

# **AFRICAN DEVELOPMENT FUND**



## **ZAMBIA**

### **CENTRAL PROVINCE EIGHT CENTRES WATER SUPPLY AND SANITATION**

#### **PROJECT COMPLETION REPORT**

**(PCR)**

**OWAS DEPARTMENT**

April 2013

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## Currency Equivalents

August 2012

	UA 1.00	=	ZMK 7,822
	UA 1.00	=	USD 1.51
<b>Fiscal Year</b>	US\$ 1.00	=	ZMK 5, 500

1 January – 31 December

## Weights and Measures

1 metric ton	=	2204 pounds (lbs)
1 kilogram (kg)	=	2.200 lbs.
1 metre (m)	=	3.28 feet (ft)
1 millimeter (mm)	=	0.03937 inch
1 kilometer (km)	=	0.62 mile
1 hectare (ha)	=	2.471 acres

## Annexes

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## Acronyms and Abbreviations

AfDB	African Development Bank
ADF	African development Fund
CSP	Country Strategy Paper
CUs	Commercial Utilities
DHID	Department of Housing and Infrastructure Development
ECZ	Environmental Council of Zambia
EIRR	Economic Internal Rate of Return
ESMP	Environmental and Social Management Plan
FIRR	Financial Internal Rate of Return
GRZ	Government of the Republic of Zambia
ICB	International Competitive Bidding
MDGs	Millennium Development Goals
MLGH	Ministry of Local Government and Housing
MOH	Ministry of Health
NCB	National Competitive Bidding
NRWSSP	National Rural Water Supply and Sanitation Programme
NPV	Net Present Value
NWASCO	National Water Supply and Sanitation
UFW	Unaccounted for Water
PIU	Project Implementation Unit
WHO	World Health Organization

## A. PROJECT DATA AND KEY DATES

### I. BASIC INFORMATION

Project Number	Project Name		Country
2100150007225 (Loan) 2100155002045 (Grant)	Central Province Eight Centres Water Supply and Sanitation Project		Zambia
Lending Instruments		Sector	Environmental Classification
Loan: 2100150007225 (22/04/2004) Grant: 2100155002045 (22/04/2004)		OWAS	Cat II
Original Commitment Amount	Amount Cancelled	Amount Disbursed	Percent Disbursed
ADF Loan (UA 16.25 million) ADF Grant (UA 5.78 million)	UA 0.00 UA 687,927.66	UA 16,250,000.00 UA 5,092,072.34	100 88.1
Borrower	Executing Agencies	Co-financers and other External Partners	
Republic of Zambia	Ministry of Local Government and Housing, Project Implementation Unit -DHID	Government of Zambia UA 2.59 million	

### II. KEY DATES

Project Concept Note Cleared by Ops. Com.	Appraisal Report Cleared	Board Approval	Restructuring(s)
Not applicable at time of project	September 2003	17 December 2003	N/A
	Original Date	Actual Date	Difference in months
<b>EFFECTIVENESS</b>	June 2004	12/16/2004	6
<b>MID-TERM REVIEW</b>	Not carried out	Not carried out	N/A
<b>CLOSING</b>	June 2008	12/31/2011	42

### III. RATINGS SUMMARY

CRITERIA	SUB-CRITERIA	RATING
<b>PROJECT OUTCOME</b>	Achievement of Outputs	4
	Achievement of Outcomes	3
	Timeliness	1
	<b>OVERALL PROJECT OUTCOME</b>	<b>3</b>
<b>BANK PERFORMANCE</b>	Design and Readiness	3
	Supervision	3
	<b>OVERALL BANK PERFORMANCE</b>	<b>3</b>
<b>BORROWER PERFORMANCE</b>	Design and Readiness	3
	Implementation	3
	<b>OVERALL BORROWER PERFORMANCE</b>	<b>3</b>

### IV. RESPONSIBLE BANK STAFF

POSITIONS	AT APPROVAL	AT COMPLETION
Regional Director		Chiji Ojukwu
Sector Director	K. Bedoumra	Sering Jallow
Sector Manager	P. Njuguna	Osward Chanda
Task Manager	Mecuria Assefaw	Mecuria Assefaw
PCR Team Leader		Herbert Chinokoro

## B. PROJECT CONTEXT

### *Below is a summary of the rationale for Bank assistance*

1. The Central Province Eight Centres Water Supply and Sanitation Project (CP8CWSSP) responded to the need to improve water supply infrastructure to enable a reliable water supply in both quantity and quality in the project areas. In addition, the project supported the Government of the Republic of Zambia (GRZ's) national sector goal of ensuring provision of adequate quantity and quality of water to all competing users and improved sanitation for all at acceptable cost on a sustainable basis.

The project further met the GRZ's policy on the creation of Commercial Utilities (CUs) to effectively and efficiently manage the service provision on a commercial basis.

2. The project was in line with the Sector Goal of improving the quality of life and productivity of all Zambians by ensuring an equitable provision of an adequate quantity and quality of water to all competing user groups and improved sanitation services for all at acceptable cost and on a sustainable basis. The project fell within the Goals of the water sector, which is to ensure that Zambia's water resources are effectively developed to contribute to poverty reduction through increased access to safe water and sanitation and increased food security for low-income rural and urban people. Zambia also ascribes to the Millennium Development Goals (MDGs), which as these pertain to water supply and sanitation, is aimed at reducing by 50% the number of people without these services by 2015. The Bank's CSP (2002-2004) highlighted the GRZ's expressed priority for reducing poverty with a strategy that was shaped by the need to concentrate in a few areas where operations would have the highest development impact, Water and Sanitation being one of these areas to improve social services. When completed, this project targeting 268,255 people will, together with the Bank financed Central Province Rural Water Supply and Sanitation Project completed in 2007, provide adequate services to over 1.2 million people, and would go a long way in contributing to achievement of the water and sanitation MDGs in Zambia.

3. The project was also in line with the Bank's Integrated Water Resources Management Policy which, among others, supports priority of rehabilitation of existing infrastructure over new construction, and also encourages ultimate cost recovery while taking into account social equity and capacity to pay by the poor.

4. On-going Bank funded water projects in Zambia that complement this project comprise: (i) the Nkana Water Supply and Sanitation Project (NWSSP) and the National Rural Water Supply and Sanitation Programme (NRWSSP). The two projects build on continued Bank support to Zambia to provide sustainable access to water supply and sanitation both in urban and rural areas so as to facilitate the achievement of the MDG for water and sanitation and to contribute towards poverty alleviation. Through its support on both these projects, the Bank together with the other cooperating partners active in the sector support GRZ in developing the water sector through its national urban and rural programmes.

## C. PROJECT OBJECTIVES AND LOGICAL FRAMEWORK

### **1. Development Objectives**

Improved quality and delivery of water supply and sanitation services in the eight centres in Central Province, through rehabilitation and extension of the existing infrastructure, and commercialization of these services by:

- (i) Increased access to water supply meeting WHO standards and improved sanitation services available at affordable rates
- (ii) Improved customer service through increased reliability and 24 hours availability of water supply
- (iii) Eliminating water rationing in the project area
- (iv) Halving Incidence of water borne diseases
- (v) Improved Revenue collection from 61% in 2002 to 90% by 2007
- (vi) Reducing Unaccounted-for-water from 51% to 20% by 2007

The financing plan and actual costs are given in Annex 1.

### **2. Major Project Components**

**Component A) Water Supply:** Rehabilitation of existing and development of new sources (groundwater and/or surface water) including 25 new boreholes and rehabilitation of 2 existing, and construction of Mushimbili Dam for Kapiri Mposhi. The dam, built only for drinking water supply, was a 15 m high modified homogeneous earth fill structure, with a maximum water level of 12.2 m controlled by the spillway; and with adequate capacity to cater for the 2020 water demand for this centre. Other works included construction of one new water treatment plant and 5 new storage tanks, rehabilitation of 24 existing reservoirs, replacement and/or rehabilitation of a total of 187 km of pipework, installation of 148 water kiosks, 80 km of house connection pipes and installation of 14,860 water meters.

**Component B) Sanitation:** This was to involve rehabilitation of existing sewerage schemes, rehabilitation and expansion of 32 km of sewer reticulation, cleaning/flushing 65 km of sewer lines, rehabilitation of 10 and construction of 5 new sewage treatment stabilisation ponds and associated pumping stations. On-site sanitation involved rehabilitation, cleaning and flushing of septic tanks, and support for the peri-urban population to provide their own improved pit latrines. The public health campaign was to

include dissemination of information against spread of HIV/AIDS, and also provided support for the National Roll Back Malaria campaigns by providing a revolving fund for subsidised sale of treated mosquito nets. Under this component, each of the local authorities of the project centres were supposed to be provided with solid waste collection and disposal facilities comprising a trailer/tractor system, as well as tools (shovel, forks, etc.) for handling the waste by workers.

Component C) Building Works: This involved civil works for Construction/rehabilitation of 7 new office buildings, a laboratory and 2 workshops in the project centres. The works were to include extension of these facilities where space is not adequate and for construction of new facilities where they do not exist. The workshops would be equipped with plant and tools necessary for efficient operation and maintenance of the water supply and sanitation facilities developed under the project.

Component D) Institutional Support: This component consisted of (i) support for the establishment of the Central Province Commercial Utility, with headquarters in Kabwe and separate operational centres in the rest of the project centres in accordance with the organizational structure developed as part of the Study; (ii) capacity building within the CU to ensure effective management and operation of the water supply and sewerage facilities; and (iii) technical assistance to the CU once formed, in the form of short-term consultancies to develop operational routines for general utility management based on best practices. Short-term studies were also carried such as determination of the cost of services supply for purposes of tariffication and (b) develop a strategy for private sector participation in solid waste management. In addition, the project provided motor vehicles including a vacuum tanker for sanitation services.

Component E) Project Management: This component was to provide logistical and operational support for the PIU, comprising a Project Manager, Water and Sanitation Engineer and Accountant, seconded from both MLGH and the Provincial Local Authorities. It also included the provision for engineering services for supervision of the works, and annual audit of the project.

### 3. Assessment of project objectives

PROJECT OBJECTIVES DIMENSIONS		ASSESSMENT	WORKING SCORE
RELEVANT	a) Relevant to the country's development priorities	Project is relevant targeting improved Water and Sanitation which forms an integral part of the National Development plans and enshrined in the National Water Policy	4
ACHIEVABLE	b) Objectives could in principle be achieved with the project inputs and in the expected timeframe	Slow start to implementation but objectives are expected to be achieved. Required one year extension	3
CONSISTENT	c) Consistent with the Bank's country or regional strategy	Clearly in line with the CSP for Zambia.	4
	d) Consistent with the Bank's corporate priorities	Project consistent with Banks corporate priorities which placed emphasis on poverty reduction through interventions such as the provision of adequate quantities of good quality water and improved sanitation	4

<b>4. Table of Outputs and Indicators</b>				
<b>COMPONENTS</b>	<b>ACTIVITIES</b>	<b>OUTPUTS</b>	<b>EXPECTED OUTCOMES</b>	<b>INDICATORS TO BE MEASURED</b>
<b>Water supply rehabilitation and extension</b>	Rehabilitation of existing and development of new groundwater and surface water, water treatment plants construction and rehabilitation of water storage reservoirs, distribution networks, public water kiosks, installation of water meters.	25 production boreholes rehabilitated and/or installed; 2 existing water treatment plants rehabilitated and 1 new installed, 5 new water storage reservoirs constructed and 24 existing rehabilitated, 74 km of distribution pipes replaced and water distribution networks extended by 113 km, 148 public water kiosks installed, 80 km of house connection pipes replaced and 14,600 water meters installed	1.1 268,255 people in the project area have access to water supply meeting WHO standards and improved Sanitation services available at affordable rates by 2008 1.2 Improved customer service through increased reliability and 24 hours availability of water supply by 2007. 1.3 Water rationing eliminated in the Project Area by 2007. 1.4 Incidence of water borne diseases halved by 2010. 1.5 Unaccounted-for-water reduced from 51% to 20% by 2007	Number of boreholes drilled and working, Hours of water supply, Number of Water Kiosks constructed and working Number of Kilometres of network laid, Number of Kilometres rehabilitated, Number of meters installed.
<b>Sanitation</b>	Rehabilitation and extension of Sanitation of sewer network in the 8 centres, construction and rehabilitation of sewage treatment plants and pumping stations construction of on-site improved latrines	32km of sewer reticulation rehabilitated and expanded, 65km of sewer lines cleaned/flushed, 10 sewage treatment plants and associated pumping stations rehabilitation and 5 new constructed; 180 on –site Sanitation facilities (improved latrines)	1.1 Meet 268,255 people in the project area have access to water supply meeting WHO standards and improved Sanitation services available at affordable rates by 2008 1.2 Incidence of water borne diseases halved by 2010.	Number of Sewage treatment plants rehabilitated & constructed and working Number of KMs of sewer reticulation extended Number of KMs of sewer lines cleaned /flushed Number of on-site sanitation facilities constructed and working
<b>Building works</b>	Construction/rehabilitation of 7 new office buildings, a laboratory and 2 workshops	7new office buildings, 2 workshops and 1 laboratory constructed	Operational centres for the utility established in the eight centres	Number of office buildings and workshops constructed
<b>Institutional Support</b>	Water supply and sanitation schemes in the project centres in Central Province operated on commercial basis	Commercial Utility established and operational, Improved customer database, regular monthly billing; Increased acceptance of new tariffs.	1.1 Establishment of the Central Province Commercial Utility, with headquarters in Kabwe and separate operational centres in the rest of the project centres 1.2 Revenue collection improved from 61% in 2002 to 90% by 2007; Unaccounted-for-water reduced from 51% to 20% by 2007	Commercial utility established Tariff adjustment implemented on time Billing done monthly Number of Customers

<b>5. Attainment of logical framework objectives</b>			
<b>LOG. FRAME DIMENSIONS</b>		<b>ASSESSMENT</b>	<b>WORKING SCORE</b>
<b>LOGICAL</b>	a) Presents a logical causal chain for achieving the project development objectives	Clear on how the developmental objectives are to be achieved	4
<b>MEASURABLE</b>	b) Expresses objectives and outcomes in a way that is measurable and quantifiable	The Log frame clearly makes it easy to monitor activities and outputs. These are expressed in a way that is measurable and quantifiable	3
<b>THOROUGH</b>	c) States the risks and key assumptions	Risks were articulated and the key assumptions were stated except the risk of communities not contributing in full towards the construction onsite sanitation facilities which was not highlighted and what would happen if UFW could not be reduced to target figure.	3



## D. OUTPUTS AND OUTCOMES

### I. ACHIEVEMENT OF OUTPUTS

MAJOR ACTIVITIES			Working Score	Share of Project Costs in percentage (as stated in Appraisal Report)	Weighted Score
Expected Outputs	Actual Outputs				
<b>1. Water supply rehabilitation and extension</b> 25 production boreholes rehabilitated and/or installed	25 production boreholes rehabilitated and/or installed	100%	4	66.61%	2.33
2 existing water treatment plants rehabilitated and 1 new installed	2 existing water treatment plants rehabilitated and 1 new installed in Mkushi and Kapiri	100%	4		
5 new water reservoirs constructed and 24 existing rehabilitated	5 new reservoir constructed in Nampundwe, Chisamba, Kapiri Mposhi, Mkushi and Serenje and rehabilitation carried out on the 24 reservoirs in all project centres	100%	4		
74 km of distribution pipes replaced	66.07km of distribution pipes replaced	89%	3		
Water distribution networks extended by 113 km	145.73kms of distribution network extended	129%	4		
148 public water kiosks installed	81 public water kiosks installed. (Balance 67 constructed by CEP in Kabwe)	55%	2		
80 km of house connection pipes replaced	80 km of house connections replaced	100%	4		
14,600 water meters installed	11,179 water meters installed	77%	3		
<b>2. Sanitation</b> 32km of sewer reticulation rehabilitated and expanded	33.9 km of sewer reticulation rehabilitated and expanded	106%	4	21.04%	0.72
65km of sewer lines cleaned/flushed	65km of sewer lines cleaned	100%	4		
10 sewage treatment plants and associated pumping stations rehabilitation/ constructed	10 sewage ponds constructed/rehabilitated in Kabwe, Kapiri Mposhi, Mumbwa , Serenje	100%	4		
5 new sewage pump stations constructed	5 new sewage pump stations constructed in Kabwe	100%	4		
1640 on –site sanitation facilities (original plan was 180)	539 on –site sanitation facilities	33%	1		
<b>3. Building works</b> Construction of 7 new office buildings, a laboratory and 2 workshops	7 new office buildings, 2 workshops and 1 laboratory constructed	100%	4		
<b>4. Institutional Support &amp; Project management</b> Commercial Utility established and operational	Commercial Utility established and operating	100%	4	9.47%	0.38
Regular monthly Billing	Billing system procured for customer data base & monthly bills produced every 21st day of the month	100%	4		
Increased acceptance of new tariffs	Tariff adjustment done annually after public hearing	100%	4		
Constitution of PIU with appropriate staff and hire of engineering supervision engineer	PIU constituted, Engineering supervising consultant engaged		4		

		100%		
Tools and water treatment chemicals provided	Tools and Water treatment chemicals procured	100%	4	
<b>OVERALL OUTPUT SCORE</b> [Score is calculated as the sum of weighted scores]				4

## II. ACHIEVEMENT OF OUTCOMES

<b>1. Achievement of outcomes</b>			
<b>OUTCOMES</b>			<b>Working Score</b>
<b>Expected</b>	<b>Actual</b>		
1. Meet 268,255 people in the project area have access to water supply meeting WHO standards and improved sanitation services available at affordable rates by 2008	213,613 people in the project area have access to Water supply with water quality compliance of 95% and of these 75, 540 had access to improved sanitation services by 2009	80%	3
2 Improved customer service through increased reliability and 24 hours availability of water supply by 2008	Customer services greatly improved with response time to complaints averaging 48 hours from the previous 5 days, 22 hours of supply on average from 5 hours by 2009	87.5%	3
3. Water rationing eliminated in the Project area by 2008	Water rationing has been eliminated with improved hours of supply from 5 to 22 hrs on average and extension of service to the peri urban areas by 2009	100%	4
4. Incidence of water borne disease halved by 2010.	Incidences of diseases reduced. No major outbreak and no cholera related deaths in project area since 2009. The incidence of diseases has reduced by 48% from 18.77 cases per 1,000 people to in the year 2000 to 10.04 cases per 1,000 in 2011.	100%	4
5. Unaccounted-for-water reduced from 51% to 20% by 2007	UFW reduced from 61% to 53% (Regulators report 2006/2007 & 2011/2012).	26%	1
6. Revenue collection improved from 61% in 2002 to 90% by 2007;	Collections have averaged 78% with the utility collecting more than 90% in some months of the year by 2009	87%	3
7. Commercial utility established by 2004	Commercial Utility established in 2006, with headquarters in Kabwe and separate operational centres in the rest of the project centres in accordance with the organizational structure developed as part of the Study	100%	3
<b>OVERALL OUTCOME SCORE</b> [Score is calculated as an average of the working scores]			3
<b>2. Additional outcomes.</b>			
As an indirect impact, the reduction of time spent on fetching water and the positive health impact through reduced morbidity will allow peri urban populations to increase productive and income generating activities which will ultimately lead to more inclusive growth outcomes. The beneficiaries interviewed mentioned that the incidence of waterborne diseases has reduced which is corroborated by the health statistics attached in the annexes.			
Fifty-six percent of water kiosks constructed are managed by women. In addition to providing water to communities, the kiosks act as shops to supplement the incomes of the operators.			
<b>3. Risks to sustained achievement of outcomes. State the factors that affect, or could affect, the long-run or sustained achievement of project outcomes. Indicate if any new activity or institutional change is recommended to help sustain outcomes. The analysis should draw upon the sensitivity analysis in Annex 3, where appropriate.</b>			
Risks to sustained achievement of outcomes are:			
<ul style="list-style-type: none"> <li>Weak Operations and maintenance of the new infrastructure. The utility needs to invest in O&amp;M and have staff trained if the infrastructure is to be properly maintained.</li> <li>High UFW and absence of a water demand management plan</li> <li>A tariff below full cost recovery which would result in the Utility not collecting enough revenue which undermines financial</li> </ul>			

strength and limits the ability to improve levels of access and service.

- The non-completion of the remaining Ventilated Improved Latrines to be constructed would lead to discontent among intended beneficiaries and a lack of proper sanitation leading to outbreaks of diseases.

To sustain outcomes, the Utility has gone ahead to prepare a water demand management plan to address the high UFW. It has a set of highly prioritised interventions covering two years aimed at improving efficiencies and increasing the customer base. It targets reduction of UFW to 20% in the long run, improving billing and collection efficiency, increasing coverage and lowering the unit cost of production. Refer to annex 3. An exit strategy has been prepared, highlighting the interventions to be put in place to ensure the continued improvement and sustainability of operations with a dedicated new maintenance department in the utility. GRZ has gone ahead to fund the community contribution part to ensure completion of the remaining VIP latrines.

## E. PROJECT DESIGN AND READINESS FOR IMPLEMENTATION

### 1. Project Design

The project design was formulated using Bank's experience with similar operations in the country and was consistent with the Bank's country strategy. The impact and outcome were consistent with the government's development strategy. This particular project was informed by a feasibility study initiated by the Bank. For the institutional arrangements, the selected option was the formation of a single water utility to manage services in all 8 project centres on commercial basis. A utility would provide services at lower cost due to the economies of scale achieved through such grouping.

The Bank funded feasibility study was carried out by GKW, Price Water House and Brian Colquhoun Hugh O' Donnell consultants in 2003. The study engaged with various stakeholders, including communities to be served, local authorities, health, and Environmental Council of Zambia (ECZ) officials. A comprehensive survey was carried out in the beneficiary communities in order to determine effective demand, willingness and ability to pay for the selected level of services. Besides the survey, a number of stakeholder workshops were conducted during the various stages of study implementation, in order to arrive at a project formulation which takes into account such factors as choice of technology, ability to pay, environmental and social considerations, institutional, financial and management options for the utility, and also solicit communities support during implementation and in the operation and maintenance.

A project implementation team was drawn from within the ministry and comprised a project coordinator, project engineer and accountant. The familiarity gained by the executing agency in the previous Central Province Rural Water Supply and Sanitation Project with Bank's procedures, particularly the fulfilment of loan conditions, accounting and financial management requirements, procurement procedures and disbursements methods avoided some of the serious delays experienced with similar past Bank funded projects in the country.

### 2. Design Assessment

PROJECT DESIGN AND READINESS FOR IMPLEMENTATION DIMENSIONS		ASSESSMENT	WORKING SCORE
<b>REALISM</b>	a) Project complexity is matched with country capacity and political commitment.	Project was not complex in its design and all partners put in the necessary measures to ensure successful execution. It supported Government's reform programme for the water sector with the eventual establishment of the commercial utility to run water and sanitation services in the project area	4
<b>RISK ASSESSMENT AND MITIGATION</b>	b) Project design includes adequate risk analysis.	While overall adequate risk analysis was carried out, the risk assessment on the ability of communities to contribute for the construction of on-site sanitation were not adequate. Mitigation measures of mobilisation and sensitisation were weak leading to the slow pace of communities contributing, affecting project completion.	2
<b>USE OF COUNTRY SYSTEMS</b>	c) Project procurement, financial management, monitoring and/or other systems are based on those already in use by government and/or other partners.	Use of country systems was not part of the projects approach. Financial management and environmental monitoring systems were those already existing in government. All staff on the project management team were those seconded from the Ministry and the Ministry carried out procurement from within.	3

3. For the following dimensions, provide separate working scores for Bank performance and Borrower performance:			WORKING SCORE	
			Bank	Borrower
<b>CLARITY</b>	d) Responsibilities for project implementation were clearly defined.	Responsibilities clearly defined for implementation in Appraisal Document and understood by the Executing Agency, consultants and AfDB supervision teams as well as stakeholders such as the Local Authorities who were in charge of supervision of the construction of onsite sanitation facilities	4	4
<b>PROCUREMENT READINESS</b>	e) Necessary implementation documents (e.g. specifications, design, procurement documents) were ready at appraisal.	Implementation documents were prepared during feasibility study and where ready at appraisal. The documentation had to be reviewed by supervision consultant and necessary changes made before tendering	4	3
<b>MONITORING READINESS</b>	f) Monitoring indicators and monitoring plan were agreed upon before project launch.	Indicators agreed upon before project launch. In addition, monitoring indicators like water quality and water coverage were captured through technical audits by NWASCO the Water Regulator. Auditors carried out annual audits as per Bank and GRZ requirements	3	3
<b>BASELINE DATA</b>	g) Baseline data were available or were collected during project design.	Baseline data such as service level standards, consumer views on water, sanitation and solid waste, economic situation, willingness and ability to pay, demographic trends and town development were collected during feasibility study and at appraisal, this was verified and updated. There was a gross under estimation of the baseline figures for Unaccounted for Water.	2	2

## F. IMPLEMENTATION

### Implementation summary

1) The project was approved in December 2003, Loan and Grant Protocol Agreement were signed in April 2004 and disbursement commenced in July 2005. There was a slippage of 15 months after approval due to delay in meeting conditions precedent to first disbursement. The project original closing date was June 2008. However, two extensions were granted to enable some of the outstanding works to be completed by contractors. The main civil works contract Lot1A delayed commencement because of the bid price exceeding the budget. In addition, an extension was granted to enable some of the outstanding works to be completed by contractors working on VIP latrines. These delay caused the project to be extended to enable the works to be fully completed and the defects liability period to be fully implemented. The project finally closed on 31 December 2011 giving a slippage of 42 months. Refer to annex 6.

2) Government of Zambia's met its 10% contribution, plus cost overruns incurred during implementation. Government contribution increased by more than US \$ 5 million during project implementation to cover increased costs on the construction contracts. Refer to annex 6, item 11&12.

3) The quality of outputs ranged from very good for Lot1A and to satisfactory for Lot 1B and Lot 3. The performance of the Consultant was satisfactory. The quality on the VIP Latrines was generally poor. Some facilities have unplastered walls, door frames were not properly fitted and on some, access for desluding was not provided.

4) Unaccounted for Water was 53% after project completion, even after replacement of old pipes and meter installation. One major cause of this could have been that since the consumption and production could be accurately measured because of meters installed, the 51% which was assumed to be the baseline was probably not accurate and therefore this cannot be used at completion to assess achievement. Staff from the utility mention UFW could have been as high as 70% before project start. The NWASCO 2006/ 2007 report indicates a figure of 61%. Activities undertaken on the project which included metering, replacement of old leaking pipes and having active leakage control teams in the distribution network brought about moderate improvements in UFW. UFW reduced from 61% to 53% using the figure presented in the 2011/2012 NWASCO report.

5) While the project activities, would have had a positive impact on UFW, the possible causes of why UFW remained high would have been that part of the networks, which were not rehabilitated as their condition were satisfactory at project preparation stage, had deteriorated by project implementation time and the additional water produced and higher water pressures achieved increased the incidence of leakages in these un-rehabilitated networks. There is need to provide adequate funding to cover basic rehabilitation and improvement of existing system in order to reduce UFW before embarking on an extensive investment program.

6) The support for solid waste management was undertaken by GRZ through “Make Zambia Clean” and Healthy Program. Government procured refuse collection vehicles for all the constituencies in the project area whilst the Ministry of Health undertook a massive malaria control programme. Hence, GRZ submitted an official request to re-allocate the funds originally envisaged for solid waste management to be used for the other project activities. Bank agreed to re-allocate the funds to finance the other activities of the project, mainly water supply works and additional VIP latrines.

7) During construction of Mushimbili Dam, a total of 30 households with a population of 282 people were displaced. These were fully relocated and compensated as per the Bank’s policy Involuntary Settlement of 2002. Refer to annex 6, item 9.

8) Bank supervision was planned for every six months; there were only a few occasions when this deviated from the plan. They were effective and provided guidance on how project implementation could be improved and resolved many of the challenges on the project. No Midterm review was conducted. It would have flagged the issue of low demand from communities on the community contributions required for the VIP latrines and would have influenced the formulation of a strategy of how to design the sanitation subsidy to the vulnerable and how to undertake construction for full and partial contribution VIP latrines. On the UFW, the MTR would have enabled the baseline to be redefined according to the new data coming from the measurement process after meter installation.

#### **9) Project value added**

The project improved water supply and sanitation in terms of quantity and quality. This was against a background where the water supply and sanitation services in the project area were highly inadequate due to deterioration of the infrastructure. There was water rationing with supply hours averaging not more than 5 hours a day. The existing sewage collection, treatment and disposal facilities were in an equally run-down state, with all pump stations having broken down and the stabilization ponds being out of service due to poor operation and lack of maintenance. As a result of the poor sanitation condition and low access to clean water, there was high incidence of water-borne diseases like cholera, dysentery and diarrhea in the project centres, which was more pronounced in the poorer communities. Refer to annex 6 item 33.

By project closure on 31 December 2011, the following was achieved:

#### **10) Viability of the utility**

The project support has established a utility staffed with qualified staff that has ensured the proper operation and maintenance of the new infrastructure. The improvement of WSS services has had positive financial benefits to the utility as the willingness to pay for services has improved compared to before. Total income has improved with a projected operating profit of ZMK 487, 903, 000 for the year 2011. Refer to annex 3 (d). With the new billing system procured the utility is now able send bills to consumers every 21st day of the month. The project has also enabled the utility to improve performance and commercial management methods which has seen collection efficiency increase from 61% in 2002 to average of 78% with the utility collecting over 90% of revenue in some months. In addition, customer base increased to 16,400 from under 10,000 at project start. Government agencies are not paying when the invoices fall due contributing to the low collection ratios. The utility has instituted debt management strategies to recover outstanding debt both from Government and domestic consumers. Tariff adjustment are done annually after public hearing in order to ensure that Lukanga attains full cost recovery in line with the National Water Policy.

#### **11) Improved water supply**

The development of 25 boreholes, high lift pump station, 5 new reservoirs, rehabilitation of two water treatment plants, rehabilitation and construction of new water distribution mains has resulted in improved reliability and continuity of service in the 8 centres. Water supply hours have improved from 5 to 22 hours on average with some centres receiving 24 hours of supply. The installation of water kiosks in the peri-urban areas has made water availability within reachable distances. The implementation of the project has resulted in no major outbreak of Cholera in the eight centres. The incidence of diseases has reduced by 48% from 19.35 per 1,000 cases in the year 2000 to 10 per 1,000 cases in 2011.

## 12) Improved sanitation

Sanitation interventions involved rehabilitation of existing sewerage systems and rehabilitation of sewer reticulation, cleaning/flushing of sewer lines, rehabilitation of 10 and construction of 5 new sewage treatment stabilisation ponds and associated pumping stations. On-site sanitation involved rehabilitation, cleaning and flushing of septic tanks, and support for the peri-urban population to provide their own improved pit latrines and the construction of 1,640 Ventilated Improved Latrines once completed. In addition, a vacuum tanker was procured for pit emptying in areas not covered by sewer networks. Community mobilization and public health education has had positive awareness on hygiene and general wellbeing of communities in the project area. Refer to annex 6, item 33.

## 2. Comments on the role of other partners

1) Project entirely funded by the Bank and Government of the Republic of Zambia.

2) Contractors for Lot 1A performed satisfactorily with some delays in certain areas like drilling of boreholes which was behind schedule during project implementation but the delay did not affect the overall completion period. Contractor's performance in Lot 1B was weak as the Contractor constantly failed to accelerate progress beyond his own program. The contract which was supposed to be completed on 10 April 2008 was extended to November 2009. Though it took such a long time, the contract works were to acceptable standards. Refer to annex 6, item 19.

3) The construction of onsite sanitation facilities was awarded to small Zambian contractors. The pace of construction was very slow and was affected by having both fully funded latrines and partially funded latrines by the communities'. However, due to the slow community contributions for the partially funded latrines, construction pace of the Local contractors assigned to construct on site sanitation facilities was slow.

4) The Local Authorities performance in the project was very good. The councils were very helpful in assisting the project get the required permits and support from the councillors.

5) The regulator, National Water and Sanitation Council (Nwasco) was involved in monitoring performance of the CU through technical audits.

6) Auditors carried out annual audits as per Bank and GRZ requirements from the Auditor General's Office.

7) Copperbelt Environmental Project funded by the World Bank constructed the remaining balance of 67 kiosks in Kabwe to bring the total number of kiosks to 148 as envisaged in the appraisal report.

## 3. Harmonization. State whether the Bank made explicit efforts to harmonize instruments, systems and/or approaches with other partners.

The Bank as part of the Water Cooperating Partners group ensured that there was close collaboration with other cooperating partners during monthly meetings and also during supervision missions to share experiences and ideas on how challenges facing not only the project but the sector as a whole could be resolved.

## 4. Attainment of implementation objectives

PROJECT IMPLEMENTATION DIMENSIONS		ASSESSMENT		WORKING SCORE
TIMELINESS	a) Extent of project adherence to the original closing date. If the number on the right is: below 12, "4" is scored between 12.1 to 24, "3" is scored between 24.1 to 36, "2" is scored beyond 36.1, "1" is scored	Difference in months between original closing date and actual closing date or date of 98% disb. rate.	The original closing date was June 2008. Extended to 30 September 2011 and then to 31 December 2011.	1
		42		
BANK PERFORMANCE	b) Bank complied with:			
	Environmental Safeguards	The project was classified in the Environmental and Social Category 2 and an ESIA carried out and ESMP prepared		4
	Fiduciary Requirements	Bank met all fiduciary requirements albeit with some delays in processing payments		3

	Project Covenants	Bank met all project covenants	4
	c) Bank provided quality supervision in the form of skills mix and practicality of solutions	Bank supervision was helpful to project implementation in helping resolve some critical issues and providing guidance. Good skills mix of Water and Sanitation Engineers, Gender, Environmentalist Procurement, Financial Specialists	3
	d) Bank provided quality management oversight	Quality management provided, the Task Manager remained the same throughout the project	4
<b>BORROWER PERFORMANCE</b>	e) Borrower complied with:		
	Environmental Safeguards	Implementation of the ESMP was supervised by the client through the Engineering Supervision Consultant with one of the highlights being the relocation and compensation of people living around the Dam done smoothly. The ESMP was part of the Contracts for the works. Refer to annex 6, item 31.	4
	Fiduciary Requirements	The borrower complied with all requirements and accordingly all financial reports including audits were submitted to the Bank.	4
	Project Covenants	The Government honoured all project covenants with minor delays such as on the establishment of the utility	3
	f) Borrower was responsive to Bank supervision findings and recommendations	Though Borrower was responsive to Bank supervision findings, they usually took a long time to respond or effect any recommendations made	3
	g) Borrower collected and used monitoring information for decision making	Information such as collection efficiency, water quality, effluent quality, was collected during implementation and subsequently used by the borrower/ utility for decision making	3

## G. COMPLETION

### 1. Is the PCR delivered on time and in compliance with Bank policy?

Date project reached 98% disb. Rate (or closing date if applicable)	Date PCR was sent to pcr@afdb.org <i>MM/DD/YY</i>	Difference in months	<b>WORKING SCORE</b> if the difference is 6 months or less, a 4 is scored. If the difference is 6.1 or more, a 1 is scored
31 December 2011		10	1

1) The PCR preparation was done by the Zambia Field Office. Mr. Herbert Chinokoro, Water and Sanitation Specialist took the lead and assisted by the Mr. Andrew Chitembo, Financial / Economic consultant. The PCR was prepared as a joint exercise with Project Coordinator, Engineer from the utility and the Project Accountant.

2) The Borrower prepared a draft PCR and discussed it with the Bank during the Bank supervision mission of February 2012. A five day field visit was undertaken by the PCR team to the project sites from 18<sup>th</sup> to 24<sup>th</sup> March 2012. The team held meetings with the district councils in the project centres and water utility. Discussions with beneficiary communities were also held and as part of the field visit mission; a perception survey was conducted for thirty two respondents from seven of the eight project areas. The results of the survey are attached in the Economic and Financial analysis report as annex 6 and indicate generally for those areas in which the project was implemented, that the project had beneficial results on the communities. No major differences were observed between the Borrower PCR and the Banks assessment.

3) The team observed that the Lukanga Water and Sewerage Company had some lapses to operations and maintenance of the new infrastructure in particular ensuring that Preventive and Maintenance schedules were followed for the new constructed sewage ponds and sewer lines in Kabwe and Mkushi respectively, new weir in Mkushi and ensuring that Alum dosing units in Kabwe WTP and production meters were functioning. During the visit, it was also agreed with the PIU and the utility prepare an Operations and Maintenance plan for its infrastructure including the Mushimbili dam as outlined in the exit strategy.

## H. LESSONS LEARNED

### 1. INVESTMENT EXPENDITURE OPTIMISATION

After the feasibility study, in re-designing a project already conceptualized to fit the available resources at implementation, the appraisal team must ensure that the reductions in outputs are not achieved by spreading the available resources overall project activities in all areas as such an approach, politically easier to sell as it might be, is likely to spread resources too thinly in some areas and adversely impact on project outcomes. Funds should be adequate enough to cover all measures identified during Appraisal. The estimated cost for this project at appraisal was about US\$60 million and only about half was sourced. There is need to increase efforts to seek co financing of Bank projects to meet the client demands.

### 2. UNACCOUNTED FOR WATER REDUCTION

Specific interventions to reduce UFW should be pursued if UFW reduction is one of the outcomes of a project. UFW reduction goes beyond simply replacing old pipes and installing domestic meters. A Strategy for reduction of UFW incorporated in an overall water demand management plan should have been developed as a foundation for implementing activities in the established utility at project start. As a first step in developing the strategy, an initial utility-wide target for UFW reduction based on the economic level of water losses should have been set. The UFW strategy may cover a period of four to seven years. More pilot projects in the project area would have helped the utility understand the full budget and resources required to implement the entire strategy instead of one pilot assessment undertaken by a consultant together with the utility in Luangwa Township which showed UFW was reduced from 47% to 29% only concentrating on repairing leaks. In future, the Bank and executing agencies should also focus in developing water demand management plans and not trying to solve an isolated technical problem, but instead tie interventions to overall asset management, operations, customer support, financial allocations, and other factors needed to be put in place.

### 3. COMMUNITY CONTRIBUTIONS

The aspect of community contribution towards project infrastructure should be reviewed as it was identified as a major issue affecting project implementation with VIP latrines. None or delayed payments make projects lag behind for that particular activity. Contributions by beneficiary communities should not be put as a condition since in most cases the contribution is seasonal and may not be available timely. Borrowers should sensitise communities before and during project implementation of their obligations for contribution in order to ensure that communities fully understand implications of the need for timely contributions.

### 3. COMPLEMENTING INVESTMENTS INTO WATER AND SANITATION HARDWARE WITH HYGIENE EDUCATION AND PROMOTION.

In order to optimize benefits from water supply and sanitation interventions, the interventions must concurrently address water supply, sanitation and hygiene. The interventions must focus on meeting basic sanitation demands, increasing access to safe drinking water and promoting hygiene behaviour change. The project scored success in reduction in the incidences of diseases through provision improved water supply and sanitation coupled with vigorous public health campaigns on hygiene promotion working with committees at district level that comprised Local Authorities, Ministry of Health, Ministry of Community and Development to spearhead the campaigns at districts.

### 4. VALIDATING BASELINE DATA

It is important to validate baseline data and their sources and to review them if necessary, during implementation especially at mid-term review to help redefine baseline information and reset the proposed targets in the log frame. An example from this report is the one on baseline information for UFW which was not accurate at the time of project start and this ultimately affects the measurement of the outcome of the project.

The new Results Reporting System (RRS) with the Implementation Progress Report will definitely be helpful in avoiding this type of situations. Moreover, the risk of basing projects on existing sources that could be of dubious reliability or of uncertain future should be possibly outlined in log frames.



## I. PROJECT RATINGS SUMMARY

All working scores and ratings must be found in the relevant section in the PCR. For example, please insert the “Overall Output score” in Section D.I. in the “Achievement of Outputs” box below.

CRITERIA	SUB-CRITERIA	WORKING SCORE	
PROJECT OUTCOME	Achievement of outputs	4	
	Achievement of outcomes	3	
	Timeliness	1	
	<b>OVERALL PROJECT OUTCOME SCORE (score average)</b>	<b>3</b>	
BANK PERFORMANCE	<b>Design and Readiness</b>		
	Project Objectives were relevant to country development priorities	4	
	Project Objectives could in principle be achieved with the project inputs and in the expected time frame.	3	
	Project Objectives were consistent with the Bank’s country or regional strategy	4	
	Project Objectives were consistent with the Bank’s corporate priorities	4	
	The log frame presents a logical causal chain for achieving the project development objectives.	4	
	The log frame expresses objectives and outcomes in a way that is measurable and quantifiable.	3	
	The log frame states the risks and key assumptions	3	
	Project complexity was matched with country capacity and political commitment.	4	
	Project design includes adequate risk analysis.	2	
	Project procurement, financial management, monitoring and/or other systems were based on those already in use by government and/or other partners.	3	
	Responsibilities for project implementation were clearly defined.	4	
	Implementation documents (e.g. specifications, design, and procurement) were ready at appraisal.	4	
	Monitoring indicators and monitoring plan were agreed upon during design.	3	
	Baseline data was available or were collected during design.	2	
	<b>PROJECT DESIGN AND READINESS SUB-SCORE (score average)</b>	<b>3</b>	
	<b>Supervision:</b>		
	Bank complied with Environmental Safeguards	4	
	Bank complied with Fiduciary Requirements	3	
	Bank complied with Project Covenants	4	
	Bank provided quality supervision in the form of skills mix provided and practicality of solutions.	3	
	Bank provided quality management oversight.	4	
	PCR was delivered on a timely basis	1	
	<b>SUPERVISION SUB-SCORE (score average)</b>	<b>3</b>	
	<b>OVERALL BANK PERFORMANCE SCORE (score average)</b>	<b>3</b>	
	BORROWER PERFORMANCE	<b>Design and Readiness</b>	
		Responsibilities for project implementation are clearly defined.	4
Implementation documents (e.g. specifications, design, and procurement) are ready at appraisal.		3	
Monitoring indicators and monitoring plan are agreed upon.		3	
Baseline data are available or are being collected.		3	
<b>PROJECT DESIGN AND READINESS SCORE (score average)</b>		<b>3</b>	
<b>Implementation</b>			
Borrower complied with Environmental Safeguards		4	
Borrower complied with Fiduciary Requirements		4	
Borrower complied with Project Covenants		3	
Borrower was responsive to Bank supervision findings and recommendations.		3	
Borrower collected and used of monitoring information for decision-making.		3	
<b>IMPLEMENTATION SUB-SCORE (score average)</b>		<b>3</b>	
<b>OVERALL BORROWER PERFORMANCE SCORE (score average)</b>	<b>3</b>		

## J. PROCESSING

STEP	SIGNATURE AND COMMENTS	DATE
Sector Manager Clearance		16 <sup>th</sup> October 2012
Regional Director Clearance		
Sector Director Approval		

### CENTRAL PROVINCE EIGHT CENTRES WATER SUPPLY AND SANITATION PROJECT TECHNICAL ANNEXES

#### Table of Contents:

Annex 1. Project Cost and Financing by Component

Annex 2. Bank Inputs

Annex 3. Economic Analysis and Financial Analysis

Annex 4. Summary of Procurement

Annex 5 List of Supporting Documents

Annex 6. Project Narrative

Annex 7 Project Map

**ANNEX 1: PROJECT COSTS AND FINANCING**
**TABLE 1 (a): Project cost estimates by component**

	('000 UA)		
	LC	FC	Total
<b>A. Water Supply Infrastructure</b>			
A1. Rehabilitation of Networks	1260.09	7193.27	8453.36
A2. Networks Extension	672.35	4035.83	4708.19
A3. Peri-Urban Water Supply	110.95	206.05	317.50
A4. Equipment & Tools	41.93	97.48	129.41
A5. Resettlement, compensation & Environmental Mgt.	506.07	0.00	506.07
<b>B. Sanitation Program</b>			
B.1 Off-Site Sanitation	365.36	2070.38	2435.75
B.2 On-Site Sanitation	424.02	1018.01	1442.04
B.3 Solid Waste	27.23	553.63	580.86
<b>C. Building Works</b>			
C.1 Rehabilitation/Construction of CU Offices, Workshops & Stores	182.68	426.25	608.93
<b>D. Institutional Support</b>			
D.1 Establishment of CU	74.06	492.28	566.34
D.2 Water Watch Group	18.15	0.00	18.15
<b>E. Project Management</b>			
E.1 PIU	100.92	13.80	114.72
E.2 Engineering Services	190.87	1081.60	1272.47
E.3 Project Audit	34.85	0.00	34.85
<b>Base Cost</b>	3942.92	17245.21	21188.13
Physical Contingency	394.29	1724.52	2118.81
Price Contingency	247.30	1064.86	1312.15
Project Cost	4584.51	20034.59	24619.10

**Table 1 (b): Sources of financing (Loan)**

Source	('000 UA)			%
	L.C	F.C	Total	
ADF Loan	954.93	15298.34	16253.26	66.0
ADF Grant	1040.75	4736.26	5777.01	23.5
GRZ	2588.83	0.00	2588.83	10.5
<b>Total</b>	<b>4584.51</b>	<b>20034.59</b>	<b>24619.10</b>	<b>100</b>

**ANNEX 2: BANK INPUTS**

Mr. Sering Jallow	Director OWAS.2
Mr. Oswald Chanda	Manager OWAS.2
Mme. Monia Moumni	OIC OWAS.2
Mr. K. Bedoumra	Director ONIN
Mr. P.E. Njuguna	Ag. Division Manager ONIN.2
Mr. L.G. Barrow	Senior Financial Analyst ONIN.2
Mr. O.M. Amu	Senior Public Utilities Economist ONIN.2
Mr. I. Samba	Senior Environmentalist ONIN
Mr. Mecuria Assefaw	Chief Financial Analyst OWAS.2

Mme. Amel Hamza	Gender Specialist OWAS.2
Mr. Herbert Chinokoro	Water & Sanitation Specialist ZMFO
Mr. Natan Jere	Procurement Specialist, ZMFO
Mme. Nancy Ogal	Water and Sanitation Engineer, OWAS.2
Mr. Rees Mwasambili	Water and Sanitation Specialist OWAS.2
Mr. Andrew Mbiro	Water and Sanitation Specialist UGFO

## Missions

Date	To	Name	Mission
May 2003		Water and Sanitation Expert, Financial Analyst, Public Utilities Economist, Environmentalist	Preparation
September 2003		Manager (ONIN), Senior Financial Analyst, Senior Public Utilities Economist, Senior Environmentalist	Appraisal
March 2004		Financial Analyst, Water and Sanitation Expert, Procurement Specialist	Launch
10.11.2004	19.11.2004	Financial Analyst, Water and Sanitation Expert, Gender/Social Experts.	Supervision
28.06.2005	07.07.2005	Financial Analyst, Water and Sanitation Expert, Gender/Social Experts.	Supervision
08.11.2005	17.11.2005	Financial Analyst, Water and Sanitation Expert, Gender/Social Experts.	Supervision
21.06.2006	29.06.2006	Financial Analyst, Water and Sanitation Expert, Gender/Social Experts.	Supervision
04.07.2007	14.07.2007	Financial Analyst, Water and Sanitation Expert, Gender/Social Experts.	Supervision
02.02.2008	15.02.2008	Financial Analyst, Water and Sanitation Expert, Gender/Social Experts.	Supervision
23.03.2009	03.04.2009	Financial Analyst, Water and Sanitation Expert, Gender/Social Experts.	Supervision
01.02.2010	14.02.2010	Financial Analyst, Procurement expert, Water and Sanitation Expert	Supervision
20.11.2010	04.12.2010	Financial Analyst, Procurement, Water and Sanitation Expert	Supervision
20.06.2011	01.07.2011	Financial Analyst, Procurement expert, Water and Sanitation Expert	Supervision
20.02.2012	1.03.2012.	Financial Analyst, Water and Sanitation Expert, Gender Expert	Supervision
18.03.2012	24.03.2012	Water and Sanitation Expert, Financial/ Economic Analyst (Consultant)	Project Completion Report mission

## Ratings

Indicators	10.11.2004	28.06.2005	08.11.2005	21.06.2006	04.07.2007	02.02.2008	23.09.2009	01.02.2010	20.11.2010	20.06.2011	20.02.2012
<b>A. PROJECT IMPLEMENTATION</b>											
Compliance with loan conditions precedent to entry into force	2	3	3	3	3	3	3	3	3	3	3
Compliance with General Conditions	2	2	2	2	3	3	3	3	2	3	3
Compliance with other Conditions	2	2	2	2	2	2	2	3	2	2	3

<b>B. PROCUREMENT PERFORMANCE</b>											
Procurement of Consultancy Services	2	3	2	2	2	2	3	3	3	3	3
Procurement of Goods and Works	2	2	2	2	3	2	2	2	2	2	2
<b>C. FINANCIAL PERFORMANCE</b>											
Availability of Foreign Exchange	0	1	2	2	3	3	2	3	3	3	3
Availability of Local Currency	2	2	2	2	2	3	3	3	3	3	3
Disbursement Flows	1	2	2	2	2	2	2	3	3	3	3
Cost Management	2	2	2	2	2	2	2	2	3	3	3
Performance of Co-Financiers											
<b>D. ACTIVITIES AND WORKS</b>											
Adherence to implementation schedule	2	2	2	2	3	3	3	3	2	3	2
Performance of Consultants or Technical Assistance	0	2	2	2	2	2	2	3	2	3	3
Performance of Contractors	0	0	0	2	2	2	3	2	2	2	2
Performance of Project Management	2	2	2	2	2	2	3	3	2	2	2
<b>E. IMPACT ON DEVELOPMENT</b>											
Likelihood of achieving development objectives	2	2	2	2	3	3	3	3	3	3	3
Likelihood that benefits will be realized and sustained beyond project completion	2	2	2	2	2	2	2	3	3	3	3
Likely contribution of the project towards an increase in	2	2	2	2	2	2	2	3	3	3	3
<b>Current Rate of Return</b>											

F. OVERALL PROJECT ASSESMENT											
Current Supervision Average	1.56	1.94	1.94	2.06	2.38	2.38	2.50	2.75	2.75	2.81	2.75
Current Trend over time											2.35

### ANNEX 3: ECONOMIC (EIRR) AND FINANCIAL ANALYSIS (FIRR)

#### 3 (a) Basic Assumptions for the Computations of Economic Net Present Value (ENPV), Economic Internal Rate of Return (EIRR), Financial Analysis and Internal Rate of Return (FIRR)

<b>Project Life</b>	30	years									
Incremental O & M Costs	1.50%	of capital cost									
<b>Non-Revenue Water</b>											
NRW Current (2011/2012)	53%										
NRW Target	20%										
NRW Annual Reduction	5%										
2005 Base Production per day	36,558	M3	Appraisal report								
2005 Base Water Production per year	13,343,670	M3									
2011 Production	24,800,000	M3	from NWASCO	2010/2011 report							
Capacity Production	30,000,000	M3									
Annual Increment	500,000	M3									
2011 Population in Area of Service	376,574	from NWASCO	2010/ 2011 report								
Annual Population Increase Rate	2.30%	from CSO	2010 Census								
<b>Population Profile</b>	<b>% pop.</b>	<b>Pop No.</b>	<b>L/c/d</b>	<b>Demand (l/d)</b>							
Peri-Urban	60.00	225,944	30	6,778,320							
Low Cost	25.00	94,144	100	9,414,400							
Medium Cost	10.00	37,657	135	5,083,695							
High Cost	5.00	18,829	190	3,577,510							
Totals	<b>100.00</b>	<b>376,574</b>		<b>24,853,925</b>							
Water Service Coverage	Weighted Average	66%									
2011 Water Service Coverage	66%										
Target Water Service Coverage	95%										
Annual Increase	2.50%										
Per Capita Demand	42M3	using 2011 NRW and Coverage									
Daily demand	116.83M3										
Tariffs	ZMK	USD									
2011 Billing	K12, 883,000,000	\$2,342,363.64	ZMK Amount from NWASCO	2011 report							
Water Billed	10,416,000M3										
Tariff Current	K1, 236.85	\$0.23	per M3								
Tariff Target	K2, 002.00	\$0.36	per M3	\$0.36							
Tariff Annual Increase -	US \$	5%									

Forex Rate 2012	K5, 500
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### Health Benefits

Base Incidence of Water Borne Disease	18.77 per 1000 people (Average Appraisal Report)
Mortality Rate	3% of incidence (Water Supply and Sanitation Public expenditure Review 2011 report)
Average Productive Time Lost Due to Pre-mature Death	10 years
Projected Increase in Water Borne diseases without project	1%
Projected Decrease with Project	20% per year
Target Incidence Rate	10 per 1000 people
Travel costs to clinic	K2, 000
Consultation	K2, 000
Time	3 hours
Minimum wage / Month	K600, 000
Minimum wage/ Day	K30, 000
of incidence Water Supply and Sanitation PER 2011 report)	K3, 750 per hour
Minimum Wage / Year	K7, 200,000 per year

### 3 (a) FIRR for Central Province Eight Centres Water Supply and Sanitation Project

(USD) Year		Investment	Incremental O & M	Total Cost	Incremental Water Sales M3	Incremental Revenue	Net Income	PV
Yr 0	2005	1, 280,884.00	19,213.26	1,300,097.26	0.00	0.00	-1,300,097.26	-1,300,097.26
Yr 1	2006	6, 306,426.00	113,809.65	6,420,235.65	828,165.00	186,337.00	-6,233,898.65	-6,052,328.79
Yr 2	2007	12, 561,459.00	302,231.54	12, 863,690.54	1, 656,330.00	372,674.00	-12, 491,016.54	-11, 773,981.09
Yr 3	2008	9, 805,842.00	449,319.17	10, 255,161.17	1, 955,658.60	440,023.00	-9,815,138.17	-8,982,241.83
Yr 4	2009	4, 789,535.00	521,162.19	5,310,697.19	4,155,038.40	934,884.00	-4,375,813.19	-3,887,853.34
Yr 5	2010	5, 434,235.00	602,675.72	6,036,910.72	5,957,291.60	1,340,391.00	-4,696,519.72	-4,051,259.16
Yr 6	2011	1, 808,010.00	629,795.87	2,437,805.87	4,811,658.60	1,082,623.00	-1,355,182.87	-1,134,944.31
Yr 7	2012	0.00	629,795.87	629,795.87	5, 021,658.60	1,129,873.00	500,077.14	406,608.47
Yr 8	2013	0.00	629,795.87	629,795.87	5, 854,475.10	1, 383,120.00	753,324.14	594,681.03
Yr 9	2014	0.00	629,795.87	629,795.87	6, 737,291.60	1, 671,269.00	1, 041,473.14	798,202.44
Yr 10	2015	0.00	629,795.87	629,795.87	7, 670,108.10	1, 997,800.00	1, 368,004.14	1,017,923.55
Yr 11	2016	0.00	629,795.87	629,795.87	8, 652,924.60	2, 366,479.00	1, 736,683.14	1, 254,616.85
Yr 12	2017	0.00	629,795.87	629,795.87	9, 685,741.10	2, 781,390.00	2, 151,594.14	1, 509,084.84
Yr 13	2018	0.00	629,795.87	629,795.87	10, 768,557.60	3, 246,952.00	2, 617,156.14	1, 782,155.98
Yr 14	2019	0.00	629,795.87	629,795.87	11, 901,374.10	3, 767,946.00	3, 138,150.14	2, 074,686.93
Yr 15	2020	0.00	629,795.87	629,795.87	12,765,064.00	4,243,458.00	3,613,662.14	2,319,472.22
Yr 16	2021	0.00	629,795.87	629,795.87	13,165,064.00	4,595,250.00	3,965,454.14	2,471,139.92
Yr 17	2022	0.00	629,795.87	629,795.87	13,325,064.00	4,850,323.00	4, 220,527.14	2,553,488.33
Yr 18	2023	0.00	629,795.87	629,795.87	13,325,064.00	4, 850,323.00	4,220,527.14	2,479,114.88
Yr 19	2024	0.00	629,795.87	629,795.87	13, 325,064.00	4,850,323.00	4,220,527.14	2,406,907.65
Yr 20	2025	0.00	629,795.87	629,795.87	13,325,064.00	4,850,323.00	4,220,527.14	2,336,803.54
Yr 21	2026	0.00	629,795.87	629,795.87	13, 325,064.00	4, 850,323.00	4,220,527.14	2,268,741.31
Yr 22	2027	0.00	629,795.87	629,795.87	13, 325,064.00	4,850,323.00	4,220,527.14	2,202,661.46
Yr 23	2028	0.00	629,795.87	629,795.87	13, 325,064.00	4,850,323.00	4,220,527.14	2,138,506.27
Yr 24	2029	0.00	629,795.87	629,795.87	13,325,064.00	4,850,323.00	4,220,527.14	2,076,219.68
Yr 25	2030	0.00	629,795.87	629,795.87	13,325,064.00	4,850,323.00	4,220,527.14	2,015,747.26
Yr 26	2031	0.00	629,795.87	629,795.87	13,325,064.00	4,850,323.00	4,220,527.14	1,957,036.18
Yr 27	2032	0.00	629,795.87	629,795.87	13, 325,064.00	4, 850,323.00	4,220,527.14	1,900,035.13
Yr 28	2033	0.00	629,795.87	629,795.87	13,325,064.00	4,850,323.00	4,220,527.14	1,844,694.30
Yr 29	2034	0.00	629,795.87	629,795.87	13, 325,064.00	4, 850,323.00	4, 220,527.14	1, 790,965.34
Yr 30	2035	0.00	629,795.87	629,795.87	13, 325,064.00	4, 850,323.00	4, 220,527.14	1, 738,801.30

**NPV@3%      6,755,589.00**  
**IRR            4.02%**

### Sensitivity Analysis

The major key variables in the project implementation henceforth are target NRW and target tariff rates. In finding the above NPV of US \$ 6.7 Million, in the underlying assumptions above, the assumed target rates were 20% for NRW and \$0.364 per M3 for tariffs from the current 53% and \$0.225. If it is assumed that 100% achievement means that the target rates are achieved, which is the base assumption, and assume that 0% means that both rates remain as at now and negative percentages indicating higher terminal NRW and lower terminal tariffs, that is adverse changes, then Table 3.1 gives an array of results for different combinations of achievement.

TABLE 3.1: Sensitivity Analysis Changes in NPV (US \$ 000) from changes in target NRW and Tariffs

		Target NRW										
		12%	20%	28%	35%	43%	50%	58%	66%	73%		
		<< Positive ----- Base Assumption = 100% ----- Adverse >>										
Target Tariff	Base Assumption = 100% -- Positive >> -- Adverse <<	\$6,755.59	120%	100%	80%	60%	40%	20%	0%	-20%	-40%	
		\$0.392	120%	\$12,890.10	\$9,104.68	\$4,958.32	\$429.74	-\$4,400.71	-\$9,560.48	-\$14,969.70	-\$20,439.32	-\$25,908.94
		\$0.364	100%	\$10,317.84	\$6,755.59	\$2,832.39	-\$1,473.03	-\$6,080.31	-\$11,016.92	-\$16,202.97	-\$21,449.43	-\$26,695.89
		\$0.336	80%	\$7,347.85	\$4,042.55	\$377.08	-\$3,670.59	-\$8,020.14	-\$12,699.00	-\$17,627.32	-\$22,616.04	-\$27,604.76
		\$0.308	60%	\$3,978.18	\$945.48	-\$2,428.04	-\$6,181.26	-\$10,236.34	-\$14,620.74	-\$19,254.60	-\$23,948.87	-\$28,643.12
		\$0.281	40%	\$224.58	-\$2,534.74	-\$5,604.16	-\$9,027.95	-\$12,749.16	-\$16,799.69	-\$21,099.68	-\$25,460.07	-\$29,820.46
		\$0.253	20%	-\$3,896.79	-\$6,382.74	-\$9,148.07	-\$12,232.65	-\$15,588.29	-\$19,261.73	-\$23,184.47	-\$27,167.61	-\$31,150.75
		\$0.225	0%	-\$8,348.61	-\$10,561.19	-\$13,022.41	-\$15,767.79	-\$18,754.41	-\$22,024.90	-\$25,526.68	-\$29,085.99	-\$32,645.30
		\$0.197	-20%	-\$12,901.39	-\$14,840.58	-\$16,997.70	-\$19,403.88	-\$22,021.49	-\$24,887.88	-\$27,957.01	-\$31,076.55	-\$34,196.09
		\$0.169	-40%	-\$17,454.15	-\$19,119.97	-\$20,973.00	-\$23,039.97	-\$25,288.56	-\$27,750.87	-\$30,387.33	-\$33,067.10	-\$35,746.86

The array shows that while the project NPV is highly sensitive to changes in both terminal tariff and NRW rates, changes in the tariffs have a higher relatively impact on the project NPV as a 20% adverse change in this parameter, from 100% to 80%, results in a 40% change in the project NPV from \$ 6.75 Million to \$4.04 Million a change of \$ 2.71 Million compared to a 27% change in the project NPV from \$ 6.75 Million to \$4.95 Million to a change of \$ 1.79 Million for a similar change in NRW. A 20% positive change in both results in an NPV of \$12.89 Million.



**3 (b) Economic Analysis - Computation of ENPV and EIRR (USD)**

							Economic benefits						
	Invest.	Incremental O & M	Total Cost	Incremental Water Sales M3	Incremental Revenue US \$	Net Financial Benefit	Travel Cost to Clinic Avoided	Consultation Fees Avoided	Cost of Sick Time Avoided	Cost of Deaths Avoided	Total Economic Benefits	Net Economic Benefit	PV
Yr 0	1,280,884	19,213	1,300,097	-	\$0	-1,300,097.00	0.00	0.00	0.00	0.00	0.00	-1,300,097.00	-1,300,100.00
Yr 1	6,306,426	113,810	6,420,236	828,165	186,337	-6,233,899.00	404.00	404.00	2,275.00	445,091.00	448,174.00	-5,785,725.00	-5,617,210.00
Yr2	12,561,459	302,232	12,863,691	1,656,330	372,674	-12,491,017.00	763.00	763.00	4,291.00	824,727.00	830,544.00	-11,660,473.00	-10,991,110.00
Yr 3	9,805,842	449,319	10,255,161	1,955,659	440,023	-9,815,138.00	1,082.00	1,082.00	6,087.00	1,178,182.00	1,186,433.00	-8,628,705.00	-7,896,490.00
Yr 4	4,789,535	521,162	5,310,697	4,155,038	934,884	-4,375,813.00	1,246.00	1,246.00	7,008.00	1,348,364.00	1,357,864.00	-3,017,949.00	-2,681,410.00
Yr5	5,434,235	602,676	6,036,911	5,957,292	1,340,391	-4,696,520.00	1,301.00	1,301.00	7,321.00	1,413,818.00	1,423,741.00	-3,272,779.00	-2,823,130.00
Yr 6	1,808,010	629,796	2,437,806	4,811,659	1,082,623	-1,355,183.00	1,359.00	1,359.00	7,644.00	1,466,182.00	1,476,544.00	121,361.00	101,640.00
Yr 7	0	629,796	629,796	5,021,659	1,129,873	500,077.00	1,418.00	1,418.00	7,977.00	1,531,636.00	1,542,449.00	2,042,526.00	1,660,760.00
Yr 8	0	629,796	629,796	5,854,475	1,383,120	753,324.00	1,480.00	1,480.00	8,323.00	1,597,091.00	1,608,374.00	2,361,698.00	1,864,350.00
Yr 9	0	629,796	629,796	6,737,292	1,671,269	1,041,473.00	1,543.00	1,543.00	8,681.00	1,662,545.00	1,674,312.00	2,715,785.00	2,081,420.00
Yr 10	0	629,796	629,796	7,670,108	1,997,800	1,368,004.00	1,610.00	1,610.00	9,055.00	1,741,091.00	1,753,366.00	3,121,370.00	2,322,590.00
Yr 11	0	629,796	629,796	8,652,925	2,366,479	1,736,683.00	1,679.00	1,679.00	9,442.00	1,806,545.00	1,819,345.00	3,556,028.00	2,568,950.00
Yr 12	0	629,796	629,796	9,685,741	2,781,390	2,151,594.00	1,750.00	1,750.00	9,845.00	1,898,182.00	1,911,527.00	4,063,121.00	2,849,790.00
Yr 13	0	629,796	629,796	10,768,558	3,246,952	2,617,156.00	1,824.00	1,824.00	10,262.00	1,976,727.00	1,990,637.00	4,607,793.00	3,137,680.00
Yr 14	0	629,796	629,796	11,901,374	3,767,946	3,138,150.00	1,901.00	1,901.00	10,696.00	2,042,182.00	2,056,680.00	5,194,830.00	3,434,390.00
Yr 15	0	629,796	629,796	12,765,064	4,243,458	3,613,662.00	1,981.00	1,981.00	11,146.00	2,133,818.00	2,148,926.00	5,762,588.00	3,698,790.00
Yr 16	0	629,796	629,796	13,165,064	4,595,250	3,965,454.00	2,064.00	2,064.00	11,612.00	2,225,455.00	2,241,195.00	6,206,649.00	3,867,780.00

Yr 17	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,151.00	2,151.00	12,097.00	2,330,182.00	2,346,581.00	6,567,108.00	3,973,210.00
Yr 18	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,240.00	2,240.00	12,600.00	2,421,818.00	2,438,898.00	6,659,425.00	3,911,710.00
Yr 19	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,333.00	2,333.00	13,122.00	2,513,455.00	2,531,243.00	6,751,770.00	3,850,440.00
Yr 20	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,429.00	2,429.00	13,666.00	2,631,273.00	2,649,797.00	6,870,324.00	3,803,930.00
Yr 21	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,529.00	2,529.00	14,228.00	2,736,000.00	2,755,286.00	6,975,813.00	3,749,840.00
Yr 22	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,633.00	2,633.00	14,811.00	2,840,727.00	2,860,804.00	7,081,331.00	3,695,690.00
Yr 23	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,741.00	2,741.00	15,417.00	2,958,545.00	2,979,444.00	7,199,971.00	3,648,170.00
Yr 24	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,852.00	2,852.00	16,045.00	3,076,364.00	3,098,113.00	7,318,640.00	3,600,290.00
Yr 25	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	2,968.00	2,968.00	16,695.00	3,207,273.00	3,229,904.00	7,450,431.00	3,558,370.00
Yr 26	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	3,088.00	3,088.00	17,372.00	3,338,182.00	3,361,730.00	7,582,257.00	3,515,850.00
Yr 27	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	3,213.00	3,213.00	18,074.00	3,469,091.00	3,493,591.00	7,714,118.00	3,472,810.00
Yr 28	0	\$629,796	629,796	13,325,064	4,850,323	4,220,527.00	3,343.00	3,343.00	18,802.00	3,613,091.00	3,638,579.00	7,859,106.00	3,435,030.00
Yr 29	0	629,796	629,796	13,325,064	4,850,323	4,220,527.00	3,477.00	3,477.00	19,557.00	3,744,000.00	3,770,511.00	7,991,038.00	3,390,970.00
Yr 30		629,796	629,796	13,325,064	4,850,323	4,220,527.00	3,616.00	3,616.00	20,340.00	3,901,091.00	3,928,663.00	8,149,190.00	3,357,360.00

**ENPV @3% 47,242,370.00**

**EIRR 9.16%**

### 3 (d) Financial statements for the Lukanga Water and Sewerage Company Limited

Water Liters '000 ZMK '000	2008		2009		2010		2011	
	Customers	Water Product.	Customers	Water Product.	Customers	Water Product.	Customers	Water Product.
<b>Outputs based on NWASCO reports</b>	11,383.00	18,000.00	14,360.00	22,000.00	15,403.00	24,800.00	15,403.00	24,800.00
<b>Growth from previous year</b>			26%	22%	7%	13%	0%	0%
Average revenue per annum	566,523	358,263	611,733	399,295	632,072	392,573	890,599	553,141
Average direct cost per annum	320,933	202,954	230,134	150,215	254,242	157,907	323,847	201,138
Average admin cost per annum	226,923	143,504	319,104	208,288	370,889	230,355	483,061	300,023
Average operational cost	350,502	78,150	K527,156	135,801	586,928	134,179	609,841	78,742
Average labour cost	207,874	143,504	297,972	208,288	351,970	230,355	465,410	300,023
Average profitability	-90,155	-57,013	-87,548	-57,145	-16,984	-10,549	31,676	19,674
Collection efficiency	65%		84%		74%		79%	
O & M Cost Coverage	49%		71%		77%		75%	
<b>Statement of Comprehensive Income</b>								
<b>Revenues</b>								
Water & Sewerage Supply	6,448,728		8,784,492		9,735,810		13,717,901	
Miscellaneous Income	0		0		692,973		1,151,606	
Other Fees	0		0		71,713			
	<b>6,448,728</b>		<b>8,784,492</b>		<b>10,500,496</b>		<b>14,869,507</b>	

<b>Cost of Sales</b>							
Chemicals	279,794		493,102		638,800		422,780
Energy	2,599,682		1,862,176		2,259,228		3,148,978
Motor Vehicle Costs	175,747		230,450		311,761		311,283
Operational Consumables	127,430		174,280		173,593		68,090
Repairs & Maintenance	225,838		237,116		243,326		597,365
Services & Supply	244,685		307,607		289,389		439,723
	<b>3,653,176</b>		<b>3,304,731</b>		<b>3,916,097</b>		<b>4,988,219</b>
<b>Gross Margin</b>	2,795,552		5,479,761		6,584,399		9,881,288
	<b>43.4%</b>		<b>62.4%</b>		<b>62.7%</b>		<b>66.5%</b>
MLGH Grants	139,100		480,808		1,997,376		
Interest	5		0		0		
Capital Grants Utilised	28,876		352,206		197,077		
	<b>167,981</b>		<b>833,014</b>		<b>2,194,453</b>		<b>0</b>
<b>Total Income</b>	2,963,533		6,312,775		8,778,852		9,881,288
<b>Admin Expenses</b>							
Staff Salaries	2,366,225		4,278,882		5,421,399		7,168,709
Medical & Funeral Expenses	43,589		33,643		42,600		83,991
Training Expenses	7,150		41,934		25,481		123,912
Recruitment Costs	166,101		227,881		115,770		63,969
Other Personnel Expenses	K0		0		K107,559		-
	<b>2,583,065</b>		<b>4,582,340</b>		<b>5,712,809</b>		<b>7,440,581</b>
<b>Operating Expenses</b>							
Advertising & PR	91,165		137,149		212,476		72,308
Bank Charges	30,104		70,246		89,489		91,900
Communication Expenses	96,034		141,233		168,847		151,823
Depreciation	154,823		393,035		427,873		541,795

Insurance	0		0		37,013		69,880
Other Admin Expenses	612,972		742,872		1,157,336		1,024,184
Other Expenses	3,910		185,115		0		0
Penalties	417,694		0		0		0
Peri urban costs	0		0		99,828		914
Provision for Bad Debts	0		1,317,977		1,134,784		0
	<b>1,406,702</b>		<b>2,987,627</b>		<b>3,327,646</b>		<b>1,952,804</b>
Total Operational & Admin Costs	<b>3,989,767</b>		<b>7,569,967</b>		<b>9,040,455</b>		<b>9,393,385</b>
<b>Operating Profit</b>	<b>-1,026,234</b>		<b>-1,257,192</b>		<b>-261,603.00</b>		<b>487,903.00</b>
Net Financing Income	-		173.00		332.00		
<b>Profit/ Loss Before Tax</b>	<b>-1,026,234</b>		<b>-1,257,019</b>		<b>-261,271</b>		<b>487,903</b>

## ANNEX 4 - SUMMARY OF PROCUREMENT

Consultancy services	Construction Supervision	Institutional Support to Lukanga Water & Sewerage	Public Health and Malaria Campaign	Auditing Services		
Original Contract value	Euro1,321,550 and US \$206,160.60	US \$849,994.00	US \$134,550.00	US \$51,000.00		
Company	Gauff Engineering Consultants	Poyry Environmental GmbH/Grant Thornton	Brian Colquhoun Hugh O Donnell & Partners	Grant Thornton		
Procurement mode (Appraisal)	QCBS	QCBS	QCBS	QCBS		
Actual mode of procurement	QCBS	QCBS	QCBS	QCBS		
<b>CIVIL WORKS</b>	<b>Lot 1A – Rehabilitation and Extension of Water Supply and Sewerage Systems in Kabwe, Kapiri-Mposhi and Mkushi</b>	<b>LOT 1B- Rehabilitation and Extension of Water &amp; Sewerage network in Chibombo Mumbwa, Nampundwe, Serenje and Chisamba</b>	<b>Construction of Office blocks, Laboratory and Workshops</b>	<b>Construction of VIP latrines in Mumbwa and Nampundwe (Lot 2 &amp; 3)</b>	<b>Construction of VIP latrines in Kapiri-Mposhi (Lot 4)</b>	<b>Construction of VIP latrines (Lot 1 &amp; 5)</b>
Original Contract value	US \$25,383,144.07	US \$4,012,77.63	US \$1,014,000.00	ZMK 3,584,738,399	ZMK 879,762,397	ZMK 2, 539, 347,602
Company	China Geo Engineering Corporation	China Jiangxi Corporation	China Jiangxi Corporation	Built Trust Zambia Limited	Geotech Engineering Limited	Dansuz Zambia Limited
Procurement mode (Appraisal)	ICB	ICB	ICB	NCB	NCB	NCB
Actual mode of procurement	ICB	ICB	ICB	NCB	NCB	NCB
<b>GOODS</b>	<b>Supply of various office equipment</b>	<b>Supply of Liquid Chlorine</b>	<b>Supply of Motor Vehicles</b>	<b>Supply of various equipment and tools</b>		
Original Contract value	ZMK 381,329,950	US \$ 47,472	ZMK 381,349,000	US \$ 615,402		
Company	Superior Furnishers	Chemical & Engineering	CFAO Zambia	Goodwill Holdings		
Procurement mode (Appraisal)	International Shopping	International Shopping	NCB	International Shopping		
Actual mode of procurement	International Shopping	International Shopping	NCB	International Shopping		

## ANNEX 5: LIST OF SUPPORTING DOCUMENTS

1. Appraisal Report of the Central Province Eight Centres Water Supply and Sanitation, AfDB November 2003;
2. Quarterly Progress Reports;
3. Project Completion Report, Ministry of Local Government and Housing, March 2012;
4. Bank Supervision Reports;
5. Audited Project Accounts
6. Report on the Economic and Financial Analysis of the CP8CWSSP

## ANNEX 6 - PROJECT NARRATIVE

### Project Background

1) As part of the ongoing sector development efforts, the Bank financed in 1998, the Water Supply and Sanitation Study for Seven Centres in Central Province of Zambia. The objective of the study was to prepare long term (20 year) strategic development programmes for water and sanitation in Chibombo, Chisamba, Kabwe, Kapiri-Mposhi, Mkushi, Mumbwa, and Serenje, conduct feasibility studies, and finally, prepare detailed designs and tender documents for the immediate project. Nampundwe was added later, bringing the total number of centres covered by the study to eight. The study culminated in detailed designs and preparation of draft tender documents for the works required to restore water supply and sanitation services into a serviceable state. In conformity with the country's sector strategy, the study also detailed the Institutional arrangements required for sustained delivery of these services. GRZ requested the Bank to finance the proposed Central Province Eight Centres Water Supply and Sanitation Project as detailed by the study. A Bank appraisal mission was fielded in September 2003.

2) The project was approved in December 2003 and the Loan Agreement and Grant Protocol Agreement were signed in April 2004 and disbursement commenced in July 2005. A Project Steering Committee was established in 2004 comprising a senior official from each of the following Ministries; the Ministry of Finance and National Planning, the Ministry of Local Government and Housing (MLGH) and the Department of Housing and Infrastructure Development (DHID), the Ministry of Energy and Water Development, the Ministry of Tourism, Environment and Natural resources, the Ministry of Health, the Permanent Secretary - Central Province and the Provincial Local Government Officer, Central Province. The Project Implementation unit was established in 2005 within the Department of Housing and Infrastructure Development with seconded staff from Ministry of Local Government and Housing and the PIU relocated to Kabwe in January 2006.

### Project value added

3) The project improved water supply and sanitation in terms of quantity and quality. It enabled approximately 300,000 people in the project area to have access to safe, clean water supply and improved sanitation services. This has resulted in improved reliability and continuity of service with 5 new storage reservoir constructed in Nampundwe, Chisamba, Kapiri Mposhi, Mkushi and Serenje towns and the rehabilitation of two water treatment plants in Mkushi and Kapiri Mposhi.

4) Water rationing has been eliminated in all the 8 centres and water available for an average 18 hours of supply with some centres receiving 24 hours supply.

5) Community mobilization and public health education has had positive awareness on hygiene, malaria and HIV/AIDS. The greater impact has been felt on the health aspect in the project areas. There has been no major outbreak of Cholera in the eight centres after project implementation. The incidence of diseases has reduced by 48% from 18.77 cases per 1,000 people to in the year 2000 to 10.04 cases per 1,000 in 2011.

6) The installation of water kiosks in the peri-urban areas has made water availability within reachable distances. As an indirect impact, the reduction of time spent on fetching water and the positive health impact through reduced morbidity will allow peri urban populations to increase productive and income generating activities which will ultimately lead to more inclusive growth outcomes.

7) The creation and operation of the Commercial Water Utility staffed with qualified staff has ensured the proper operation and maintenance of the new infrastructure. The improvement of water supply has positive financial benefits to the new company as the willingness to pay for services has improved compared to before.

8) The revenue collection efficiency has increased from an average of 61% in 2002 to 78% in 2011. This will guarantee the sustainability of the project. Customer base increased to 16,400 from under 10,000 at project start and 76% metering has been achieved from 2% at project start.

9) During the construction of the Mushimbili Dam, a total of 30 households with a population of 282 people were displaced. These were fully relocated and compensated as per the Bank's policy Involuntary Settlement of 2002. Each family was built an iron roofed house and a pit latrine. In addition 10 iron sheets were given to each family to enable them build an additional house. Nine

boreholes were drilled for the resettled families as a source of water. Livelihoods restoration was done through the provision of fertilizer, maize seed, compensation of fruit trees and employment as local labour in the construction of houses and access roads.

### **Project Implementation**

10) The project was approved in December 2003, Loan and Grant Protocol Agreement were signed in April 2004 and disbursement commenced in July 2005. There was a slippage of 15 months after approval due to delay in meeting conditions precedent to first disbursement. The project original closing date was June 2008. However, two extensions were granted to enable some of the outstanding works to be completed by contractors. The main civil works contract Lot1A delayed commencement because of the bid price exceeding the budget. In addition, an extension was granted to enable some of the outstanding works to be completed by contractors working on VIP latrines. These delay caused the project to be extended to enable the works to be fully completed and the defects liability period to be fully implemented. The project finally closed on 31 December 2011 giving a slippage of 42 months.

11) The Government committed to meet its 10 % contribution, plus cost overruns incurred during implementation. Government contribution increased by more than US\$ 5 million during project implementation to cover increased costs on the construction contracts. Project cost overruns included (i) extra cost due to bid prices being above the allocated budget, which the Government committed to pay on Lot 1A and (ii) extra cost due to BOQ revisions by the executing agency.

12) For Lot 1A, due to the bid price exceeding the budget the award was delayed significantly. However, following an undertaking by the Government of the Republic of Zambia through the Ministry of Local Government and Housing to provide funds to bridge the shortfall, the Contract was finally awarded on 22nd September 2006. At the time of award of contract the Government of the Republic of Zambia had already pledged to finance in total the shortfall of the contract amount and the contract was therefore signed for the full contract value of US\$ 25,383,114.07 out of which the ADB would provide an amount of US\$ 20,490,623.00 and the remainder by the GRZ. The amounts were confirmed in letters from the ADB and GRZ dated 01/08/2006 ref.OWAS.2/LTR/2006/08/003/ma and 08/08/2006 ref. MFAL/102/12/808 respectively.

13) As a result of changes in available amount by the ADB the contribution percentages for each party also changed as the ADB would only be able to finance the project by 80.7% as opposed to the original 90%. Therefore, the balance of US\$ 4,892,491.07 or 19.3% had to be financed by the GRZ. The Government accordingly provided the shortfall and the contract proceeded as per project measures. However the final contract value increased following the release of additional funds.

14) Works for construction of major infrastructure commenced in November 2006. This included the development of 25 high yielding boreholes, rehabilitation of two water treatment plants, high lift pump station, the rehabilitation and extension of water and sewer networks as well as the construction of five water storage reservoirs.

15) There were some delays in certain areas like drilling of boreholes which was behind schedule during project implementation but the delay did not affect the overall completion period as the Contractor caught up with the program for Lot 1A. Although by the expiry of the Contract period on 6 November 2008 there were still outstanding works like installation of switch gear and high lift pumps at High ridge pump station and installation of filter sand in Kapiri and Mkushi the contract was deemed to have been completed on schedule because the Contractor could have had long completed the works had the Client given possession of site to the Contractor. It took more than a year for the power company to install transformers and connect power to various sites as new works had been carried out. As a result only the Mushimbili Dam was commissioned within the project completion period. The Consultant had to negotiate with the Contractor so that commissioning of the various installed equipment could be done during the Defect Liability Period at no cost at all to either party. The action by the Engineer averted an extension of completion period which could have had resulted in extra costs to the Client.

16) On the sanitation works in Lot 1A, during project implementation period it was discovered that in the case of Kabwe the budget for interceptor tanks was not provided but only provided for house connection. The consultant therefore decided that the interceptor tanks had to be built first because without them the house connection would not be viable as there will be nowhere to discharge the sewage from the houses. The result was that the interceptor tanks were constructed but the houses were not connected to the new sewer system. In the case of Kapiri the project measures included construction of new set of ponds and interceptor tanks but with



no provision for house connections. This has delayed the full utilization of the new ponds. The Lukanga Water and Sewerage Company has received funding from Government and is connecting houses to the trunk mains in Kapiri. The proposed Kasanda ponds in Kabwe were cancelled due to environmental considerations as the ponds were considered to be in the midst of the township and other upcoming dwelling structures. A pump house was instead constructed and two new sewage pumps installed to lift sewage to pump station 1 for onward transmission to Katondo ponds.

17) The quality of works on Lot 1A was very good. Throughout the project implementation period all construction materials were being tested both on site and at private laboratories to ensure that they conform to acceptable standards as specified in the contract documents. Furthermore, all installed DI and PVC pipes were pressure tested and flushed before being commissioned. The MLGH, Consultant and the Contractor took a joint inspection visit to the pipe factory in China. The Consultant further took an inspection tour to Denmark to go and inspect clear water pumps before shipment to Zambia.

18) For Lot 1B, the project commenced on 30 April 2006. The contract involved the rehabilitation of Water Supply and Sanitation in Mumbwa, Chibombo, Chisamba, Nampundwe and Serenje towns where the networks were rehabilitated and new construction was carried out together with the construction of kiosks and installation of domestic meters.

19) In terms of actual versus the planned progress, Contractor's performance in Lot 1B was weak as the Contractor constantly failed to accelerate progress beyond his own program. Although the Consultant could have invoked certain contract clauses to either revoke or punish the Contractor the Consultant's view was that such a move would disadvantage the communities who were already eagerly waiting for the provision of good quality water to flow in their homes after waiting for so many years. Amidst frustrations of incompetence by the Contractor, the Consultant resolved to remain patient and continue to offer guidance to the Contractor until the project targets were achieved. The contract which was supposed to be completed on 10 April 2008 was extended to end on 09 August 2008 even then the Contractor failed to complete the works on time. The result was that the project was behind schedule for one year. The Consultant recommended to the Employer that the Contractor should be allowed to complete the remaining works during the Defects Liability Period at no cost to each party at all. The Contractor successfully completed the contract works in November 2009. Though it took such a long time, the contract works were to acceptable standards.

20) The Lot 3 contract for construction of CU offices and workshops had to be re-advertised as it was discovered that most Bidders were none compliant. The Contract was finally awarded to China Jiangxi Corporation for International, Economic & Technical Co-operation on 14 October 2008. However, due to some mathematical errors commencement was delayed until the figures were harmonized in the tender. The Contractor mobilized to site on 01 July 2009. The contract completion period was six months. The initial idea was for the project to run concurrently with the Lot 1B project so that both contracts could be supervised at the same time as they were being undertaken by the same Contractor. However, the arrangement could not work because the award came late after lot 1B had already been completed. The Ministry of Local Government and Housing approved an extension of six months from 31 July to 31 December 2009. A further extension of three months extending the completion period to 30 April 2010 was granted by the Employer after the cement Manufacturer failed to deliver the consignment on time despite the Contractor having paid for it. The cement shortage was actually national and the Contractor had no control over it.

The quality of works on Lot 3 was satisfactory.

21) The construction of onsite sanitation facilities was awarded to small Zambian contractors. The pace of construction was very slow and was affected by having both fully funded latrines and partially funded latrines by the communities'. However, due to the slow community contributions for the partially funded latrines, construction pace of the Local contractors assigned to construct on site sanitation facilities was slow.

22) In trying to solve issue of slow pace, the Ministry deducted a portion of fees payable on the contractors' progress certificates, thus effectively penalising the contractors for the risk of non-receipt of community contributions, an activity over which they had no responsibility. For those contractors who mobilised the project funded component material for the latrines, storage and pilferage while awaiting the community contributions became an additional cost. The project had to be extended for an additional nine months to enable the contractors complete the works. At the time of project closure, the works still had not been completed due to

the slow pace of community contributions. After consultations with the Ministry, the Government will cover the remaining portion of the partially funded on sanitation facilities.

23) During the construction of the Mushimbili Dam, a total of 30 households with a population of 282 people were displaced. These were fully relocated and compensated as per the Bank's policy Involuntary Settlement of 2002. Each family was built an iron roofed house and a pit latrine. In addition 10 iron sheets were given to each family to enable them build an additional house. Nine boreholes were drilled for the resettled families as a source of water. A School, Church and a Cooperative were constructed in Kapiri-Mposhi as part of the relocation funded from Government counterpart funds. Livelihoods restoration was done through the provision of fertilizer, maize seed, compensation of fruit trees and employment as local labour in the construction of houses and access roads.

24) On the consultant's performance, the assignment was executed in two phases. The tendering and contract award phase involved mainly tender documents review since design was done by another consultant during the feasibility study. During the construction supervision of works phase, the consultant monitored the quality of works, certification of works and on the job technology transfer to the PIU and water utility.

25) Supervision and quality control of the works was done satisfactorily. All defects that were identified in the design were rectified at no cost to the client. The consultant was in terms of quality of electrical and mechanical equipment very particular of their durability, reliability, operation, maintenance and local back up.

26) The supervision consultancy had two addenda mainly due to extension of time for Lot 1B and Lot 3 contracts. The addenda were paid using Counterpart Funds from GRZ. The consultants produced 10 quarterly progress reports and a total of 49 site meeting were held with minutes produced.

27) The LA performance in the project was very good. The councils were very helpful in assisting the project get the required permits and support from the councillors. In particular Kabwe Municipal council provided office space at no cost to the PIU for the duration of the project. The councils made their technical staff and Environmental Health Technicians during the promotion of VIP latrines to provide the much needed site supervision.

28) The support for solid waste management was undertaken by GRZ through "Make Zambia Clean" and Healthy Program. Government procured refuse collection vehicles for all the constituencies in the project area whilst the Ministry of Health undertook a massive malaria control programme. Hence GRZ submitted an official request to re-allocate the funds originally envisaged for solid waste management to be used for the other project activities. Bank agreed to re-allocate the funds to finance the other activities of the project, mainly water supply works.

29) Unaccounted for Water was 53% after project completion, even after replacement of old pipes and meter installation. One major cause of this could have been that since the consumption and production could be accurately measured because of meters installed, the 51% which was assumed to be existing level of UFW was probably not accurate and therefore the 20% target cannot be used at completion to assess achievement. Utility staff mentions it could have been as high as 70% before project start. The NWASCO 2006/ 2007 report indicates a figure of 61%. Activities undertaken on the project which included metering, replacement of old leaking pipes and having active leakage control teams in the distribution network brought about moderate improvement in the figure of UFW. There was a moderate improvement from 61% to 53% using the 2011/2012 NWASCO report although not as significant as was planned to get from 51% to 20%.

30) Bank supervision was planned for every six months; there were only a few occasions when this deviated from the plan. They were effective and provided guidance on how project implementation could be improved and resolved many of the challenges on the project. No Midterm review was conducted. It would have flagged the issue of low demand from communities on the community contributions required for the VIP latrines and would have influenced the formulation of a strategy of how to design the sanitation subsidy to the vulnerable and how to undertake construction for full and partial contribution VIP latrines. On the UFW, the MTR would have enabled the baseline to be redefined according to the new data coming from the measurement process after meter installation.

31) The implementation of the Environmental Social Management Plan (ESMP) was supervised by the client through the Engineering Supervision Consultant with one of the highlights being the relocation and compensation of people living around the Dam done smoothly. The ESMP was part of the Contracts for the works which ensured that the contractor was obliged to carry out the provisions of the plan. The project had both positive on social and environmental impacts. By nature of the works involved, the communities in the affected areas experienced intermittent water supply during the implementation period. The impact was mitigated as the community was always informed at least 24 hours in advance before any shut down.

While the project has successfully restored the capacity of the infrastructure, the increased water supply has had a negative impact on the deteriorating sewerage infrastructure for low cost areas resulting in constant sewer overflow. The utility has instituted preventive maintenance routines to deal with this. In addition the increased water pressure in the system while satisfying the water demand is proving to be a cost to the company as it frequently experiences pipe bursts in the old network mainly comprising Asbestos Cement pipes.

32) A total of UA 687. 927.66 was to be cancelled at project. Part of the cancelled amounts was towards Chemicals – Calcium Hypochlorite was supplied and not accepted by the Water Company as it did not meet the specifications. In addition, the executing agency had wanted to claim funds as additional works carried out by a contractor on Lot1B as part of the electrical works which were already part of the contract and these were disapproved. In addition, a balance of funds was to be used by the executing agency to procure meters and plumbing accessories just before closing date but unfortunately they did not prepare the tender documents to execute the planned activities. The executing agency wanted to use an expired contract to procure these.

#### **Accomplishments and Outstanding Matters**

33) The following physical outputs were achieved at Project Closure on 31 December 2011:

- The project improved water supply and sanitation in terms of quantity and meeting 95% compliance on Bacteriological quality according to the WHO standards to approximately 300,000 people.
- Improved reliability and continuity of service with 5 new storage reservoir constructed in Nampundwe, Chisamba, Kapiri Mposhi, Mkushi and Serenje towns
- Water rationing has been eliminated in all the 8 centres and water available on average 18 hours of supply with some areas on 24 hours supply
- 66.06 kms of distribution mains replaced
- 145.73 kms distribution network extended
- 33.9 kms of sewer reticulation rehabilitated
- 65km of sewer lines flushed
- 10 sewerage ponds rehabilitated/ constructed in Kabwe, Kapiri Mposhi, Mumbwa , Serenje, Nampundwe, Chisamba, Chibombo and Mkushi
- 5 new sewer pump stations constructed in Kabwe
- Approximately 539 out of 1640 VIP latrines constructed and the rest at various stages of completion under construction
- Commercial Utility - Lukanga Water and Sewerage Company Limited established in 2006
- Institutional Support provided to the newly formed utility for the following: Competitive recruitment of top management, carry out training needs assessment for utility staff, review organization structure and incentive schemes, development performance strategies and regulations for human resource development, assist development of business plan, development of book keeping and financial management systems, assist develop cost covering tariff, establish of a computerized accounting system and account procedures manual, assist to establish leak detection and repairs teams, assist CU design maintenance and inspection programmes and assist develop marketing strategies design a peri urban water supply kiosk management concept.

- 12 new office buildings, workshops and laboratory constructed
- 11,179 water meters installed
- Billing system procured for customer data base & monthly bills produced every 21st day of the month
- Tariff adjustment done annually after public hearing
- 25 boreholes drilled and equipped
- 2 existing water treatment plants rehabilitated in Mkushi and Kapiri Mposhi and one installed in Mkushi
- 81 public water kiosks installed + 67 from the Copperbelt Environmental Project
- 80kms of house connections done

34) The agreed issues to be addressed within given timelines are as follows:

Issue	Action required	Responsibility	Deadline
Water supply and Sewerage works (Lot 1B)	Put in place Operations, maintenance and management plan for Mushimbili dam	LuWSC/MLGH/PIU	30 November 2012 2012
Water Supply system in Nampundwe	Complete the transfer of the system in Nampundwe to LuWSC	MLGH/LUKANGA	31 December 2012
On site Sanitation	Complete construction of the Sanitation facilities	MLGH/PIU/ Contractors	31 December 2012
Project Audit Report 2011 and Follow up	Submit the audit report	MLGH/PIU	Submitted
Government Debt	Engage with MoFNP on how this will be dismantled. Payment should be made when invoices fall due	Lukanga/ MLGH/ MoFNP	31 December 2012

# ANNEX 7 - PROJECT MAP

## ZAMBIA CENTRAL PROVINCE EIGHT CENTERS WATER SUPPLY AND SANITATION PROJECT LOCATION MAP

