

Democratic Socialist Republic of Sri Lanka

FY2017 Ex-Post Evaluation of Japanese ODA Loan

“Water Sector Development Project and Water Sector Development Project (II)”

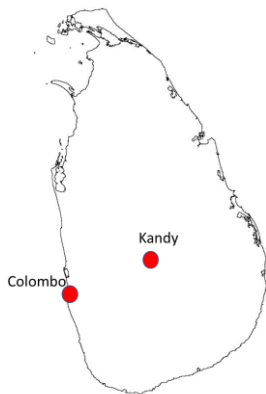
External Evaluator: Tsuyoshi Ito, IC Net Limited

0. Summary

As the population of Sri Lanka increases, the Water Sector Development Project and Water Sector Development Project (II) were implemented in Greater Colombo and Greater Kandy in order to accommodate the ever-rising demand for water. The objectives of these two projects are to provide water for domestic use in a safe and stable manner by installing and expanding water supply equipment, thereby contributing to improving the residential environment in the target regions. There were no changes to Sri Lanka’s national plans related to water supply and sewage both at the time of the appraisal and the ex-post evaluation; thus, these were acknowledged as being consistent with development policies and priority issues. From the perspective of consistency with development needs, at the time of the appraisal it was acknowledged that it was necessary to accommodate the increasing demand for water, while at the time of the ex-post evaluation it was acknowledged that it was necessary to reduce the non-revenue water rate in Colombo, as well as needs for expanding distribution networks, reducing the non-revenue water rate, and improving the sewage system in Kandy. The projects are also consistent with Japan’s assistance policy and their relevance is high. Moreover, the projects added outputs by using the surplus with the project costs generated from fluctuations in the exchange rate. The project costs were lower than planned, but there were considerable overruns in the project period attributable to problems with implementation management. Therefore, the efficiency of the projects is fair. The majority of the indicators for operational effectiveness that denote project effectiveness were achieved. While the extent to which impacts such as improvements to the residential environment and sanitation and health were achieved is not necessarily clear, other positive impacts were observed. Therefore, the effectiveness and impacts of the projects are high. While there were no major problems with the institutional and technical aspects of operation and maintenance, or the status of operation and maintenance, there have been delays in setting the rate structure designed to improve the financial aspects. Therefore, the sustainability of the projects is fair.

In light of the above, these projects are evaluated to be satisfactory.

1. Project Description



Project locations



Kadana water treatment plant

1.1 Background

In 2005, 78% of Sri Lanka's total population had access to safe drinking water through wells, surface water, and similar sources. However, the water supply coverage rate remained at the low level of 30%. In addition, as the country's population has risen year by year the demand for water has rapidly increased, as evidenced by the fact that the water consumption of 148 million m³ throughout Sri Lanka as a whole in 1995 had risen to 247 million m³ by 2005. In Greater Colombo in particular, the coverage rate had reached 58%, a high level compared with that in other regions. However, at the time 1.6 million people of the region's population of 3.7 million people were unable to access this water supply. In Greater Kandy, only 300,000 people were able to access the water supply in 2001, but by 2006 this had risen to 600,000 people, with the coverage rate improving from 27% to 56%. However, the population of Greater Kandy was 1.1 million people in 2006, 1.3 million people in 2010, and is expected to rise to 1.6 million people by 2020. The region's existing facilities for supplying water was unable to keep pace with this growth, and there was an urgent need to close the gap between supply and demand.

Even in those regions that had water supply coverage, it was not considered that an adequate amount of water was being supplied. For example, there were a number of regions that only had one to two hours of water supply per day due to reasons such as a lack of capacity with the water treatment plant facilities, shortage of water pumps, and the deterioration of the facilities.

Given such conditions, the Water Sector Development Project (hereafter referred to as "Project I") and the Water Sector Development Project (II) (hereafter referred to as "Project II") were implemented and managed with their own respective objectives. Thus, they were evaluated individually with regard to their efficiency and effectiveness. With regard to the rating results, they were assessed by combining the two projects together.

1.2 Project Outline

The objective of Project I is to provide safe water for domestic use in a stable manner in Greater Colombo and Greater Kandy by installing and expanding water supply equipment, thereby contributing to improving the residential environment in these regions. The objective of Project II is to provide water for domestic use in a safe and stable manner in Greater Colombo by improving and expanding a water supply system along the Kalu Ganga River water system as well as reducing non-revenue water within the city of Colombo, including in tenement gardens (low-income localities), thereby contributing to improving the residential environment within said region.

Loan Approved Amount / Disbursed Amount	Project I: 13,231 million yen / 13,217 million yen Project II: 8,388 million yen / 8,269 million yen
Exchange of Notes Date / Loan Agreement Signing Date	Project I: March 23, 2007 / March 28, 2007 Project II: June 24, 2008 / July 29, 2008
Terms and Conditions	Interest Rate Project I: 1.5% Project II: 1.4% Consulting service: 0.01%
	Repayment Period (Grace Period) 30 years (10 years)
	Conditions for Procurement General Untied
Borrower/Executing Agency	Government of the Democratic Socialist Republic of Sri Lanka / National Water Supply and Drainage Board (NWSDB)
Project Completion	Project I: December 2015 Project II: August 2016
Main Contractors (Over 1 billion yen)	Project I: NCC Ltd. (India) / Sierra Construction Limited (Sri Lanka) (JV), Maga Engineering (PVT) Ltd. (Sri Lanka), China Geo Engineering Corporation (China) Project II: NCC Ltd. (India), Salcon Engineering BHD (Malaysia)
Main Consultants (Over 1 billion yen)	Project I: Nihon Suido Consultants Co., Ltd. (Japan), NJS Consultants Co., Ltd. (Japan), Nihon Suido Consultants Co., Ltd.(Japan) / NJS Consultants Co., Ltd.(Japan) / Ceywater Consultants (PVT) Ltd. (Sri Lanka) / Nippon Koei UK Co. Ltd. (UK) (JV) Project II: Nihon Suido Consultants Co., Ltd. (Japan) / NJS Consultants Co., Ltd. (Japan) / Ceywater Consultants (PVT) Ltd. (Sri Lanka) (JV)
Related Studies (Feasibility Studies, etc.)	Project I: Project Formation Study (April 2006) Project II: Project Formation Study (October 1996)
Related Projects	<u>Japanese ODA Loans</u>

	Towns East of Colombo Water Supply Project (1990), Greater Colombo Water Supply System Extension Project (Coverage of the Southern Urban Areas) (1993), Towns North of Colombo Water Supply Project (1996), Kalu Ganga Water Supply Project for Greater Colombo (1997), Project for Reduction of Non-Revenue Water (1999), Greater Kandy Water Supply Project (2001)
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2. Outline of the Evaluation Study

2.1 External Evaluator

Tsuyoshi Ito, IC Net Limited

2.2 Duration of Evaluation Study

This ex-post evaluation was conducted with the following schedule.

Duration of the Study: October 2017–January 2019

Duration of the Field Studies: February 19–March 15, 2018 / May 21–June 6, 2018

3. Results of the Evaluation (Overall Rating: B¹)

3.1 Relevance (Rating: ③²)

3.1.1 Consistency with the Development Plan of Sri Lanka

In 2002, the Government of Sri Lanka formulated its National Policy of Water Supply and Sanitation as part of its initiatives to reduce poverty, in which it set forth the objectives of ensuring access to safe water for the entire population and installing adequate sewage treatment facilities. Based on the Millennium Development Goals, Sri Lanka set a target of “ensuring access to safe water for 85% of the population by 2010, and for 100% of the population by 2025.” It also aimed to set in place water supply for 100% of its urban areas and 75% of its rural areas by 2010. What is more, the Corporate Plan (2007–2011) enacted by the National Water Supply and Drainage Board (NWSDB), which is the executing agency, in 2007 made it a goal to reduce the non-revenue water rate within the city of Colombo, which had been 34% at the time, down to 1% per year. With respect to sewage development, it set forth a plan to connect 70% of Sri Lanka’s total population to sewage (including onsite treatment) by 2010, and achieving 100% coverage by 2025.

The National Policy of Water Supply and Sanitation (2016–2020) confirmed at the time of the ex-post evaluation set forth a number of targets. These include the following: (1) 100% access to safe water, (2) 60% water supply via water distribution pipes, (3) reducing non-revenue water in Colombo to 20%, and (4) 7% sewage treatment rate via sewage development in urban areas.

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² (3): High, (2): Fair, (1): Low

Furthermore, the latest version of the NWSDB's Corporate Plan (2016–2020) set forth the targets of expanding water coverage (including achieving a water supply coverage rate of 60% by 2020), reducing the non-revenue water rate, and improving project efficiency through the introduction of ICT based on the National Policy of Water Supply and Sanitation.

In this manner, the orientation of Sri Lanka's national plans related to water supply and sewage and the NWSDB's Corporate Plans have remained unchanged from the time of the appraisal through to the time of the ex-post evaluation. Thus, the projects are consistent with development policies and priority issues.

3.1.2 Consistency with the Development Needs of Sri Lanka

Whereas the coverage rate in Greater Colombo had been down at 58% as of 2005, the demand for water has been trending upward since that time as a result of the increase in the population. However, some districts had only six hours of water supply per day. In Greater Kandy, the coverage rate as of 2001 was low at 27%, with the sewage coverage rate not even reaching 3% (2005). Just like with Greater Colombo, the demand for water continued to rise in Greater Kandy as a result of the increasing population, and along with the increase of sewage volume, the degradation of living environments and the contamination of rivers proceeded apace.

Inquiries to the NWSDB at the time of the ex-post evaluation revealed that the coverage rate for Colombo had already reached 92% by 2013 and 97% by 2017. However, it had not brought the non-revenue water rate down to its target of 20%, as this was still 38% in 2013 and 34% in 2017. In Colombo, there is a greater need to reduce the non-revenue water rate through rehabilitation and the like, more so than there is for extending the distribution network. Similarly, according to the NWSDB the coverage rate in Kandy was 46% in 2013 and 59% in 2017, while its non-revenue water rate was 39% in 2013 and 26% in 2017. Thus, it is necessary to both extend the distribution network and decrease the non-revenue water rate. The sewage coverage rate in Kandy is currently sitting at 0%, indicating an ongoing need for sewage development.

As indicated above, at the time of the appraisal it was necessary for the country to accommodate its increasing demand for water. At the time of the ex-post evaluation, there was ongoing recognition of the need to reduce the rate of people without access to water in Colombo, and the need to extend distribution networks, reduce the non-revenue water rate, and improve the sewage system in Kandy. Therefore, these projects are consistent with these sorts of development needs.

3.1.3 Consistency with Japan's ODA Policy

Japan's Country Assistance Policy for Sri Lanka (2004) set forth "institutional reform and

assistance for improving the country's economic foundations" as the direction for its assistance. As part of this, developing water supply and sewage for major metropolitan regions were not specified as priority areas. However, the FY 2006 Medium-Term Strategy for Overseas Economic Cooperation for Japanese ODA loans designated "improving the urban environment sector (improving water supply and sewage)" under "improving the investment environment by improving basic infrastructure" as one of its priorities for support for Sri Lanka. From this, it can be seen that these projects were consistent with Japan's ODA policy at the time of the appraisal.

3.1.4 Appropriateness of the Project Plan and Approach

These projects significantly overran their project periods. The details for this will be described later in the section on efficiency. The delays in project implementation were attributable to problems with implementation management and additions to the project scope, not to deficiencies in the project plans.

With Project II, revisions to the master plan related to supplying water in Western Province were carried out, so Project I was implemented ahead of this. Project I was planned based on the master plan before the plan underwent these revisions, but it was acknowledged that it was necessary to revise the master plan during the implementation of Project I. No particular inconsistencies were acknowledged with this.

These projects are consistent with Sri Lanka's development plans and development needs, as well as with Japan's ODA policy. It cannot be claimed that the delays with the project implementation were due to deficiencies with the plan. Rather, water supply improvements for Greater Colombo situated in Western Province were included in Project I; thus, ideally, the revisions to the master plan should have been carried out through Project I. The need to do so was acknowledged in the middle of Project I, meaning there were no problems with relevance of the plan and the approach. Therefore, the relevance of implementing these projects is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

These projects consisted of a number of elements. For Project I, these include the following: (1) Greater Kandy Water Supply Project (GKWSP), (2) Greater Colombo Water System Rehabilitation Project (GCWRP), (3) Towns North of Colombo Water Supply Project (TNCWSP), (4) Greater Kandy Waste Water Disposal Project, and (5) strengthening organizations, while Project II consisted of: (1) Kalu Ganga Water Supply Project (KGWSP), (2) countermeasures against non-revenue water, and (3) consulting services. Table 1 shows both the planned and actual outputs from these projects.

Table 1: Output Comparison Table

Plan	Actual
<p><u>Greater Kandy Water Supply Project (GKWSP)</u></p> <ul style="list-style-type: none"> - Newly install 15 reservoirs - Newly install 6 pump stations - Install 11 pump sets - 26.4 km of water distribution pipes - 105.1 km of water supply pipes - Construction work to prevent non-revenue water: 200 km - Consulting services (detailed design, bid tendering assistance, construction supervision assistance) 	<p><u>Greater Kandy Water Supply Project (GKWSP)</u></p> <ul style="list-style-type: none"> - Newly installed 8 reservoirs - Newly installed 5 pump stations - Installed 11 pump sets - 27.7 km of water distribution pipes - 73.9 km water supply pipes - Consulting services (detailed design, bid tendering assistance, construction supervision assistance) - Additional outputs from the surplus (1 sedimentation tank, 2 water tanks, 1 pump shed, 3 pumps, 10.85 km of water distribution pipes, 21.7 km of water supply pipes)
<p><u>Greater Colombo Water System Rehabilitation Project (GCWRP)</u></p> <ul style="list-style-type: none"> - New installation of and repairs to reservoirs in Central Greater Colombo (newly install 1 reservoir, repair 1 reservoir, 1 management office) - Repair and extend the water supply system in Kotikawatta – Mulleriyawa (newly install 1 pump station, 4.4 km of water distribution pipes, 40 km of water supply pipes, 1 reservoir, 1 water tower, 1 pump shed) - Improve the living environment in the tenement gardens (connect 900 households to water supply) - Consulting services (bid tendering assistance, construction supervision assistance) 	<p><u>Greater Colombo Water System Rehabilitation Project (GCWRP)</u></p> <ul style="list-style-type: none"> - New installation of and repairs to reservoirs in Central Greater Colombo (newly installed 2 reservoirs and built 1 management office) - Repaired and extended the water supply system in Kotikawatta – Mulleriyawa (46.1 km of water supply pipes, 1 water tower) - Consulting services (bid tendering assistance, construction supervision assistance)
<p><u>Towns North of Colombo Water Supply Project (TNCWSP)</u></p> <ul style="list-style-type: none"> - 2 reservoirs - Repair 1 reservoir - 2 pump sheds - 8 pump operating rooms - Pump station electrical equipment (for 6 pump stations) - Water supply pipes: 571 km - 1 management office - Consulting services (bid tendering assistance, construction supervision assistance) 	<p><u>Towns North of Colombo Water Supply Project (TNCWSP)</u></p> <ul style="list-style-type: none"> - 2 reservoirs - Repaired 1 reservoir - 2 pump sheds - 6 pump operating rooms - Pump station electrical equipment (for 6 pump stations) - Water supply pipes: 1,700 km - Built 5 management office - Consulting services (bid tendering assistance, construction supervision assistance) - Additional outputs from the surplus (1 RSC office building, 4 district engineer office buildings, 1 water tank, 22.3 km of water

<p><u>Greater Kandy Waste Water Disposal Project</u></p> <ul style="list-style-type: none"> - Consulting services for the basic design, bid tendering assistance, and improving capacity <p><u>Strengthening organizations</u></p> <ul style="list-style-type: none"> - Consulting services for capacity building <p><u>Kalu Ganga Water Supply Project (KGWSP)</u></p> <ul style="list-style-type: none"> - Build 1 water treatment plant in Kadana (treatment capacity of 60,000 m³/day, chemical clarification / rapid filtration method) - 14.5 km of water distribution pipes between Bandaragama and Piliyandala - 1 reservoir and 1 pump shed in Piliyandala - 1 reservoir and 1 pump shed in Moratuwa - 320.65 km of water supply pipes (Kesbewa, Boralesgamuwa, Gonapoloa, Polgasowita, Ingiriya, Handapangoda, Diyagama, Piliyandala, Panadura East, and Magamma) - Consulting services (bid tendering assistance, construction supervision assistance) <p><u>Countermeasures against non-revenue water</u></p> <ul style="list-style-type: none"> - Replace 120 km of water supply pipes in CBI District and Colombo 02 District - Improve pipes in order to connect to water supply pipe networks and water supply pipe mains in CBI District and Colombo 02 District (private connections for 2,000 households³) <p><u>Consulting services</u></p> <ul style="list-style-type: none"> - Bid tendering assistance, construction 	<p>supply pipes, replaced connecting pipes, spare water supply pipes, and office and vehicle equipment)</p> <p><u>Greater Kandy Waste Water Disposal Project</u></p> <ul style="list-style-type: none"> - Consulting services for the basic design, bid tendering assistance, and improving capacity <p><u>Strengthening organizations</u></p> <ul style="list-style-type: none"> - Consulting services for capacity building <p><u>Kalu Ganga Water Supply Project (KGWSP)</u></p> <ul style="list-style-type: none"> - Built 1 water treatment plant in Kadana (treatment capacity of 60,000 m³/day, chemical clarification / rapid filtration method) - 21.0 km of water distribution pipes between Bandaragama and Piliyandala - 3 water towers in Kesbewa, Jumburaliya, and Kumbuka - 250 km of water supply pipes (Kesbewa, Jumburaliya, Piliyandala, Miriswatta, Koralaime, Gonapoloa, Kumbuka, Panadura East) - Consulting services (bid tendering assistance, construction supervision assistance) <p><u>Countermeasures against non-revenue water</u></p> <ul style="list-style-type: none"> - Replaced 56.5 km of water supply pipes in CBI District - Improved pipes in order to connect to water supply pipe networks and water supply pipe mains in CBI District and Colombo 02 District (private connections for 2,000 households) - Additional outputs from the surplus (1 water supply tower, laid 212 km of water distribution pipes, rehabilitated 25 km of water supply pipes, 1 RSC office building, 1 district engineer office) <p><u>Consulting services</u></p> <ul style="list-style-type: none"> - Bid tendering assistance, construction
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³ The NWSDB's past actual performance for this was 2,000 households a year (its target was 3,000 households). With these projects, which added on to this, the plan was to connect 1,000 households a year via Japanese ODA loans and have the NWSDB bear the burden for connecting another 500 households, for a planned number of households connected of about 3,500 per year.

<p>supervision assistance</p> <ul style="list-style-type: none"> - Revise master plan targeting Western Province, which includes Greater Colombo, and prepare F/S report based on revised master plan - Assist in improving the capacity of the NWSDB concerning O&M (assist in improving capacity related to preventive O&M and reducing non-revenue water, procurement of equipment for repairing water meters and leak detection equipment, etc.) 	<p>supervision assistance</p> <ul style="list-style-type: none"> - Revised master plan targeting Western Province, which includes Greater Colombo, and prepared F/S report based on revised master plan - Assisted in improving the capacity of the NWSDB concerning O&M (assisted in improving capacity related to preventive O&M and reducing non-revenue water, procurement of equipment for repairing water meters and leak detection equipment, etc.)
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Sources: Documents provided by JICA, Project Completion Report (PCR)

After the projects began, the rate of inflation was higher than had been anticipated at the time of the appraisal. As a result, from early on in the implementation stage the plans for the GKWSP and GCWRP were curtailed. However, the rate of inflation returned to normal later on which, together with fluctuations in the exchange rate, resulted in a surplus arising in the project costs. Therefore, in the latter half of the implementation stage this surplus was used to add additional outputs for the GKWSP and TNCWSP. These were examined in line with the objectives of both of these projects, and instituted within the scope of the initial budget with the consent of both the executing agency and JICA. As will be discussed later on, because the envisioned project results were achieved, it can be judged that there were no problems with the changes in outputs.

For Project II, the plan at the time of the appraisal was to use Japanese ODA loans for the task of installing private connections for 1,000 households a year. The NWSDB had planned to provide connections for 2,500 households per year in addition to this. Thus, it was anticipated that the total number of households that would be connected each year would come to 3,500. This target of 3,500 households exceeded the 3,000 households found in the annual plans of the NWSDB to that point. As the actual work of installing these private connections was carried out without any problems, it is fair to say that there were no problems with the setting of this project target.

In addition, at the time of the appraisal, the supplier of the water supply pipes and the contractor for pipe laying works were different, so it had been pointed out that coordination for the procurement package was a point that should be kept in mind for the implementation to ensure that this was performed smoothly. This difference between the water supply pipe supplier and laying contractor did not cause any problems such as implementation delays or the like.

3.2.2 Project Inputs

3.2.2.1 Project Costs

In the plan for Project I, the total project costs were to be 17,644 million yen, of which 13,231

million yen was to be covered by Japanese ODA loans. In actuality, this came to 14,228 million yen, with the total disbursement amount from Japanese ODA loans coming to 13,217 million yen. In the plan for Project II, the total project costs were to be 10,846 million yen, of which 8,388 million yen was to be covered by Japanese ODA loans. In actuality, this came to 9,784 million yen, of which the total loan disbursement amount came to 8,269 million yen. A comparison of the planned and actual project costs is shown in the table below. The project costs were lower than planned.

Table 2: Project Costs

		Plan	Actual
Project I	Total project costs	17,644 million yen	14,228 million yen
	Japanese ODA loan	13,231 million yen	13,217 million yen
Project II	Total project costs	10,846 million yen	9,784 million yen
	Japanese ODA loan	8,388 million yen	8,269 million yen

Sources: Documents provided by JICA, NWSDB

The Japanese ODA loan portion of the project costs were largely as planned at 99% for both Projects I and II. The total project costs for both Project I and Project II were lower than planned at 81% and 90% of the plan, respectively.

3.2.2.2 Project Period

The planned and actual project periods for both Projects I and II are shown in Table 3. The defined completion point for Project I was the expiration of the warranty period for the public works, while that for Project II was the end of the construction work. Compared with the plan, the project periods suffered substantial overruns of 154% over for Project I and 233% over for Project II.

Table 3: Project Period

	Plan	Actual
Project I	March 2007–September 2012 (5 years and 7 months, or 67 months)	June 2007–December 2015 (8 years and 7 months, or 103 months)
Project II	July 2008–December 2011 (3 years and 6 months, or 42 months)	July 2008–August 2016 (8 years and 2 months, or 98 months)

Source: Documents provided by JICA, PCR

The overruns in the project implementation can be summarized as follows for each of the components.

- (1) Towns North of Colombo Water Supply Project (TNCWSP): The project proceeded largely as planned up through the selection of contractors and procurement, but delays of approximately one year arose in some of the sub-components during the implementation stage. Major factors behind these delays in construction included the time it took to be issued construction permits from the Road Development Authority (RDA) and the emergence of managerial deficiencies (financing difficulties and worker shortage) on the part of the construction contractors for the additional sub-components through the use of the surplus.
- (2) Greater Colombo Water System Rehabilitation Project (GCWRP): The project went largely as planned up through the selection of contractors and procurement, but delays of about one year arose due to the time required to respond once bedrock and soft ground were unexpectedly encountered during the reservoir construction stage. Delays partially arose due to a lack of capacity on the part of the construction contractors (the allocation of funds and human resources as a result of implementing multiple projects proved problematic).
- (3) Greater Kandy Water Supply Project (GKWSP): The project went largely as planned up through the selection of contractors and procurement, but substantial delays of four years arose during the implementation stage. This was partially due to managerial deficiencies on the part of the construction contractors, but largely attributable to the implementation of the additional sub-components through the use of the surplus. They seem to be more of extensions of the implementation period rather than delays.
- (4) Greater Kandy Waste Water Disposal Project: Delays arose in the procedures for selecting the contractors. Afterwards, following the completion of the basic design in the implementation stage, demands to change the specifications arose and substantial delays occurred before the project was completed on account of the changes made to the design.
- (5) Kalu Ganga Water Supply Project (KGWSP): Delays of approximately one year occurred in the design consultant selection stage (on the Japanese side). Because there were no acceptable contractors during the construction contractor advance review stage, the conditions were reassessed and another review was performed, which caused the delays. In addition to delays caused by bad weather during the implementation stage, further delays occurred as a result of a lack of capacity on the part of the construction contractors (input delays).
- (6) Countermeasures against non-revenue water: In the implementation stage, substantial delays arose as a result of partial capacity shortfalls on the part of the contractors (depletion of funds) and other such factors.

As this indicates, there is a sense in which the project period grew longer as a result of adding to the scope by using the surplus with the project costs generated from the depreciation of the

yen. However, one major factor in this is owing to the delays caused by problems with implementation management. The project period exceeded the plan, and the time efficiency of the projects has been deemed to be low.

3.2.3 Results of Calculations for Internal Rates of Return (Reference Only)

For internal rate of return, Financial Internal Rate of Return (FIRR) and Economic Internal Rate of Return (EIRR) were calculated at the time of the appraisal for GWKSP and TNCWSP of Project I and for Project II. The internal rate of return and assumptions for each project at the time of the appraisal are as follow.

1) GWKSP

<u>FIRR: 8.1%</u>	<u>EIRR: 19.5%</u>
Cost: Project cost and operation and maintenance cost	Cost: Project cost (exclusive of tax) and operation and maintenance cost
Benefit: Income from water fee	Benefit: Willingness to pay

2) TNCWSP

<u>FIRR: 7.6%</u>	<u>EIRR: 9.5%</u>
Cost: Project cost and operation and maintenance cost	Cost: Project cost (exclusive of tax) and operation and maintenance cost
Benefit: Income from water fee	Benefit: Willingness to pay

3) Project II

<u>FIRR: 5.0%</u>	<u>EIRR: 12.4%</u>
Cost: Project cost and operation and maintenance cost	Cost: Project cost (exclusive of land acquisition cost and tax) and operation and maintenance cost
Benefit: Income from water fee	Benefit: Willingness to pay

While FIRR was recalculated at the time of the ex-post evaluation for GWKSP, as required data were obtained, it was 14.6%. The rate is higher than it was estimated at the time of the appraisal, one of the reasons is because the amount of water supplied, which is used in calculating the income from water fee (the benefit), includes the amount of water supplied by the same water treatment plan even before the project. Therefore, the figure cannot be considered as FIRR of the GWKSP. For TNCWSP and Project II, detail data on benefit could not be confirmed and thus, internal rate of returns were not recalculated.

The project costs were lower than planned, but the project period significantly exceeded the plan. This was primarily due to problems in the implementation stage, including delays in obtaining construction permits, deficiencies in process management due to a lack of managerial capacity on the part of the outsourcing contractors, as well as the changes to the specifications during the latter half of the implementation stage. Therefore, the efficiency of the projects is

fair.

3.3 Effectiveness / Impact⁴ (Rating: ③)

3.3.1 Effectiveness

3.3.1.1 Qualitative Effects (Operation and Effect Indicators)

The baseline, target, and actual figures at the time of the appraisal for the projects' operation and effect indicators have been summarized in the table below.

Table 4: Operation and Effect Indicators

(1) Greater Kandy Water Supply Project (GKWSP)					
	Baseline	Target	Actual		
	2005	2012	2015	2016	2017
		Time of Completion	Completion Year	1 Year After Completion	2 Years After Completion
Total population served (people)	325,000	511,000	595,000	628,000	664,000
Hours of water supply (hours/day)	0-12	24	24	24	24
Amount of water supply (m ³ /day)	36,500	48,000	102,800	107,700	117,500
Water supply coverage rate (%)	46	56	79.3	83.8	88.5
(2) Towns North of Colombo Water Supply Project (TNCWSP)					
	Baseline	Target	Actual		
	2005	2012	2015	2016	2017
		Time of Completion	Completion Year	1 Year After Completion	2 Years After Completion
Total population served (people)	47,800	153,300	681,900	-	732,900
Amount of water supply (m ³ /day)	10,100	54,000	151,000	-	163,000
Water supply coverage rate (%)	9	28	69	-	73
(3) Greater Colombo Water System Rehabilitation Project (GCWRP)					
	Baseline	Target	Actual		

⁴ The rating for this is performed by factoring the impacts in with the determination of project effectiveness.

	2005	2012	2014	2015	2017 ^{Note 1}
		Time of Completion	Completion Year	1 Year After Completion	2 Years After Completion
Total population served (people)	68,000	124,000	-	-	150,000
Hours of water supply (hours/day)	6-18	20-22	-	-	24
Amount of water supply (m ³ /day)	11,600	13,600	-	-	-
Water supply coverage rate (%)	60	100	-	-	100
(4) Water Sector Development Project (II)					
	Baseline	Target	Actual		
	2007	2013	2016	2017	2018
		2 Years After Completion	Completion Year	1 Year After Completion	2 Years After Completion
Total population served (people) ^{Note 2}	344,200	490,600	637,200	683,000	
Amount of water supply (m ³ /day)	—	48,000	-	94,300	
Number of houses connected (houses) ^{Note 2}	63,600	110,600	-	169,000	
Non-revenue water rate (%) ^{Note 3}	52.7	37.9	-	43.0	
Utilization rate of water treatment plant (daily average) (%)	—	80	95	105	
Number of increased connections in tenement gardens (houses) ^{Note 4}	—	3,000	-	3,000	

Source: Documents provided by JICA and the executing agency, etc.

Note 1: Since there were no actual values for 2016, which was the second year following the completion of the project, the actual values for 2017 were listed instead.

Note 2: The figures include the facilities from the Kalu Ganga Water Supply Project for Greater Colombo (Kalu Ganga River Phase I, Stage I).

Note 3: Figures for the entire city of Colombo.

Note 4: Targets all households that reside in the tenement gardens of the target regions for the component of reducing non-revenue water (the CBI District and Colombo 02 District within Colombo City).

For the confirmations based on the evaluation indicators, some of the data could not be obtained, but for those indicators in which the actuals were confirmed, the targets were achieved for all of them. Although the target year was project completion for the indicators of Project I, the results showed that the targets had been maintained up to the time of the ex-post evaluation.

Furthermore, in Sri Lanka, the necessity to respond to non-revenue water was recognized from the time of the project appraisal. Particularly in Colombo, the needs for reducing the non-revenue water through rehabilitation was higher than expansion of the supply networks; however, rate of non-revenue water was not used as an indicator for GCWRP. Considering that the Corporate Plan of NWSDB at the time of the appraisal had reducing non-revenue water as one of the targets, it would have been desirable to incorporate the rate of non-revenue water as an indicator for the project.

In addition to the operation and effect indicators, the water supplied by the Kalu Ganga River water treatment plant (Kadana water treatment plant) was compared against Sri Lanka's water quality standards to confirm the extent to which these projects have given rise to and maintained their effects. As a result of confirming this with the executing agency at the time of the ex-post evaluation, the water quality of the Kalu Ganga River water treatment plant was in conformance with Sri Lanka's national water quality standards for drinking water. Furthermore, the following items were confirmed regarding the effects of strengthening the capacity of the executing agency that was carried out through the consulting services: (1) Extent to which the basic design for the Greater Kandy sewer system was used, (2) Extent to which NWSDB's management plan was utilized and entrenched, (3) Extent to which the revised master plan was used, and (4) NWSDB's status of operation and maintenance. The confirmation performed at the time of the ex-post evaluation found that (1) had entered the implementation stage as Kandy City Wastewater Management Project under ODA loan at the time of the ex-post evaluation, and that the basic design drafted through these projects was being used. From the NWSDB's management plan (consisting of financial affairs, a management structure, investments, and a rate structure) from (2), the management structure and investments are being used. It was learned that while a request to revise the rate structure was made to the Government of Sri Lanka, this has not been approved and therefore has not led to improving the NWSDB's financial affairs. However, this is seen as a delay in approval due to political ramifications. As for the revised master plan from (3), according to the NWSDB this is being used in a full-scale manner. However, because it took time from the planning until the implementation was carried out, the project did not end up conforming to the demand predictions. Therefore, the project has not necessarily achieved results when it comes to satisfying demand as had been anticipated by the master plan. Conversely, similar to the setting of rates, the time it took from the request for support pursuant to the master plan through to the implementation of the project was a major factor in not satisfying the demand anticipated by the master plan. As for (4), facility operation

and maintenance plans have been prepared for each of the regional support centers.

While there are problems with the extent to which both the NWSDB's management plan and the revised master plan are being used, it can be said external factors have had a significant impact on this. On the other hand, as can be seen from the degree to which the operation and effect indicators have been achieved, the intended effects have largely been achieved and it was confirmed that these effects had been maintained (or improved) as of the time of the ex-post evaluation. Therefore, the effectiveness of the projects is high.

3.3.1.2 Qualitative Effects (Other Effects)

The qualitative effects mentioned at the time of the appraisal seem to be impacts based on their contents. Thus, they will be listed in the section on impacts.

3.3.2 Impacts

3.3.2.1 Intended Impacts

The intended impacts for both Project I and Project II were to: (1) Improve the residential environment for the local residents and (2) Improve sanitary conditions. In addition to these, Project II had another intended impact given as being to: (3) Improve health conditions. For these sorts of impacts, because the projects have many beneficiaries, it is difficult to get a precise grasp of the extent of their contributions. Therefore, in addition to gathering data from local health care centers, attempts were made to interview the relevant officials from health organizations and the local governments in the target regions, as well as the beneficiaries of the projects.⁵

Data on water-borne illnesses retained by the Department of Health Statistics of the Ministry of Health, Nutrition and Indigenous Medicine and the city halls of both Colombo and Kandy were checked. However, no clear results were observed, such as a decline in infection rates as a result of these projects.

For the interviews with beneficiaries, talks were held with 83 people in Colombo and 18 people in Kandy, as well as 10 people in the target region for the KGWSP (93 men and 18 women). Out of the beneficiaries interviewed, 20 of them (14 men and 6 women) were residents of tenement garden in Colombo⁶.

The results of this revealed that only a small number of approximately one-third of the users felt any change (improvement) with respect to either the residential environment, sanitary conditions, or health conditions in the project's target regions. However, among those users who

⁵ Initially, the plan had been to conduct group interviews aimed at the water users. However, because of difficulties with selecting participants from among the beneficiaries and the fact that interview venues could not be secured, individual interview surveys were adopted through the use of questionnaire forms.

⁶ Other beneficiaries were residents of Central Colombo (34) and North Colombo (29).

received support for connecting their homes to the water supply in the tenement gardens, about half of them indicated that they felt an improvement, revealing a higher tendency to feel this way among the users in tenement gardens than among the total beneficiaries as a whole.

Seen solely from the results of the interviews with beneficiaries, the intended impacts were only achieved to a limited extent. However, the fact that no major difference was seen with regard to ensuring safe water before and after the projects seems to be a major factor behind this. The major objective of these projects was to install and rehabilitate distribution networks, and many of the users already had home connections to the water supply prior to the start of the projects. Therefore, the results of these projects included improvements to the water supply status such as the amount of water supply, the water pressure, and the hours of water supply. It is reasonable to conclude that even though these projects clearly improved convenience, they did not have a sizable impact on the environment, sanitation and health. Furthermore, even in those impoverished regions where people gained home connections to the water supply through these projects, they were able to access the safe water needed for daily life to a certain extent from common faucets prior to the project. While the presumption has been that the projects would give rise to impacts when compared with other regions, it is conceivable that people's assumptions that it would bring about across-the-board improvements to the environment as well as health and sanitation were overblown. Therefore, while it could not be adequately confirmed through this ex-post evaluation that the intended impacts from the time of the planning were achieved, it seems premature to determine that there was no impacts.

3.3.2.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

Both Project I and Project II were classified under Category B based on the Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Consideration (2002). The executing agency decided to conduct monitoring of the air quality, water quality, noise, and other factors during the construction to serve as a countermeasure against contamination during the construction work. With respect to the facility design, consideration was given to the operating noise and foul odors from the water treatment plant, pump stations, and other facilities, with the assumption being that the sludge generated at the water treatment plant would be disposed of via landfill disposal or the like.

From the interviews to the NWSDB at the time of the ex-post evaluation, it was learned that environmental monitoring was carried out during the construction work based on Sri Lanka's domestic standards. However, existence and results of environmental monitoring plan and results of monitoring during the construction have not been confirmed. No particular consideration was given to noise from the water treatment plant or the pump stations. However, most of the pumps were installed underground in pump sheds, and it was confirmed during the

onsite field studies that noise would not pose a major problem. As for considerations for foul odors, lime treatment was carried out at the water treatment plant in order to reduce the amount of sludge generated, and this is then disposed of at a disposal site within the plant. Thus, this does not affect the residents in the surrounding area.

It was confirmed that there were no other negative impacts on the natural environment either during the construction work or after the completion of projects.

(2) Resettlement and Land Acquisition

When confirmation was made with the NWSDB at the time of the ex-post evaluation, the organization had acquired 8.9 hectares of land for the GKWSP for Project I, as well as 0.4 hectares of land for Project II. The land acquisition was carried out according to the laws of Sri Lanka. Although it took time to carry out the negotiations with the land owners, no problems arose with this. While it was deemed that there would be no need to resettle residents at the time of the appraisal, in actuality two households had to be resettled for the GKWSP. Resettlement locations and new dwellings were secured for both of the households. The resettlement procedures were carried out by referring to JICA's Japan Bank for International Cooperation Guidelines for Confirmation of Environmental and Social Consideration (2002). The costs for the resettlement were provided by the executing agency, and no problems occurred with this.

(3) Other Positive and Negative Impacts

In the plan for Project II at the time of the appraisal, initial connection costs for the private connections in the tenement gardens were set out of consideration for the income level of the poor people living there. In addition, the expectation was that a roughly three-year installment payment scheme would be adopted in these areas.

At the time of the ex-post evaluation, relaxed water rates were set for low-income households. The water rates were structured so that their price per unit would increase according to the amount used. If an ordinary household were to use between zero and five units in a single month, then it would be charged 12 rupees per unit as the lowest rate for them. Conversely, even if residents of the tenement gardens were to use the same number of units as an ordinary household, their rate would be set at only five rupees. From the interviews with the beneficiaries performed at the time of the ex-post evaluation for the projects, it was learned that relaxed rates had been set in relation to the installation of water distribution pipes and meters related to the initial connection costs. From the results of the qualitative study as well, it was learned that many held the view that it was not difficult to make the payments.

Regarding other positive impacts, many voiced the opinion that the projects improved the living environment for women, particularly in the tenement gardens, such as by reducing the chore of drawing water performed by women and improving privacy protections for them

(doing laundry and using the toilet at home). In addition, a laboratory on water supply-related materials for Kandy that these projects supported the launch carried out quality inspections and training for the water supply pipes, which led to the establishment of quality standards for the materials. This can also be mentioned as a positive impact. In addition, these projects experienced difficulties over and over again with the selection of construction contractors (in that contractors with limited implementation capacity were selected). To address this problem, the method for calculating hypothetical estimated costs on the side of placing the orders were revised in order to make it possible to select contracts on the basis of estimates that were reasonable in a technical sense, rather than simply selecting the cheapest bid tenderer. Based on this, hypothetical estimate guidelines were created.

No problems arose with beneficiaries bearing the initial costs as a result of the setting of the relaxed rates for the tenement gardens (initial costs, water usage rates). At the same time, other outcomes that were affirmed included the gender-related impact in the tenement gardens, the standardization of water supply-related materials, and the impact on improving procurement operations through the lessons learned from the projects.

As for the effectiveness of the projects, while some data could not be obtained, the targets were achieved for most of the indicators and the effects were being maintained or improved upon at the time of the ex-post evaluation. Regarding the impacts, it could not necessarily be clearly confirmed that the intended impacts had been achieved. However, much of the project content served to improve the water supply systems in regions that were already being supplied with water. When this fact is taken into consideration, it would be difficult to logically expect improvements in both an environmental and health sense from the projects (residential environment, sanitary conditions, and health conditions). On the other hand, reasonable, relevant spillover effects from the projects were confirmed, such as the impact on women in the tenement gardens and the standardization of water supply-related materials. These can be duly acknowledged as impacts of these projects. Given the above, the implementation of these projects has been observed as having produced effects largely as planned. Therefore, the effectiveness and impact of the projects are high.

3.4 Sustainability (Rating: ②)

3.4.1 Institutional Aspects of Operation and Maintenance

At the time of the appraisal, it was decided that the NWSDB, as the executing agency, would carry out operation and maintenance for the projects. The NWSDB was established in 1975 on the legal grounds provided by the National Water Supply and Drainage Board Law No. 2 of 1974. It has been charged with installing water supply and sewage systems, as well as their operation and maintenance, in Sri Lanka as a whole (excluding facilities owned by municipal governments). As of 2005, it had approximately 8,000 staff members. The NWSDB has

Regional Support Centers (RSCs) in different areas, and these RSCs were put in charge of operation and maintenance following the completion of the projects. The plan was to have the operation and maintenance authorities of RSC Greater Colombo assume responsibility for the facilities of Greater Colombo, and the operation and maintenance authorities of RSC Central assume responsibility for the Greater Kandy facilities. However, because the city of Kandy owns the reservoirs and water distribution and water supply pipes within Kandy, the Water Works Department of the Kandy Municipal Council (KMC) was to carry out operation and maintenance for these, as well as billing and collection of water fees. Outside the KMC area, the water supply facilities were to be maintained by NWSDB.

When this was confirmed at the time of the ex-post evaluation, there had been no changes from the plan at the time of the appraisal regarding the agency in charge of operation and maintenance. Practical operation and maintenance is carried out by each RSC, with each RSC equipped with a structure for dividing up duties and reporting. Compared with staff quota in each RSC, there is no shortage of personnel. As an example, both RSC Western Central and RSC Western North suffer from vacancies to the point that they are down around 4% of their staff quota. However, as its service area expands, RSC Western Central is considering increasing its current staff of 1,422 people to 1,804 people. As this indicates, the operation and maintenance divisions lack the staff commensurate with the increase in their tasks; thus, they are handling this by outsourcing some of their operation and maintenance tasks. While personnel shortages have arisen at the RSCs, they are handling this by outsourcing their tasks. Therefore, it is fair to say that there are no problems regarding the number of personnel and that an operation and maintenance structure has been set in place.

3.4.2 Technical Aspects of Operation and Maintenance

The NWSDB has previously implemented numerous projects from aid agencies, including Japan's. Thus, it had sufficient experience with project implementation. Because its technical skills would be supplemented by the consulting services through these projects, at the time of the appraisal, it was deemed to be endowed with technical capabilities regarding operation and maintenance for both water supply and sewage.

From the interviews with the NWSDB and on-site studies at the time of the ex-post evaluation, it seemed that operation and maintenance are being properly carried out on the facilities installed via these projects. The manuals on water treatment plant operation and management and the manuals on pump operation and so forth that were prepared via these projects are being put to use. The employees who were the beneficiaries of technology transfers through this project are still in place.

Some of the operation and maintenance tasks are being outsourced, but the technical levels of the contractors commissioned with this are not necessarily adequate. Therefore, the RSCs have

worked to maintain the necessary technical level through efforts like providing technical guidance to contractors upon the start of consignments, or providing onsite guidance and supervision as needed.

3.4.3 Financial Aspects of Operation and Maintenance

At the time of the appraisal, in its Corporate Plan, the NWSDB stated that it would give consideration to the setting of rates needed to supply water, as well as the establishment and introduction of sewage rates, in order to recover its operation and maintenance expenses and ensure people's ability to pay. In addition, because this had been carried out in conjunction with reducing expenses and enhancing its fee collection system, no problems had been foreseen regarding the financial aspects. However, according to the study for the Jaffna Kilinochchi Water Supply and Sanitation Project carried out by the Asian Development Bank (ADB) in 2010, the NWSDB ran operating deficits between 2002 and 2009. The ADB study opined that, to improve its financial aspects, the NWSDB needed to revise its water rates, take countermeasures against non-revenue water, and streamline its organization.

Table 5 shows the budgetary allocation and execution status for each RSC as confirmed at the time of the ex-post evaluation. Since FY 2016, no budgetary shortfalls have occurred, and the necessary budgets have been allocated.

Table 5: RSC Budget Table

(Unit: million rupees)

	FY 2015	FY 2016	FY 2017
RSC (Western Central)			
Total budget	143.77	209.57	213.73
Total expenditures	163.60	177.92	183.00
RSC (Western North)			
Total budget	1,273.30	1,409.20	1,429.80
Total expenditures	1,274.76	1,213.92	1,275.08
RSC (Central) (Kandy)			
Total budget	1,936.06	2,403.14	2,460.75
Total expenditures	1,953.83	2,126.42	2,241.39

Source: NWSDB

Conversely, according to the financial outlook from the NWSDB's Corporate Plan, the public corporation's overall financial situation has been persistently in the red (as indicated in Table 6), with the amount of its deficits expected to increase in the future. The biggest factor behind these

deficits has been its repayment of the loans for project costs pertaining to capital investments and other such expenditures. However, these loans have been guaranteed by the government. Thus, it is likely that the NWSDB will be able to avoid financial catastrophe even in the worst-case scenario.

Table 6: Financial Outlook for the NWSDB

(Unit: million rupees)

	FY 2019	FY 2020
Total operating income	49,037,412	49,827,829
Total operating expenditures	43,166,722	45,674,666
Total debt repayment	40,964,524	57,394,488
Total expenditures	84,131,246	103,069,154
Surplus / deficit ^{Note 1}	-64,800,836	-118,042,162

Source: NWSDB

Note 1: Including the amount carried over from the previous fiscal year

The NWSDB reassesses its water rate structure once every three years to eliminate its chronic deficits. While it had already petitioned the government regarding its rate revisions in 2017, as of June 2018 these had not been approved and so it is impossible to offer an outlook for the future. However, the plan is to shift its basic balance into the black as soon as the new rate structure is approved.

As of this point in time, there are sufficient operation and maintenance costs, but the NWSDB is spending this even as it runs deficits. If the petitioned rate structure is approved, then this is expected to improve. However, this is impossible to foresee at the time of the ex-post evaluation. Thus, it is fair to say that there are problems regarding its financial aspects.

3.4.4 Status of Operation and Maintenance

Based on the on-site study at the time of the ex-post evaluation and the like, it was confirmed that the facilities installed and machinery procured through these projects were undergoing proper operation and maintenance. The Kadana water treatment plant from the KGWSP is already processing water in volumes that exceed its design capacity. The reason for this resides in the scenarios in the master plan and the fact that this project was implemented on the basis of these (by the time the facility, which was designed based on demand predictions from a certain point in time actually went into operation the situation was different from back when the demand conditions were predicted, so as demand has already continued to increase ahead of this it has resulted in insufficient supply). The subsequent plan to expand the Kadana water treatment plant is planned to be completed in 2020. Until then, the plant has no choice but to

operate above and beyond its design capacity, but it has been posited that there are no problems with this in a technical sense.

There are no problems with the institutional aspects of operation and maintenance. At the time of the ex-post evaluation, there were no problems with the operation of the facilities and machinery. In cases where some of the operation and maintenance tasks are outsourced, there are concerns regarding the technical capabilities of the contractors to which this is commissioned, and there are concerns over the amount of water being processed by the Kadana water treatment plant exceeding its design capacity. However, these are being handled in an appropriate manner. However, there are also concerns that delays in revising the rate structure will endanger the sustainability of the project's financial aspects. In light of the above, the projects' operation and maintenance have some problems regarding both their technical and financial aspects. Thus, the sustainability of the effects achieved through the projects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

As the population of Sri Lanka increases, the Water Sector Development Project and Water Sector Development Project (II) were implemented in Greater Colombo and Greater Kandy in order to accommodate the ever-rising demand for water. The objectives of these two projects are to provide water for domestic use in a safe and stable manner by installing and expanding water supply equipment, thereby contributing to improving the residential environment in the target regions. There were no changes to Sri Lanka's national plans related to water supply and sewage both at the time of the appraisal and the ex-post evaluation; thus, these were acknowledged as being consistent with development policies and priority issues. From the perspective of consistency with development needs, at the time of the appraisal, it was acknowledged that it was necessary to accommodate the increasing demand for water, while at the time of the ex-post evaluation, it was acknowledged that it was necessary to reduce the non-revenue water rate in Colombo, as well as needs for expanding distribution networks, reducing the non-revenue water rate, and improving the sewage system in Kandy. Thus, the projects are consistent with Japan's assistance policy and their relevance is high. The projects also added outputs by using the surplus with the project costs generated from fluctuations in the exchange rate. The project costs were lower than planned, but there were considerable overruns in the project period attributable to problems with implementation management. Therefore, the efficiency of the projects is fair. The majority of the indicators for operational effectiveness that denote project effectiveness were achieved. While the extent to which impacts such as improvements to the residential environment and sanitation and health were achieved is not necessarily clear, other positive impacts were observed. Therefore, the effectiveness and impacts of the projects are high. While there were no major problems with the institutional and

technical aspects of operation and maintenance, or the status of operation and maintenance, there have been delays in setting the rate structure designed to improve the financial aspects. Therefore, the sustainability of the projects is fair.

In light of the above, these projects are evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

It has previously been pointed out that improving the NWSDB's financial aspects is an important issue. The water rates must be revised in order to eliminate the NWSDB's chronic deficits. The approval of the Sri Lankan government is required to revise the rate structure. Thus, although this is something that exceeds the scope of the NWSDB's jurisdiction, a continuing appeal to the government should be made to encourage prompt approval and implementation of the revision.

4.2.2 Recommendations to JICA

None in particular

4.3 Lessons Learned

Examine design specifications that give consideration to the time period for the master plan's supply/demand estimates and pragmatic project implementation plans

For projects where master plans are formulated, like these projects, the projects are planned based on the supply/demand estimates found in the master plan. Conversely, by the time the facilities began operating after the delay and other problems that occurred during implementation for these projects, the time period for the supply/demand estimates from the time of the project planning had lapsed, resulting in a state of affairs in which demand exceeded the facility's capacity. In general, project plans are prepared on the assumption that projects will be implemented as planned. However, in developing countries, there is a certain degree of risk in presuming that project delays will not occur. Forethought should be given to considering facility specifications by foreseeing a certain degree of delays in a more practical manner.

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1. Project Outputs	<p>(1) Greater Kandy Water Supply Project (GKWSP)</p> <ul style="list-style-type: none"> • Newly install 15 reservoirs • Newly install 6 pump stations <p>(2) Greater Colombo Water System Rehabilitation Project (GCWRP)</p> <ul style="list-style-type: none"> • Central Greater Colombo: Newly install 1 reservoir, repair 1 reservoir, and 1 management office building • Kotikawatta – Mulleriyawa: Newly install 1 pump station, 1 reservoir, 1 water tower, and 1 pump shed • Improve the living environment in the tenement gardens <p>(3) Towns North of Colombo Water Supply Project (TNCWSP)</p> <ul style="list-style-type: none"> • 2 reservoirs • Repair 1 reservoir • 2 pump sheds • 1 management office building <p>(4) Greater Kandy Waste Water Disposal Project</p> <ul style="list-style-type: none"> • Basic design, bid tendering assistance, consulting services <p>(5) Strengthening organizations</p> <ul style="list-style-type: none"> • Consulting services for capacity building <p>(6) Kalu Ganga Water Supply Project (KGWSP)</p> <ul style="list-style-type: none"> • 1 water treatment plant in Kadana • 14.5 km of water distribution 	<p>(1) Greater Kandy Water Supply Project (GKWSP)</p> <ul style="list-style-type: none"> • Newly installed 8 reservoirs • Newly installed 5 pump stations • Additions to the project scope <p>(2) Greater Colombo Water System Rehabilitation Project (GCWRP)</p> <ul style="list-style-type: none"> • Central Greater Colombo: Newly installed 2 reservoirs, 1 management office building • Kotikawatta – Mulleriyawa: 1 water tower <p>(3) Towns North of Colombo Water Supply Project (TNCWSP)</p> <ul style="list-style-type: none"> • Largely as planned • Additions to the project scope <p>(4) Greater Kandy Waste Water Disposal Project</p> <ul style="list-style-type: none"> • As planned <p>(5) Strengthening organizations</p> <ul style="list-style-type: none"> • As planned <p>(6) Kalu Ganga Water Supply Project (KGWSP)</p> <ul style="list-style-type: none"> • As planned

	<p>pipes between Bandaragama - Piliyandala</p> <ul style="list-style-type: none"> • 1 reservoir and 1 pump shed in Piliyandala • 1 reservoir and 1 pump shed in Moratuwa <p>(7) Countermeasures against non-revenue water</p> <ul style="list-style-type: none"> • Replace water supply pipes in CBI District and Colombo 02 District • Improve pipes in order to connect to water supply pipe networks and water supply pipe mains in CBI District and Colombo 02 District <p>(8) Consulting services</p> <ul style="list-style-type: none"> • Bid tendering assistance, construction supervision assistance • Revise the master plan • Assist in improving the capacity of the NWSDB 	<p>(7) Countermeasures against non-revenue water</p> <ul style="list-style-type: none"> • Largely as planned • Additions to the project scope <p>(8) Consulting services</p> <ul style="list-style-type: none"> • As planned
2. Project Period	<p><u>Water Sector Development Project</u> March 2007–September 2012 (67 months)</p> <p><u>Water Sector Development Project (II)</u> July 2008–December 2011 (42 months)</p>	<p><u>Water Sector Development Project</u> June 2007–July 2015 (98 months)</p> <p><u>Water Sector Development Project (II)</u> July 2008–July 2016 (96 months)</p>
3. Project Costs	<p><u>Water Sector Development Project</u></p> <p>Amount Paid in Foreign Currency 5,630 million yen</p> <p>Amount Paid in Local Currency 12,014 million yen (10,726 million rupee)</p> <p>Total 17,644 million yen</p> <p>ODA Loan Portion 13,231 million yen</p> <p>Exchange Rate 1 rupee = 1.12 yen</p>	<p><u>Water Sector Development Project</u></p> <p>13,231 million yen</p> <p>997 million yen (1,215 million rupee)</p> <p>14,228 million yen</p> <p>13,217 million yen</p> <p>1 rupee = 0.82 yen</p>

	(As of 2006)	(Average between 2007 and 2015)
	<u>Water Sector Development Project (II)</u>	<u>Water Sector Development Project (II)</u>
Amount Paid in Foreign Currency	4,396 million yen	8,269 million yen
Amount Paid in Local Currency	6,450 million yen (6,142 million rupee)	6,524 million yen (8,258 million rupee)
Total	10,846 million yen	14,793 million yen
ODA Loan Portion	8,388 million yen	8,269 million yen
Exchange Rate	1 rupee = 1.05 yen (As of 2007)	1 rupee = 0.79 yen (Average between 2008 and 2016)
4. Final Disbursement	<u>Water Sector Development Project</u> June 2015 <u>Water Sector Development Project (II)</u> November 2015	