

Ex-Post Monitoring of Japanese ODA Loan Project

South Africa

Kwandebele Region Water Augmentation Project

External Monitoring Consultant: Katsumi Matsuyama, Nakamoto&Associates Co., Ltd.

1. Project Description



Project Location



Bronkhorstspruit Water Purification Plant

1.1 Project Objective

The project aims to fulfill the present and future water demand in Kwandebele region, one of the former homelands, by installing conduits and water pipes and expanding water purification and pumping facilities in the region thereby contribute to the improvement of the sanitation environment and the activation of industries.

1.2 Outline of the Loan Agreement

Approved Amount / Disbursed Amount	3,097 million yen / 1,814million yen
Loan Agreement Signing Date / Final Disbursement Date	May 1996 / November 2003
Ex-Post Evaluation	2006
Executing Agency	Department of Water Affairs (DWAF)
Main Contractor	Fregold-Construction (South Africa)• Valente-Bros (South Africa) (JV)
Main Consultant	-

1.3 Background of Ex-post Monitoring

Kwandebele region, located approximately 60 km east of the capital Pretoria, is one of the former

homelands. Because of its geographical location, Kwandebele region was developing as the largest township for black residents commuting to Pretoria. The region was experiencing rapid population growth marking an annual growth rate of approximately 7.5% for several years prior to the appraisal of this project. However, Kwandebele region did not have sufficient infrastructure such as water supply. To improve this situation, this project implemented installation of water pipes, construction of water treatment plants, and expansion of pump facilities.

However, with the enactment of the Constitution of the Republic of South Africa in 1997, Water Service Act was signed into law according to a policy on water supply and sanitation and water supply policies of local municipalities were reviewed on a national scale.¹ Review of the water policy of the Kwandebele region uncovered the fact that expending a large capital for drawing water from Great Dry Dam was unnecessary. Hence, the project was cancelled in 2000. As a result of the policy change of the country, the jurisdiction of water supply was planned to be transferred from Ministry of Water Affairs (DWAF) to local municipalities. But since the local governments had not been established, and organizations to assume the role of water service provider (WSP) in the region were nonexistent, Ikangala Water Board (IWB) was organized as a body to implement the installation of water supply infrastructure and the operation and maintenance of the facilities. At the time of ex-post evaluation (2006), the DWAF was providing IWB with personnel and financial support. However, they were insufficient. The local municipalities had not entered into a water supply agreement with IWB, and payments for water supply were not being made. Based upon the fact that the IWB had not employed any engineers, and the resignation of CEO and five members of the management staff, it was judged that IWB was lacking the capacity to sustain the water supply service. There was concern over the sustainability over the project, as the capacity was insufficient to effectively utilize the facilities installed by this project and satisfy the water needs for the region.

Under these circumstances, in the ex-post evaluation report, recommendations were made to Japan International Cooperation Agency (JICA) to organize the problems, carefully analyze the situation, and apply the lessons learned from this project to future project formation. Recommendation was also made to the South African local governments to establish relations with appropriate Water Service Providers (WSP) as Water Service Authority (WSA) as soon as possible.

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.

¹ (1) Water Services Authority (WSA): Functions of administration, planning, and regulations concerning water supply services (it was stipulated that the local municipalities having jurisdiction over each service area shall serve as WSAs)
(2) Water Services Provider (WSP): Functions of designing, construction, ownership, operation, maintenance and customer relations concerning water supply services

2. Outline of the Monitoring Study

2.1 External Monitoring Consultant

Katsumi Matsuyama (Nakamoto & Associates Co., Ltd.)

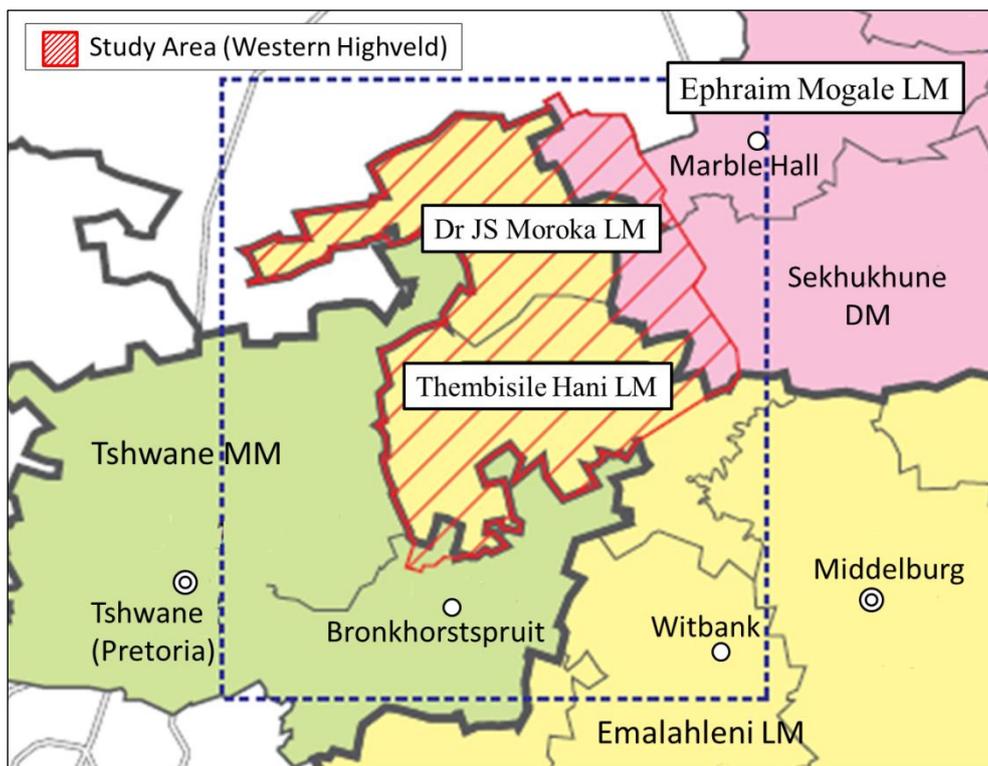
2.2 Duration of Monitoring Study

Duration of the Study: September 2012 – June 2013

Duration of the Field Study: November 16, 2012 – November 24, 2012

2.3 Constraints During the Monitoring Study

At the time of the appraisal of this project in 1996, current Western Highveld region (former Kwandebele region) represented an administrative area of former homeland. However, according to the interview with DWAF, Western Highveld is merely a name for the historical region, in which, currently, its boundary passes through four local municipalities (There were five municipalities at the time of ex-post evaluation. The municipalities were reorganized subsequently). The region name is used by the water suppliers for the operation of the facilities, since multiple municipalities share the facilities within the region. The water supplied by the facility is utilized by municipalities inside and outside of the region.



Source: Reference obtained from Japan International Cooperation Agency (JICA)
 MM (Metropolitan Municipality): administrative body of metropolitan area. Also holds authority as regional district municipality.
 DM (District Municipality): administrative organization under the state and above LM
 LM (Local Municipality): administrative organization under DM. Lowest in the hierarchy of administrative bodies.

Figure 1 Western Highveld Region

This study revealed that the data pertaining to this area does not exist, since Western Highveld region is neither a name of an administrative district nor a collection of administrative districts. Western Highveld is a region designated for the purpose of operating the water service facilities, and its boundary passes through parts of the four neighboring local municipalities.

Since Western Highveld is not an administrative district, water supply and consumption data pertaining to this particular region could not be obtained. Therefore, efforts were made to obtain alternative data which are comparable to the ex-post evaluation.

3. Monitoring Results

3.1 Effectiveness

3.1.1 Quantitative Effects

3.1.1.1 Results from Operation and Effect Indicators

(1) Volume of Water Supply and Water Supplied Population

According to "Blue Drop Report 2011" issued by DWAF, the water-supplied populations of four municipalities, which are partially a part of Western Highveld (Greater Sekhukhune, Dr. JS Moroka,

Thembisile, City of Tshwane) have reached 3.7million, and the volume of supplied water is 300,000 m³ per day (Table 1). According to the interview with DWAF, although there are persistent problems of leakage and illegal connection to water supply pipes, Western Highveld region have not experienced any water shortage due to the above mentioned reasons or any other reasons. At the time of the study, there were problems with water pipes near some villages, and DWAF was working to repair the pipelines.

Table 1 Water supplied population and Volume of Water Supply in four municipalities

Municipality	Population supplied with water (persons)	Volume of water supply (m ³ /day)
G. Sekhukhune DM	854,093	95,627
Dr. JS Moroka LM	218,290	2,000
Thembisile LM	264,400	50,399
City of Tshwane MM	2,445,083	156,497

Source: DWAF Blue Drop Report 2011 *value from ex-post evaluation

Calculating from the data from Table 1, each resident of the four municipalities receive approximately 79 liters (0.07 m³) of water per day. In the Reconstruction and Development Program, water supply of 20-30 liters per person per day was held as a short-term goal, and 50-60 liters per person per day was held as a mid-term goal. Current numbers exceed both of these goals.

For the reasons mentioned above, data for the supply and demand of water pertaining to the Kwandebele region could not be obtained. However, considering the calculation from the water supplied population and supplied volume and the result from the DWAF interview, water shortage could not be detected in the four municipalities studied by this project.

(2) Component Capacity

The capacities of the 4 components installed by this project are as follows:

Table 2: Capacity of Components

Component		Capacity	
		2006*	2012
1	Installation of Ekangala-Enkeldoornooog Gembokkspruit water pipe	Length: 42km Capacity: 1 m ³ /s	Length: 42km Capacity: 1 m ³ /s
2	Ekangala regulating reservoir	Capacity : 20,000m ³	Capacity : 20,000m ³
	Enkeldoornooog regulating reservoir	Capacity : 11,000m ³	Capacity : 11,000m ³
3	Kwandebele Region regulating reservoir	Capacity : 10,000m ³ × 2	Capacity : 10,000m ³ × 2
4	Procurement of equipment for Bronkhorstspruit water treatment facilities	Treatment Capacity : 21 million m ³ /day	Treatment Capacity : 54 million m ³ /day

Source: DWAF *data from ex-post evaluation

The data obtained for the capacity of Bronkhorstspruit water treatment plant differ from those reported in the ex-post evaluation report. According to an interview with DWAF, there were no renovations made after the ex-post evaluation, and the reason for the difference between the two numbers is unknown. Otherwise, there are no changes in the capacity of the components from the time of ex-post evaluation.

Utilization statuses of the four components are as follows.

- Bronkhorstspruit water treatment plant treats 43,000 m³ of water per day supplied from Rand Water Board, utilizing the water treatment facility implemented by this project.
- Of these, 30,000 m³ per day is supplied to City of Tshwane. The remaining 13,000 m³ per day is combined with 31,000 m³ per day supplied from Rand Water Board, and the total of 44,000 m³ per day is sent to Thembisile through the Enkeldoornooog water pipe and Enkeldoornooog regulating reservoir. The water supplied population for the four components could not be obtained due to the reasons mentioned in the "Constraints during the Monitoring Study".

From Table 1, total water supply to the four municipality is 304,523 m³ per day. Amount of water conveyed to Enkeldoornooog regulating reservoir through Ekangala-Enkeldoornooog water pipe is 44,000 m³ per day, which is the capacity of the pipeline. Assuming that all of the water is supplied in one day, the percentage of contribution to the entire water supply is 14.4%. Also, in assuming that, of the 43,000 m³ that is treated at Bronkhorstspruit water treatment plant, the remaining 30,000 m³ which is not sent through Ekangala-Enkeldoornooog pipeline (volume consumed in City of Tshwane), is consumed in one day, the percentage of contribution to the entire water supply is 9.8%. From the above, the contribution of the four components to the water supply to the entire municipality can be

speculated to be approximately 24.2%.

3.1.1.2 Results of Calculations of Internal Rates of Return (IRR)

Re-calculation of Internal rate of return (IRR) will not be performed since IRR was not calculated at the time of ex-post evaluation.

3.1.2 Qualitative Effects

See Impact.

From the above, concerning effectiveness, it was confirmed that four components implemented by this project continue to be in operation since the time of ex-post evaluation. From the aforementioned reasons, data on the balance of supply and demand of water cannot be compared to those in the ex-post evaluation. However, from the data obtained by this study, water shortage could not be seen, and the contributions of this project to the water supply to the four municipalities (approximately 24.2% of the total water supply) were confirmed.

3.2 Impact

3.2.1 Intended Impacts

3.2.1.1 Improvement of Living Conditions

According to the interviews to residents of Bronkhorstspuit, located within the Western Highveld region, there is no problem with the quality or quantity of tap or drinking water. There were also no reports of leakage.

Concerning the impact on living conditions, information required for confirming the improvement of public health in the targeted region could not be obtained from the Ministry of Health (MOH). As alternative indicators, "under-five mortality" from "Mortality and Causes of Death in South Africa, 2009: Findings from Death Notification"(MCD) issued by MOH, and "water piped onto premises" from "Estimates for the Use of Improved Drinking-Water Sources of South Africa" (EIDW) issued by World Health Organization (WHO) and United Nations Children's Fund (UNICEF) were collected and compared (Table 3).

Table 3 Under-five Mortality and the Portion of Families Using Potable Water

	Under-5 mortality (persons)	Use of Drinking Water Sources (%)	
		Urban	Rural
2001	41,094	97.6	60.5
2002	46,470	Data Not Available	
2003	51,881	98.2	64.1
2004	57,355	Data Not Available	
2005	62,029	Data Not Available	
2006	64,326	98.8	64.3
2007	61,540	98.3	67.4

Source: "Mortality and Causes of Death in South Africa: 2009" Ministry of Health, "Estimates for the Use of Improved Drinking-Water Sources South Africa (EIDW): March 2010" WHO/UNICEF

According to CIA World Factbook and World Bank, life expectancy of South Africa is as follows:

Table 4 Average Life Expectancy Rate of South Africa

(Unit: years)	
	Life Expectancy
2001	48.09
2002	45.43
2003	46.56
2004	44.19
2005	43.27
2006	42.73
2007	42.45
2008	51.24*
2009	51.61*
2010	52.08*
2012	49.41

Source: CIA World Factbook
*World Bank

Compared to the time of ex-post evaluation, improvement was seen in the under-five mortality and life expectancy. However, since the components implemented by this project are limited in comparison with the scope of the project, it is impossible to present a clear causal relationship.

3.2.2 Other Impacts

3.2.2.1 Environmental Impact

No negative environmental impact has been detected from the time of ex-post evaluation. According to an interview with DWAF, no particular comment can be made concerning the environmental impact of this project since its implementation was limited.

From the above, concerning the impact, the components implemented by this project were limited compared to the plan, as indicated in the ex-post evaluation report, and therefore, it is impossible to perceive the above figures as impacts resulting from this project.

3.3 Sustainability

3.3.1 Structural Aspects of Operation and Maintenance

At the time of ex-post evaluation, Western Highveld region was under direct jurisdiction of DWAF, since the region was not included in the service area of Water Service Company and the local municipality had not been established. Currently, WSP is the local government itself, company partially-owned by the local government, private contractor, NGO, or community organizations which follow WSA's procedures in carrying out the operations. IWB was providing services to the region at the time of ex-post evaluation; however, IWB has been liquidated.

WSA's regional offices of the four municipalities are located in remote locations, and interviewing all of the offices under the conditions of this study was impossible. Therefore, interviews were done with officials, in charge of operation and maintenance, from Dr. JS Moroka and Thembisile, where the four components are operating. Under the supervision of DWAF, plan for water supply is made by local government (WSA), and WSP collects water fees and performs the operation and maintenance of the facilities. Among the local municipalities, in Dr. JS Moroka, WSP is the local government itself, and in Thembisile, multiple private contractors and local governments (Rand Water Board; Lekwa, municipality located in the neighboring district; Dr. JS Moroka; City of Tshwane) are acting as WSPs and conducting the supply of water and the operation and maintenance of the facilities. Fee collection is implemented by the local government itself. Operation and maintenance personnel for Greater Sekhukhune and City of Tshwane could not be interviewed, but following information concerning the operation and maintenance were obtained from the "Blue Drop Report 2011":

Table 5 Names of WSA and WSP

WSA	WSP
Greater Sekhukhune DM	Greater Sekhukhune DM; Lepelle Water; Elias Motswaledib
City of Tshwane MM	City of Tshwane MM; Rand Water; Magalies Water

Source: Blue Drop Report 2011

In the ex-post evaluation, concern was shown over the relationship between the IWB, which was the WSP, and the local municipality. However, the IWB has already been liquidated, and service agreement between WSA and WSP is stable. The contract is renewed every year. Information on the number of workers could not be obtained, but through an interview with the officials in charge of operation and maintenance at Thembisile and Dr. JS Moroka, there are no shortages of workers.

Every year, DWAF conducts an audit targeting all WSAs over water quality, maintenance status of the facilities, and management structure, and publishes the results as the “Blue Drop Report”. Municipality with a high score receives an award. Similar audit is also done for sewage treatment, and the results are published annually as the “Green Drop Report”. The water service framework of DWAF-WSA-WSP is currently established throughout the country. Under these circumstances, DWAF conducts audit and rating to each WSA, and the results are disclosed to the public. This procedure has been carried out for the past several years. Therefore, it can be concluded that the operation and maintenance structure has improved since the time of ex-post evaluation.

According to an interview with DWAF, concerning the operation and maintenance structure of the four municipalities, imbalance in the supply and demand of water has been recognized as a common problem. Intake of water is ultimately twice the volume of consumed water. In other words, treated water is twice the amount of the water demand, and there exists an imbalance. The causes of this imbalance are: lack of technical knowledge to draft a plan and control the volume of intake based on ascertained demand volume of water, inefficiency of water treatment facilities due to deterioration and leaks from water pipes, and the consumer's low awareness towards economizing water consumption. In order to improve the situation, WSA is working to repair the failing facilities and educating the consumers on water economy through seminars and pamphlets.

Although adequate system for operation and maintenance is organized, there is still room for improvement in water economy such as, systematic planning of water supplier, facility improvement, and educating and raising public awareness on water economy.



Ekangala-Enkeldoornoog Aqueduct facility



Ekangala Regulating Reservoir
Minor leakage can be seen

3.3.2 Technical Aspects of Operation and Maintenance

Interview was conducted to respective officials in charge of operation and maintenance at Thembisile and Dr. JS Moroka. From the interviews, the problems of worker shortages and inadequate skill level, detected at the time of ex-post evaluation, have been resolved. In Thembisile, WSP is the local government itself, and in Dr. JS Moroka, in addition to Rand Water Board, three municipalities of Lekwa, City of Tshwane, and Dr. JS Moroka are WSPs. At Thembisile, engineer staff carries out the basic operation and maintenance procedures such as leakage inspection, and repair of minor malfunctions. In case of complex malfunctions, the repair is commissioned to private contractors. Thembisile is planning to hire three highly-skilled engineers in order to manage to these problems themselves in the future. Also in the near future, there are plans to separate departments for water supply and sewage in order to raise the efficiency of water business management. Furthermore, by increasing the number of regional offices, Thembisile is expecting to decentralize the operation and maintenance of facilities and the collection of water fee. In Dr. JS Moroka, water business is divided into water treatment department and water supply department. Interview could only be held with the water treatment department. The department currently has a staff size of 35. There is no shortage of workers, and they have no plans of recruiting. According to the official of the water treatment department, the water supply department is mainly in charge of counter services such as fee collection.

3.3.3 Financial Aspects of Operation and Maintenance

In Thembisile, improvements were made based on the proposals made in the “Special Assistance for Project Sustainability” (SAPS) report of 2011. Improvement could be seen since the

implementation of SAPS (2011). Currently, Revenue from water services is processed separately from general account, in accordance with the SAPS report. Although the details of the budget could not be obtained through the field studies in Thembisile and Dr. JS Moroka, according to an interview with DWAF, there is no shortage of the budget for water services. Currently, in addition to conducting the operation and maintenance of the facilities, DWAF is holding meetings in various places and publishing pamphlets in order to raise public awareness on water economy. These were activities that were not possible in the past. Further, water rates are reviewed annually, though they are not necessarily revised each year. Payment of water fee is generally done through pre-paid card for corporations, and individuals pay a fixed rate at a regional office or through bank transfer.

According to the interview to the official in charge of water treatment department at Dr. JS Moroka, there is ample budget provided for operation. However, data on the budget could not be obtained.

3.3.4 Current Status of Operation and Maintenance

The following were selected for site visits:

Water pipe between Ekangala and Enkeldoornoog-Gemsbokkspruit

Ekangala Regulating Reservoir

Bronkhorstspuit Water Treatment Plant

The ex-post evaluation indicated that the four components were not in the state to be operated and managed effectively. Currently, the components are operated and managed effectively, and are operating under good condition. According to an interview with DWAF, Enkeldoornoog Regulating Reservoir and Kwandebele Region Regulating Reservoir, which were not selected for on-site surveys, are also functioning properly.

3.4 Others

Urgent agreement between local governments and WSA was recommended in the ex-post evaluation. Currently, the problem has been resolved, and no problems can be detected in the relation between local governments and WSP.

There is a necessity for water supplier in the region to initiate more advanced and complex issues such as securing of water resource, building industrial water facilities, and sewage recycling plants.

From the above, concerning sustainability, improvement can be seen from the time of ex-post evaluation. Shortage of employees and insufficient technical knowledge has been resolved in Thembisile and Dr. JS Moroka. Furthermore, there are no problems with the maintenance of the components implemented by this project. The problem with the relation between WSP and WSA reported in the ex-post evaluation report has been resolved. Systems for performing the operations

are established between DWAF, WSA, and WSP and functioning satisfactorily. However, since there are problems such as the volume of water intake far exceeding the demand, there is still room for improvement.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

(1) Utilization and Contribution of Implemented Components

Four components installed by this project are operating in satisfactory condition, and provides 24% of the total water supply to the four municipalities which are part of Western Highveld region. The components are serving a role in fulfilling the water demand of the region. However, since only a limited portion of the planned components has been implemented, the project's contribution to the improvement of living environment and industrial development was unclear.

WSA of Thembisile and Dr. JS Moroka have ample personnel and the maintenance of the facilities was adequately performed. In addition, accounting issues identified by the SAPS report have been addressed. According to the interviews to the officials of each region, sufficient budget is secured for the operation and maintenance expenses.

This project was terminated without the implementation of all planned components. Since ex-post evaluation was conducted based upon the evaluation plan to evaluate all of the planned components, this ex-monitoring was also conducted under the same premises. Therefore, there were many difficulties in the verification of the direct effects of this project and analyses of information. Under these circumstances, the following conclusion was drawn. Although the installed component provides 24%, which is only a portion, of the volume of water demand of the region, no water shortage could be seen in the region. Therefore, there is a possibility that the original plan for water intake was too large.

(2) Situation of Local Government

Local government is functioning as WSA, but there are recommendations described in the following sections.

(3) Operation and Maintenance

Although there are no problems with water supply to the Western Highveld Region with respect to the region's water demand, there are recommendations described in the following section.

4.2 Recommendations

4.2.1 Recommendation to WSA

WSA has currently initiated a reparation project with Rand Water Board to replace corroded water

pipes as indicated in the SAPS report. It is desirable to continue to ensure future repairs and extend the lifespan of the components.

4.2.2 Recommendation to DWAF and the Government of South Africa

1. It is desirable to continue to provide adequate budgetary measures and guidance on the operation and maintenance, including the maintenance of facilities, to the water suppliers of local municipalities. Also, as mentioned in the SAPS report, DWAF is expected to take initiative in combining WSAs and organizing the joint management of water supply facilities, which is currently being managed by individual WSAs.

2. South Africa's water service environment has changed considerably from the 1990s. Actions toward problems resulting from economic development such as, preventing water resources pollution, securing industrial water and construction of water treatment facilities, installation of sewage pipelines as a premise of the increase in flush toilets from improved living standards, securing a dependable water source to respond to the progression of desertification need to be addressed promptly with central government and local government as a team. Meanwhile, DWAF and municipalities are aware of their technical inability and insufficient management knowledge to solve these problems. It is desirable therefore to strengthen the cooperation with other countries to obtain the necessary technology and knowledge.

4.3 Lessons Learned

None.

Comparison of the Original and Actual Scope of the Project

Item	Original	Actual
1. Outputs		
1) Installation of Ekgangala-Enkeldoornoog Gembokkspruit conduit	42-km long, capacity 0.52 m ³ /s	42-km long, capacity 1m ³ /s
2) Construction of Ekgangala Regulating Reservoir and Enkeldoornoog Regulating Reservoir	Capacity 10,000 m ³ and 40,000 m ³	Capacity 20,000 m ³ and 11,000 m ³
3) Procurement of equipment for Bronkhorstspuit Water Purification Works (Stage 2)	Add 6.0 million m ³ , total capacity 21.0 million m ³	Procured (used for other region)
4) Civil works for the expansion of Bronkhorstspuit Water Purification Works (Stage 2)	Expansion of the intake from the river, intake pumping station and the conduit	Suspended
5) Construction and installation of Kendal Regulating Reservoir, Matla-Khutala conduit and Kendal-Bronkhorstspuit Dam conduit	10,400m ³ , 2.3 km long, capacity 0.6 m ³ /s, and 35km long, capacity 0.5 m ³ /s	Suspended
6) Installation of Bronkhorstspuit-Ekgangala conduit	10km long, capacity 0.68 m ³ /s	Suspended
7) Procurement of equipment for Bronkhorstspuit Water Purification Works (Stage 3)	Add 5.0 million m ³ , total capacity 26.0 million m ³	Suspended
8) Civil works for the expansion of Bronkhorstspuit Water Purification Works (Stage 3)	Details undecided	Suspended
9) Construction of Kwandebele Region Regulating Reservoir	Capacity 10,000 m ³	10,000 m ³ x 2
10) Construction of the Second Kendal Regulating Reservoir	Capacity 10,400 m ³	Suspended
11) Construction of Tweefontein Reservoir and Kwandebele Region Regulating Reservoir	Capacity 40,000 m ³ and 10,000 m ³	Suspended
2. Project Period	May 1996 – May 2001 (61 months)	Oct. 1996 – Nov. 2003 (86 months)
3. Project Cost		
Foreign Currency	732 million yen	N/A
Local Currency (In local currency)	3,408 million yen (144 million rand)	N/A
Total	4,129 million yen	2,327 million yen
ODA Loan Portion	3,097 million yen	1,814 million yen
Exchange Rate	1 rand = 23.67 yen	1 rand = 20.07 yen

Note 1) The total 4,129 million yen, which is the amount shown in appraisal material provided by JICA, does not agree with the total of the foreign and local currency portions converted into yen (4,140 million yen).

Note 2) Calculated based on the JICA loan amount (in rand) stated in the Project Completion Report and the amount actually provided by JICA (in yen).