahan saat ini
- Jaringan listrik di atas IPAL

Kemungkinan Tindakan Mitigasi

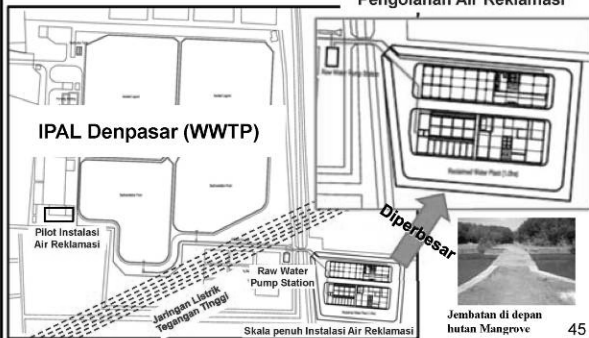
- Identifikasi awal tata guna lahan dan pengguna lahan untuk konsultasi dan kompensasi (jika diperlukan)
- Tidak merancang bangunan di bawah jaringan listrik



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Layout Instalasi Pengolahan Air Reklamasi

Usulan Layout Instalasi Pengolahan Air Reklamasi



45

Kondisi Lingkungan Sekitar Instalasi Air Reklamasi



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(2) Pemasangan pipa distribusi dan transmisi air

Dampak Potensial

- Kemacetan lalu lintas

Kemungkinan Tindakan Mitigasi

- Pemasangan pipa pada malam hari
- Metode Jacking
- Pipa yang mudah dipasang (HDPE)
- Pengaturan lalu lintas setempat
- Sosialisasi dan pengumuman awal
- Mengubah rute pipa transmisi jika diperlukan



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Titik Potensi Kemacetan Lalu Lintas


Contoh Metode Jacking di Kuta



Pengembangan jaringan Distribusi ke Tanjung Benoa

Transmisi Utama Baru (ø400 HDPE)

Titik Berpotensi Kemacetan Lalu Lintas



Jalan dekat Airport

Benoa

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(3) Aspek Hukum, Teknis dan Organisasi Air Reklamasi

Dampak Potensial

1. Kualitas Air

Kemungkinan Tindakan Mitigasi

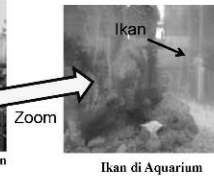
1. Menetapkan standar kualitas air reklamasi (jika diperlukan)
2. Pengukuran parameter kualitas air setiap bulan dan harian
3. Pengendalian residu klorin pada pengguna air reklamasi
4. Manajemen resiko dengan pemantauan menggunakan ikan
5. Pelatihan pengendalian kualitas air bagi petugas operasional & pemeliharaan



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Kemungkinan Tindakan Mitigasi (Lanjutan)

6. Tanggungjawab yang jelas antara BLUPAL, SPC dan PDAM
7. Stabilisasi kualitas efluen IPAL Denpasar
8. Pembersihan pipa distribusi yang ada
9. Pemeriksaan dan penegakan kepatuhan pembuangan air limbah bagi pengguna domestik dan industri (terutama untuk pariwisata)



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(4) Aspek Komersial dan Budaya Air Reklamasi

Dampak Potensial

1. Keluhan
2. Rumor Berbahaya

Kemungkinan Tindakan Mitigasi

1. Keterbukaan informasi hasil pengujian mutu air bulanan dan harian melalui situs SPC
2. Sosialisasi pada pelaksanaan AMDAL, konstruksi dan operasional



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Kemungkinan Tindakan Mitigasi (lanjutan)

3. Menyiapkan air yang lebih baik terkait warna, bau, dan kekeruhan.
4. Promosi (studi tour ke unit pilot test dan instalasi pengolahan air reklamasi, menerbitkan sertifikat lingkungan, iklan lingkungan, poster, stiker, gambar, dll.)
5. Konfirmasi permintaan terhadap air reklamasi dengan sasaran hotel sebelum penandatanganan kontrak KPS



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III. Prakondisi & Produk dari AMDAL

Prakondisi

1. Konfirmasi kelayakan proyek oleh pihak Indonesia
2. Konfirmasi permintaan secara kuantitatif setelah promosi
3. Menstabilkan kualitas efluen dari IPAL Denpasar
4. Standar baru air reklamasi (jika perlu)
5. Penyampaian KA-ANDAL setelah mengkaji TOR AMDAL & Konsultasi Publik oleh pihak Indonesia

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Produk Pekerjaan

1. Re-konfirmasi dari kepatuhan hukum yang berlaku di Indonesia tentang standar kualitas air dan lain-lain.
2. Evaluasi sasaran kualitas air
3. Kajian terhadap kemungkinan air terminum secara tidak sengaja
4. Sosialisasi
5. Laporan Utama dan Ringkasan Eksekutif AMDAL
6. Laporan Rencana Pengelolaan Lingkungan
7. Laporan Rencana Pemantauan Lingkungan
8. Pelaksanaan Rencana Kelola dan Pantau Lingkungan

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IV. Merefleksikan Opini Anda

1. Wawancara terhadap Pengguna Potensial Air Reklamasi saat Survei Persiapan
2. Diskusi Berkesinambungan antara pihak Indonesia (Pemerintah Pusat & Bali) dengan pihak JICA
3. Tanggapan Kuisioner saat Upacara Pembukaan
4. Diskusi & Tanggapan Lembar Saran saat Pertemuan Para Pemangku Kepentingan ini
5. Diskusi saat Promosi yang Akan Datang
6. Konsultasi Publik sebelum Penandatanganan Kontrak KPS
7. Sosialisasi saat pelaksanaan AMDAL



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Terimakasih atas perhatiannya.



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Tanya & Jawab



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APPENDIX 11

A DRAFT TOR FOR THE EIA

APPENDIX 11 A DRAFT TOR FOR THE EIA

This appendix is a draft Terms of Reference (TOR) prepared by the JICA survey team for the EIA on the proposed reclaimed water project. The Indonesian side (DINAS PU/Bali Provincial Government) needs to review and modify this draft TOR into the form of draft KA-ANDAL (i.e draft TOR/Implementation Plan of EIA) including its translation into Indonesian. They also need to submit the draft KA-ANDAL to the Environmental Board of Bali Provincial Government (BALH). The preparation of the draft KA-ANDAL should follow the guidelines for the preparation of environmental impact assessment (Ministry of Environment Regulation No. 8 of 2006). This appendix (a draft TOR for the EIA) is also prepared in reference to the guidelines. The KA-ANDAL should be finalized by the SPC based on the comments given by the AMDAL commission as seen in Figure 14.3.1 of Chapter 14 in the main report.

11.a Introduction

(1) Background of the Project

Please refer to 9.a of Appendix 9 (Detailed Project Activity Plan).

(2) Objectives and Benefits of the Project

Please refer to 9.b of Appendix 9.

(3) Related Regulations

Please refer to 14.2 (Related Laws and Regulations in Indonesia and Bali Province) and 14.3 (Procedures of Environmental Appraisal for PPP Projects in Indonesia) of the main report.

11.b Scope of the Project and the EIA

(1) Scope of the Project and Alternative Project Components

Please refer to 9.c of Appendix 9.

(2) Maps and Environmental and Social Descriptions of the Project Sites

Please refer to 9.d of Appendix 9.

(3) Results of the Initial Environmental Examination

Please refer to Appendix 10 (Environmental Effect Report).

(4) Objectives of the EIA Study

The general objectives of the EIA are to predict the environmental impacts, which may be caused by implementing the proposed project, to propose the countermeasures to minimise the probable adverse impacts through the mitigation measures and environmental management, and to acquire environmental license for the implementation of the project.

(5) Scope of the EIA Study

According to Indonesian AMDAL (EIA) procedure, which is explained in Figure 14.3.1 of Chapter 14 in the main report, the scope of work for the environmental consultants to be hired by the Indonesian side and the SPC for the implementation of the EIA may include:

- 1) public announcement about the project,
- 2) preparation of a draft KA-ANDAL,
- 3) completion of the KA-ANDAL,
- 4) data collection and field surveys,
- 5) review, evaluation and planning,
- 6) socialization,
- 7) preparation of the drafts of required EIA documents,
- 8) completion of the required EIA documents, and
- 9) acquisition of environmental license for the project.

The demarcation of the EIA-related responsibilities between the Indonesian side and the SPC is explained in 14.3.3 of the main report. Some of these work items are future explained in the following.

Regarding 4), the data collection and field surveys should be conducted based on the approved KA-ANDAL. General descriptions of data collection components in EIA are outlined below.

- a. Natural Environment: climate, geological and hydrological conditions, types of shoreline form, water quality, sediment coastal vegetation, terrestrial flora/fauna, marine flora/fauna, and description of natural disasters, etc.
- b. Social Environment: population, socio-economic profile of target areas, existing land use, related infrastructure, historical and cultural sites, traffic conditions, etc.
- c. Legal and Institutional Framework: environmental regulations regarding EIA, protected areas, spatial plan, related organizations, etc.

Descriptions of the field survey contents and methods recommended specifically for this project are explained in 11.c.

Regarding 5), the review, evaluation and planning include:

- a. review on the confirmation of reclaimed water demand,
- b. review on the confirmation of legal compliances,
- c. review of the IEE conducted in the preparatory survey,
- d. further evaluation of negative impacts,
- e. further proposal of mitigation measures, and
- f. further considerations on environmental management and monitoring.

As for b., the review on the confirmation of legal compliances includes i) the confirmation of the technical feasibility of the proposed wastewater reclamation treatment process to meet its corresponding water quality standards continuously, ii) the confirmation of the acquisition of land use permit for the proposed wastewater reclamation plant, iii) the confirmation of all the water quality standards to be applied for this project, iv) the right of PDAM Badung to supply the reclaimed water (which is neither drinking water, clean water nor irrigation water), v) the legal acceptance of calling the reclaimed water as “New Clean Water” without meeting the existing water quality standards of clean water, etc.

As for c. to f., the IEE to be reviewed included environmental scoping, alternative analyses, evaluation of significant negative impacts, consideration of mitigation measures against the significant negative impacts, public consultation, drafting of water quality monitoring plan, etc. In the EIA, further evaluation of negative impacts is required, and mitigation measures should also be proposed for identified minor impacts. The monitoring plan of traffic conditions at the pipe installation sites and other necessary monitoring plans should also be prepared in the EIA.

Regarding 7) and 8), the required EIA documents consist of ANDAL (Main EIA Report), RKL (Environmental Management Plan), RPL (Environmental Monitoring Report) and Executive Summary.

11.c Methodology of the EIA

Table 11.c.1 shows descriptions of the filed survey contents and methods recommended specifically for this EIA.

Table 11.c.1 Contents and Methods of the Recommended Field Surveys for the EIA

No.	Survey Item	Target Site	Purposes	Remarks regarding Method
1	Land Use	Wastewater Reclamation Plant	To investigate present land uses (for crab harvesting, keeping a small board, etc.) at the site. To assess the impacts of the project on the present land uses and land users. To consider whether or not consultation and/or compensation for the land users are required.	1) Confirmation of the economic dependence of the land users on the site
2	Biota and Ecosystem		To investigate the existing situation of biota and ecosystem at the site. To assess the impacts of the construction on them.	1) Confirmation of the absence of endangered and rare species and species having high economic values
3	Water Pollution		To investigate the current water quality at streams around the site. To assess the positive impacts of the wastewater reclamation on the surrounding water environmental into which all the treated wastewater from the WWTP is currently discharged. To assess the negative impact of the land clearing, excavation and embankment on the water environmental around the site.	1) Water quality tests of those parameters included in the effluent standards for WWTPs or the environmental standards of Bali Provincial Government, etc. 2) At few locations
4	Traffic Flow	Pipeline Routes	To investigate present traffic flow along the routes of new transmission and trunk distribution pipes. To assess the impacts of the pipe installation on the traffic. To propose countermeasures to minimize the impacts on the traffic during the construction.	1) At about 10 locations where the traffic is already congested or the width of road is narrow 2) At different times of a day, a week and (if possible) a year
5	Noise and Vibration		To investigate present noise and vibration levels at commercial (relaxation spa, etc.) and cultural facilities (family and cultural temples) along the routes of new transmission and trunk distribution pipes. To assess the impacts (noise and vibration) of the pipe installation on the activities in these commercial and cultural facilities. To propose countermeasures to minimize these impacts.	1) At about 10 facilities 2) At different times of a day, a week and (if possible) a year
6	Waste Disposal	Dumping Sites of Construction Wastes	To investigate the conditions of available dumping sites for the construction wastes (cleared mangrove trees, excavated asphalt and soil, wastes from temporary construction works, etc.) To select the most suitable dumping site and assess the impacts of the transportation and disposal of the construction wastes on the dumping site. To propose countermeasures to minimize these impacts.	1) at few dumping sites

The cultural acceptance of the reclaimed water at the targeted hotels needs to be further assessed in the demand confirmation on the reclaimed water or the public consultation during the transaction stage of PPP project prior to the signing of the PPP contract. The technical feasibility of the proposed wastewater reclamation process (i.e. whether or not applied water quality standards can be met continuously) should also be confirmed before the signing of the PPP contract. However, if any of these points (the cultural acceptance, the reclaimed water demand and the compliance of water quality standards) cannot be confirmed before the signing of PPP contract by any chance, the unconfirmed points should be confirmed through field surveys (questionnaire survey, water quality tests, etc.) or consultation with the hotels in the EIA.

11.d Implementation Structure of the EIA and Other Information

According to the guidelines for the preparation of environmental impact assessment (Ministry of Environment Regulation No. 8 of 2006), the information regarding the implementation structure (1. proponent of the project, 2. responsible consulting company or persons for the implementation of the EIA, 3. costs of the EIA and 4. implementation schedule of the EIA) should be included in KA-ANDAL. Other information to be included in KA-ANDAL is references and appendixes.