

Ex-Post Monitoring of Completed ODA Loan Project

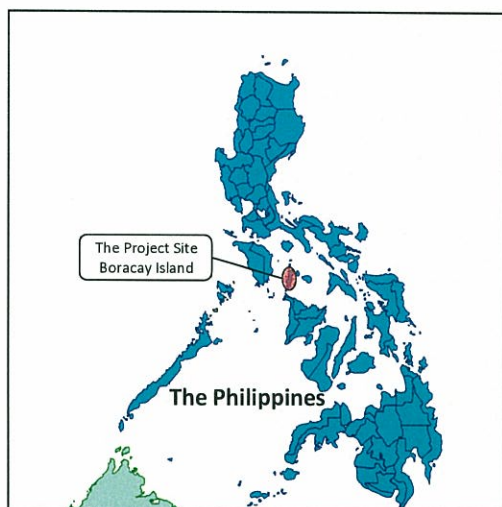
Republic of the Philippines

Boracay Environmental Infrastructure Project

External Evaluator: Tomoko Matsushita

INGEROSEC Corporation

1. Project Description



Location of the Project Site



Nabaoy Intake Plant

1.1 Project Objective

The objective of this project is to address the water shortages, pollution of groundwater and the sea by sewage water, and the increase in the amount of waste generated by developing the facilities of water supply, sewage, and solid waste disposal, and thereby contribute to conserving the natural environment along with promoting the development of tourism on Boracay Island in Western Visayas.

1.2 Outline of the Loan Agreement

Approved Amount/ Disbursed Amount	1,352 million yen/1,350.5million yen
Loan Agreement Signing Date/final Disbursement Date	August, 1995/December, 2002
Ex-post Evaluation	Fiscal Year 2005
Executing Agency	Philippine Tourism Authority (hereinafter referred to as "PTA." The agency was reorganized as the Tourism Infrastructure and Enterprise Zone Authority (TIEZA) upon passage of R.A. 9593 or The Tourism Act of 2009)

Main Contractor	Nippon Steel Corporation (Japan), PHESCO (The Philippines)
Main Consultant	Consultants for Engineering (The Philippines) / Science and Technology Inc. (The Philippines) / Engineering and Development Corp. of the Philippines (EDCOP, The Philippines)) / Nippon Jogesuido Sekkei Co, Ltd. (Japan)

1.3 Background of Ex-post Monitoring

Boracay Island in the Western Visayas is one of the foremost tourism promotion spots based on use of the sea resources in the Philippines. The number of international tourists to the island increased rapidly from the late 1980s to the early 1990s. On the other hand, due to economic revitalization, there were concerns over adverse effects on the environment: water shortages caused by population growth, contamination of groundwater and ocean by sewage discharge, and increased amount of waste. Therefore, conservation of the natural environment while sustainably promoting tourism development of the island became a matter of priority. Against this background, infrastructure development projects such as facilities of water supply, sewage and solid waste disposal were implemented by JICA.

In the ex-post evaluation, while it was confirmed that the results were generally expressed in the volume of water supply, the number of individual connections, etc., the following issues were raised:

- 1) The collection rate of sewer service charge is low. Since the articles of association for the water supply and sewage services had not been established in Boracay Water and Sewage System (hereinafter referred to as "BWSS"), the measures to increase the collection ratio and to tackle on non-payment were not defined.
- 2) The quantity of sewage treated exceeded the treatment capacity of the sewage treatment plant (STP).
- 3) A Part of the waste disposal facility was used for drying sludge, discharged from the BWSS's STP, but the remaining part was not used.

Therefore, this project was selected for ex-post monitoring and reviewed under each criterion with the findings from the field survey and other research activities with a final conclusion being drawn.

2. Outline of the Monitoring Study

2.1 Duration of Monitoring Study

Duration of the Study: March 2011 – January 2012

Duration of the Field Study: 1 – 14, August, 2011

2.2 Constraints during the Monitoring Study

The evaluation team distributed the questionnaires to the Tourism Infrastructure and Enterprise Zone Authority (hereinafter referred to as “TIEZA”) and Boracay Island Water Company (hereinafter referred to as “BIWC”) to obtain information/data. However, there were data gaps in the information provided by TIEZA due to the limited information available to them at that time (i.e. data regarding tourism trends, GDP on the island, etc.). In addition, as no meeting was held with the Local Government Unit (hereinafter referred to as “LGU”), there is a lack of information regarding the solid waste disposal facilities. In order to recover this lack of information, the survey by JICA (2010) after the ex-post evaluation, meetings with relevant organizations such as BIWC, etc., and existing materials by the Department of Tourism were used.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

In January 2010, TIEZA (PTA at the time) and Manila Water Company Inc. (hereinafter referred to as “MWCI”) established BIWC as a public-private partnership as part of a water supply and sewage systems development and expansion project. Until then, BWSS, a PTA unit had been operating water supply and sewage services on Boracay Island. Associated with this, Operation and management of water supply and sewage systems on the island were transferred from BWSS to BIWC. BIWC was capitalized at 300 million pesos, of which 80% was financed by MWCI and 20% by TIEZA. BIWC commenced the project for development and expansion of water supply and sewage systems under a 25-year concession contract.

(1) Water supply system

As part of the above-mentioned project, BIWC is expanding and upgrading the water distribution facilities in order to ensure stable water supply on the island. As Table 1 shows, all the indices (e.g. population served by water supply, number of connections, etc.,) exceed the planned values and the values at the time of the ex-post evaluation.

Table 1: Indicators for Water Supply Services

	Planned	Ex-post evaluation (2005)	Ex-post monitoring	
			(2010)	(2011)
Population, served water supply (number of people)	16,284	14,431	25,590	29,192
Connection to water supply (number of connections)	-	2,075	4,049	4,409
Water supply volume (m ³ /day)	3,600	3,600	8,451	8,902
Service ratio of facility (%)	77	60	79.7	84.0
NRW (%)	-	18	33.6	23.6

Source: BIWC

Along with the increase in population served by water supply, the availability of 24-hour water supply increased from 60% in 2009 to 90% in 2010 in one year since its establishment. According to JICA's survey in 2010, the water distribution pipes were not installed in the northern hilly area, but in this ex-post monitoring it was confirmed that expansion of the distribution pipes to this area has been completed by March 2011. As the delivery of water to this area became possible, the population served by the water supply has increased. Also, according to BIWC, the water pressure was increased from 15psi¹ to 30psi between 2010 and 2011, which has improved the efficiency of the water supply.

In addition, it was confirmed that BIWC has taken the following measures to decrease the NRW ratio. In order to reduce leaks, BIWC has carried out renewal of water distribution pipes and laying further water distribution pipes from 2010 onwards. Moreover, since its establishment in 2010, BIWC have adopted the method of operating water supply business recommended by the International Water Association, of which their parent organization MWCI is a member, to improve their service delivery. They are also improving their customer care by speeding up response to water leaks, etc., in accordance with the customer care standards of MWCI. As a result of these initiatives, the NRW ratio has reduced from 37% in 2009, to 33.6% in 2010, and to 23.6% in 2011.

(2) Sewage system

The quantity of sewage flowing into the sewage treatment plant (STP) at the time of the ex-post evaluation was 4,500m³/day, which was more than double the design capacity (2,200m³/day), resulting in incomplete treatment. This was caused by the rapid increase in the population and the fact that the water supplied by other water supply companies

¹ psi (pounds per square inch) is a unit for indicating pressure.

flowed into the sewage pipes of the implementing authority at the time, namely BWSS, which brought about an excess in the quantity to be treated.

Indicators for sewage treatment services (e.g. population covered by sewage service, the quantity of sewage treated, and etc.) are shown in Table 2. The average quantity of inflow at the time of the ex-post monitoring was 4,500m³/day, and the maximum inflow during the rainy season was 6,500m³/day. Through the expansion project, currently being implemented by BIWC, the upgraded STP has its capacity 2.5 times higher, from 2,600m³/day (2005) to 6,500m³/day (2011). Thus it can be said that the problem of excessive treatment raised at the time of the ex-post evaluation has been resolved. The number of connections to the sewage system has increased from 657 (2005) to 761 (2011). Of these connections, the number of business connections has increased from 359 (2005) to 657 (2011), of which the number of connections for large-scale businesses such as hotels etc. is 426 (2011), an increase of 19% from the 359 connections in 2005². Also, it was confirmed that the increase in the population served by the sewage treatment system has increased about 9 times.

Overview of STP



Table 2: Indicators for Sewage Treatment Services

	Planned	Ex-post evaluation (2005)	Ex-post monitoring	
			(2010)	(2011)
Population covered by sewage system (number of people)	16,284	3,328	25,590	29,192
Volume of sewage treated (m ³ /day)	524,240	566,725	3,334	3,553
Capacity of the STP (m ³ /day)	2,600	2,600	2,200	6,500
Collection rate of sewerage tariff (%)	-	60	87.6	87.7
Connection to sewerage system (number of connections)	-	657 (residential: 298, commercial : 359)	712 (residential: 99, commercial : 603)	761 (residential: 104, commercial : 657)

Source: BIWC

² According to BIWC, “domestic connection” was re-defined in the 2006 system of charges. Prior to this, small-scale accommodation facilities and small-scale private shops or restaurants were classified as domestic connections in addition to normal households, and only large-scale commercial facilities were classified as “business connections”. From 2006 onwards, small-scale accommodation facilities and small-scale private shops or restaurants have also been classified as business connections.

In the interview with BIWC, it was confirmed that the sewage charges are calculated based on the amount of water used³. However, since some customers use water supplied by other private suppliers apart from BIWC⁴, it is not possible to grasp the exact amount of water consumption⁵. Therefore, in order to secure charge collection, by assigning staff responsible for each area, BIWC conducts individual home visit to explain on service charge. Through this initiative, the collection ratio has improved from 60% (2005) to 87.7% (2011).

3.1.1.1 Internal Rates of Return (IRR)

The economic internal rate of return (EIRR) in the ex-post evaluation was 7.66%, which is a reduction from the 18.57% at the time of examination, due to currency rate fluctuations such as a 10% drop in the dollar relative to the peso. Also, the financial internal rate of return (FIRR) was 10.02%, which is about the same as that at the time of examination. In this survey, since documents regarding costs and benefit were not available, FIRR and EIRR have not been calculated.

3.1.2 Qualitative Effects

As a result of the water supply and sewage systems development and expansion project started in 2010 by TIEZA (PTA at the time) and MWCI, the facilities, processes, as well as equipment of the water supply and sewage systems have been upgraded and/or improved. This has contributed to the quantitative results as described above.

Details of the main upgrades are as follows:

(1) Water supply facilities

- Installation of additional generators at intake facilities and booster pump stations
- Installation of various pumps and motors as well as fuel storage tanks
- Extension of water transmission pipeline from Manoc-Manoc Barangay to Yapak Barangay (8.5km) and extension of distribution pipeline (8.5km).

(2) Sewage facilities

- Upgrade of STP's capacity (2,600m³/day→6,500m³/day)
- Installation of primary and secondary lines, and etc. (9,576 lm)

From the above, as a result of the water supply and sewage systems development

³ BIWC's sewage charge is calculated as follows: "water supply volume×70%×15 peso" for individual households, "water supply volume×70%×20 peso" for commercial entities.

⁴ e.g. Boracay Tubi System

⁵ In this case, the sewage charge is "the number of rooms/toilets ×0.6m³×days" for hotels.

and expansion project by the private-public partnership of TIEZA and MWCI, the connections to water and sewage service have increased. The indicators for effectiveness exceed values in the initial plan as well as at the time of the ex-post evaluation. Thus it can be concluded that sufficient results have been achieved.

3.2 Impact

3.2.1 Improvement in natural environment

As a result of the upgrading of the equipment in 2010, the sewage treatment capacity has expanded, and the problem of excessive treatment at the STP raised by the ex-post evaluation has been resolved. The water quality of the discharged water is shown in Table 3, which shows a great improvement in 2011, with BOD, COD, and TSS all satisfying the environmental standards of the Philippine Department of Environmental and Natural Resources (DENR). The reason for the increase in COD values from 2006 onwards, after the ex-post evaluation, is considered to be due to the reproduction of plankton etc. as a result of the discharge of untreated sewage water because of the excessive treatment at the STP.

Table 3: Quality of Discharged Water

	DENR Standard values	Ex-post evaluation (2005)	Ex-post monitoring					
			(2006)	(2007)	(2008)	(2009)	(2010)	(2011)
BOD	30	32	118	156	204	171	118	26
COD	60	72	144	308	283	235	189	42
TDS	1,000	994	-	-	-	-	-	-
TSS ⁶	70	-	174	184	187	215	130	32

Source: JICA Survey Report (2010) and BIWC

According to the JICA survey (2010) after the ex-post evaluation, the problem of bad odors from the sludge drying beds in a part of the solid waste disposal facility was raised. In the present ex-post monitoring, the use of this facility has ceased, and a new sludge treatment and dewatering equipment has been installed within the site of the BIWC office. It has been confirmed that the emission of bad odors at the remained site of the disposal facility have improved. As the dried sludge discharged from the newly

⁶ TSS refers to the total suspended solids. This is an index that indicates lack of clarity due to mud or sand. TDS refers to the total dried solids, which indicates the concentration of impurities dissolved in the water. Since this is an index that is applicable to water quality testing of drinking water, it is not appropriate as an index indicating the water quality at the location where wastewater is discharged. Thus BIWC does not currently use TDS as an index for measurement of water quality.

installed sludge treatment and dewatering equipment is used as land improvement material by the local residents, no effect on the surrounding environment can be seen.

Also, in the ex-post evaluation, it was pointed out that the remaining part of the solid waste disposal facility was not being used, but it was confirmed that they were investigating its use as a recycling facility. In an interview survey with TIEZA during this ex-post monitoring, it was stated that there were discussions with the LGU ongoing at present, but no specific plan has been decided. According to the survey carried out in 2011 by Technologie Transfer Zentrum (TTZ), a research institute affiliated with Bremen University in Germany, waste that cannot be processed on Boracay Island is transported to a sanitary landfill at Barangay Kabulihan, Panay Island, about 1km from Boracay, where the waste is treated. According to the TTZ survey, at present the treatment capacity of the waste treatment facility exceeds the demand, but the facility has been designed with the objective of treating waste discharged within the island, so as long as measures such as waste reduction are not taken, there is a concern that eventually there will be waste in excess to be treated.

3.2.2 Effect of Tourism Development on the Local Economy

After the ex-post evaluation, the number of visitors has increased continuously at a constant percentage rate, and in 2010 the number of visitors (overseas and domestic) was 779,666, a 66% increase compared with the year 2000. The rate of increase in overseas visitors was 73%, and the rate of increase in domestic visitors was 60%, increasing at an average annual rate of 16% and 10% respectively. In particular, from January to June this year, there was a significant increase of 26.3% compared with the same period of last year (503,203 visitors), and by 2016 the number of visitors is estimated to reach 1 million.

Associated with the increase in numbers of visitors, the tourist revenue has also increased. At the time of the ex-post evaluation in 2005, the tourist revenue was 140 million US dollars, but in 2010 it reached 14,332 million pesos (about 300 million US dollars). Also, tourist revenue in the period from January to June 2011 increased by about 20% compared with the same period in the previous year, which was the largest rate of increase in the past 10 years. As can be seen from these facts, tourist revenue is increasing significantly as a result of promotion by the tourism industry⁷.

In addition, in recent years, a company affiliated with an Overseas Chinese plutocracy has been carrying out a large-scale tourist development project on Boracay Island, which is likely to create 3,000 new jobs on the island and attract 350,000 tourists

⁷ The official statistics on the tourism revenue, the share of the tourism sector to the regional GDP, and the employment ratio in the sector were not provided from TIEZA. Therefore, internet site such as Manila Bulletin Net, etc., was referred for data on the tourist revenue.

every year. As a result, in the next 3 years, the GDP per person on the island is likely to be more than double from about 40,000 pesos per person in 2011 to 90,000 pesos⁸.

Although it is difficult to say that the expansion of economic activities on the island based on tourism is the result of this project alone, it is considered that the safe and stable supply of water as a result of the expansion and development of the water supply and sewage works has produced a certain level of effect. Also, the improvement of the water quality of the discharged water plays a role in ocean conservation which is a tourist resource.

3.2.3 Improvement in Living and Sanitary Environment

Interviews were held with stakeholders such as BIWC, local residents (4 households), and operators of tourist hotels (3 persons) regarding this project and the water supply and sewage systems development and expansion project currently being implemented. All respondents replied that there were no problems with water quality, taste, smell, water pressure, etc., and that “the local residents and hotel employees use the water as safe drinking water”. Also, as there were no reports of water-related illnesses, it is considered that there are no problems with the sanitary environment.

3.2.4 Other impacts

In the interviews with TIEZA, it was noted that the compensation to those affected by the construction has been properly implemented, and thus there are no problems concerning relocation and land acquisition.

Regarding the issue of the effect on the natural environment that was raised at the time of the ex-post evaluation, from the above, this survey has confirmed that the water quality of the location where the water is discharged has been improved as a result of improving the sewage treatment plants. Also, it has been confirmed that the emission of bad odors at the place where sludge was dried within the solid waste disposal facility have been improved, as a result of the installation of a new sludge processing and dewatering equipment within the site of the BIWC office.

Also, since it was confirmed in this ex-post monitoring that the effect on the economy of the island of tourist development was large, and this project protects important tourism resources, it is considered that the project has had a positive impact on the economy of the island by enabling the stable supply of safe purified water.

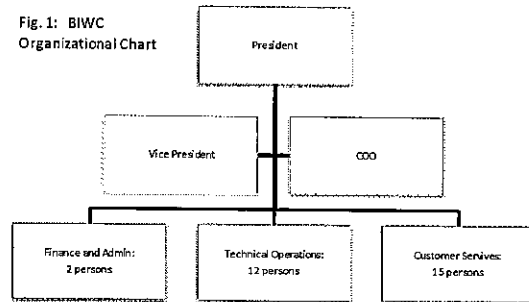
⁸ From Business Inquirer homepage (<http://business.inquirer.net>) and Boracay Business Center homepage (<http://www.boracayinfo.com/info.htm>).

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

MWCI, the parent company of BIWC, is a private water supply company formed within the Ayala Group, a local conglomerate. MWCI is one of the largest-scale company in Asia, and currently employs 1,808 persons. The main capital of BIWC has been contributed by Ayala Corporation (43%), public works expense (44.5%), Mitsubishi Corporation (7%), IFC (5.2%), and so forth.

Fig. 1: BIWC Organizational Chart



The number of employees of BIWC is 32 at present (of which 12 are in operation-related departments, and 15 in customer-related departments), and 90% (72 employees) of the staff of BWSS have continued to work as a contract base in each departments for BIWC. Also, 5 persons including management have been seconded from MWCI, which creates a system where know-how can be easily provided from MWCI for business operation. BIWC operates its facilities and responds to customers on a 24-hour system, but according to the employees there are no staff shortages in the system. From the above, it is considered that there are no problems in the operation and maintenance management system.

3.3.2 Technical Aspects of Operation and Maintenance

BIWC has acquired its business operation and facility maintenance methods from MWCI. Also, training is frequently carried out utilizing the know-how of MWCI with the objective of improving the capabilities of the employees. Last year, trainings were carried out covering the fields such as financial accounting and charge collection, procurement, project management (water quality and maintenance management), etc., in addition to OJT. Also, a training (*i.e.* corporate accounting (taxation) training) was jointly held with the Philippine Institute of Certified Public Accountants (PICPA). Since the training was held on both managerial and technical aspects, there are no matters of concern regarding the skills of BIWC.

3.3.3 Financial Aspects of Operation and Maintenance

The current financial data provided by BIWC is shown in the table 4. The liquidity ratio is as high as 93.2%. On the other hand, the capital adequacy ratio remains at 26.9%, which means public and private funds represent a large portion of total assets of BIWC, established joint venture, based on a concession contract launched in 2010.

In addition, the BIWC financial data shows that 11% of total cost and expenses in 2010 was used for repairs and maintenance, as well as 8% of total cost and expenses in a month of December 2009. Therefore, BIWC has been financing the cost of minimal repairs and maintenance needed for proper operation and maintenance.

Moreover, according to BIWC, of the total budget of 1.6 billion pesos for the water supply and sewage systems development and expansion project, the budget for expansion for the coming 5 years has already been secured.

A part of the budget is funded through the Development Bank of Philippines (DBP) under a yen loan project, the “Environmental Development Project”, currently being undertaken by JICA.

Table 4: BIWC Financial Conditions

	2010
Total Assets	1,201,894,295
Current Assets	171,494,020
Fixed Assets	1,030,400,625
Current Liability	184,031,133
Capital	323,103,218
Sales	148,834,890
Recurring Expenses	69,152,493
Depreciation Expense	35,220,935
Net Surplus / Deficit	8,174,449
Liquidity Ratio (%)	93.2%
Capital Adequacy Ratio (%)	26.9%
Return On Asset (%)	0.7%
Total Assets Turnover	12.4%
Net Profit to Sales	5.5%

出典: BIWC

3.3.4 Current Status of Operation and Maintenance

Operation and maintenance of the facilities is carried out based on the operation and maintenance methods of MWCI. As a result of a site survey at each facility, it was found that all facilities operate on a 24-hour system, and checks on the status of operation of the facilities and water quality are carried out every hour. Thus no particular problems for maintenance were seen.

Regarding the customer service, based on BIWC’s own customer response criteria, a 24-hour response hotline is provided and there are internal rules for responding in a short time to complaints etc., to increase the customer satisfaction. (For example, for a burst water pipe, response must be within 2 hours, and the repair completed within 8 hours, and etc.)

According to the simple interviews with 4 resident households that were some customers of BIWC, they showed a very high level of satisfaction with the current customer service of BIWC.

Upgraded equipment in facilities
Bolabog Pumping Station



Pinaungon Pumping Station



From the above, no particular problem regarding sustainability from the viewpoint of maintenance was seen in terms of the structural aspects, technical aspects, and financial aspects.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

In January 2010, BIWC was established as a joint venture between TIEZA and MWCI, and based on a 25-year concession contract, they commenced a water supply and sewage systems development and expansion project, with the aim of strengthening the function of the facilities established in this project. This has performed well, and in the ex-post monitoring, the values of all the indices such as population served by water supply, number of connections, etc., exceeded the values in the initial plan and values at the time of the ex-post evaluation. In addition, it was confirmed that in 1 year from its establishment, the availability of 24-hour water supply has increased from 60% to 90%. Also, BIWC operates business based on the operation and maintenance methods of their parent company MWCI, and no problems were seen in terms of operation and maintenance. Sewage service charge is calculated based on the amount of water consumption. For those customers, using water from other private supplier apart from BIWC, the amount cannot be calculated correctly. Therefore, in order to increase the collection ratio, BIWC staff visit individual households for service charge collection. As a result of this effort, the collection ratio has improved since the ex-post evaluation. In the survey conducted by JICA in 2010 after the ex-post evaluation, it was pointed out that a part of the solid waste disposal facility, which was used for sludge drying beds, was generating bad odors. However, in the present ex-post monitoring, it was found that the use of this facility has stopped, and a new sludge processing and dewatering equipment has been installed within the site of the BIWC office. There is a plan to construct a trauma center at the former site of the disposal facility/sludge drying bed area. It was, likewise, confirmed that there are no more complaints about the emission of bad odors in the vicinity.

Also, concerning the unused part of the solid waste disposal facility, TIEZA and LGU are currently investigating its use as a recycling facility with the initiatives of TIEZA. It is estimated that amount of waste will increase in the future, which may facilitate more effective use of the facility.

4.2 Recommendations

None

4.3 Lessons Learned

None

End

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Project Outputs		
Water supply system		
1) Intake facilities	<ul style="list-style-type: none"> Installation of infiltration wells at 16 locations along the Nabaoy River 	<ul style="list-style-type: none"> Intake plants and intake pump condensed into one location
2) Water treatment facilities	<ul style="list-style-type: none"> Water treatment plant: capacity of 4,000m³/day Chlorination facilities 	<ul style="list-style-type: none"> Water treatment plant: capacity of 12,000m³/day Equipment procurement: chlorination facilities, set of generators, electricity supply facilities, water meters
3) Transmission facilities	<ul style="list-style-type: none"> Transmission pipelines: extension of 6,500m, inner diameter of 250mm, PVC Submarine pipeline crossing: extension of 1,000m, inner diameter of 250mm 	<ul style="list-style-type: none"> Transmission pipelines: extension of 1,945m, inner diameter of 200mm, PVC Submarine pipeline crossing: extension of 960m, inner diameter of 250mm, PVC
4) Distribution facilities	<ul style="list-style-type: none"> Distribution pipelines: extension of 16.7km, inner diameter of 75-300mm Ground reservoirs: capacity of 2,600m³ (Brgy. Manoc-Manoc), capacity of 100m³ (Brgy. Yapak) 	<ul style="list-style-type: none"> Distribution pipelines: extension of 29.07km, inner diameter of 50-400mm Ground reservoirs: capacity of 2,000m³ (Brgy. Manoc-Manoc), capacity of 550m³ (Brgy. Yapak)
5) Booster pump stations	<ul style="list-style-type: none"> Two stations: in the vicinity of the water treatment plant, and Brgy. Balabag 	<ul style="list-style-type: none"> As planned.
6) Water supply equipment	<ul style="list-style-type: none"> 1,900 service connections (1,500 residential, 400 	<ul style="list-style-type: none"> Service connections (717 residential, 188

	commercial)	commercial)
Sewage system		
1) Sanitation (installation of toilets)	<ul style="list-style-type: none"> 3 communal toilets with septic tanks, 402 simplified pour flush toilets 	<ul style="list-style-type: none"> 3 public toilets, 115 simplified pour flush toilets
2) Sewer pipelines	<ul style="list-style-type: none"> Sewer collection pipelines: extension of 16km, diameter of 150mm, extension of 5,425m, diameter of 300mm 3 pump facilities 	<ul style="list-style-type: none"> Sewer collection pipelines: extension of 185.051m, diameter of 350mm (primary sewage collection), extension of 1,492.01m diameter of 250mm (primary sewage collection), extension of 5,9751m, diameter of 200mm (secondary), extension of 2,5551m, diameter of 200mm (secondary), extension of 8841m, diameter of 100mm (project directly managed by PTA: primary sewage collection) One pump facility, 7 lift facilities
3) Sewage treatment plant	<ul style="list-style-type: none"> Installation of sewage treatment plant (2.5ha): anaerobic pond, maturation pond, chlorination pond, facultative pond, regulating pond Discharge conduit: extension of 1,000m, inner diameter of 300mm 	<ul style="list-style-type: none"> Installation of sewage treatment plant (oxidation ditch, etc..)
Solid waste disposal		
	<ul style="list-style-type: none"> Landfill site (2.4ha) and attendant equipment 	<ul style="list-style-type: none"> Landfill site (1.3ha) (drying area for sewage sludge) and attendant equipment
Consulting services	<ul style="list-style-type: none"> Foreign: 50M/M Local: 181M/M 	<ul style="list-style-type: none"> Foreign: 50M/M Local: 181M/M

2. Project Period	August 1995 – September 2000 (62 months)	August 1995 – March 2003 (92 months)
3. Project Cost		
Total	1,803 million yen	1,961 million yen
Japanese ODA loan portion	1,352 million yen	1,350.5 million yen