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Report No: PAD 1204

INTERNATIONAL DEVELOPMENT ASSOCIATION

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED CREDIT

IN THE AMOUNT OF SDR 47.2 MILLION
(US$65 MILLION EQUIVALENT)

TO THE

REPUBLIC OF ZAMBIA

FOR A

LUSAKA SANITATION PROJECT

May 1, 2015

Water Global Practice (GWADR)
Africa Region

CURRENCY EQUIVALENTS

(Exchange Rate Effective March 31, 2015)

Currency Unit	=	Zambian Kwacha (ZMW)
ZMW 7.585	=	US$1
US$ \1.37949	=	SDR 1

FISCAL YEAR
January 1 – December 31

ABBREVIATIONS AND ACRONYMS

AfDB	African Development Bank
BOD	Biological Oxygen Demand
CP	Cooperating Partner
CPS	Country Partnership Strategy
CQS	Consultant's Qualifications
CSO	Combined System Overflow
DA	Designated Account
DEWATS	Decentralized Wastewater Treatment Systems
EIB	European Investment Bank
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FM	Financial Management
FSM	Fecal Sludge Management
GRS	Grievance Redress System
GRZ	Government of the Republic of Zambia
IC	Individual Consultant
ICB	International Competitive Bidding
ICR	Implementation Completion and Results Report
IDA	International Development Association
IEC	Information, Education and Communication
IFI	International Financial Institution
IFR	Interim Financial Report
IPR	Independent Post Review
JMP	Joint Monitoring Program
KfW	Kreditanstalt für Wiederaufbau (German Development Bank)
LCC	Lusaka City Council
LCS	Least Cost Selection
LWSC	Lusaka Water and Sewerage Company
LWSSD	Lusaka Water Supply, Sanitation and Drainage
MCA	Millennium Challenge Account
MCDMCH	Ministry of Community Development, Mother and Child Health
MDG	Millennium Development Goals

MoF	Ministry of Finance
MoH	Ministry of Health
MIS	Monitoring and Information System
MLGH	Ministry of Local Government and Housing
NCB	National Competitive Bidding
NWASCO	National Water Supply and Sanitation Council
O&M	Operation and Maintenance
OSS	On-site Sanitation
P-RAMS	Procurement Risk Assessment and Management System
PAD	Project Appraisal Document
PDO	Project Development Objective
PE	Procuring Entity
PIU	Project Implementation Unit
PLR	Performance and Learning Review
PPA	Project Preparation Advance
PPIAF	Public Private Infrastructure Advisory Facility
PPR	Procurement Post Review
QBS	Quality Based Selection
QCBS	Quality and Cost Based Selection
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
SNDP	Sixth National Development Plan
SORT	Systematic Operations Risk Rating Tool
SSS	Single Source Selection
TA	Technical Assistance
TOR	Terms of Reference
TTL	Task Team Leader
UNICEF	United Nations Children's Fund
US$	United States Dollars
WA	Withdrawal Application
WB	World Bank
WHO	World Health Organization
WSP	Water and Sanitation Program
WSPIP	Water Sector Performance Improvement Project
WSS	Water Supply and Sanitation
WSUP	Water and Sanitation for the Urban Poor
WWTP	Wastewater Treatment Plant
ZEMA	Zambia Environmental Management Agency
ZPPA	Zambia Public Procurement Authority

Regional Vice President:	Makhtar Diop
Country Director:	Kundhavi Kadiresan
Senior Global Practice Director:	Junaid Kamal Ahmad
Practice Manager:	Jonathan S. Kamkwalala
Task Team Leader:	Michael John Webster

ZAMBIA
Lusaka Sanitation Project

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PAD DATA SHEET

Zambia

Lusaka Sanitation Project (P149091)

PROJECT APPRAISAL DOCUMENT

AFRICA

Report No.: PAD1204

Basic Information			
Project ID P149091	EA Category B - Partial Assessment	Team Leader Michael John Webster	
Lending Instrument Investment Project Financing	Fragile and/or Capacity Constraints [ ] Financial Intermediaries [ ] Series of Projects [ ]		
Project Implementation Start Date 22-May-2015	Project Implementation End Date 30-Jun-2020		
Expected Effectiveness Date 31-Jul-2015	Expected Closing Date 31-Dec-2020		
Joint IFC No			
Practice Manager/Manager Jonathan S. Kamkwalala	Senior Global Practice Director Junaid Kamal Ahmad	Country Director Kundhavi Kadiresan	Regional Vice President Makhtar Diop

Borrower: REPUBLIC OF ZAMBIA			
Responsible Agency: Lusaka Water and Sewerage Company			
Contact:	Mr. George Ndongwe	Title:	Managing Director
Telephone No.:	260211251712	Email:	gndongwe@lwsc.com.zm

Project Financing Data(in USD Million)					
[ ]	Loan	[ ]	IDA Grant	[ ]	Guarantee
[X]	Credit	[ ]	Grant	[ ]	Other

Total Project Cost:	68.50	Total Bank Financing:	65.00
Financing Gap:	0.00		

Financing Source	Amount
BORROWER/RECIPIENT	3.50
International Development Association (IDA)	65.00
Total	68.50

Expected Disbursements (in USD Million)

Fiscal Year	2016	2017	2018	2019	2020	2021
Annual	5.00	10.00	10.00	10.00	15.00	15.00
Cumulative	5.00	15.00	25.00	35.00	50.00	65.00

Institutional Data

Practice Area (Lead)

Water

Contributing Practice Areas

Health, Nutrition & Population

Cross Cutting Topics

[ ] Climate Change
[ ] Fragile, Conflict & Violence
[ ] Gender
[ ] Jobs
[ ] Public Private Partnership

Sectors / Climate Change

Sector (Maximum 5 and total % must equal 100)

Major Sector	Sector	%
Water, sanitation and flood protection	Sanitation	90
Health and other social services	Health	10
Total	100	

☑ I certify that there is no Adaptation and Mitigation Climate Change Co-benefits information applicable to this project.

Themes		
Theme (Maximum 5 and total % must equal 100)		
Major theme	Theme	%
Urban development	Urban services and housing for the poor	40
Environment and natural resources management	Pollution management and environmental health	30
Urban development	Municipal finance	15
Urban development	City-wide Infrastructure and Service Delivery	15
Total		100

Proposed Development Objective(s)

The Project Development Objective is to increase access to sanitation services in selected areas of Lusaka and strengthen the Lusaka Water and Sewerage Company's capacity to manage sanitation services.

Components

Component Name	Cost (USD Millions)
Sewerage Improvements	40.50
On-site Sanitation	14.00
Institutional Strengthening	9.00
Unallocated	2.00
Project Preparation Advance	3.00

Systematic Operations Risk- Rating Tool (SORT)

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environment and Social	Moderate
8. Stakeholders	Moderate
9. Other	
OVERALL	Substantial

Compliance

Policy

Does the project depart from the CAS in content or in other significant respects?	Yes [ ]	No [X]
Does the project require any waivers of Bank policies?	Yes [ ]	No [X]
Have these been approved by Bank management?	Yes [ ]	No [ ]
Is approval for any policy waiver sought from the Board?	Yes [ ]	No [X]
Does the project meet the Regional criteria for readiness for implementation?	Yes [X]	No [ ]

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment OP/BP 4.01	X	
Natural Habitats OP/BP 4.04		X
Forests OP/BP 4.36		X
Pest Management OP 4.09		X
Physical Cultural Resources OP/BP 4.11		X
Indigenous Peoples OP/BP 4.10		X
Involuntary Resettlement OP/BP 4.12	X	
Safety of Dams OP/BP 4.37		X
Projects on International Waterways OP/BP 7.50	X	
Projects in Disputed Areas OP/BP 7.60		X

Legal Covenants

Name	Recurrent	Due Date	Frequency
Financial Covenant	X		CONTINUOUS

Description of Covenant

The Project Implementing Agency shall take all measures necessary to ensure that its Operating Revenue shall reflect the principles of Cost Recovery and be sufficient to cover Operating Expenses and Debt Service.

Conditions

Source Of Fund	Name	Type
IDA	Subsidiary Agreement	Effectiveness

Description of Condition

The Subsidiary Agreement has been executed on behalf of the Recipient and the Project Implementing Entity.

Source Of Fund	Name	Type
IDA	Project Steering Committee	Effectiveness

Description of Condition		
The Recipient has established the Project Steering Committee.		
Source Of Fund	**Name**	**Type**
IDA	Project Implementation Unit	Effectiveness
Description of Condition		
The Project Implementing Entity has established the Project Implementation Unit.		
Source Of Fund	**Name**	**Type**
IDA	Project Implementation Manual	Effectiveness
Description of Condition		
The Project Implementing Entity has adopted the Project Implementation Manual.		

Team Composition

Bank Staff

Name	Role	Title	Unit
Michael John Webster	Team Leader (ADM Responsible)	Sr Water & Sanitation Spec.	GWADR
Wedex Ilunga	Procurement Specialist	Senior Procurement Specialist	GGODR
Lingson Chikoti	Financial Management Specialist	Consultant	GGODR
Charity Inonge Mbangweta	Team Member	Team Assistant	AFCS3
Chloe Oliver Viola	Team Member	Infrastructure Economist	GWADR
Christiaan Heymans	Team Member	Sr Water & Sanitation Spec.	GWASA
Kisa Mfalila	Environmental Specialist	Senior Environmental Specialist	GENDR
Lucson Pierre-Charles	Team Member	Program Assistant	GWADR
Maiada Mahmoud Abdel Fattah Kassem	Team Member	Finance Officer	WFALA
Montserrat Meiro-Lorenzo	Team Member	Sr Public Health Spec.	GCCPT
Ngoni R. Mudege	Team Member	Sr Water & Sanitation Spec.	GWASA
Odete Duarte Muximpua	Team Member	Operations Analyst	GWASA
Paula F. Lytle	Safeguards Specialist	Senior Social Development Specialist	GSURR
Peter M. Hawkins	Team Member	Sr Water & Sanitation Spec.	GWASA
Stephen Mugendi Mukaindo	Counsel	Counsel	LEGAM

Extended Team

Name	Title	Office Phone	Location
Fritz Schwaiger	Utility Specialist / Financial Analyst		
Webster Muti	Safeguards Consultant		Harare
Zvikomborero Hoko	Sanitary Engineer		Harare

Locations

Country	First Administrative Division	Location	Planned	Actual
Zambia	Lusaka	Lusaka Province	**X**	

Consultants (Will be disclosed in the Monthly Operational Summary)

Consultants Required ?	Consulting services to be determined

I. STRATEGIC CONTEXT

A. Country Context

1. **Zambia has recently become a lower middle-income country and has a stable democratic political system.** A decade of sustained economic growth—averaging 5.7 percent per year over the past ten years—has positioned Zambia among the top ten fastest growing economies in Sub-Saharan Africa, and allowed it to attain lower-middle income status. Zambia's economy was expected to grow at 5.5 percent in 2014. Nominal per capita income is US$1,810 (2013). Zambia achieved independence in 1964 and, after a period of single-party rule until 1991, has successfully held five peaceful national elections. The country recently elected Mr. Edgar Lungu from the Patriotic Front Party as successor to the deceased President Michael Sata through a peaceful national election. General elections will be held in 2016.

2. **Many of the development challenges Zambia still faces are similar to those of low-income countries.** Poverty rates are stubbornly high at 68 percent (using Purchasing Power Parity at US$1.25 per day), as is inequality (0.52 gini coefficient, over 0.50 is considered high). Key measures of human development are worse than many low-income countries; under 5 mortality is 119 per 1000 live births (compared to low income country average of 108), life expectancy is 49 (compared to a low income country average of 59), and malnutrition in children under five is 45 percent (compared to low-income average of 36 percent). This last indicator closely tracks poor sanitation. Zambia ranks 141 out of 187 countries in the UN's Human Development Index in 2014. The economy remains largely undiversified (mainly dependent on copper) and largely concentrated in urban areas. Zambia is lagging on various Millennium Development Goal (MDG) targets, including those for water and sanitation.

3. **Lusaka is Zambia's capital and largest city.** The most recent census (2010) estimated the population of Lusaka Province, one of Zambia's 10 provinces, as 2.3 million which represented 17 percent of Zambia's national population of 13 million. The province is divided into 8 districts (Lusaka, Kafue, Chongwe, Luangwa, Rufunsa, Chirundu, Chilanga and Shibuyunji). The population of Lusaka City was estimated at 1.7 million. With a population growth rate of 4.5 percent, one of the highest in Sub-Saharan Africa, it is estimated the city's population will grow to 2.3 million in 2015 and 5 million by 2035.

B. Sectoral and Institutional Context

4. **Water supply and sanitation is a core development issue for Zambia's economic growth and social development.** Lack of adequate water supply and sanitation results in poor public health and environmental conditions and, furthermore, constrains investment. Sixty-three percent of Zambians have access to clean drinking water supply compared to an MDG target of 75 percent by 2015 as defined by the United Nations Children's Program (UNICEF)/World Health Organization (WHO) Joint Monitoring Program (JMP). 43 percent have access to adequate sanitation, 56 percent in urban areas and 34 percent in rural areas, compared to a MDG target of 70 percent. The national long-term vision is to reach: (i) 100 percent access to clean water, (ii) 90 percent access to sanitation; (iii) rehabilitation and reconstruction of sewage

facilities in all major towns and cities, and (iv) collection and treatment of 80 percent of all wastewater by 2030.

5. **Lack of adequate sanitation in Zambia significantly impacts human development.** Zambia loses 1.3 percent of GDP due to public health impacts of poor sanitation (Water and Sanitation Program, 2012) which results in child malnutrition, illness and premature death. The economic burden of inadequate sanitation falls most heavily on the poor who are most likely to have inadequate sanitation facilities.

6. **The adverse impact of poor sanitation is most acute in Lusaka.** Lusaka is suffering from a sanitation crisis that claims lives through regular occurrence of cholera, typhoid and dysentery and causes severe environmental pollution. An estimated 70 percent of Lusaka's urban residents live in 33 "peri-urban areas", which are relatively high-density, unplanned neighborhoods largely comprised of poor residents. Roughly 90 percent of peri-urban areas rely on pit latrines, most of which are "unimproved" (that is, they do not comply with the JMP definition of adequate sanitation); the remaining 10 percent living in peri-urban areas use sewers, septic tanks or defecate in the open (estimated at 1 percent). In addition, 60 percent of Lusaka's water supply is derived from fairly shallow groundwater abstracted within the city, which is prone to contamination through fissures in the underlying rock. The most vulnerable areas coincide with low-income neighborhoods situated to the south-west of the city center, making sewerage an attractive sanitation option in these areas, provided it is possible to ensure low leakage rates. Poor management of solid waste and storm water drainage and the generally flat terrain further compound these problems. Despite widespread consensus regarding the need to construct sewers, the city has been reluctant to shoulder investment costs, which may be difficult to recover.

7. **The water sector reforms, which started in the 1990s, need to be completed to increase both the financial viability of commercial utilities and the focus on sanitation.** In 1994, the Government of Zambia (GRZ) launched a comprehensive water sector reform program aimed at ensuring quality provision of water supply and sanitation, at affordable costs and on a sustainable basis. The seven principles of this reform program laid out in the1994 National Water Policy called for: (i) separation of water resources functions from water supply and sanitation; (ii) the separation of regulatory and executive functions; (iii) the devolution of responsibilities for water supply to local authorities and private enterprises; (iv) achievement of full cost recovery for water supply and sanitation (WSS) services through user charges in the long run; (v) human resources development for effective institutions; (vi) the adoption of technology in line with local conditions (and ability to pay); and (vii) increased GRZ priority and budget spending for the sector.

8. **Significant progress has been made in terms of the separation of water resources management from water supply and sanitation, the separation of regulatory and executive functions and the devolution of responsibilities from the central to local governments.** However, a second round of reforms is needed to improve the financial viability of these utilities and to build capacity for sanitation services throughout the country, and in Lusaka in particular. Good headway has been made to date particularly on the institutional and regulatory fronts. In terms of the separation of functions, while the Ministry of Energy and Water has overall

responsibility for the water sector, water supply and sanitation falls under the auspices of the Ministry of Local Government and Housing (MLGH). Separation of the regulatory and executive functions was achieved through the passage of the Water Supply and Sanitation Act of 1997, which established the independent regulator, the National Water and Sanitation Council (NWASCO). Responsibility for service provision has been devolved to the Local Authorities who have established 11 municipally-owned regional commercial utilities to manage water and sanitation throughout the country. These utilities are regulated by NWASCO; environmental pollution is regulated by the Zambian Environmental Management Agency (ZEMA). To date, NWASCO has focused on sewerage, and not on regulation of onsite sanitation.

9. **The Lusaka Water and Sewerage Company (LWSC) is responsible for water supply and sanitation in Lusaka Province.** The Water Supply and Sanitation Act of 1997 provides the option for local authorities to delegate responsibility for water and sanitation provision to the commercial utilities. The Lusaka City Council (LCC), through the establishment of LWSC, provides LWSC with the mandate to provide water and sanitation services—and to enforce all by-laws enacted by LCC related to water and sanitation services—for the urban residents of Lusaka Province. LWSC was formed in 1988 as a Private Limited Liability Company owned by the city councils of Lusaka (60 percent), Kafue (20 percent), Chongwe (10 percent) and Luangwa (10 percent). Its ownership has now expanded to include all districts in Lusaka Province. LWSC currently has the mandate to supply services to Lusaka City, Kafue, Luangwa, Chongwe, Chirundu, Rufunsa, Chilanga and Shibuyunji. LWSC has 91,342 water connections serving 1.4 million people (as of December 2014), and provides sewerage services to 14 percent of residents in the city through about 33,000 sewerage connections. An integrated approach to managing sanitation (wastewater and solid waste) is lacking, as is coordination between the city council and LWSC for housing development.

10. **LWSC has achieved significant results in water supply with World Bank support, but has not yet been able to address sanitation.** As documented in the ICR for the Water Sector Performance Improvement Project (WSPIP) which closed in June 2013, LWSC has made significant improvements in the financial viability of the company, and in strengthening the institution for future investments. For example, the operating ratio (revenue/cost) increased from 0.8 at the start of the project (2007) to 1.3 at project close (2014); this positive result has been maintained since the closure of the project. The World Bank has a strong partnership with LWSC and has been building up to a large capital expansion project for over a decade (including a strong focus on institutional strengthening through several projects). However, it still faces significant challenges, such as high non-revenue water (45 percent compared to a desired level of less than 25 percent) and inefficient staffing (10 staff/1000 connections compared to a benchmark of 1-3 staff/1000 connections). The Millennium Challenge Corporation (MCC) grant to Lusaka of US$355 million—which was based in large part on the WSPIP design, and motivated by the performance improvement achieved under WSPIP—focuses mainly on water supply and drainage. Sanitation services have not improved at the pace of water services and have received little support from Cooperating Partners (CPs). The increased supply of water without the corresponding improvements in sanitation creates an additional public health risk.

11. **The Lusaka Sanitation Master Plan provides a comprehensive strategy for full coverage of sanitation by 2035.** With support from the Millennium Challenge Corporation (MCC), the

Government of the Republic of Zambia (GRZ) developed the Lusaka Sanitation Investment Master Plan (2011). The Master Plan provides a strategy for 100% coverage of Lusaka Province—in both off-site (sewers) and on-site sanitation—by 2035. Lusaka's sewer network of 480 kms currently covers approximately 30 percent of the city's area, and covers 14 percent of Lusaka's residents, mostly the better-off. Including on-site sanitation (pit latrines and septic tanks, often shared), sanitation coverage reaches about 69 percent; however, many of these facilities do not meet public health requirements as defined by Government policy, and JMP. Many on-site systems—septic tanks and pit latrines—are not working properly because of rocky conditions and a high water table, and this may lead to users making direct connections or deliberately dumping removed contents into storm water drains and streams. Significant investments and reforms are required to reach the target of 100 percent sanitation coverage (on-site and off-site) cited in the Sanitation Master Plan (2011) by 2035. The Master Plan estimates that $1.9 billon is needed by 2035 and prioritizes investments into short term ($370 million), medium term ($635 million) and long term ($925 million). Short-term investments include collection system upgrades and expansion, treatment upgrades and expansion and improvement of on-site sanitation facilities and their management.

12. **The Lusaka Sanitation Program is one of the first steps towards implementing the Lusaka Sanitation Master Plan with the aim of providing adequate sanitation facilities to all urban citizens of Lusaka Province, starting with investments in Lusaka City.** The Program is being implemented by LWSC, consistent with the Lusaka Sanitation Master Plan. Four International Financial Institutions (IFIs) have been requested to support the Lusaka Sanitation Program: the European Investment Bank (EIB), Kreditanstalt fur Wiederaufbau (KfW), the African Development Bank (AfDB) and the World Bank. The World Bank's support would be provided through the proposed Lusaka Sanitation Project. EIB will finance sewerage collection and treatment and KfW has proposed to finance sludge treatment. AfDB and the World Bank will support sewage collection, on-site sanitation, and institutional strengthening. Of the five sewersheds in Lusaka City (see map in Annex 7), LWSC has proposed that the World Bank finances investments in the Ngwerere and Manchinchi sewersheds, and that the AfDB focus on Matero and Chunga. The Millennium Challenge Corporation, through a grant of US$355 million (of which approximately US$60 million is for sanitation) is already focusing on the Kaunda Square/ Chelston sewersheds. The preliminary financing estimates for the four IFIs supporting the Lusaka Sanitation Program are in Table A3.8 in Annex 3. While the World Bank's support is included under the Lusaka Sanitation Program, the Project Development Objectives for the World Bank's Project can be achieved independently of the larger Program. The World Bank's project is being prepared ahead of the other projects and is expected to be submitted to the Board prior to the other financing being fully defined.

C. Higher Level Objectives to which the Project Contributes

13. **The proposed project is aligned with the FY13–16 World Bank Country Partnership Strategy (CPS) for Zambia.** The CPS focuses on three pillars: (i) reducing poverty and vulnerability of the poor; (ii) improving competitiveness and infrastructure for growth and employment; and (iii) improving governance and economic management. The proposed project would contribute to the first pillar by supporting investments that would have positive effects on the health of poor residents in the beneficiary areas and the second pillar through enhanced

economic development of the prioritized economic sectors through provision of improved infrastructure. In this way, the project is also well-aligned to the World Bank's twin goals of eliminating absolute poverty and promoting shared prosperity. The project was not included in the indicative financing program of the CPS, but is being explicitly included in the program for the CPS Performance and Learning Review (PLR) currently under preparation.

14. **The Government has identified poverty reduction, jobs, and governance as its main priorities.** Zambia aspires to be a middle-income country by 2030 as articulated in the country's Vision 2030 statement. The Government's strategy for growth and development is outlined in the Sixth National Development Plan (SNDP, 2011-2015), focused on realizing pro-poor growth by converting mineral wealth into widely shared prosperity. However, government policies for achieving this strategy are still evolving and implementation is lagging. The SNDP recognizes that past performance in the sanitation sector has been poor, and prioritizes investments in sanitation in order to improve economic growth and quality of life. The SNDP presents ambitious targets for improved sanitation coverage and increased national budget to support this aim. The project supports the government's development plan by improving sanitation services of the poor in order to achieve improvements in public health and raise dignity.

15. **The Lusaka Sanitation Program is intended to improve public health, chronic malnutrition and reduce environmental pollution.** Through the provision of adequate sanitation services, the Program is expected to improve Lusaka's poor public health outcomes, in particular, the incidence of cholera, dysentery, typhoid, diarrhea and environmental enteropathy, all of which have a strong impact on children under five stunting levels and mortality. These health outcomes predominantly impact the poor, and therefore the project is expected to primarily benefit poor households in Lusaka. In addition, investments will be focused on reducing the contamination of groundwater (Lusaka's main source of drinking water) which will benefit all utility water users in Lusaka.

II. PROJECT DEVELOPMENT OBJECTIVES

A. Project Development Objectives

16. The Project Development Objective is to increase access to sanitation services in selected areas of Lusaka and strengthen the Lusaka Water and Sewerage Company's capacity to manage sanitation services.

B. Project Beneficiaries

17. The project will have three types of direct beneficiaries:

- **LWSC sewerage customers.** The project will upgrade existing sewers and main collectors and expand the sewerage system to new customers. The identified investments will provide 4,100 new connections (assuming 50 percent of the households in the sewered areas connect to the sewer) that will benefit 33,000 people. 82 kms of sewers will be upgraded and laid, and the quality of effluent discharged from the Ngwerere Sewerage Ponds will be improved.

- **On-site sanitation customers.** 180,000 people (of which 50 percent would be women) in 37,000 households are expected to benefit from 10,000 on-site sanitation facilities and decentralized wastewater management (DEWATS) systems. Field data used by LWSC show an average number of 18 users per onsite facility, made up of several households sharing on the same plot. Though current coverage criteria by JMP do not consider shared sanitation facilities as improved, the current advanced draft of the Sustainable Development Goals, due to be finalized in September 2015, considers an improved facility shared by up to 5 households as improved. Average household size in urban areas of Lusaka Province is 4.8, according to the Living Conditions Monitoring Survey Report (2010), so 5 households are equivalent to 24 people. Thus, for the current project, coverage criteria will be set at 8 people per sewer connection as per NWASCO standards, and 18 users per (shared) on-site facility based on the LWSC figure. Fecal Sludge Management (FSM) infrastructure and service providers will be developed with the capacity to serve an estimated 25,000 on-site facilities, which in turn would benefit 450,000 people. These households will be in selected peri-urban areas in which poor people reside. About 500,000 people will benefit from improved hygiene and sanitation awareness.

- **LWSC water customers.** All LWSC customers with water connections will benefit from improved protection of the groundwater and avoid further water treatment costs that would have been passed on to water supply customers by LWSC.

18. The Project is also likely to indirectly benefit non-LWSC customers in the intervention compounds and downstream from the wastewater treatment plant (WWTP) effluents by reducing the contamination of surface and groundwater which they consume. Stronger capacity to monitor effluents from WWTP, surface and groundwater quality and disease outbreaks is likely to benefit the population well beyond the geographical areas covered by the proposed project.

C. PDO Level Results Indicators

19. The achievement of the PDO will be measured in terms of the following indicators:

(1) People provided with access to improved sanitation facilities
(2) People with access to adequate fecal sludge management systems
(3) Tons of BOD5 pollution removed by the treatment plant
(4) Tons of BOD5 pollution removed by the FSM systems
(5) Sewerage tariff increased to recovery operation and maintenance (O&M) and debt servicing costs
(6) Performance contract between LWSC management and branches signed
(7) Integrated geographically-referenced Monitoring and Information System (MIS) established and used
(8) Percent of sewerage blockage complaints addressed
(9) Direct project beneficiaries of which 50 percent are female

III. PROJECT DESCRIPTION

A. Project Components

20. The project will have the following three components. Details are provided in Annex 2.

- **Component 1: Sewerage improvements (US$40.5 of which the World Bank will finance US$38 million).** The objective of this component is to upgrade and expand sewerage systems in the Ngwerere and Manchinchi sewersheds. Collection system upgrading and expansion will be based on top priority investments as identified in the Lusaka Sanitation Master Plan by LWSC. Year 1 investments will include sewer network expansion in the Emmasdale and Chaisa neighborhoods and Kafue Road and the upgrade of Ngwerere Western Interceptor. Year 2 to 5 investments will be network expansion in Chawama, Kuomboka and Garden, upgrade of Ngwerere downstream collector and upgrade and extension of Ngwerere sewage ponds. Resettlement costs and potential land purchase for extension of Ngwerere sewage ponds will be financed by the government.

- **Component 2: On-site sanitation (US$14 million of which the World Bank will finance US$13 million).** The objective of this component is to develop a comprehensive response to the on-site sanitation challenges facing Lusaka and support on-site sanitation services and systems in priority areas. This component will focus on priority peri-urban areas that will not be sewered in the medium- to long-term due to technical and financial considerations. Investments will include a support fund for on-site sanitation facilities, support to the development of fecal sludge management (FSM) infrastructure and service providers, construction of a number of DEWATS systems and sanitation and hygiene promotion. The areas to be covered under this component will be selected after the completion of the feasibility study. Land purchase for the FSM infrastructure will be financed by the government.

- **Component 3: Institutional strengthening (US$9 million of which the World Bank will finance US$9 million).** This component will provide technical assistance (TA) to enhance LWSC's capacity to implement the project, operate and maintain the facilities going forward, support the reforms needed to deliver sanitation services effectively and efficiently and to respond better to customer demand. This will include: (i) project management support to LWSC to implement the project, (ii) TA to strengthen the capacity of LWSC to provide sanitation services and preparation funds for future investments and equipment for sewer maintenance and labs, and (iii) building capacity for monitoring program implementation and impacts in LWSC, LCC, Ministry of Community Development, Mother and Child Health (MCDMCH) and MoH. Specific activities to be included under the technical assistance include: (a) human resources strategy to consider realigning sewerage and sanitation departments; (b) revenue enhancement strategies to ensure cost recovery of sewerage and sanitation services, (c) asset management strategy to improve management of sanitation assets; (d) improved customer care, in particular around sewerage blockages and new sanitation activities; and (e) continuation of the shadow credit rating undertaken during preparation (funded by the

Public Private Infrastructure Advisory Facility, PPIAF); (f) continuation of the performance contract between LWSC management and branches; (g) various training activities and strategic studies (such as an update of the Sanitation Master Plan). In addition, a consultancy under the Project Preparation Advance is solely dedicated to addressing institutional strengthening, and will identify further components.

B. Project Costs and Financing

21. Project cost is US$68.5 million which will be financed through an IDA credit of US$65 million equivalent in Special Drawing Rights (SDR) and through a government contribution of US$3.5 million. The government contribution will be towards land purchase and resettlement costs. The summary project costs are in Table 1 below. A detailed cost break-down is in Annex 5.

Table 1: Project Costs

Project Components	IDA financing US$ mln	GRZ financing US$ mln	TOTAL US$ mln
1. Sewerage Improvements	38	2.5	40.5
2. On-site sanitation	13	1	14
3. Institutional strengthening	9		9
Sub-total	60	3.5	63.5
Unallocated	2		2
Repayment of Preparation Advance	3		3
Total Financing Required	**65**	**3.5**	**68.5**

22. **Allocation between off-site and on-site sanitation.** It should be noted that, while the budget allocation for on-site sanitation is less than for sewerage improvements, and whereas 86 percent of residents rely on on-site facilities (the Master Plan estimates that this proportion will remain over 50 percent by 2035), the impact of improved on-site sanitation is expected to be greater than for sewerage relative to the support the project will provide. In particular, the partial support for building improved on-site facilities, the introduction of improved FSM services for peri-urban neighborhoods, and sanitation promotion, will reach a much greater proportion of the city, with far fewer funds, but are expected to have a higher public health impact than the sewers. However, Government policy not to fully subsidize on-site sanitation, and the absorptive capacity of LWSC in utilizing funds for on-site sanitation is much lower than for sewerage improvements, so there is a limit to financing that can be provided for Component 2. The Project aims to increase this absorptive capacity by addressing binding constraints through Components 2 and 3. Noting that on-site sanitation falls under LWSC's mandate, Components 2 and 3 will include an emphasis on building LWSC's capacity for on-site sanitation, and reorienting the utility to on-site sanitation solutions. The project has set aside an unallocated category of funds that could be reallocated to the on-site component during implementation

should this component be disbursing quickly. AfDB is also planning to finance an on-site sanitation component of a similar order of magnitude.

C. Lessons Learned and Reflected in the Project Design

23. The project design draws lessons from the following:

- **On occasion, a stand-alone sanitation project may be preferable to a water and sanitation project.** International experience shows that typically cities first invest in water supply and then move to sanitation. Citizens demonstrate a greater demand for water supply, and utilities can more easily provide water supply through cost recovering tariffs. This is true in Lusaka. LWSC and Cooperating Partners (including the World Bank through the Water Sector Performance Improvement Project, WSPIP) have focused on increasing the production of water (through bulk water supply and groundwater) and improved water distribution, but have not addressed sanitation for decades. The increased water supply has increased the volumes of wastewater which now require adequate collection, treatment and disposal. The Government has therefore requested, in order to address this lag in sanitation, for a stand-alone sanitation project which allows renewed focus on sanitation.

- **Sanitation is best tackled through a comprehensive approach.** The initial request from GRZ was to finance upgrade of the Manchinchi and Chunga wastewater treatment plants. As shown in the fecal waste flow diagram in Annex 2, improving effluent quality discharging from the wastewater treatment plants will have a minor impact on the overall fecal waste load entering the environment. Therefore, the World Bank has promoted and the Government has agreed to address the sanitation challenge in its entirety, looking at on-site sanitation, off-site sanitation investments, as well as the necessary capacity building and institutional strengthening required to address these challenges.

- **Investments in on-site sanitation and fecal sludge management will have a greater impact on public health than off-site sanitation.** Investment in sewerage collection and treatment addresses a relatively smaller proportion of the overall waste load entering the environment. The World Bank estimates the overall fecal waste properly collected and disposed of in Lusaka is 23 percent (see fecal sludge flow diagram in Annex 2). The contribution of the sewerage system to this satisfactory disposal is around 3.5 percent of all fecal waste generated in Lusaka. Investments in sewerage collection and treatment are expensive compared to the available financing and the ability of customers to pay tariffs needed to recover the operation and maintenance costs. Therefore, in Lusaka, as in most developing country cities, addressing on-site sanitation through improved facilities and improved fecal sludge management will have a greater impact on environmental pollution and public health than improvements to the sewerage system. However, it should be noted that while the level of investments is higher for Component 1 (Sewerage Investments), this is because these are inherently more expensive per capita and the absorptive capacity for Component 2 (On-site Sanitation) is lower. In addition, there is little experience in promoting FSM services at scale and LWSC has limited capacity to implement FSM.

- **Improved sanitation facilities are essential for implementing viable FSM services.** A study carried out in 12 cities by the Water and Sanitation Program (WSP) has shown that the quality of on-site facilities is generally poor in peri-urban areas, as in most cities this is left to the household, and information from Water and Sanitation for the Urban Poor (WSUP) and Leeds University, UK, suggests that the situation in Lusaka is no different. As a result, FSM service providers face challenges in using hygienic methods to service those facilities. It is therefore necessary to improve household containment in order both to improve hygiene for users, and to be accessible for adequate fecal sludge disposal.

- **Ensuring that customers connect to the sewers is a perennial challenge in sewerage projects.** International experience has shown that customers can be reluctant to connect to a main sewer line passing the house due to affordability or other constraints. This problem was also found in the WSP-supported Kalingalinga Pilot project. The project has included measures to ensure effective demand for connections and for on-site facilities and has emphasized the need to fully engage the community through door-to-door engagement with individual households, community structures, and collaboration with other agencies such as LCC and MLGH to enforce regulations and by-laws.

- **The project design draws lessons from the recently completed World Bank operation.** The project design has been significantly influenced by the lessons from the WSPIP project, in particular, the institutional arrangements, and the use of incentive-based performance contracts that were an effective tool for improving service delivery.

- **Project design has derived a number of lessons from the Kalingalinga pilot project.** LWSC is implementing a condominial sewerage pilot project with support from WSP. Kalingalinga is a peri-urban area in Lusaka with 45,000 households. Key lessons derived from Kalingalinga include: (i) need to engage more strongly with individual customers, and not only at the larger community level, in order to improve rate of connections; (ii) the need for further analytical work on subsidies in order to have a consistent approach between the government and CPs; and (iii) the need to strengthen and build the capacity of the LWSC's peri-urban unit.

IV. IMPLEMENTATION

A. Institutional and Implementation Arrangements

24. **Legal Agreements:** The Ministry of Finance (MoF), representing the Government of the Republic of Zambia (GRZ) will sign a financing agreement for the IDA credit with the World Bank. There will be a subsidiary agreement between MoF and LWSC through which the funds and the responsibility to implement the project will be passed on to LWSC. There will be a project agreement between LWSC and the World Bank to define the eligible activities and the implementation modalities.

25. **The project will be implemented by LWSC.** All funds will flow through LWSC, and implementation will be coordinated by a Project Implementation Unit. LWSC has to date

focused more on sewerage than on-site sanitation. However, under the project, LWSC is committed to expanding their services into on-site sanitation to fulfill their mandate. LWSC will also utilize the Sanitation Fund to support on-site sanitation; this fund was created to improve sanitation services for the poor, and is managed by LWSC. A sanitation levy, which is a 2.5 percent of the collected water bill, is included in the tariff agreed with NWASCO. LWSC collects this levy as part of the water bill and sets aside this money for improving sanitation services for the poor. On average ZK300 000 is raised per month. LWSC only spends the funds on projects that have been approved by the regulator. LWSC has used the Sanitation Fund to support condominial sewerage improvements in the Kalingalinga peri-urban area, amongst others.

26. **On-lending/on-granting terms:** The IDA credit will be passed on to LWSC partially as a loan, and partially as a grant, as agreed between MoF and LWSC. Component 1 will be on-lent from MoF to LWSC on the same terms and conditions as the financing agreement between MoF and IDA. Components 2 and 3 will be a grant from MoF to LWSC.

27. **Project Implementation Unit:** LWSC has formed a project implementation unit (PIU) that will manage the project. The structure of the PIU has been agreed with the World Bank and has been judged to have sufficient capacity to implement the project. Key staff of the PIU include: project manager, finance officer, procurement officer, safeguards officer, monitoring and evaluation specialist, sanitary engineer, on-site sanitation specialist and community development specialist. LWSC has recently implemented a World Bank-financed project (WSPIP) and is familiar with World Bank procedures which will facilitate implementation. The PIU has retained most of the staff that were active in the implementation of WSPIP.

28. **LWSC will implement Component 1.** The PIU will work closely with the sewerage department to implement Component 1. LWSC operates a network of 480 kms of sewers with seven wastewater treatment plants (WWTPs). Under the Project an additional 82 kms will be rehabilitated and constructed, and up to 500 kms under the Lusaka Sanitation Program. The Project will assist LWSC to strengthen both the capacity of the sewerage department and the PIU to operate and maintain this larger network.

29. **LWSC will implement Component 2.** The main subcomponents are: (i) hygiene promotion program, (ii) construction of on-site facilities, (iii) the development of FSM services, and (iv) the construction of DEWATS systems. Each of these will be contracted to a consultant or NGO with the requisite skills and capacity. The hygiene promotion program will be coordinated with the work of other partners working in Lusaka through a formal mechanism involving the partners and key Zambian institutions in order to realize synergies and ensure consistency of messaging. The contract for construction of onsite facilities will include the development of arrangements with a micro-finance institution for funding user advance payments, and the training of local builders to deliver the actual facilities. The development of FSM services will include the selection, according to agreed criteria, and training of entities to be developed to deliver the services. The DEWATS systems will be implemented under similar arrangements to Component 1.

30. **LWSC will implement Component 3 in collaboration with other institutions.** Sub-components 3.1 (project management) and 3.2 (TA to LWSC) will be implemented directly by LWSC. Sub-component 3.3 (program monitoring) will be implemented in collaboration with MCDMCH, MoH and LCC. Funds for this component will be managed by LWSC who will also be responsible for procurement; technical oversight on key issues for activities to strengthen LCC, MCDMCH and MOH sanitation monitoring capacity will be done in collaboration with these institutions. MLGH, NWASCO and ZEMA will be supported by other IFIs supporting the Lusaka Sanitation Program.

31. **Steering Committee:** The government will form the Lusaka Sanitation Program Steering Committee to oversee preparation and implementation of the program, as well as the Project. The steering committee will be chaired by MLGH and draw members from the MoF, MoH, MCDMCH, LCC, NWASCO, ZEMA and others as seen relevant. The World Bank and the program's other Cooperating Partners will support the steering committee as appropriate. The steering committee will be charged with providing oversight and guidance on project implementation. The steering committee will also facilitate inter-institutional collaboration and will resolve legal and policy bottlenecks. It will meet at least twice a year and shall inform government (through the MLGH) on progress and challenges confronting the project. The PIU shall provide secretariat services for the steering committee and shall be responsible for preparing and disseminating minutes to key stakeholders, including the World Bank.

B. Results Monitoring and Evaluation

32. The Project's results framework—shown in Annex 1—has been developed and forms the basis to track progress in meeting the project's objectives. As part of the project, LWSC will submit semi-annual reports to provide an overview of progress made and highlight issues that require attention. The PIU will include a dedicated monitoring and evaluation specialist to ensure all project monitoring and evaluation is done.

33. Under Component 3, the project will support the design, development, and implementation (including capacity building) of a monitoring system to assess the effectiveness of sanitation and hygiene investments in Lusaka. The system will monitor progress and impacts through: (i) operational monitoring—assessing if the systems and investments function as they should; (ii) environmental health monitoring—assessing if the interventions are helping in reducing fecal contamination in the environment; (iii) hygiene behavior—assessing if the population follows hygienic behaviors including additional precautions in case of system failure; and (iv) health impact—assessing if the sanitation and hygiene interventions are having an impact on the health of the population. This monitoring system is further detailed in Annex 2, Component 3.3.

C. Sustainability

34. **Government commitment:** The Government has demonstrated commitment to the Project by enacting the necessary policies and by leading the Lusaka Sanitation Program, a broader, government-led program to address sanitation in Lusaka comprehensively. The government, through MLGH—the line ministry with an oversight responsible for water and sanitation—is in the process of finalizing the Zambia National Urban Sanitation Strategy. The Lusaka Sanitation

Project is consistent with the strategy, and will provide a means to pilot certain measures recommended under the strategy. NWASCO has indicated that it will intensify its oversight of LWSC's sanitation mandate; ZEMA has also recently enacted much more stringent effluent guidelines.

35. **Financial sustainability:** Sewerage tariffs are currently levied at 30 percent of the water tariff for domestic customers and 45 percent for commercial customers and are widely regarded as inadequate to recover sewerage costs. NWASCO has agreed to consider revised sewerage tariffs, if there is adequate justification made by LWSC. A technical assistance activity—funded by PPIAF—is underway to analyze LWSC's financial position and make recommendations for improving financial sustainability. A tariff analysis is also being carried out as part of program preparation; the project will use this analysis as a basis to help LWSC establish a plan for making sewerage services sustainable. The fecal sludge management interventions will be informed by pilot projects currently underway in Lusaka that are promoting financially viable FSM operators. NWASCO allows utilities such as LWSC to collect a sanitation levy which can be used for on-site sanitation and can offset the costs of less profitable sanitation activities. Technical Assistance to NWASCO is being financed by PPIAF to improve NWASCO's capacity to regulate sanitation services, including tariff setting.

36. While the project will focus on LWSC's sanitation operations, costs are currently not allocated between various services in LWSC, therefore there is still a need to optimize the water supply operations. Under the WSPIP project, significant progress was made in improving the financial performance of the water operations. Over the course of the project (from 2007 to 2014) the operating ratio of LWSC moved from 0.8 to 1.3, resulting in LWSC more than covering its cash operating costs, leaving revenues for debt servicing. This ratio has been maintained over the past year and a half since the project was closed. This was achieved through commercialization of the operations, innovative technologies—such as the installation of 18,000 pre-paid water maters—and expansion of the network and customer base. However, it should be noted that the maintenance costs are regarded as inadequate by LWSC and should be increased.

37. **Operational sustainability:** The project has included an institutional strengthening component which, among other things, will train LWSC in the management, operation, and maintenance required to improve sanitation services. The project has also devised strategies to ensure that investments are only made in areas where there is effective demand. It is noted that, for the parallel MCC project, the GRZ and LWSC have signed a "sustainability agreement" that sets forth performance requirements designed to ensure continued technical efficiency and financial and commercial sustainability of LWSC throughout the implementation of the project.[1]

38. **Incentives for communities to invest in on-site sanitation.** A key aspect of ensuring the sustainability of the on-site sanitation component is to better understand the incentives for households, especially landlords, to improve their current facilities and ensure adequate disposal of their fecal waste. The project will support improved and affordable FSM providers—offering pit-emptying services at an affordable price—and cost-sharing with users on improved on-site sanitation facilities. It will also work with LCC, NWASCO and ZEMA to improve enforcement of the by-laws requiring households to build adequate facilities and maintain them.

[1] LWSC Sustainability Agreement between GRZ and LWSC, 5th July 2013.

39. **Environmental and Social Sustainability.** LWSC has prepared and disclosed and will implement and monitor implementation of the environmental and social management framework (ESMF) and resettlement policy framework (RPF). The ESMF will guide environmental screening and development of appropriate environmental and social management tools (the environmental and social impact assessment, or ESIA, or environmental and social management plan, or ESMP) for subsequent subprojects. The RPF will guide the screening of resettlement impacts and the formulation of the appropriate resettlement management tools (RAP) for subsequent subprojects. These tools will be implemented in compliance with both the World Bank environment and social safeguards policies and ZEMA environmental and social impact assessment regulations.

V. KEY RISKS

A. Risk Ratings Summary Table

40. The risk ratings—after mitigation measures are in place—are reflected in the table below.

Risk Category	Rating
1. Political and Governance	Moderate
2. Macroeconomic	Moderate
3. Sector Strategies and Policies	Moderate
4. Technical Design of Project or Program	Substantial
5. Institutional Capacity for Implementation and Sustainability	Substantial
6. Fiduciary	Moderate
7. Environmental and Social	Moderate
8. Stakeholders	Moderate
OVERALL	**Substantial**

B. Overall Risk Rating Explanation

41. **Overall risk rating is substantial.** The project has used the Interim Guidance Note for Systematic Operations Risk-Rating Tool (SORT) to assess the project risks. The assessment rates technical design risks, institutional capacity for implementation and sustainability, and the overall risk as substantial—all other risks are rated as moderate. The risk mitigation measures are further detailed in Annex 3. Only the risks rated as substantial are detailed below:

42. **Technical design of project risk is substantial.** While the project will build on local experience in on-site sanitation projects—including the building and emptying of latrines—these technologies are still relatively new and untested—particularly at the scale included under this project. Similarly, the project includes Decentralized Wastewater Treatment Systems (DEWATS). While these systems have been widely applied in Asia and Africa, with encouraging results, the technology is still relatively new and untested.

43. The Project is part of the Government-implemented Lusaka Sanitation Program with potential parallel financing from three other IFIs. Care has been taken to ensure that the various

investments are complementary, but not linked, meaning that other investments are not required in order for the development objectives of this project to be achieved.

44. **Institutional capacity for implementation and sustainability risk is substantial.** LWSC currently operates a relatively small sewerage network of 480 kms, and has not to date intervened at any scale in unsewered areas. Under the program, the network size will double with the objective of improving service delivery significantly, including in the unsewered areas, where on-site sanitation facilities and FSM services are needed. This constitutes a major institutional challenge, as it requires a change of corporate mind-set from a typical utility perspective of simply managing a network system to that of taking responsibility for all sanitation, both networked and on-site, for all premises within Lusaka province. This has implications for the numbers and type of staff and the modalities of financing those elements of non-sewered sanitation services that cannot be covered by direct user payments to service providers.

45. While on-site sanitation falls under LWSC's mandate, and its peri-urban unit has some capacity for on-site sanitation and FSM, this capacity is limited and the increased coverage will require both increased capacity and a broader staff skill set. Increasing LWSC's capacity for implementing and managing on-site sanitation and the corporate reorientation needed to prioritize these interventions, will be a focus of Components 2 and 3.

46. The World Bank team has a long history of partnership with the MLGH and LWSC, including through the recently closed WSPIP. The experience gained through WSPIP is factored in throughout the Project's design. The World Bank team is also currently working on a series of parallel initiatives funded through PPIAF to increase capacity in the sanitation sector—including specific activities aimed at increasing capacity in sanitation and sewerage.[2]

47. The project also faces substantial risk of lack of uptake (that is, that households will not connect) both in on-site facilities and off-site facilities; this is discussed in detail in Annex 5. Some mitigating measures considered are: (a) during sub-project appraisal, LWSC will be required to have commitment from 50 percent of the people in an area before a sub-project is approved and LWSC moves in with sewage, (b) innovative financing mechanisms are being considered, such as the Project financing the cost of connections upfront, this cost being amortized into the tariff, (c) enforcement of the bylaws that require households to connect if a sewer main comes within 61 meters of the household. For on-site sanitation, there is a risk that people will not build the facilities even though they are partially subsidized. The Project will explore collaboration with micro-finance entities, and demand-responsive methods for allocating financial support. Sanitation marketing will also play a big role in creating demand for on-site sanitation and FSM and will be an integral part of these subcomponents.

VI. APPRAISAL SUMMARY

[2] The PPIAF grant is for $330,000 and is supporting (i) TA to NWASCO to improve sanitation tariffs, (ii) developing performance contracts (including for sanitation aspects) for LWSC, (iii) TA to help LWSC strengthen its balance sheet and establish a shadow credit rating, and (iv) study tours for LWSC's management for corporate governance and good practice in sanitation.

48. Annex 6 provides the full economic and financial analysis. These are summarized in the sections that follow.

A. Economic and Financial Analysis

Economic analysis

49. The World Bank is working with co-financiers (EIB, AfDB, and KfW) and adds value through its convening power and a focus on (i) poverty focused components (such as the on-site sanitation), (ii) focus on public health promotion and monitoring; and (iii) leveraging other IFI funds.

50. The objective of the economic analysis was to examine the economic viability of Components 1 and 2 of the project, by combining quantifiable direct benefits (land value increase) and indirect health benefits expected from sanitation interventions. A number of other benefits have not been quantified due to either their non-tangible nature or a lack of usable data for instance, improvements in environmental conditions and water quality.

51. To estimate indirect benefits expected from the Project, the analysis used methodology developed by the World Health Organization (WHO), which comprises the following benefits from water and sanitation interventions: (i) avoided direct health expenditure due to decrease in illness, (ii) income gained as a result of decrease in illness-related absenteeism in working age population, (iii) income gained as a result of decrease in child illness related absenteeism among caretakers of targeted school age population; (iv) opportunity cost of school absenteeism among the targeted school age population; (v) estimated value of loss-of-life avoided as a result of improvements in water and sanitation; and (vi) estimated value of time savings resulting from improved convenience of access to sanitation. The impact of poor sanitation on chronic malnutrition (stunting) through, so called, environmental enteropathy, has been recently proven. However, the WHO methodology used does not yet include the well-known negative effects on the learning ability and lifelong earning potential of stunted children.

52. Results of the project economic analysis measured by the NPV and ERR over a period of 20 years at a discount rate of 10 percent are summarized in the table below, demonstrating that the project is economically justified. This would be further strengthened if many of the unquantifiable benefits were accounted for, including improvements in environmental conditions and water quality.

	NPV	**ERR**
Overall Project Economic Viability	$2,460,772	11%

53. The following table summarizes the annual value of the above project health benefits from 2020-2035.

Benefit from Project On-Site Sanitation Interventions	**Annual Benefit Amount (US$) from On-site Sanitation (2020-2035)**

Avoided health expenditure	2,047,000
Avoided income loss (working adult)	608,000
Avoided school absenteeism	423,000
Avoided income loss (caretakers for sick child)	706,000
Avoided loss of life	4,090,000
Convenience time saving	1,409,000
Total annual benefits	**$9,285,000**

Financial Analysis

54. The financial analysis of Component 1 seeks to determine the required sewerage tariff increase that will ensure LWSC collects sufficient incremental cash to cover all operation and maintenance expenses of the sewerage operations related expenses (that is, to ensure a positive cash-flow). A full financial assessment of LWSC, including affordability analysis, is currently underway through a consultancy financed by KfW, a co-financier of the larger Lusaka Sanitation Program. This assessment will verify if LWSC can afford the umbrella Program, or if some reductions will have to be made to the proposed level of wastewater treatment and sludge management facilities (financed by EIB and KfW). The sewerage system and sewage pond improvements included under the Project are of higher priority and would not be affected. The financial analysis assumes that the financing of Component 1 will be on-lent to LWSC at IDA conditions, and financing for Component 2 will be on-granted.

55. ***Component 1: Sewerage improvements:*** The model shows that Component 1 is financially viable if the sewerage tariff is increased by 0.16 US$/m³ (i.e., from 0.81 US$/m3 to 0.97 US$/m3 on the average tariff) gradually over the project period. This corresponds to a 20% increase of the current sewerage tariff from 30% to 50% of the water supply tariff for domestic customers and from 45% to 65% for other customers. While a full affordability and willingness to pay study is being under-taken, this level of tariff increase is deemed affordable given available data. The project is financially viable; with the proposed tariff increase, LWSC will be able to cover all financial obligations related to this project.

56. In Zambia, tariffs need to be approved by the national regulator NWASCO. Block tariffs are in place for water supply in Lusaka. According to LWSC's tariff application to NWASCO, the average water supply tariff in 2015 is 5.418 ZMW/m³ (0.81 US$/m³). NWASCO confirmed that higher sewerage tariffs will likely be acceptable when much desired investments are done in the sewerage sector and that these are eligible costs according to the tariff methodology.

57. ***Component 2: On-site sanitation:*** Component 2 includes construction of on-site sanitation facilities which shall be owned and primarily financed by the users. Based on the experience gained from the Kanyama pilot project performed by LWSC, the typical construction costs are US$1,000/improved latrine and the project will support such costs up to 50%. Construction of 10,000 on-site facilities is planned.

58. Component 2 also includes the construction of two fecal sludge management facilities and the equipment and motorization of 10 sludge emptying teams. Based on the Kanyama pilot project experience, the average current charge is US$49 per latrine emptied.

59. The financial analysis estimated emptying costs for an average sized on-site facility, based on the assumption that by project end (2021) the seven emptying teams and two fecal sludge treatment facilities will be serving 25,000 on-site facilities, at the rate of 5,000 per year. Based on these assumptions the financial analysis shows that the initial operation would need to be subsidized, to enable a gradual increase in the charge from the current US$50 per unit beginning in 2018 to US$75 per unit in 2021, which would then cover costs. The operational subsidy required for the years 2018-2020 is about US$800,000 and has been included in the project budget.

B. Technical

60. **Component 1 investments have all been identified in the Master Plan and assessed in feasibility studies to ensure that cost effective solutions are being provided through the project.** These studies provided rigorous engineering assessments of the priorities for sewerage in Lusaka, based on the relevant technical, environmental and financial considerations. Investments are focused on the Manchinchi and Ngwerere sewersheds in order for the different IFIs supporting sanitation investments in Lusaka to work on different sewersheds. A number of sub-projects have been defined for which implementation can commence in year-1 after credit effectiveness, as design and tender documents are under preparation. The cost estimates included in the feasibility studies take into consideration geological conditions and include supervision costs and contingencies. The applied unit rates reflect current market prices and appear reasonable. An additional feasibility study and preliminary design is also ongoing for formulating additional high priority sub-projects.

61. **Component 2 addresses on-site sanitation and fecal sludge management:** The Sanitation Master Plan foresees that approximately 50 percent of Lusaka's population will use such facilities in the medium and long term. It includes construction of on-site facilities such as improved pit latrines, bathrooms and septic tanks based on standardized designs that best suit the residents' needs, emptying procedures, and the soil, groundwater and flooding characteristics, and as proposed under the National Urban Sanitation Strategy. It further includes the development and testing of business models, tools, equipment, work and labor safety procedures for safely and hygienically emptying existing, as well as newly built, on-site facilities. The project will undertake an analysis of the optimum number and location of fecal sludge treatment facilities such as to minimize the overall cost of FSM services. New facilities will be built in coordination with parallel investments under the KfW and AfDB components of the Lusaka Sanitation Program. The facilities will contribute to LWSC's objective of maximizing revenue from recycling the processed sludge. Two fecal sludge treatment facilities will be constructed under this project.

62. **Component 3 includes TA for project management and capacity building activities for LWSC and other key stakeholders**. LWSC's technical capacity in sanitation services shall be improved through training of staff and by purchasing adequate sewerage maintenance equipment. Also included is TA for strengthening the LWSC's capacity to manage the Lusaka Sanitation Program. The TA components already identified include: (i) HR strategy to consider realigning sewerage and sanitation departments; (ii) revenue enhancement strategies to ensure

cost recovery of sewerage and sanitation services, (iii) asset management strategy to improve management of sanitation assets; (iv) improved customers care, in particular around sewerage blockages and new sanitation activities; and (v) continuation of the shadow credit rating undertaken during preparation (funded by PPIAF); (vi) continuation of the performance contract between LWSC management and branches; (vii) various training activities and strategic studies (such as an update of the Sanitation Master Plan). Further components are expected to be identified through an ongoing consultancy dedicate to addressing technical capacity funded under the Project Preparation Advance. Since LWSC's limited capacity for on-site sanitation is a binding constraint for this project, TA aimed at increasing this capacity, and the corporate reorientation needed to appreciate the merit of these interventions, will be prioritized. A provision is also included for performing further studies, designs and preparatory services for later project phases. LWSC, through the peri-urban, monitoring and the monitoring and evaluation, will also explicitly collaborate with MCDMCH and LCC to strengthening cooperation between these organizations and for systematic monitoring of the sector's performance. The TA will assist LWSC in determining the extra staff requirements to meet its wider responsibilities with regard to sanitation, and provide appropriate training as and when they are recruited by LWSC.

C. Financial Management

63. **A financial management assessment of LWSC and MLGH was completed in October 2014.** The FM assessment concluded that the financial management arrangements in place meet the World Bank's minimum requirements under OP/BP10.00 and are adequate to provide, with reasonable assurance, accurate and timely information on the status of the Project. The overall financial management risk rating of the project is ***low***. Details of this assessment are included in Annex 3. A format for the Interim Financial Reports and the audit terms of reference with IDA has been agreed.

64. LWSC's finance director, who will be assisted by the project accountant, will have overall responsibility for the project's financial management. This includes working with staff members that are appropriately qualified, experienced, and trained in handling IDA funds, financial regulations, and procedures.[3] For the Project, LWSC will use: (a) its finance and purchasing procedures manual, last revised in 2010, and (b) the computerized accounting system (tested ACCPAC Accounting software).

D. Procurement

65. **The World Bank updated the procurement capacity assessment for LWSC in December 2014 using the World Bank's Procurement Risk Assessment and Management System (P-RAMS).** The findings, key recommendations and risk mitigation measures were discussed with the government and LWSC. The overall procurement risk for this Project is rated as ***substantial*** largely due to: (i) the anticipated technical complexity and high values of the contracts under the project; (ii) some challenges which may be encountered in the use of supply and installation contracts for the electro-mechanical goods for the pumping stations; (iii) limited in country

[3] LWSC will benefit from experience from the Water Sector Performance Improvement Project—an IDA-financed project which closed June 30, 2014.

knowledge of similar complex works as no sewer systems of the magnitude expected under the project have been undertaken in almost 25 years. LWSC will require reinforcing its technical capacity as this will impact procurement, contract and project implementation generally. On the other hand it is expected that LWSC should be able to handle the requirements and adapt fairly quickly given the previous experience with World Bank and other donor funded operations. LWSC recently implemented an IDA operation, the Water Sector Performance Improvement Project (P071259), is implementing the project preparation advance (PPA), and will implement the Project.

E. Social (including Safeguards)

66. The Project is being implemented within Lusaka Province, and specifically within the Manchinchi and Ngwerere sewersheds. The project areas consist of a mixture of typical urban and peri-urban settings. Population growth and urban influx have strained the ability of local authorities and service providers to provide adequate water and sanitation facilities. The peri-urban area is made up of largely unplanned settlements, including houses rented from absentee landlords. These peri-urban areas are fairly high density—water supply is through a combination of yard connections, stand points, kiosks, hand pumps, and unprotected wells. Sanitation facilities are mostly pit latrines and septic tank systems. Some families have no latrine at all and depend on either borrowed or shared latrines, or resort to open defecation. The peri urban areas are prone to diarrheal diseases and malnutrition linked to poor sanitation. Sixty percent of the population in the project area lives under the poverty line and unemployment is about 31 percent. Lack of access to water and to sanitation puts particular burdens on girls and women, either through responsibility for bringing water to the household or lack of personal safety in accessing sanitation.

67. Representation in the project areas is via elected and appointed leadership as well as non-governmental organizations (NGOs). Local leadership revolves around elected ward councilors; Ward development committees are expected to provide horizontal linkages among the various government agencies and programs within communities as well as vertical linkages with provincial and district development committees. Ward development committees are one means by which community participation is channeled. In addition to the formal structures, local NGOs and community-based organizations (CBOs) are active on project related issues such as health and water. NGO activities have included outreach to communities to encourage citizen monitoring and hygienic practices. As part of project preparation, local CBOs operating in the peri-urban onsite sanitation sector were identified and consulted. A specific subset of CBOs are the 10 Water Trusts that supply water independently of LWSC in some peri-urban areas. Two of the strongest ones are also providing FSM services in collaboration with WSUP, which provides them with technical assistance. They constitute a potential resource in the areas where they exist, and would be considered together with other NGOs, CBOs and the private sector when selecting service providers. A second subset of interest is the community based enterprises delivering solid waste management services.

68. The World Bank will offer direct project implementation support to LWSC who will be working with selected NGOs, private sector and targeted beneficiaries. On the ground, there will also be close collaboration with other applicable government departments operating within the

project area including, but not limited to the MOH, MCDMCH, Social Welfare, district authorities and Ward Development Committees who have in-depth information on social structures, community development targets and vulnerable groups on the ground.

69. The potential positive and negative impacts of the project are detailed in the ESMF and RPF for the broad project and the ESMP and RAP for the first year investments. The subsequent subprojects will be screened according to the provisions of the project ESMF and the appropriate safeguards tools will be formulated and implemented. The major positive social impact in all of the subprojects is provision of sustainable access to sanitation to the urban people of Lusaka in general and the poor people in the peri urban areas of Lusaka in particular. This benefit can be enhanced with appropriate sanitation marketing so that the infrastructure can be effectively used and targeted beneficiaries take up the service. Selection of beneficiaries should also be done to enhance access to sanitation subsidies and facilities by vulnerable groups like widows, the elderly, people living with HIV and AIDS, and child-headed families.

70. Potential negative impacts of the project include related resettlement issues arising from the construction of sewer pipelines, pump stations, and related infrastructure. The Resettlement Action Plan (RAP) notes that these will be very minor. Any resettlement costs will be borne by LWSC and are estimated in the RAP. In previous water supply projects, people affected by the projects showed support by accepting compensation to affected properties and elected to resettle in other locations. It is anticipated that this high level of cooperation can also be achieved for this project. Systematic and participatory evaluations of the affected populations will be conducted, and a RAP developed for each subproject.

71. Another potential negative impact will arise from the fecal sludge management initiatives that could expose employees to infections. This occupational safety risk will be mitigated through the selection and effective use of desludging equipment and personal protective equipment. Safe working procedures, training and regular screening and treatment for excreta-related infections of employees will also be implemented.

72. Because the Project area has unplanned settlements that are densely populated, and there are signs of encroachment on road reserves, there will be some resettlement. A Resettlement Action Plan has been prepared, consulted and disclosed for the prepared two sections of year 1 investments. There are minimal resettlement issues in the Kafue sewer extension because the road reserve is wide and no encroachment. The Emmasdale sewer expansion raises only nominal resettlement issues since the settlements are planned and there are no encroachments on the road reserves. The Ngwerere sewer upgrade has resettlement issues arising from the disturbance of market places and some gardens, boundary walls and a few structures that are encroaching on the road reserve; these are addressed in the RAP. The proposed diversion will result in resettlement and public safety issues arising from potential demolitions of permanent houses, inadequate working space for excavators and potential falling in trenches by children. As a result, Involuntary Resettlement OP/BP 4.12 is triggered. This will be mitigated through the formulation of the Resettlement Policy Framework (RPF) for the broad project and the RAP for the specific subprojects. The RPF and the subsequent RAPs will be disclosed and implemented accordingly.

73. Resettlement impacts under the project will occur in stages, based upon each year's planned investments and concomitant construction activities. Year one investments will impact on 209 individuals in the form of temporary relocations from market places and disruptions of gate entrances for households. In the residential project areas of low density housing, the disruption will consist of short-term restricted access to driveways. In commercial areas, resettlement will involve removal of kiosks, billboards and cultivated areas. Resettlement planning allows for reinstatement of kiosks and billboards, following construction, with compensation for cultivated areas. For years 2-5 investments, the exact impact is yet to be determined and is dependent on pipeline routes but the potential negative impacts are generally similar.

74. Sanitation has many important gender implications: lack of an on-plot facility exposes women and girls to danger when seeking a facility elsewhere, particularly at night; women bear the brunt of dealing with the consequences of poor sanitation, as the primary care providers within the household; and women have primary responsibility for cleaning the immediate living environment and promoting hygiene at family level. It is therefore essential to ensure that female voices are properly heard during project preparation and design and in decision-making on spending money to improve the household toilet or have it emptied. These issues will be covered in the relevant terms of reference and monitored by the project team.

F. Environment (including Safeguards)

75. The proposed project is categorized as an Environmental risk Category B based on the minimal environmental impacts associated with the small-scale sanitation civil works which will entail rehabilitating and upgrading sanitation infrastructure. The civil works to be carried out under Component 1 and 2 are expected to generate impacts which are largely positive (health benefits to the population) and where adverse impacts might likely occur; they are expected to be small-scale and temporary and can be addressed with known mitigation measures. Since the specific investments under the project are not yet fully designed, it is not possible to ascertain with absolute certainty the nature or extent of the environmental risks. As such, LWSC has developed an Environmental and Social Management Framework (ESMF) describing the baseline for the preliminary environmental assessment and the screening procedures. The ESMF includes generic mitigation measures for addressing identified environmental impacts, risks and opportunities under the project. The investment details for the first year investment are known and have been screened for environmental risks and impacts. The scope of the activities is limited to expanding, rehabilitating, and upgrading existing infrastructure; this can be sustainably implemented under an Environmental and Social Management Plan (ESMP) and RAP, and does not require a full Environmental and Social Impact Assessment (ESIA). An ESMP has been prepared to comply with the World Bank's policy and an ESIA is being prepared for ZEMA compliance.

76. *Environmental benefits:* The project will largely generate positive impacts contributing to better health through increased access to sanitation facilities, reduced incidence of water borne disease and improved awareness of good hygiene practices. The major potential positive impact generated by the project is the provision of sewer services and on-site facilities and fecal sludge management to areas that currently have only problematic onsite sanitation facilities, thereby reducing the potential for groundwater pollution from such areas. The enhancement of this

benefit lies with the strengthened enforcement of the local authority by laws that currently require households within 61 meters of a sewer main to connect, to ensure all possible connections to the sewer are made.

77. *Environmental risks:* Potential environmental risks will largely be related to the contamination of the surface and groundwater by effluents. The Chunga river drains into the Kafue river while the Ngwerere river drains into the Chongwe river, both of which drain into the Zambezi river. The surface water quality within the Ngwerere and Chunga rivers is negatively impacted by the effluent discharges. Monitoring by the Department of Water Affairs shows that the ground water shows signs of fecal pollution, though the exact origins of this have not yet been established. It is probably due to multiple causes, including sub-standard on-site and sewerage infrastructure, unsatisfactory FSM practices and periodic flooding of sanitation systems in low-lying areas such as Kanyama.

78. The upgrade and expansion of the sewer network will likely increase the load of effluent discharges into receiving water. The proposed Kafue Road and the Emmasdale sewer expansion and upgrade may result in increased inflow to the Ngwerere sewage ponds, thereby increasing the pollution load to the Chongwe river that finally drains into the Zambezi river. The negative impact can be mitigated to a large extent through the upgrading of the wastewater treatment facilities and introduction of effluent reuse. Enforcement of effluent discharge standards from industries to the sewer line and ensuring adequate pre-treatment by industries will increase the water quality of the effluent discharges.

79. Investigations by the Department of Water Affairs linked groundwater contamination to the use of pit latrines in the peri-urban areas; the construction of improved on-site facilities should nevertheless reduce this contamination, as the fecal load is a given and, if not contained is circulating elsewhere in the environment, with ample opportunity to contaminate groundwater. This positive impact will be achieved by adopting sustainable pit latrine designs that improve access to sanitation, facilitate hygienic FSM, and limit ground water pollution by ensuring separation of fecal waste and urine from grey water.

80. As part of project preparation, the task team has applied the climate change risk screening tool to understand the potential risks to the project from the effects of climate change in the project area. The results of the screening suggest that there is a moderate risk to the overall project development objectives. The potential risks the Project faces due to climate change are increased frequency and intensity of floods, which might damage sanitation infrastructure and reduce its effectiveness. Originally, the Project took into consideration the recurrent floods in Lusaka.

81. It is important to note that the conditions of the sanitation services in Lusaka are very likely to be better managed after the successful implementation of the project. Without interventions, the effects of climate change are likely to lead to an increase in outbreaks of water borne diseases and child malnutrition in Lusaka's peri-urban areas, which are often the poorest. Project activities, which already take into consideration the flooding potential, are expected to strengthen the capacity of the LWSC and its key stakeholders (municipal authorities and decentralized

health services) to reduce the current levels of fecal matter in the environment and surface water as well as prevent and control water borne diseases and disease outbreaks.

G. Other Safeguards Policies Triggered

82. ***Projects on International Waterways (OP/BP 7.50)***. OP 7.50 is triggered because the project areas lie within the Chongwe River watershed which is a tributary of the Zambezi river, which has been categorized as an international waterway for purposes of the policy. The Chongwe river is a source of water supply to a small portion of the Zambian population and one that is at risk of increased pollution from various forms of pollution, including fecal discharge. The Chongwe river marks the western boundary of the Lower Zambia National Park before it discharges into the Zambezi. The proposed project will finance: (i) an additional 82 kms of sewer lines and collectors to the existing sewage collection system; (ii) construction of three pumping stations with capacities of 11 l/s, 58l/s, and 8l/s respectively; (iii) upgrading and expansion of the Ngwerere sewage ponds from a current capacity of 16.6 ML to 24.9 ML; and (iv) on-site sanitation. This scenario is considered minor since it does not exceed the design capacity of the upgraded wastewater treatment plant in terms of the volume of the hydraulic load.

83. The proposed project and the resultant sub-projects fall within the sewerage type of projects and are within the immediate catchment of the Zambezi River, an international water body, thereby raising grounds for triggering the policy. The scope of the project and resultant subproject will not cover works and activities that would exceed the original scheme or change the nature of the resultant effluent to the effect that it can be considered a new scheme. The project is aimed at improving the quality of the effluent to reduce the overall pollution load to the Zambezi River catchment thereby creating grounds for qualification for notification exemption. LWSC has sought exemption for the requirement for notification of riparian states and has been approved by the African Vice Presidency of the World Bank.

H. World Bank Grievance Redress

84. Communities and individuals who believe that they are adversely affected by a World Bank (WB) supported project may submit complaints to existing project-level grievance redress mechanisms or the WB's Grievance Redress Service (GRS). The GRS ensures that complaints received are promptly reviewed in order to address project-related concerns. Project affected communities and individuals may submit their complaint to the WB's independent Inspection Panel which determines whether harm occurred, or could occur, as a result of WB non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the World Bank's attention, and World Bank Management has been given an opportunity to respond. Information on how to submit complaints to the World Bank's corporate Grievance Redress Service (GRS), is available at http://www.worldbank.org/GRS. For information on how to submit complaints to the World Bank Inspection Panel, available at www.inspectionpanel.org.

Annex 1: Results Framework and Monitoring
ZAMBIA: LUSAKA SANITATION PROJECT

Project Development Objective (PDO): To increase access to sanitation services in selected areas in Lusaka and strengthen LWSC's capacity to manage sanitation services

PDO Level Results Indicators*	Core	Unit of Measure	Baseline	Cumulative Target Values					Frequency	Data Source/ Methodology	Responsibility for Data Collection	Description (indicator definition etc.)
				YR 1	YR2	YR 3	YR 4	YR 5				
Indicator 1: People provided with access to improved sanitation facilities under the project	X	People (thousands) (through sewerage) [through on-site facilities]	0 (0) [0]	0 (0) [0]	20 (2) [18]	60 (6) [54]	150 (24) [126]	213 (33) [180]	Annual	Progress reports from LWSC	LWSC	Based on 50% sewer connection rate; assuming 8 people per sewer connection and 18 people per on-site facility [4]
Indicator 2: People with access to adequate fecal sludge management systems		People (thousands)	0	0	36	108	252	360	Annual	Progress reports from LWSC	LWSC	"Adequate" will need to be defined. Assuming 20,000 on-site facilities are serviced, serving 18 people each. [5]
Indicator 3: Tons of BOD5 removed by the treatment plant supported under the project	x	Tons/year	230	230	230	470	709	949		Reports from LWSC		Recorded at Ngwerere Sewerage Ponds [6].
Indicator 4: Tons of BOD5 removed by fecal sludge management systems		Tons/year	0	0	21	63	147	210		Reports from LWSC		Calculated on basis of sludge volume taken over, multiplied by 35 g BOD5/liter. [7]
Indicator 5: Domestic sewerage tariff increased to recovery O&M and debt servicing costs for domestic and other		% of water tariff	30% 45%	30% 45%	35% 50%	39% 54%	43% 58%	50% 65%				This indicator is contingent on tariff proposals being approved by NWASCO.[8]

[4] Based on 50% of ultimately planned sewer connections; assuming 8 people per connection as per NWASCO guidelines; and assuming 18 people per on-site facility as per figures from Kanyama pilot project.

[5] 8 people per sewer connection based on NWASCO guidelines. 18 people per on-site facility based on data of Kanyama FSM pilot project. Assumed overall average frequency of emptying is once in five years.

[6] Based on Ngwerere SP baseline load as per data of LWSC for 2013/2014 being 7000 m³/d with BOD5 inflow 110 mg/l and outflow 20 mg/l. For 2020, assumed flow is 20,000 m³/d (80% of design capacity being 24,900 m³/d) with an inflow BOD5 of 170 mg/l and outflow BOD of 40 mg/l.

[7] Based on assumption of 35,000 mg/liter BOD5 for received fecal sludge; 1200 liter sludge per standard size single latrine; with 10,000 standard size latrines emptied by end of project. Double size latrines or bigger to be counted in standard size equivalents.

customers												
Indicator 6: Performance contract signed between LWSC management and branches		Yes/no	No	yes	yes	yes	Yes	yes	Annual	Progress reports from LWSC	LWSC	
Indicator 7: Integrated MIS established and used		Established/ Used	No	No	Established	Used	Used	Used		Report from LWSC		
Indicator 8: Percentage of sewerage blockage complaints addressed satisfactorily		%	96	93	88	88	92	96				NWASCO definition to be used. Will be monitored across the whole service area
Indicator 9: Direct project beneficiaries of which 50% female (on-site + off-site)	x	%	0	0	38 (36+2)	114 (108+6)	276 (252+24)	393 (360+33)	Annual	Progress reports from LWSC	LWSC	Assuming sewerage (at 50% connections) plus FSM
INTERMEDIATE RESULTS												
Results Indicators	**Core**	**Unit of Measure**	**Baseline**	**Cumulative Target Values**					**Frequency**	**Data Source/ Methodology**	**Responsibility for Data Collection**	**Description (indicator definition etc.)**
				YR 1	**YR2**	**YR 3**	**YR 4**	**YR 5**				
Intermediate Result (Component One): Sewerage improvements (sewers, collectors, pump stations, treatment facilities constructed)												
New household sewer connections constructed under the Project	x	No	0	0	300	850	2600	4100	Semi-annual	Progress reports	LWSC	Assumes 50% of households connect
Length of sewer rehabilitated and newly constructed		km	0	0	5	20	50	82	Semi-annual			Including main collectors and network
Wastewater treated per year		m^3/day (thousands)	7	7	7	10	15	20	Annual	Progress reports	LWSC	Influent to Ngwerere ponds
Intermediate Result (Component Two): Access to on-site sanitation services and fecal sludge management systems												
Improved on-site facilities constructed under the Project	x	No. (thousands)	0	0	1	3	7	10	Semi-annual	Progress reports	LWSC	
2 Fecal sludge management facilities constructed & used		Constr-ucted/ Used			2 Con-struc.	Used	Used	Used	Semi-annual	Progress reports	LWSC	

[8] In the corresponding increase in ZMK/m^3 plus inflation compensation to be applied in case NWASCO changes the sewerage tariff from "% of water tariff" to a true"real sewerage tariff in ZMK/m^3".

Operation Manual for FSM developed and in use					yes					Progress reports	LWSC	
People trained to improve hygiene behavior or sanitation practices under the project (cumulative)	X	People (thousands)	0	0	36	108	252	360	Annual	Progress reports from LWSC	LWSC	Assuming that marketing campaign targets those with access to FSM services
Observed presence of hand washing facilities		%	0%	0%	20%	40%	60%	80%		Progress reports from LWSC		Report from program monitoring system (using data gathered by EHTs). In % of households in the project target area.
Intermediate Result (Component Three): Institutional strengthening												
Minimum collection rate		%	92	85	85	85	85	85	Annual	Progress reports	LWSC	
Number of sewer blockages addressed		#/km	5.7	5.0	4.5	4.5	4.8	5.2	Annual	Progress reports	LWSC	
Feasibility studies completed		Number					1	2	Annual	Progress reports	LWSC	
Drinking water samples tested (bacteriological and residual Chlorine)		Number	16755	16800	17000	17200	17500	17800	Annual	Progress reports	LWSC	Using LWSC report to NWASCO

Annex 2: Detailed Project Description
ZAMBIA: Lusaka Sanitation Project

Component 1: Sewerage Improvements

1. An estimated 14 percent of Lusaka's population is connected to piped sewerage and the remainder relies on on-site solutions (pit latrines and septic tanks) or open defecation. Map 2 (Annex 7) provides details on the predominant forms of sanitation throughout Lusaka City. Sewered areas are those areas serviced by LWSC with conventional water-borne sewers; private sewered areas are areas in which private developers have provided their own sewers (and sometime their own treatment facilities). Septic tank areas are those areas in which the majority of households use some form of closed, underground tank to contain sewage and drain into a soakaway; pit latrine areas have some form of basic latrine. Most of the septic tanks and pit latrines do not comply with government and JMP standards for "adequate sanitation".

2. The sewerage system comprises of 480 kms of sewers, eight pumping stations and seven WWTPs. The majority of the collection system is more than 40 years old and hardly any investments have been made in the sanitation sector since then. The recently completed hydraulic model shows that more than half of the existing interceptors are likely under capacity, even under today's flows. The WWTPs have combined design capacity of 67,000 m^3/day. Two WWTPs, Manchinchi and Chunga are "conventional" biological treatment plants (using trickling filters) and five are waste stabilization ponds. The WWTPs discharge is not compliant with health and environmental standards, representing a health hazard to nearby and downstream populations. LWSC pays annual fees and fines to ZEMA for non-compliance, as appropriate.

3. 60 percent of Lusaka's water supply is abstracted from the groundwater aquifer running through the city. A total of 107 boreholes are located across Lusaka, though the majority and those with the largest capacity are located to the south and south-west (Lusaka's industrial area). Lusaka has an unusually high groundwater table which is prone to contamination, particularly in high-density neighborhoods without adequate sanitation. Some of the boreholes already show increasing concentrations of nitrogen and three have actually been shut down due to quality issues.

4. The Lusaka Sanitation Master Plan aims for 100 percent sanitation coverage for Lusaka Province by 2035 through a combination of off-site and on-site systems. Investment needs in the amount of $1.9 billion have been identified, including $1.3 billion (67 percent) for sewer collection and treatment facilities and $640 million for improved on-site sanitation systems. The 94 sub-projects identified for sewerage and wastewater treatment are grouped into three categories: (1) $370 million (20 percent) for priority 1 short term investments (until 2015), (2) $635 million (30 percent) for medium term investments (until 2020) and (3) $925 million (50 percent) long term investments (until 2035). After their implementation, 57 percent of Lusaka's households would have a household sewer connection, with the rest relying on on-site sanitation. The ranking criteria applied were (i) infrastructure needs for the respective planning period; and (ii) maximum benefits from a technical and public health viewpoint. Existing networks being already overloaded and in need of rehabilitation were classified as most critical.

5. Feasibility studies and preliminary designs were prepared in 2012 for a number of priority 1 sub-projects identified in the Master Plan. The MCC agreed to finance and implement projects in two of the five sewersheds: Kaunda Square and Chelston. Feasibility studies and conceptual designs are available for priority sub-projects totaling approximately $60 million (including VAT) for the Manchinchi and Ngwerere sewersheds. These sub-projects include expanding and upgrading sewers and the Ngwerere and Garden sewage ponds. As part of project preparation, additional feasibility studies have been commissioned for more priority projects. Detailed design and preparation of tender documents for a selection of these sub-projects is ongoing as part of the recently commissioned consultancy for preparation of additional feasibility studies. This permits their implementation to commence in year one of project effectiveness.

6. The project will use innovative sanitation technologies where appropriate. The project will use condominial sewers, decentralized wastewater systems (DEWATS) and other innovate technologies as appropriate, and as recommended in the feasibility studies. The project will draw lessons for the ongoing Kalingalinga condominial sewerage pilot project. "condominial sewerage" is the application of simplified sewerage (small bore, low cost) coupled with consultations between users and agencies during planning and implementation, popularized in Brazil. LWSC, with technical assistance from the Water and Sanitation Program (WSP), has been piloting the use of condominial sewerage in Kalingalinga, a peri-urban area of Lusaka with 45,000 people. In preparation for the current project, LWSC recently went on a learning visit to Brazil that was funded by WSP. Previously in 2014, LWSC also went to eThekwini in Durban to learn from the Durban experience including onsite sanitation management.

7. Costs for all components and sub-components are in Annex 5.

Year 1 Investments

8. The following sub-projects have been selected for year one investments based on the following selection criteria (i) number of people served by the project closing date (access to sanitation); (ii) environmental impact (mitigation of groundwater and surface water pollution); (iii) compliance with social safeguards (resettlement and land acquisition completed); and (iv) frequent flooding/lack of drainage in target areas (which makes on-site sanitation solutions impossible). The numbering system adopted is as identified in the Lusaka Sanitation Investment Master Plan.

9. **CSE-23: Collection System Expansion Kafue Road, Manchinchi Sewershed.** The 112 ha area is located in the south-west of Lusaka and extends from the roundabout at the southern end of Cairo Road to the junction of Kafue Road with Chifundo Road. It is a growing commercial area including a large shopping center in the north, having currently on-site sanitation systems. The geology of the area is unfavorable for on-site solutions with a shallow rock layer, a high groundwater table and the area is prone to flooding. The proposed sewer system will not only serve this industrial area but in the future, it will receive sewerage from the Kuomboka sewer service area (CSE-25), another priority sub-project identified in the Master Plan. LWSC has committed to provide water supply connections in parallel to sewerage (but not financed out of the project). The sub-project includes construction of 7.6 kms of sewers of diameter 300 to 600 mm and provides 132 commercial enterprises access to sanitation. One collector on each side of

the road is planned with the eastern one being able to take up the future flows from Kuomboka. Two pumping stations will be constructed with capacities of 11 l/s and 58 l/s lifting the sewage without the need of force mains. The collected wastewater will discharge into the existing Manchinchi main collector ending at the Manchinchi wastewater treatment plant. The collector (CSU-09) as well as the treatment plant will be upgraded under the EIB project.

10. **CSE-08: Collection System Expansion Emmasdale and Chaisa, Ngwerere Sewershed**. Part of Emmasdale is already sewered and the project will connect the remaining area of 156 ha. The residential and commercial facilities existing in the area are currently served by pit latrines and septic tanks. The area is moderately flood prone and population density is medium. The number of people in the service area is about 12,900 plus 23 commercial connections. It is assumed, within the life of the project, that half of these households will connect to the sewer. This assumption is based on estimates by LWSC which is based on the enquiries for connections that have been made by residents. The sub-project includes construction of 15.1 kms of gravity sewers of diameter 200 to 400, as well as a pumping station for 8 l/s and 10 m plus a 350 m long force main of diameter 200 mm. The collected sewage will be discharged into the Ngwerere West Interceptor which will be upgraded under this project (CSU-05) which is followed by the Ngwerere Downstream collector to be upgraded under CSU-07 which ends at the Ngwerere Sewage Ponds.

11. **CSU-05: Upgrade of Ngwerere West Interceptor, Ngwerere Sewershed**. This existing interceptor starts 700 m west of the Great North Road and runs east till it discharges into the Ngwerere Downstream collector. It follows a stream which is part of the Bombay Drainage system and runs within the stream in Chaisa and Mutambe (Marapodi) locations. The collector is asbestos cement which is 40 years old and has inadequate capacity. A significant amount of the wastewater collected leaks into the ground, polluting the stream which is a raw water supply source for Chongwe Town. Its intake faces serious problems of algae and aquatic weeds. This project proposes partly realigning and upgrading 2.8 kms of the collector of diameter 600 and 700 mm due to informal settlements.

Year 2 to 5 Investments

12. The ongoing feasibility study will provide preliminary designs and detailed designs for the subprojects to be implemented in year 2-5.

13. **CSE-25: Network expansion in Chawama-Kuomboka.** The Chawama-Kuomboka sewer service area covers approximately 162 ha. The Kuomboka area has existing household water service while LWSC has committed to provide water supply to Chawama concurrently with the sewer service, but not financed under this Project. This network expansion will connect into CSE-23 included under year 1 investment. The total sewer length is estimated at 24.1 kms with diameters ranging from 200 to 500 mm. It is estimated that some 35,712 people can potentially connect to the sewer and that 25% of this population (about 9,000) will benefit by the project closing date. While the Master Plan classified this investment as priority 2, LWSC views this as a priority 1 investment due to the number of people to be served, the impact of the investment on the groundwater pollution, the link with the Kafue Road main collection and the urgency of the investment.

14. **CSE-10: Network expansion in Garden.** The target project area is predominantly served by an onsite sanitation system. The area is flood-prone thus making onsite sanitation systems unfavorable given risks to pollution and disease outbreaks. LWSC estimates that some 8,250 people will benefit from the project through access to sewers. No feasibility study has been done for this sub-project; the ongoing feasibility study and detailed design, funded from the PPA, will further prepare this sub-project.

15. **CSU-07: Upgrade of Ngwerere Downstream Collector.** The collector is currently leaking and causing negative environmental impacts including the growth of algae and other aquatic plants downstream. It is estimated that some 45,219 people will benefit from the upgrade. However, no feasibility study has been done for this sub-project. The ongoing feasibility study and detailed design, funded from the PPA, will further prepare this sub-project.

16. **TU-04: Upgrade of Ngwerere Sewage Ponds.** The Ngwerere ponds were constructed in 1969; they generally perform very well. However, for a long period the system has not been receiving all the sewage from the collector sewers as a number of the sections for the interceptor sewers were found to be insufficient in terms of capacity, with some having collapsed a long time ago resulting in spillages of raw sewage into the environment. The anticipated increase of flow following repairs, upgrade and expansion of collector and interceptor sewers will result in increased flows to the Ngwerere Ponds. In the short term, upgrading of the ponds will provide the required capacity.

17. The following works are deemed necessary to upgrade the ponds: (i) modification of inlet to avoid overflows; (ii) modification of pipes between ponds in order to have sufficient capacity and to have clear hydraulic conditions; (iii) modification of outlet in order to have sufficient capacity and to have clear hydraulic conditions; (iv) demolition of screen and grit chamber which is insufficient to prevent screenings and grit passing through and reaching the ponds; (v) installation of new manually cleaned screens; (vi) installation of new manually cleaned grit chamber; (vii) installation of new Venturi outlet measurement system; (viii) removal of vegetation (water hyacinths, reeds and other vegetation); (ix) excavation of ponds to increase volumetric capacity; (x) dredging of ponds and dewatering of dredged material; (xi) rebuilding of eroded embankments; (xii) construction of sludge drying beds adjacent to the ponds and installation of walling around the ponds for reasons of safety and security; and installation of meters and repairs of the embankment.

18. To improve operations, LWSC will need to purchase both a floating sludge removal facility to enable regular desludging and a power generator. The upgrade of the sewage ponds will result in increased capacity leading to reduction of raw sewage spillage, the current scenario. The effluent quality will improve although it may not meet all of ZEMA's standards for some parameters. The improvement in sewage treatment capacity and effluent quality will reduce public health risks and will also reduce pollution of downstream water resources which are linked to sources of drinking water for downstream communities including Chongwe Town.

19. **TE-02 Extension of Ngwerere sewage ponds.** The extension of the existing plant will be by building an additional 50% capacity. The works required for expansion of Ngwerere Ponds

include: (i) inlet structure and outlet structure; (ii) pipes between ponds; (iii) new manually cleaned screen; (iv) new manually cleaned grit chamber; (v) new Venturi outlet measurement; (vi) excavation of ponds; (vii) riprap on embankments; (viii) installation of new sludge drying beds (to be shared with existing ponds); (ix) installation of walling around the ponds; and (x) access road and service road to and around the ponds. The extension of the Ngwerere ponds will contribute to the improvement of the health conditions of the population of Lusaka and of the users of the receiving water body downstream of the actual discharge point (of the insufficiently treated wastewater). The number of beneficiaries (2015 figure) affected by the Ngwerere Ponds upgrade (TU-4) and extension (TE-2) is approximately 134,000. In 2020 the number will be 308,082; however, it should be noted that the beneficiaries listed in paragraph 17 only include the direct beneficiaries of the improved sewers. Both TU-4 and TE-2 are contingent on the outcome of the EIB-financed feasibility study for Manchinchi and Chunga WWTP which has a possibility of recommending reallocating the WWTP to the current Ngwerere site. If this transpires, additional investments will be proposed for World Bank financing.

20. **Customer sewerage connections:** The average cost of a sewerage service connection is US$500 excluding VAT based on the Kalingalinga experience. The public health act requires customers within 61 m of a sewer line to connect to sewerage. In order to be able to enforce this regulation, the GRZ has agreed to finance the service connections under the MCC project. It is therefore proposed to include the cost of service connections into the project cost. In case they are not (grant) financed by the GRZ, the costs shall be recovered through the sewerage tariffs. The costs for connecting 100% of the potential customers (8,200 connections) will be US$4.1 Million.

21. **Stand-by investments**: As some of the sub-projects proposed for year 2-5 were not assessed in detail during both the Master Plan and feasibility studies, it has been agreed to include additional possible sub-projects. These include (i) CSE-20: Network expansion Kanyama (Manchinchi), (ii) CSE-05: Network expansion Chipata (Ngwerere) and (iii) CSE-06: Network expansion Kabanana (Ngwerere). These sub-projects will be assessed as part of the feasibility studies that are funded by the PPA. The outcome of the assessment may affect the final decision on the subprojects to be included under Year 2-5 investments.

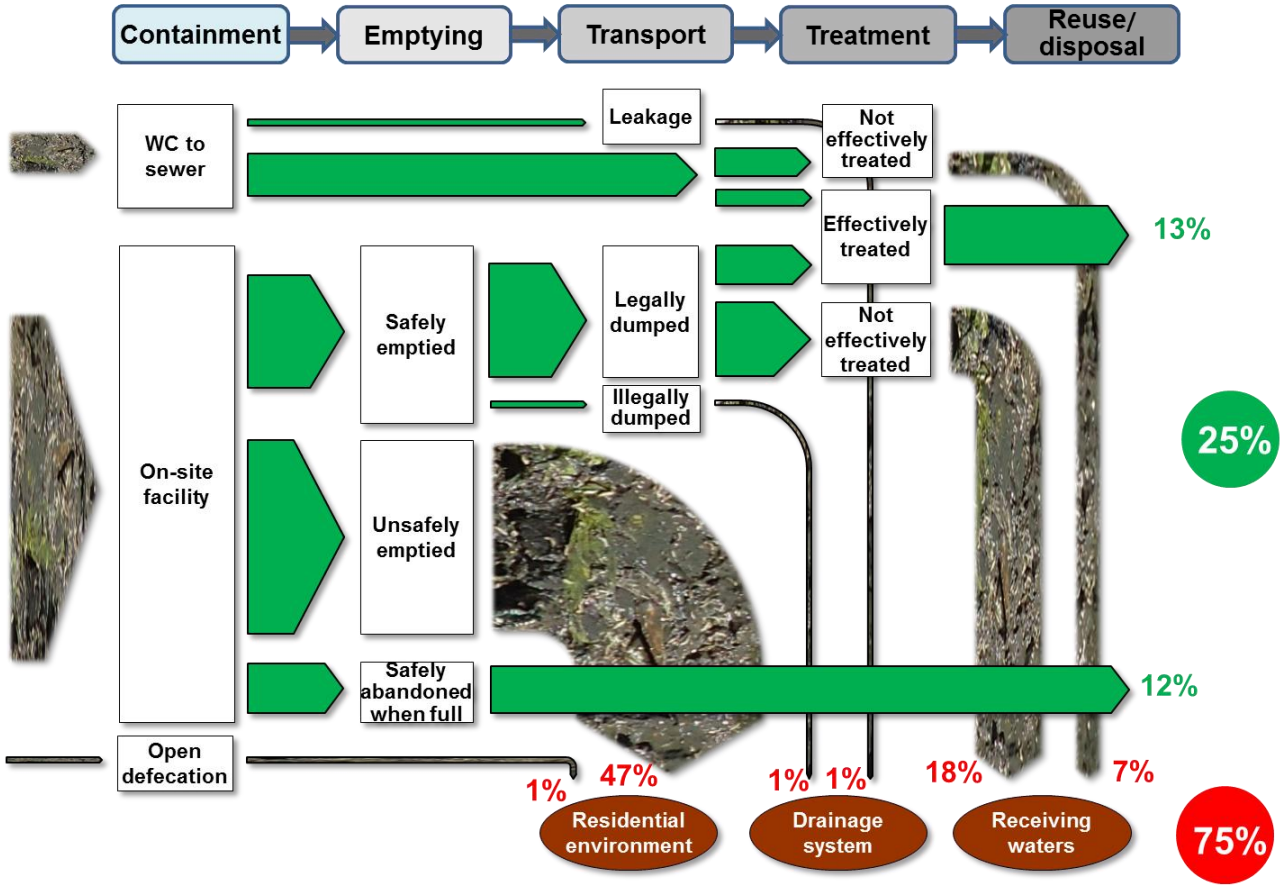
Component 2: On-site Sanitation

22. As per the Water Supply and Sanitation Act No. 28 of 1997, local authorities are mandated to provide water supply and sanitation services. In Lusaka, this responsibility has been delegated to LWSC as per the articles of association of LWSC. Seventy percent of Lusaka's population of 2.3 million lives in peri-urban areas. Ninety percent of these people—some 1.5 million people—are served by pit latrines, either communal (shared) or private. There are few organized systems for emptying pit latrines (except for the FSM pilot in Kanyama and Chazanga), and the informal methods widely employed are both unhygienic and harmful to the environment. Some are backfilled when full and a new one is constructed. Peri-urban areas are densely populated and in many cases no space is left for constructing new ones.

23. Preliminary estimates conclude that only 25 percent of all fecal waste flows in Lusaka are collected and disposed of in a safe and environmentally acceptable way, including the fecal

flows from water closets (see Figure A2.1 below, based on LWSC rough estimates). Currently, both the sewers and on-site facilities pollute the environment, through leaking sewers, faulty pump stations, inadequate effluent treatment and inadequate treatment for on-site systems. However, what Figure A2.1 highlights is that lack of adequate FSM accounts for the great majority of the overall discharge into the residential environment.

Figure A2.1 Indicative Estimated Lusaka Fecal Waste Flows



24. LWSC has implemented a pilot project with the Kanyama Water Trust to establish a FSM system. The operator empties basic pit latrines, transports the sludge to a bio-digester and dries the sludge on drying beds. The main challenges are that many pits are not lined and sometimes collapse while emptying; tools to perform the emptying in a safe and hygienic way are still under development. Congested site conditions do not permit access to some pits with motorized equipment; standard health and safety procedures for the workers are yet to be formally established. The consistency of the fecal sludge to be collected varies considerably from pit to pit and very often the pits are misused for solid waste disposal, complicating their emptying. LWSC delegated the management of this activity to the Kanyama and Chazanga Water Trusts. The project included managing the emptying of the pits and developing this activity into a business model; piloting new methods of emptying pits and pit emptying tools; formalizing the pit emptiers; identifying primary transport means and designing, constructing and operating bio-digesters and drying beds. This component builds on the experience gained through this pilot project, and intends to further improve procedures, tools, equipment and facilities.

25. LWSC will be in charge of managing this component. NGOs and/or consulting firms will be contracted by LSWC as consultants and facilitators working with providers of FSM and onsite facilities construction services. Component 2 will run throughout the 5-year project period and includes the following sub-projects:

- **Hygiene promotion program.** LWSC will build on the experience gained from the 2009 Sanitation Marketing Strategy Project (Kalingalinga). As there will be similar efforts from partners such as UNICEF and the MCA, a coordination mechanism will be established with the key government agencies, including MoH, MCDMCH and LCC, to ensure consistency of messaging and maximum synergy in the design and implementation of this program for the entire Lusaka Province. This includes developing leaflets and information folders, radio and television spots, training teachers and providing them with training material. The NGO's/consultants will assist LSWC in designing the program and developing information material. This activity will target the whole city.

- **Promoting and managing the construction of on-site sanitation facilities with standardized design, including managing a support fund.** A consultant/NGO will be procured to deliver this component, which will develop, in close cooperation with LWSC and by using available designs from other projects, standards for improved on-site sanitation facilities. These will be for private as well as communal (shared) purposes and be consistent with the Draft Urban Sanitation Strategy developed by MLGH. A series of standard designs will be adopted providing a range of service levels (improved pit latrine, pour-flush latrine, septic tank system, etc.) each with the option of adding a bathroom, taking into consideration safe containment and emptying of fecal sludge, user preferences, gender and accessibility to disabled people, as well as the range of physical conditions present in Lusaka such as high water table, susceptibility to flooding and rocky ground.

- The consultant/NGO shall also design and implement a marketing campaign in the selected target areas for this sub-component, making use of innovative communication tools and channels to reach potential clients, using a combination of mass media and direct contact, as well as product demonstrations and possibly working with locally present CBOs/NGOs. In order to ensure the public good elements of improved sanitation, the project will contribute up to 50% of construction costs, defining a standard user contribution for each option, which shall be paid in advance. A limited number of vulnerable households identified by official government systems will be eligible for higher subsidies; some public facilities for markets, bus stations etc. (to be delegated to private management) will be fully financed by the project.

- The consultant/NGO will develop a mechanism with one or more micro-finance institutions which will enable users who so wish to spread the advance payment over time. These arrangements may include the establishment of a guarantee fund or subsidized interest rates to increase affordability. Builders will be trained and contracted for small lots of facilities by the consultant/NGO. Assuming on average support of $500

per unit, 10,000 units can be constructed with a subsidy budget of $5 million, serving about 180,000 people in the project focus area. The support fund will be managed by the consultant/NGO through a performance contract under the control of LWSC.

- **Decentralized Wastewater Systems (DEWATS**). LWSC will build up to 10 DEWATS, which are intermediate options for excreta management in low income communities where continuous water supply is available. Each system will serve up to 150 households, connected through a simplified sewer system to an anaerobic treatment unit and reed bed for effluent polishing. The system has been widely applied in Asia and Africa, including 4 towns in Zambia (Solwezi, Kansuswa, Kariba and Libuyu) with encouraging results so far. Estimated costs are US$200-300 per person, about a half to two thirds of the cost of conventional sewerage. The construction of DEWATS will be phased, starting with 2 in the first year of implementation to gain experience, with the remaining 8 being built in years two to five. The DEWATS will be managed by the sewerage department, as experience shows that community management is not effective. Strong community engagement activities, user training and service promotion will be carried out as part of the sanitation marketing sub-component. WSP will assist with ensuring the learning from the DEWATS pilots.

- **FSM Services and Equipment Development, Training and Marketing.** A second consultant/NGO will be procured to manage this component in close cooperation with LWSC and with the involvement of workers and consultants with hands-on experience. They will review and implement the FSM services business model proposed by the feasibility study, including the institutional, technical and financial support required for the establishment of commercially viable FSM services. In performing this task, the consultant/NGO will identify, adapt and develop a range of appropriate equipment and tools for emptying on-site sanitation facilities. This may include the adaptation of standard centrifugal and diaphragm pumps, small-scale vacuum equipment, locally manufactured "Gulper" sludge hand pumps, macerator pumps, adapted Archimedes screws, etc. Special attention should be paid to safe and hygienic working conditions when developing tools as well as changing/washing facilities for workers. Also required is the adaptation of transport facilities and cheap haulage equipment such as easily maneuverable hand carts, motor tricycles, pick-up trucks fitted with plastic tanks and possibly a vacuum pump, including the possibly necessary transfer from small vehicles to vacuum tankers, taking into account the space constraints on fixed transfer facilities.

- Once equipment is developed and tested, the consultant/NGO shall procure and supply, in close cooperation with LWSC, suitable equipment for up to 7 pit emptying teams based on the range of equipment developed and identified as most suitable. This should also include the procurement of suitable work clothing (including boots), cleaning and disinfection tools. The teams will be set up and the equipment procured in tranches, making use of the practical experience gradually gained. The pit emptying service providers will be selected on the basis of criteria to be agreed, including entrepreneurial skills, linkages and familiarity with the target communities, and experience in related business areas. Possible candidates would include, but not be limited to, private sector vacuum tanker operators, community-based enterprises providing sold waste

management services, Water Trusts, and other CBOs working on health and social development issues. A clear objective is also to introduce a cost covering tariff for on-site facilities emptying after the initial introductory period, with the intermediate shortfall being covered by a decreasing subsidy estimated at a total cost of US$800,000. It is estimated that each team will serve approximately 700 facilities per year, increasing to a total of 5,000 facilities per year by the end of the project, thus serving approximately 450,000 people.

The consultant/NGO shall facilitate FSM business implementation by developing and implementing a training package for LWSC and the 7 FSM teams in close cooperation with LWSC and the emptiers themselves, including a detailed service framework and operation manual for FSM operations. This will include procedures for hygienic and efficient preparation, emptying, transport and disposal of fecal sludge, regular medical inspections of the workers, tool washing and washing and cleaning and disinfecting clothes and staff after completing work. Compliance by the workers shall be monitored. The manual shall be improved and refined from time to time, incorporating the lessons learned, and formalized under NWASCO. The introduction of the FSM services in each area will also be accompanied by a marketing campaign developed by the consultant/NGO.

- **Designing and constructing fecal sludge treatment facilities and supporting transfer stations.** The consultant/NGO, in close cooperation with LWSC, shall identify the most suitable locations for fecal sludge treatment facilities, based on experience from Lusaka and in Zambia in general. The consultant should bear in mind that the new WWTP (Manchinchi and/or Chunga) will be equipped with fecal sludge and septage reception facilities as well as sludge treatment facilities. Thus the proposed designs should consider sludge transfer to Manchinchi if this is more cost-effective. The designs include digesters and bathing/cleaning and laundry facilities for the emptying teams. If capacity is not available at Manchinchi, drying beds and reuse/disposal methods should also be part of the treatment plants. The designs will need to respond to technical criteria and get the necessary approval by local authorities. LWSC will be responsible for constructing and operating the two facilities but may delegate the actual operation to the FSM service provider or other private sector entity, if found to be technically and commercially viable. Transfer facilities will also be constructed in those service areas where emptying teams are established but have no treatment facility. Dumping fees will be charged to cover operation costs. The 2 new units are expected to serve at least a population of 450,000.

- **Support to LWSC to deliver FSM and OSS construction**: LWSC has not previously been much involved in providing on-site sanitation facilities and FSM services, and will have to build its capacity to do so. LWSC is still deciding which department will manage these activities, but support required will be essentially the same in any case. For onsite facilities construction, an engineer and a social specialist will be hired under the project to oversee the work of the consultant/NGO and to oversee construction quality control. The FSM function will most probably be integrated into the sewerage department;

staffing and consultant support requirements will be determined under the institutional assessment.

Component 3: Institutional Strengthening

26. This component will finance consulting services, goods, training, and incremental operating costs to support the project's implementation and management, and technical assistance to LWSC. Component 3 is divided into (i) project management support to LWSC to implement the project, (ii) TA to strengthen the capacity of LWSC to provide sanitation services and preparation funds for future investments and equipment for sewer maintenance and labs, and (iii) building capacity for monitoring program implementation and impacts, in collaboration with LCC and MCDMCH/MoH (and including TA to improve inter-institutional coordination).

3.1 Project Management

27. **Project Implementation Unit (PIU):** LWSC has established a PIU to manage the Lusaka Sanitation Program with staff from LWSC and outside consultants. The PIU will have overall responsibility of planning, implementing, and monitoring the program and the Project and will on a day-to-day basis report to LWSC's managing director or another official designated by the managing director. The project will finance the PIU's staff costs. AfDB is planning to finance the PIU incremental operating costs. The project will hire a consulting firm to support the PIU management team. The firm will be expected to provide the management team with overarching project management for Component 1, 2 and 3 and bring in specialized capacity as needed.

3.2 Technical Assistance to LWSC

28. Much of the institutional framework needed for a functioning water and sanitation sector is in place in Zambia. The WSPIP project had a strong institutional focus, though primarily on water supply services. The TA under this component is intended to continue advancing the institutional agenda in the sanitation sector, and to provide LWSC with the TA it needs to build its capacity for delivering sanitation services.

29. Inadequate capacity is a major challenge to LWSC's operations, and this will increase as the utility shifts more towards on-site sanitation and increasing sewerage assets that demand increased operation and maintenance capacity. One of the consultancies under the Project Preparation Advance is solely dedicated to addressing this issue: *Institutional Assessment and Design of Technical Assistance*. This consulting assignment is carrying out an institutional assessment of LWSC and designing the technical assistance program to help LWSP improve its performance, build capacity in understanding and meeting its customers' sanitation needs, improve the operation and maintenance of sanitation services, build appropriate development partnerships with the private and public sector, and enhance the sustainability of the investment under the Lusaka Sanitation Program. This includes a sector mapping to assess the roles and responsibilities of the key stakeholders in sanitation service provision. Recommendations will be made on the necessary actions to improve the sector's effectiveness, to work constructively to support drivers of change towards such effectiveness, and to mitigate the obstacles to making progress and achieving the changes required.

30. The TOR of this consultancy require the review of various aspects of LWSC's business and organization, including: i) organizational structure and governance systems (including the impact of decentralization of operation and maintenance of sanitation infrastructure); ii) capacity in donor and stakeholder coordination; iii) human resources and current efficiency (including a proposed organization structure for LWSC to meet its expanded sanitation mandate); iv) the structure and capacity needed to manage the financing schemes for toilet construction and connection to the sewer systems (including the funding support scheme); v) structure and skills required for on-site sanitation implementation, including toilet construction, hygiene and sanitation promotion, and FSM; and vi) the optimum corporate organizational structure to deliver this new mandate. The consultancy will then design the TA package to build LWSC's capacity to deliver on its expanded sanitation mandate, including a human resources development strategy.

31. Technical assistance will improve LWSC's performance, build capacity in operation and maintenance of sanitation services and enhance the sustainability of the investments. TA activities to be considered include activities to: support utility governance and financial management, improve operational efficiency, support tariff improvements and expand the performance indicators to include sanitation and sewerage. The operational management and maintenance of sewers, WWTP and other sanitation facilities—including sewer cleaning equipment—will be strengthened and customer management and community liaison will be improved. The TA will explore how best to ensure the effectiveness of LWSC's peri-urban Unit, moving it from a project implementation unit approach towards supporting the mainstreaming of peri-urban and low-income community issues into a unified city-wide sanitation planning process and the provision of a range of consumer services by LWSC.

32. Institutional strengthening will focus on utility reforms and how LWSC would be better oriented to better deliver services in water and sewerage effectively and efficiently, while meeting its operating and maintenance costs, and in response to client demand. A major focus of this TA will be strengthening and mainstreaming the operations of the peri-urban unit. Since LWSC's limited capacity for on-site sanitation is a binding constraint for this project, TA aimed at increasing this capacity, and the corporate reorientation needed to appreciate the merit of these interventions, will be prioritized.

33. In addition to the TA program under design, the following activities are envisaged to be supported under this component:

- **Performance Contract Technical Audit:** With financing from PPIAF, LWSC has engaged a consultant to design a performance contract to agree on performance targets between LWSC management and LWSC branches. The project will finance an annual independent technical audit of the performance contract. Any incentive payments to be made due to improved performance will be paid by LWSC. In parallel, the LWSSD project (with financing from MCC) supports a sustainability agreement which is a performance contract between MLGH and LWSC. The sustainability agreement was based on the Development Financing Agreement for Performance Enhancement developed under the WSPIP project.

- **TA to improve sanitation operations:** TA will be identified by the ongoing institution assessment of LWSC to improve the operational performance of the sewerage department and the peri-urban unit in on-site sanitation. Institutional strengthening will focus on utility reforms and how LWSC would be better oriented to better deliver services in water and sewerage effectively and efficiently, while meeting its operating and maintenance costs, and in response to client demand. Activities that could be included are: HR strategy, revenue enhancement, asset management and customer care. A legal covenant that would reflect key performance indicators for a good utility over the life of the Project has been included. The project will finance incremental staff costs for additional staff required in the peri-urban and sewerage departments to manage the sanitation system in year 1, and LWSC will commit to maintain the staff and increase in line with the expanded responsibilities as a result of year 2-5 investments.

- **Training**: LWSC will submit a training plan to the World Bank for approval. Training will focus on capacity needs to achieve the project development objectives and will include formal and informal training, study tours and peer learning.

- **Feasibility studies:** The project will finance priority feasibility studies and other studies for priority investments linked to the project as agreed between LWSC and the World Bank during implementation. In particular, the project will update the Sanitation Master Plan and prepare sanitation feasibility studies for other towns in Lusaka Province such as Kafue, Luangua and Chirundu. The component may also assess the feasibility of sludge management and reuse.

- **Equipment for sewer maintenance**: The project will finance priority major equipment and tools to improve operation and maintenance (O&M) of the sewerage infrastructure, tools and operational vehicles. The project team is of the view that proper O&M of the expanded network and sewage works will only be feasible if appropriate equipment, tools, and vehicles are available along with adequate numbers and skills of the staff in the sewerage department of LWSC.

- **Updated shadow credit rating**. During preparation, with support from PPIAF, LWSC undertook a shadow credit rating of the company to assess the credit-worthiness of the company. The credit rating agency advised that there is merit in updating the rating annually for the next two years.

3.3 Program monitoring

34. LWSC has a monitoring system for its operations. The current system, while comprehensively covering all the utility activities, has several weaknesses. It is fragmented, does not include on-site sanitation activities or fecal sludge management and has limited personnel capacity. Data quality is not always optimal; critical data are not shared in real time thus not allowing for prompt correction when needed. In addition, there is a potential conflict of interest between the data collected and the unit collecting it (for instance water and effluent quality data being collected and analyzed by the unit's operating the treatment plants). This used

to be the practice in most countries across the world. However currently, best practices suggest the separation of the operating units and those monitoring the performance of those units.

35. The project will support the design, development, capacity building and implementation of a monitoring system to assess the effectiveness of sanitation and hygiene investments in Lusaka. The monitoring system will assess:

- *Operational monitoring:* Assess that the systems and investments function as required
- *Environmental health monitoring:* The interventions are helping reduce fecal contamination in the environment.
- *Hygiene behavior:* The population follows hygienic behaviors including additional precautions in case of system failure.
- *Health impact:* The sanitation and hygiene interventions are having an impact on the health of the population.

36. **Operational monitoring:** This falls within the purview and mandate of LWSC. For off-site sanitation, improved monitoring would include the functionality of sewers and wastewater treatment plants, response time to clear sewer blockages, the quality of piped water and the quality of effluents from treatment plants. In the case of on-site sanitation, monitoring would need to cover the entire results chain from construction standards for new latrines and septic tanks, the number and behavior of users, and the disposal, treatment and security of sludge. It may be impractical for LWSC to carry out some of those monitoring activities. In these cases, decentralized administrative and health care structures or community based organizations could be used and data collection could be progressively phased in. Some on-site operational indicators could be included in NWASCO's regulatory framework for LWSC and linked to accessing sanitation funds. The AfDB intends to support capacity building activities for NWASCO, including review and potential update of the regulatory framework including indicators. In addition key data and analysis from the monitoring system could be shared regularly with partner institutions (LCC, MCDMCH/MoH and ZEMA) to strengthen coordination and foster joint analysis of and action to improve Lusaka's sanitation situation. The Project will finance a monitoring and evaluation specialist under the PIU that will report to the Ministry of Local Government and Housing.

37. **Environmental health monitoring:** Frequent and comprehensive monitoring of environmental fecal contamination falls within LWSC's mandate and is very expensive and labor intensive. In addition, fecal contamination of the environment from sources beyond the control of the project makes it nearly impossible to derive useful information in the short term. In the medium terms however, it is possible to start seeing contamination patterns pointing to issues in the system. A two-pronged alternative is therefore proposed: (i) to use as proxy indicators the share of total waste water that is actually treated, as well as the number of on-site sanitation "units" emptied per year, and tons or cubic feet of sludge that get to the treatment plants, which together with treatment plant efficiency would help estimate how much additional fecal matter is being treated; and, (ii) to implement a surface water quality surveillance system, which would test a representative sample of surface water bodies and shallow wells in "sentinel sites" across the city. Data collection for this last activity will be carried-out by institutions other than LWSC,

most likely decentralized health committees, and environmental health officers in health facilities and local councils).

38. **Behavioral monitoring:** In partnership with LCC, a TA financed by MCA is carrying out formative research. On the basis of the results of this research, an information, education and communication (IEC) working group/committee composed of technicians from LWSC**,** LCC MCDMCH and MOH, will develop an IEC strategy, implementation and monitoring plans for behavior change related to water and sanitation in the LWSC covered area. The recent positive experience with the Ebola communication strategy shows that this modality facilitates coordination and coherence of messages across institutions while leveraging of resources from different institutions and partners. The action plan will identify the activities to be financed by the project.

39. **Health impact:** Monitoring sanitation interventions' impact on the health of the population is the responsibility of the MCDMCH and MOH. The existing surveillance system will be integrated in the health district information system from the MOH, which will be used for this activity.

40. **Institutional/organizational needs**. A memorandum of understanding (MOU) will be needed between LWSC, LCC, MCDMCH and MOH outlining roles and responsibilities for data collection, communication and information sharing mechanisms, and performance indicators (accountability framework). Initially, recurrent costs for the monitoring systems would be eligible to be financed under the project. However, the MOU will also explicit the commitments of the respective institutions to include the recurrent costs for the implementation of the monitoring system beginning in the next budget cycle (2017-2019). One staff member each from LWSC, LCC, MLGH, and MCDMCH/MoH will be identified as focal points to develop and implement the water and sanitation monitoring plan for Lusaka. Their role is to act as liaison officers with their respective parent institutions.

41. Organizationally, and in accordance with recommended international best practices, LWSC will consider reassigning the water and effluent quality monitoring function away from operations in order to improve governance.

42. **Financial resource needs.** An estimated US$2 million will be needed to design and implement the monitoring system while building the capacity of LWSC, LCC and MCDMCH/MOH, in the following areas: (i) LWSC: to monitor operation and performance of sanitation system in Lusaka; (ii) LCC: to monitor and enforce sanitation standards; and (iii) MCDMCH/MOH: to monitor the impact of sanitation interventions on the health of the population. Those resources would be used for: (i) goods such as laboratory equipment and reagents, field testing kits, computers, vehicles, computers and cellphone or mobile devices; (ii) technical assistance services to set up the information system, provide training and revise operating protocols; and (iii) non-TA services such as training, IEC surveys, and laboratory services. Table A2.4 details activities to be funded under the monitoring system.

Table A2.4: Indicative inputs to strengthen the monitoring system

Institution/role	Inputs
LWSC: Monitor operation and performance of sanitation system in Lusaka.	- M&E specialist for the M&E unit - Laboratory equipment/reagents for LWSC to increase water and waste water effluents and sludge quality testing capacity - TA to set up the monitoring information system geo referenced as well as common platform /interphase with relevant info systems in partner institutions including software and upgrading of computing capacity of M&E unit. - Financial resources to contract out to a certified laboratory for quarterly in-depth testing of water for heavy metals, toxic chemicals and pathogens - GPS devices for LSWC data collectors and monitoring officials to enter monitoring data into LWSC database in real-time. - Computer monitoring and evaluation unit. - Staff training.
LCC Enforce sanitation standards	- Training of environmental health experts to cover all wards. - GPS devices for LSWC data collectors and monitoring officials to enter monitoring data into LWSC database in real-time. Resources to cover costs of information transmission. - Two cars to facilitate transport support for environmental Health technicians. - Seven motorbikes for the seven constituency level environmental health offices. - Rehabilitation and equipment of seven constituency level environmental health offices. - Informatics equipment for seven constituency level health offices.
MCDMCH/ MOH: Monitor impact of sanitation interventions in population's health.	- Training of environmental health technicians in sanitation assessment and latrine quality assessment. - Training, follow-up and retraining of community health volunteers on sanitary situation assessment. - GPS devices/ tablets for data collection officers, transmission costs. - 30 motorbikes for environmental health officers. - Two vehicles for transport of district environmental health officer. - TA to integrate the disease surveillance system in the district health system. - Laboratory equipment, reagents UTH & field kits (community volunteers).

Annex 3: Implementation Arrangements
ZAMBIA: Lusaka Sanitation Project

Project Institutional and Implementation Arrangements

1. LWSC will implement all aspects of the project and will operate and maintain all investments once commissioned. All funds will flow through LWSC and implementation will be coordinated by a Project Implementation Unit (PIU). LWSC has to date focused more on sewerage than on-site sanitation but, under the project, LWSC is committed to expanding its services into on-site sanitation to fulfill its mandate. The government will form the Lusaka Sanitation Program Steering Committee to oversee preparation and implementation of the Program and the Project. The Steering Committee will represent all government stakeholders—including, but not limited to, MoH, MCDMCH, LCC, NWASCO, and ZEMA—and will be supported by the World Bank and other Cooperating Partners as appropriate.

2. **Stakeholder mapping:** The high demand for safe sanitation in Lusaka has over the years created a plethora of actors, differing in institutional size and mandate and employing a wide range of approaches to sustainably improve access to safe sanitation in formal and informal settlements. The Sanitation Master Plan categorizes these actors into (i) sanitation service providers, (ii) policy, regulatory and coordinating institutions, and (iii) all others with an indirect role. The following institutions have a key responsibility for, or influence over, water and sanitation service in Zambia. Key agencies in the urban WSS sector and their responsibilities are summarized in Table A3.1.

Table A3.1 Stakeholder mapping

Agency	Key Function	WSS Sector Responsibilities	Accountable to (in sector)	Enforcement instrument
Ministry of Finance	Resource mobilization and allocation	Mobilize local revenues and international aid. Lead negotiations and sign aid agreements; disbursements to ministries	GRZ	Public finance, accounting and expenditure
Ministry of Energy and Water Development	Water resources planning and management	Water resources management; administration of water rights; limited financial management of WSS sector	GRZ	Water Resources Act
Ministry of Local Government and Housing	Local government administration including service provision	Sets WSS sector policies; administers financial transfers to service utilities; Monitors sector performance	GRZ/Ministry of Finance	Water Supply and Sanitation Act (1997)
Department of Infrastructure Development	Technical support to local authorities; coordinates resources utilization	Technical services to WSS service providers; overseas development of WSS infrastructure; sector monitoring and coordination	MLGH	Water Supply and Sanitation Act (1997)
MCDMCH/ MoH	Enforce Public Health Act	Monitor health impact, disease surveillance and	GRZ	

		produce results maps		
Urban Local Authorities	Municipal services provision	Provision of municipal services including water, sanitation, solid waste removal, roads and drainage, health infrastructure. For water and sanitation services this responsibility has been delegated to commercial utilities where they exist.	MLGH	Local Governments Acts; Water Supply and Sanitation Act (1997) Decentralization Policy, 2004
Commercial Utilities	Water and sanitation service provision and maintenance	Provides water and sanitation to urban and peri-urban areas; maintains WSS assets;	Local authorities	WSS Act; Municipal by-laws
Ward Development Committees	Local level planning and community organization	Organize, plan and create Water and sanitation community institutions such as Water Trusts. Community organization for communal service improvements	Local authorities, headed by Ward Councilor, who is an elected member of Council	Local Government Act
Household	Customers	Demand; consume and pay for services	Comply with local residents norms and demands, local councils	Service level agreements
National Water and Sanitation Council (NWASCO)	Regulator	Regulates sector performance on the basis of key performance indicators; currently not regulating the on-site sanitation	Ministry of Energy and Water	WSS Act
Zambia Environmental Management Agency (ZEMA)	Environment monitoring	Sets environmental standards; monitors pollution; penalizes	Ministry of Lands Natural Resources and Environmental Protection	Environmental Management Act No 12 (2011)
Cooperating Partners	Partner in planning and financing for service improvements	Co-finance sector with government; monitor expenditures; approve projects; enter into lateral or bi-lateral agreements with government and agencies	Ministry of Finance	Financing agreements
NGOs	Partner agencies in development	Engage in service improvement directly or in partnership with government departments	Varied	Varied

3. **Cooperating Partners** (CPs) have contributed significantly to the water and sanitation service improvement in the country. The major CPs active in the water and sanitation sector in Zambia are summarized in Table A3.2.

Table A3.2 Cooperating Partners

CP	Geographic Area of focus	Sector focus	Sector Detail	Local partner
African Development Bank	Lusaka City, Copperbelt	Water and sanitation investments	Sewer networks and pump stations; peri-urban on-site and off-site systems; rural water supply improvements	LWSC; Nkana WSC
European Investment Bank	Lusaka City	Sanitation investments	Sewer networks rehabilitation and expansion; upgrade of treatment plants	LWSC
GIZ	National	Enabling environment and capacity building framework	Sanitation policy, National Urban Sanitation Strategy (NUSS) and capacity building strategy	MLGH
JICA	National (rural)	Water supply improvements	Borehole drilling	MLGH
KfW	National	Sanitation and water	Upgrade of treatment plants	LWSC
UNICEF	National	Sanitation, health and hygiene	Triggering total sanitation rural areas; improving sanitation in peri-urban areas; planning to move into Lusaka City with EU funding.	UNICEF
World Bank/ WSP	Lusaka City Kalingalinga peri-urban area, Lusaka City	Sanitation investments, technical assistance	Sewer networks and pump stations; peri-urban on-site and off-site systems	LWSC
Millennium Challenge Account	Lusaka	Water, sanitation, drainage	US$355 million grant to implement priority investments in master plan	LWSC
Chinese Ex-Im Bank and other funds	Lusaka	Water	Kafue bulk water	LWSC
BADEA	Lop WSC	Water, sanitation	US$10 million	LWSC

4. **Key agencies in the Lusaka Sanitation Project (LSP**): The Lusaka Sanitation Project will draw from the generally accepted water and sanitation implementation modalities in Zambia, consistent with the relevant acts, policies and strategies or as specified in this PAD. The table below outlines the major agencies involved in the implementation of the LSP and their key functions. Key agencies in the LSP and their responsibilities are summarized in A3.3

Table A3.3 Stakeholder mapping for LSP

Stakeholder	What is it?	Responsibilities	Enforcement instrument
Ministry of Finance	Resource mobilization and allocation	Sign the project agreement with the World Bank Sign the subsidiary Agreement with LWSC Participate in project reviews	Financing Agreement Project Agreement
Ministry of Local Government and	Mandated for sanitation provision	Finalize sanitation policy and strategy	PAD

Housing			
Department of Infrastructure Development	Technical coordination and supervision	Chairs the project steering committee; populates the monitoring framework	MLGH
Lusaka City Council (LCC)	Supervise services provision	Enforce connection by-laws: support the community mobilization and awareness process, through ward councilors	PAD
LWSC	Accountable for project outputs and outcomes	Sign agreement with Ministry of Finance; create a PIU; develop an on-site GIS data base for on-site systems; rehabilitate and upgrade sewers, pump stations and treatment plants; improve household sanitation systems; support fecal sludge management; provide sanitation and hygiene education; monitor project and prepare reports to WB, MLGH, NASWCO and ZEMA; coordinate other donors, provide secretariat to project steering committee; contracts and supervise consultants, NGOs and Water Trusts; trains artisans; provides building and connecting standards and guides	Project Agreement Subsidiary Agreement; Performance Agreements with MLGH; PAD
MCDMCH/MoH	Enforce Public Health Act	Monitor health impact, disease surveillance and produce results maps	PAD
Community Based Organizations	Implements contracted functions in on-site and fecal sludge management activities	Sign performance contract with LWSC; community mobilization, sanitation marketing and the implementation of fecal sludge management systems and services; collect payments from communities	Implementation agreement with LWSC
NGOs / consultants	Executes or provides technical services	Upgrade materials and perform promotion and marketing campaigns in the target areas; manage the Sanitation Fund	Consulting contract with LWSC support fund agreement
House owner/Landlord	Improve household sanitation facilities	Build with own resources or from support funds, on-site systems, water connection; organizes and pays for fecal sludge emptying and removal to treatment site; participate in community planning meetings; protects environment and sanitation assets	PAD; LCC by-laws
Artisans (builders, plumbers, etc)	Technical service to households	Builds sanitation systems or connects water services as per LWSC guidelines and standards	LWSC guides and standards,; agreements with landlords
NWASCO	Regulator	Puts in place a system for regulating on-site sanitation provision, monitors performance of LWSC; reviews tariffs; licensing service providers	WSS Act

ZEMA	Environmental/resettlement monitoring	Set standards and approve environmental and social safeguards plans; monitor environmental contamination	PAD, ZEMA regulations

Financial Management

5. A financial management assessment (FM) for LWSC and MLGH was carried out jointly by a team of financial management specialists from the World Bank, and determined that LWSC and MLGH have adequate FM arrangements systems to meet the minimum requirements of the respective cooperating partners, and to effectively handle Project finances. The FM assessment by the World Bank was carried out in accordance with the Financial Management Manual for World Bank-Financed Investment Operations, issued by the Financial Management Sector Board on March 1, 2010. The objective of the assessment was to determine whether the LWSC—as the agency responsible for handling all financial management aspects of the Project—has acceptable financial management arrangements to ensure that: (a) project funds are used only for the intended purposes, in an efficient and economical way; (b) the project's financial reports are prepared in an accurate, reliable, and timely manner; (c) internal controls exist which allow early detection of errors and/or unusual practices as a deterrent to fraud and corruption; (d) project assets are safeguarded; and (e) the project is subject to external audit oversight. The overall conclusion of the assessment is that LWSC, which will be in charge of administering the funds from both the World Bank and AfDB (and other Cooperating Partners), has adequate FM systems which satisfy the minimum financial management requirements of both financiers as per the World Bank's OP/BP 10.0.

6. The overall risk rating for LWSC FM systems has been assessed as Low. To this end, the project's financial management will be managed by LWSC within their existing system.

7. ***Country Issues.*** According to the Public Expenditure and Financial Accountability (PEFA) Assessment Report, 2012 "the overall picture is mixed, with improvements in financial reporting, tax administration and internal audit, but significant slippages in budget credibility and in the accessibility to fiscal information. It is to be noted that, although progress has been made in a number of areas, some improvements were of insufficient magnitude to register an increase in the rating." This is an improvement from the Country Financial Accountability Assessment (CFAA) Report dated November, 2003 that concluded "there still remain substantial weaknesses and risks within the public financial management system of Zambia", and that there are "considerable weaknesses in the areas of budget management; financial reporting & audit, and procurement".

8. ***Risk Assessment and Mitigation.*** The overall financial management residual risk rating for LWSC is assessed as Low. The table below summarizes the risks identified, and the risk rating and mitigating measures, if any.

Table A3.4: FM risks

Risk	Initial Risk Rating	Risk Mitigating Measures	Residual Risk Rating
Inherent Risk			
Country Level • Poor governance culture, corruption, lack of accountability and poor compliance with existing regulations/procedures and lack of sanctions for offenders; • Funds may not be used for intended purposes or in an efficient and economical way.	**M**	• LWSC is a private company limited by shares and operates as an independent body that reports to an independent Board of Directors.	**L**
Entity Level • The Ministry is not adequately funded through the National Budget and can divert project funds for own use.	**L**	• LWSC prepares annual budgets and expenditure is compared with the budget on a quarterly basis. FM supervision will monitor any potential diversion of funds.	**L**
Project Level • The nature, size, and design of the project.	**L**	• The activities to be funded will be identified and fully supported by procurement plans and therefore will be easy to monitor.	**L**
Overall Inherent Risk	**L**		**L**
Control Risks			
Budgeting	**L**	• LWSC prepares annual budgets and expenditure is compared with the budget on a quarterly basis.	**L**
Accounting	**L**	• LWSC uses an enterprise resource planning system to record its transactions, and the package is functioning well.	**L**
Internal Control	**M**	• LWSC has a Financial and Purchasing Procedures Manual to provide guidance to staff. • There is an internal audit function and LWSC is adequately staffed with fully qualified professionals.	**L**
Auditing • Unacceptable audit and	**L**	• The audit will be based on agreed TOR which will specify the	**L**

Risk	Initial Risk Rating	Risk Mitigating Measures	Residual Risk Rating
untimely submission of the audit report, and lack of follow up on audit findings.		approach, scope, and timing of the audit.	
Overall control risk:	**L**		**L**
Overall risk rating:	**L**		**L**

H-High S-Substantial M-Moderate L-Low

9. ***Strengths and Weaknesses.*** The main strength identified is that the project will use the existing financial management arrangements at LWSC (developed under the successfully implemented and IDA financed Water Sector Performance Improvement Project, closed on June 30, 2014). LWSC has: (a) staff that are appropriately qualified, experienced, and trained in handling IDA funds, financial regulations, and procedures, (b) a Finance and Purchasing Procedures manual that was last revised in 2010, (c) and a computerized accounting system (tested ACCPAC Accounting software). LWSC's Finance Director, who will be assisted by the project accountant, will have overall responsibility for the project's financial management. The financial statements are audited annually by external auditors and these audited reports are publicly available.

10. ***Budgeting.*** LWSC will budget for all its expenditures under the project in such detail as to allow for regular and effective implementation monitoring of all the activities to be funded. The total project cost will be agreed upfront with the Recipient and any variations will have prior approval by IDA.

11. ***Accounting.*** LWSC will use the existing ACCPAC Accounting System to record and report on the project transactions. The ACCPAC System is tested and a reliable accounting software.

12. ***Staffing.*** LWSC has a Finance Division headed by a finance director and deputized by a finance manager in charge of finance department and an IT manager in charge of IT department. A project accountant, reporting to the finance manager, and assisted by an assistant accountant, will be responsible for the Projects' financial management. The project accountant has experience in managing donor and IDA projects and is therefore familiar with the fiduciary requirements required by the World Bank and its Cooperating Partners.

13. ***Internal Controls and Internal Audit.*** LWSC will apply the procedures as stipulated in the existing Finance and Purchasing Procedures manual. LWSC has also an internal audit department that is adequately staffed with qualified staff.

14. ***Financial Reporting.*** In accordance with the respective donors' requirements, and as agreed between the World Bank and ADB, a single quarterly progress report will be prepared by LWSC for the project (that will show all co-financiers funding and expenditures) and submitted to the financiers forty five (45) days after the end of each quarter. The Project will produce, on a

quarterly basis, unaudited interim financial reports (IFRs) to manage and monitor the use of the funds. The IFRs should at the minimum show a statement of sources and uses of funds, with the uses of funds analyzed by activities, comparing actual expenditure with budget. The quarterly reports are to be submitted to the development financiers 45 days after the end of the quarter. The formats and contents of the IFRs have been discussed and agreed with LWSC.

15. ***Funds Flow.*** Funds will flow from IDA to a segregated Designated Account (DA) to be opened at Zambia National Commercial Bank PLC, and to be managed by the LWSC Project Accountant. The DA will hold the initial advance(s) and subsequent replenishments. Funds in the DA will only be used to finance eligible Project expenditures. An additional account in local currency will be maintained to facilitate disbursements in local current as necessary.

16. ***Banking Arrangements.*** LWSC will open and maintain a Designated Account (DA) in US Dollars at Zambia National Commercial Bank PLC for the purposes of implementing the project.

17. ***External Audit.*** It is a requirement that the audit scope, terms of reference, auditor, and audit standards to be applied are acceptable to the financiers. The annual audit report will be prepared for the project (that will include all co-financiers funding and expenditures) and submitted to all the financiers within six (6) months of the end of the respective fiscal years. The audit will be carried out by the LWSC's existing independent auditors in accordance with an audit terms of reference that will be approved by the World Bank to ensure adequate coverage of the project. Audit fees will be borne by the Project. The ToRs of the external audit should clearly state that the auditors will confirm that all invoices have been paid net of taxes.

18. ***Supervision Plan:*** The objective of the financial management supervision is to ensure the continued adequacy of the borrowers' FM arrangements, compliance with relevant legal covenants of the financing agreement, and that the funds are used only for the purposes for which the funds were intended, with due regard to economy and efficiency.

19. Financial management supervision will be carried out using the risk based model. The financial management risk for the project has been assessed as Low. In line with the low risk, financial management supervision intensity will be two field visits per year in the first year of operations, thereafter, to be reviewed depending on findings from these missions. In the interim, supervision will be by desk reviews of the financial component of the unaudited quarterly IFRs.

20. ***Conclusion of the Assessment:*** The conclusion of the assessment is that the financial management arrangements in place meet the World Bank's minimum requirements under OP/BP10.00, and therefore are adequate to provide, with reasonable assurance, accurate and timely information on the status of the Project required by the World Bank. The overall financial management residual risk rating of the Project is Low.

Disbursement

21. The project will use report-based disbursement procedures. This procedure is flexible and allows the project to plan for their cash requirements on a quarterly basis. The initial advance to the DA will be made based on a 6 month cash flow forecast. Withdrawal applications (WAs) will

be completed by LWSC to request replenishment of amounts that are spent from the DA. Actual expenditures will be replenished to the DA through the submission of quarterly IFRs. The following documentation should accompany the IFRs to justify expenditures for subsequent disbursements to the DA: (i) DA activity statement supported by copy/copies of bank statements; (ii) summary statement of expenditure for contracts above the prior review threshold; (iii) summary statement of expenditure for contracts below the prior review threshold. Other disbursement methods will include direct payments; reimbursement, and special commitments. Details of withdrawal conditions and requirements will be advised in the Disbursement Letter.

Procurement

22. A Procurement Risk Assessment (P-RAMS) of LWSC was undertaken on December 24, 2014 in accordance with the World Bank's Procurement Risk Management System. The Implementation Agency Procurement Risk for LWSC was assessed as ***substantial***. Implementation of the risk mitigations actions would reduce it to ***moderate***.

23. **Procurement manual:** The procurement arrangements to be used under the Project, including packaging of procurement, maintaining clarity of accountability over procurement, record keeping, and frequency and scope of prior and post review are elaborated in the procurement manual and in the procurement plans. The procurement manual was last updated in 2007 under a previous operation funded by the World Bank: the now closed Water Sector Performance Improvement Project. Given the legal and institutional changes that have occurred since then in the area of procurement including decentralization, LWSC may wish to update the manual to take into account the provisions of the new Public Procurement Act No 12 of 2008 as revised in 2012 and the provisions of the Public procurement Regulations of 2011. These provisions affect all procurement that will be undertaken using National Procurement Procedures such as NCB. The manual will also outline the identified risks and provide risk mitigation actions. It will cover the legal and regulatory framework, roles and responsibilities of the institutions and staff involved in procurement, internal and external controls and quality assurance checks or systems, approval systems and accountability, and contracts register. It will spell out the roles and responsibilities of various players in contract management, based on both Government regulations and as required for prior review of IDA contracts.

24. **Procurement decentralization:** In effect from January 1, 2013, all procuring entities carry out procurement in a fully decentralized environment except for procurement for all single source / direct contracting which still requires review and clearance by the Zambia Public Procurement Authority (ZPPA). This means that the ZPPA is not involved in reviewing bidding documents and bid evaluation and contract award recommendations. All procurement activities are now carried out internally by the procuring entities (PEs) using their own institutional arrangements, controls and quality checks, without ZPPA participation. As of January 2015, ZPPA has transformed itself fully into a regulatory and oversight body for public procurement in Zambia based on a new institutional arrangement and staff structure.

25. **Procurement risk mitigation measures**: Based on the P-RAMS assessment, the main risks and proposed risk mitigation measures are shown in Table A3.5 below.

Table A3.5: Summary assessment of capacity, risk, and mitigation – action plan for LWSC

Issues	Risks	Mitigation measures	By when
1. Procurement planning	**Risk rating: Substantial.** The supply and installation of (electro –mechanical goods) involving the sewage treatment plant contract packages are likely to challenge the capabilities of the agency in terms of size, complexity and timing	LWSC will require enhanced skills from technical and procurement stand point. The World Bank should consider obtaining supply and installation bidding documents and contracts from other countries and share with LWSC.	Immediate, and to be reviewed throughout the life of the Project
2. Evaluation and Award of contract	**Risk rating: Substantial.** Given complexity and high value of interventions required under the project LWSC capacity may be challenged	Given possible complexity of interventions required under project, LWSC will require TA and procurement support to design, prepare the technical requirements and bidding documents. Due diligence needs to be carried out on proposed winning bidder given the high value, complexity & inherent risks.	As required, throughout the life of the project
3.Staffing	**Risk rating: Moderate.** LWSC may have insufficient access to technical and contract management expertise, given complex and large nature of proposed Project activities	LWSC will require enhancing skills and capacity from both technical and procurement stand point.	
4. Contract management and administration	**Risk rating: Substantial.** Engineering and contract management capacity of the LWSC may be challenged for large and complex procurement for which the country also has limited capacity of similar works in the recent past decades	Appoint design and supervision consultants. Training in contract management for selected key staff may be appropriate and consider hiring or allocating at least one additional qualified and experienced engineer to complement capacity of existing staff given that LWSC PMU is also responsible for other on-going project both internally and externally funded.	Upon availability of trainer(s), and continuously thereafter
		Hire consultants to enhance capacity including appointing a dispute board for all contracts estimated to cost US$50 milion and above using FIDIC dispute board standard contracts	As required throughout the life of the project

26. **Procurement Post Reviews (PPRs) and Independent Post Reviews (IPRs) by the World**

Bank. Based on the assessed **agency implementation risk for procurement**, which is **Substantial Risk**, the World Bank will carry out PPRs or IPRs for all contracts in the procurement plan that were not subject to prior review by the World Bank using a sample of 15 percent. Based on continuing assessment of risk and the success of risk mitigation measures implemented, the sample size will be reduced as risk mitigation measures are successfully implemented. High risk represents a sample size of 20 percent, Substantial risk will represent a sample size of 15 percent, Moderate risk 10 percent, and Low risk 5 percent. These changes will be communicated to the LWSC as outcomes of the PPR / IPR exercise, which also result in the revisions of the prior review and National Competitive Bidding thresholds. The review thresholds are shown in Table A3.6 below.

Table A3.6: Prior review and procurement method thresholds - Zambia

Expenditure category	Contract value threshold 27. **(US$)**	Procurement method	Contracts subject to prior review
Works	≥ 10,000,000	ICB	All
	≥ 200,000 - <10,000,000	NCB	As in procurement plan
	<200,000	Shopping	None
	All values	Direct Contracting	All
	All values	Force Account	All
Goods and Services (other than Consultants' Services)	≥ 200,000	ICB	All
	≥ 100,000 - <2,000,000	NCB	As in procurement plan
	<100,000	Shopping	None
	<300,000	Shopping (motor vehicles only)	None
	All values	Direct Contracting	All
		UN UNOPS / UNICEF	None
Consulting Firms	≥ 200,000	QCBS	All
	<200,000	CQS, LCS, QBS	As in procurement plan
	All Values	Single Source	All
Individual Consultants	≥ 100,000	IC	All
	<100,000	IC	None
	All Values	Single Source of IC	All

NOTE: Contracts selected on basis of CQS should not exceed US$200,000 equivalent. This same value will constitute the limit up to which a short list may comprise entirely national firms.

28. **Applicable legal and regulatory framework for National Competitive Bidding:** The procurement procedure to be followed for National Competitive Bidding ("NCB") shall be the open international bidding procedure set forth in the Public Procurement Act, 2008, Act. No.12 of 2008, as amended by the Public Procurement (Amendment) Act, 2011, Act No. 15 of 2011 (the "PPA"), and the Public Procurement Regulations, 2011, Statutory Instrument No. 63 of 2011 (the "Regulations"); provided, however, that such procedure shall be subject to the provisions of Section I and Paragraphs 3.3 and 3.4 of Section III, and Appendix 1 of the "Guidelines for Procurement of Goods, Works, and Non-Consulting Services under IBRD Loans and IDA Credits & Grants by World Bank Borrowers" (January 2011) (the "Procurement Guidelines"), and the additional provisions in the following paragraphs:

29. *Eligibility*: Eligibility to participate in a procurement process and to be awarded an IDA-financed contract shall be as defined under Section I of the Procurement Guidelines; accordingly, no bidder or potential bidder shall be declared ineligible for contracts financed by IDA for reasons other than those provided in Section I of the Procurement Guidelines. No restriction

based on nationality of bidders and/or origin of goods shall apply, and foreign bidders shall be allowed to participate in NCB without application of restrictive conditions, such as, but not limited to, mandatory partnering or subcontracting with national entities.

30. *Domestic Preference*: No margins of preference of any sort shall be applied in the bid evaluation.

31. *Bidding Documents*: Procuring entities shall use bidding documents acceptable to IDA.

32. *Bid validity*: An extension of bid validity, if justified by exceptional circumstances, may be requested in accordance with Appendix 1 of the Procurement Guidelines. A corresponding extension of any bid guarantee shall be required in all cases of extension of bid validity. A bidder may refuse a request for extension of bid validity without forfeiting its bid guarantee.

33. *Qualification*: Qualification criteria shall be clearly specified in the bidding documents. All criteria so specified, and only such specified criteria, shall be used to determine whether a bidder is qualified. Qualification shall be assessed on a "pass or fail" basis, and merit points shall not be used. Such assessment shall be based entirely upon the bidder's or prospective bidder's capability and resources to effectively perform the contract, taking into account objective and measurable factors, including: (i) relevant general and specific experience, and satisfactory past performance and successful completion of similar contracts over a given period; (ii) financial position; and where relevant (ii) capability of construction and/or manufacturing facilities.

34. Prequalification procedures and documents acceptable to IDA shall be used for large, complex and/or specialized works. Verification of the information upon which a bidder was prequalified, including current commitments, shall be carried out at the time of contract award, along with the bidder's capability with respect to personnel and equipment. Where pre-qualification is not used, the qualification of the bidder who is recommended for award of contract shall be assessed by post-qualification, applying the qualification criteria stated in the bidding documents.

35. *Bid Evaluation*: All bid evaluation criteria other than price shall be quantifiable in monetary terms. Merit points shall not be used, and no minimum point or percentage value shall be assigned to the evaluation criteria or significance of price in bid evaluation. No negotiations shall be permitted.

36. *Guarantees*: Guarantees shall be in the format, shall have the period of validity and shall be submitted when and as specified in the bidding documents.

37. *Cost Estimates*: Detailed cost estimates shall be confidential and shall not be disclosed to prospective bidders. No bids shall be rejected on the basis of comparison with the cost estimates without IDA's prior written concurrence.

38. *Rejection of bids and re-bidding*: No bid shall be rejected solely because it falls outside of a predetermined price range or exceeds the estimated cost. All bids (or the sole bid if only one bid

is received) shall not be rejected, the procurement process shall not be cancelled, and new bids shall not be solicited without IDA's prior written concurrence.

39. *Fraud and corruption*: In accordance with the Procurement Guidelines, each bidding document and contract shall include provisions stating IDA's policy to sanction firms or individuals found to have engaged in fraud and corruption as set forth in the "Procurement Guidelines", the "Anti-Corruption Guidelines[9]" and the "Consultant Guidelines[10]".

40. *Inspection and audit rights*: In accordance with the Procurement Guidelines, each bidding document and contract shall include provisions stating IDA's policy with respect to inspection and audit of accounts, records and other documents relating to the submission of bids and contract performance.

41. **Procurement plan:** LWSC has, with the support of the World Bank, developed a procurement plan for the PPA covering the first 24 months of Project implementation. The World Bank has reviewed and approved this plan as of April 14, 2015. The procurement plan includes all the procurement packages identified for the first 24 months of Project implementation. The procurement plan will be updated as required at least once a year throughout the life of the project.

Procurement arrangements
Goods and works

42. Particular methods of procurement of goods and works are as follows:

- **International Competitive Bidding.** Except as otherwise provided in the next paragraph, goods and works shall be procured under contracts awarded on the basis of International Competitive Bidding (ICB).
- **Other methods of procurement of goods and works.** The following list specifies the methods of procurement, other than International Competitive Bidding, which may be used for goods and works. The Procurement Plan will specify the circumstances under which such methods may be used: National Competitive Bidding, Shopping, and Direct Contracting.

Schedule for goods and works

43. Procurement of works: Works to be procured under the Project are likely to include: construction and/or rehabilitation of storage facilities, cold rooms, offices and research stations, fencing, road grading, water reticulation among others. There will be no International Competitive Bidding (ICB) and National Competitive Bidding (NCB) will follow Zambia Procurement Regulations and with the exceptions listed above, may be used for contracts estimated to cost less than US$3,000,000 equivalent per contract. Small value works estimated to

[9] "Guidelines on Preventing and Combating Fraud and Corruption in Projects Financed by IBRD Loans and IDA Credits and Grants", dated October 15, 2006, and revised in January 2011.
[10] "Guidelines: Selection and Employment of Consultants under IBRD Loans and IDA Credits and Grants by World Bank Borrowers" dated January 2011 (revised July 2014).

cost less than US$100,000 per contract may be procured under the Shopping procedures based on comparing price quotations obtained from several contractors, with a minimum of three, to assure competitive prices.

44. Procurement of goods: Goods to be procured under the Project are likely to include: vehicles, IT equipment, office equipment, laboratory equipment, office furniture, irrigation equipment, among others. The procurement will be done using the World Bank's Standard Bidding Documents for all International Competitive Bidding contracts. National Competitive Bidding (NCB) documents, in accordance with the Zambia Procurement Regulations and with the exceptions listed above, may be used for contracts estimated to cost less than US$500,000 equivalent per contract. Small value goods estimated to cost less than US$50,000 per contract may be procured under the Shopping procedures based on comparing price quotations obtained from several suppliers, with a minimum of three, to assure competitive prices, and is an appropriate method for procuring readily available off-the-shelf goods.

Consulting services

45. Particular methods of procurement for consulting services are:

- **Quality and Cost-Based Selection (QCBS)**. Except as otherwise provided in the paragraph below, consultants services shall be procured under contracts awarded on the basis of Quality and Cost-Based Selection.
- **Other methods of procurement of consultants' services**. The following list specifies selection methods, other than Quality and Cost-Based Selection, which may be used for consultants' services. The Procurement Plan shall specify the circumstances under which such methods may be used:
    1. Quality-based Selection (QBS)
    2. Selection based on the Consultant's qualifications (CQS)
    3. Least-cost selection (LCS)
    4. Single-source selection for firms (SSS),
    5. Individual Consultants (IC).
    6. Single-source selection for IC (SSS),

Schedule for consulting services

46. Selection of Consulting Services: Consulting services to be selected under the Project are likely to include: design, supervision, dispute resolution, environmental assessments and safeguard study, Financial, procurement and technical audits. These will be identified and included in the procurement plan and selection will be on the basis of methods that have been included in the approved procurement plan. These methods are also provided above. Short list comprising entirely of national consultants: Short list of consultants for services, estimated to cost less than US$200,000 equivalent per contract, may comprise entirely of national consultants in accordance with the provisions of paragraph 2.7 of the World Bank's Consultant Guidelines. Engineering and contract management contracts with cost estimates of less than US$300,000 may comprise entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines. The procurement plan will indicate those contracts using CQS

whose short lists by exception may not comprise entirely national firms. Terms of Reference (TOR) for all consultancy contracts as well as all single source selections, irrespective of the contract value, will be subject to prior review.

Environmental and Social (including safeguards)

47. Monitoring requirements for environmental and social safeguards are spelt out in the safeguards documents. The environment and social impacts of the project are tabled in the project ESMF and the respective subproject ESMP while the resettlement impacts monitoring arrangements are specified in the project RPF and the respective subproject RAP. The key partners in the monitoring and evaluation include ZEMA, LCC and project affected persons such as the RDA, ZAMTEL, vendors and households.

Monitoring & Evaluation

48. LWSC will conduct overall monitoring and coordination of project activities in accordance with the indicators included in the Results Framework, including the monitoring of compliance with safeguards policies. LWSC will establish a comprehensive monitoring system in coordination with LCC and MCDMCH, to monitor project outputs and impacts. This is further detailed in Annex 2, Component 3.3. The LWSC will submit semi-annual reports to the World Bank, covering all activities, including a procurement and financial summer report. Quarterly financial reports will also be provided to the World Bank no later than 45 days after the end of each quarter. The biannual reviews, the first one to take place six months after IDA effectiveness, will provide a detailed analysis of implementation progress toward achievement of PDO.

49. The LWSC will, not later than two years after the effectiveness date (or such other date as agreed with the World Bank), carry out a mid-term review of the project, and prepare and furnish to the World Bank a midterm report documenting progress achieved in the project's implementation during the period preceding the date of the report, taking into account monitoring and evaluation activities performed and setting out the measures recommended to ensure the continued efficient implementation of the project and the achievement of its objectives for the remainder of the project's life. The LWSC will review this midterm report with the World Bank, on or about one month after its submission.

Role of Partners

50. The Government is implementing the Lusaka Sanitation Program. The Program's objective is to provide adequate sanitation facilities to all urban citizens of Lusaka Province. The Program is being implemented by LWSC and will implement investments consistent with the Lusaka Sanitation Master Plan. As a first stage, the Program will invest in Lusaka City. The Master Plan provides a comprehensive city-wide approach to Lusaka's sanitation challenge, addressing both off-site and on-site systems as well developing LWSC's capacity to manage all aspects of sanitation, from conventional sewerage, condominial, on-site systems and fecal sludge management (FSM). In consultation with the World Bank, EIB, AfDB and KfW, the program has been structured into the following projects:

- Rehabilitating and upgrading the Manchinchi and Chunga wastewater treatment plants (WWTPs) including sludge management and disposal, sewage pumping stations and main collectors of the Manchinchi and Chunga sewershed areas. EIB and KfW have agreed to finance this component.
- Upgrading and expanding sewage collection systems in the Chunga/Matero sewersheds. This project will address system upgrades for already serviced areas and expansion into un-sewered areas. This project is expected to be financed by the AfDB.
- Upgrading and expanding sewage collection systems in the Manchinchi and Ngwerere sewersheds, promoting implementation of on-site sanitation solutions and FSM and strengthening the capacity of LWSC to effectively manage sanitation services. This aspect of the Program is proposed for financing from the World Bank under the Lusaka Sanitation Project.

51. Financing from the various IFIs has not yet been confirmed, and is scheduled for appraisal by the various IFIs after Board submission of this project. An indicative list of agreed sub-projects for the Lusaka Sanitation Program is presented in table A3.7 and financing an A3.8 below.

Table A3.7 List of sub-projects and financier

Code	Description	Sewershed
World Bank		
CSE-23	Sewer network expansion Kafue Road	Ngwerere
CSE-08	Sewer network expansion Emmasdale and Chaisa	Ngwerere
CSU-05	Upgrade of Ngwerere Western Interceptor	Ngwerere
CSE-25	Network expansion in Chawama, Kuomboka	Manchinchi
CSE-10	Network expansion in Garden	Ngwerere
CSU-07	Upgrade of Ngwerere Downstream Collector	Ngwerere
TU-04	Upgrade of Ngwerere Sewage Ponds	Ngwerere
TE-02	Extension of Ngwerere Sewage Ponds	Ngwerere
Standby		
CSE-20	Network expansion Kanyama	Manchinchi
CSE-05	Network expansion Chipata (short term only)	Ngwerere
CSE-06	Network expansion Kabanana	Ngwerere
EIB		
CSU-08	Manchinchi West	Manchinchi
CSU-09	Manchinchi South & IC to Garden Ponds downstr.	Manchinchi
CSU-10	Manchinchi East	Manchinchi
CSU-11	Manchinchi South & IC to Garden Ponds upstream	Manchinchi
CSU-16	Mass Media PS	Manchinchi
CSU-17	Woodlands PS	Manchinchi
CSU-18	Kabwata PS	Manchinchi
CSU-19	Kamwala PS	Manchinchi
CSU-20	Lumumba PS	Manchinchi
CSE-01	DMA-27 and Chunga	Chunga/Matero
CSE-03	DMA # 27	Chunga/Matero

CSE-11	Expansion to Industries	Chunga/Matero
CSE-13	Villa Elisabetha	Manchinchi
CSE-14	in Industries - second phase	Manchinchi
CSE-15	in North Mead	Manchinchi
CSE-16	Rohodes Park	Manchinchi
CSE-17	Shakespeare	Manchinchi
CSE-18	to Rhodes Park	Manchinchi
CSE-20	in Kanyama	Chunga/Matero
CSE-29	Prospect Hill South	Manchinchi
CSE-30	to Woodlands	Manchinchi
CSE-31	to Prospect Hill North	Manchinchi
CSE-32	to State House and Woodlands Ext.	Manchinchi
CSE-55	to DMA-27	Chunga/Matero
AfDB		
CSE-02	Chunga-Lilanda George & Matero	Chunga/Matero
CSE-07	Matero	Chunga/Matero
CSE-12	in Industries - first phase	Chunga/Matero
CSE-43	Kaunda Square	Kaunda Square
CSU-01	Western interceptor downstream	Chunga/Matero
CSU-02	Western interceptor upstream	Chunga/Matero
CSU-14	Noxious PS	Chunga/Matero
TU-06	Chelston Sewage Ponds	Chelston
TU-02	Matero Sewage Ponds	Chunga/Matero
Standby		
CSE-19	in Sikanze / Government	Manchinchi
CSE-56	Kamanga	Kaunda Square
CSE-57	Chamba Valley	Kaunda Square

Table A3.8: Indicative financing of Lusaka Sanitation Program

	Preliminary financing (US$ million equivalent)					
	WB	EIB	KfW	AfDB	GRZ	TOTAL
Component 1: Sewerage improvements						
1a) Sewerage collection	38	45		30	2.5	115.5
1b) Sewerage treatment		93	47			140
Component 2: On-site sanitation	13			11	1	25
Component 3: Institutional Strengthening	9			9		18
Unallocated	2					2
PPA refinancing	3					3
TOTAL	65	138	47	50	3.5	303.5

Note: Costs are indicative. EIB financing can cover up to 50 percent of overall program. KfW financing will rely on outcome of the tariff study. AfDB financing is yet to be fully defined.

52. Other partners with a role in sanitation in Lusaka include UNICEF, which is starting a sanitation project in Lusaka focusing on sanitation marketing and hygiene promotion in selected peri-urban areas. WSP will continue to provide TA support to LWSC on lesson learning for innovative sanitation improvements, monitoring, south–south learning and engagement of private sector. A number of NGOs are also active in sanitation in Lusaka. LWSC held a project preparation launch workshop at which all NGOs and private companies working in sanitation in Lusaka presented their perspectives. All material for the launch workshop is in the project files.

Annex 4: Implementation Support Plan
ZAMBIA: Lusaka Sanitation Project

Strategy and Approach for Implementation Support

1. The strategy for implementation support has been developed based on the nature of the project and its risk profile. The aim is to make implementation support to the client more flexible and efficient by focusing on implementing the risk mitigation measures defined in the Systematic Operations Risk-rating Tool (SORT).

Implementation Support Plan

2. The World Bank task team leader (TTL) will provide ongoing support by coordinating with the client and World Bank staff who will provide implementation support on technical, fiduciary (FM and procurement) and safeguards aspects. Implementation will be supported by task team members in the World Bank's Washington, DC offices as well as selected field offices (such as Lusaka, Harare, Maputo and Nairobi). This will ensure that field missions can be organized quickly should the need arise and that international expertise can also be mobilized to provide global best practices. Formal missions will be carried out at least twice per year.

3. In conjunction with government counterparts, the World Bank will monitor progress against the monitoring indicators in the results framework. The World Bank will also monitor risks and update the risk assessment and risk management measures, as needed. A midterm review will involve a more in-depth stocktaking of performance under the project. Based on the assessment of progress at the midpoint, government counterparts and the World Bank will consider recommendations for improvements or changes, and use of contingency funds assigned to the project.

4. The World Bank team will maintain close coordination with implementing partners, and will seek to coordinate supervision missions with those development partners where possible. Table A4.1 summarizes the annual expected supervision needs. Year 1 will require a higher level of input to support the project get started. Missions will be scheduled as needed.

Table A4.1: Implementation Support Main Focus and Skills

Skills Needed	Resource Estimate (Staff weeks/year)	
Task Team Leader	10	Based in Regional Office
Procurement specialist	8	Based in Country Office
Financial Management specialist	4	Based in Country Office
Sanitary engineer	8	Based in Regional Office
On-site sanitation specialist	8	Based in Regional Office
Economist/financial analyst	8	Based in HQ
Institutional Development specialist	8	Based in Country Office
Public Health Specialist	4-6	Based in Country Office
Social and environmental specialist	8	Based in HQ
Administrative and client support	12	Based in Country Office

Annex 5: Detailed Project Costs
ZAMBIA: Lusaka Sanitation Project

Code	Sub-project name	IDA financed Cost (US$) excl. VAT	GRZ financed (US$)	TOTAL
Component 1: Sewerage Improvements				
1.1	***Year 1 investments***			
CSE-23	Sewer network expansion Kafue Road	5,549,074		
CSE-08	Sewer network expansion Emmasdale and Chaisa	2,060,185		
CSU-05	Upgrade of Ngwerere Western Interceptor	3,282,407		
1.2	***Year 2 to 5 investments***			
CSE-25	Network expansion in Chawama and Kuomboka	5,123,148		
CSE-10	Network expansion in Garden	6,370,370		
CSU-07	Upgrade of Ngwerere Downstream Collector	3,157,407		
TU-04	Upgrade of Ngwerere Sewage Ponds	5,961,111		
TE-02	Extension of Ngwerere Sewage Ponds	2,386,111		
	Household connections (50%)	1,295,370		
	Design and supervision engineer	2,814,815		
	Resettlement and land acquisition for Ngwerere Pond expansion		2,500,000	
Sub-total Component 1		38,000,000	2,500,000	40,500,000
Component 2: On-site sanitation				
2.1	Hygiene promotion program	800,000		
2.2	On-site sanitation promotion and construction program incl. construction support fund for 10,000 units	5,000,000		
2.3	Develop equipment and procedures for pit latrine emptying and procure for 7 emptying teams	1,200,000		
2.4	2 fecal sludge management facilities	800,000		
2.5	Transitional operating subsidy	800,000		
2.6	Decentralized wastewater systems (DEWATS)	3,000,000		
2.7	Support to LWSC to deliver FSM and OSS construction	1,400,000		
	Resettlement and land acquisition for FSM		1,000,000	
Sub-total Component 2		13,000,000	1,000,000	14,000,000

Code	Sub-project name	IDA financed Cost (US$) excl. VAT	GRZ financed (US$)	TOTAL
Component 3: Institutional Strengthening				
3.1	***Project Management***			
	PIU staff costs	2,850,000		
	Incremental operating costs	0		
	Project management support and capacity building	1,350,000		
	Unutilized project preparation advance funds	0		
3.2	***TA for LWSC***			
	Performance contract audit	250,000		
	TA to improve sanitation operations	800,000		
	Training	350,000		
	Feasibility studies, update of the Sanitation Master Plan	700,000		
	Sewer maintenance equipment	600,000		
	Credit rating update for LWSC	100,000		
3.3	***Program Monitoring***			
	TA for program monitoring	1,000,000		
	Vehicles and motor bikes	250,000		
	Laboratory equipment and reagents	500,000		
	Office rehabilitation and equipment	250,000		
Sub-total Component 3		9,000,000	0	9,000,000
Sub-total Components 1+2+3		60,000,000	3,500,000	63,500,000
	Repayment of project preparation advance (PPA) funds	3,000,000		3,000,000
	Unallocated	2,000,000		2,000,000
Financing required		**65,000,000**	**3,500,000**	**68,500,000**
Total financing required		**68,500,000**		

Annex 6: Financial and Economic Analysis
ZAMBIA: Lusaka Sanitation Project

ECONOMIC ANALYSIS

Summary

1. The objective of the economic analysis was to examine the economic viability of Components 1 and 2 of the project, by combining quantifiable direct benefits (land value increase) and indirect health benefits expected from sanitation interventions. A number of other benefits have not been quantified due to either their non-tangible nature or a lack of usable data (for instance, improvements in environmental conditions and water quality).

2. Results of the project economic analysis measured by the NPV and ERR over a period of 20 years at a discount rate of 10 percent are summarized in the table below, demonstrating that the project is economically justified. This would be further strengthened if many of the unquantifiable benefits were accounted for.

	NPV	ERR
Overall Project Economic Viability	$2,460,772	11%

Introduction

3. The proposed Project will increase access to sanitation services in select areas of Lusaka and strengthen LWSC's capacity to manage sanitation services. The project will be implemented over a five year period (2015-2020) and consists of three components: (1) sewerage improvements, (2) on-site sanitation, and (3) institutional strengthening.

4. WSP recently published a short note on the economic impact of poor sanitation in Zambia based on a desk study of secondary data. The note concludes that Zambia loses 1.3% of GDP due to poor sanitation, primarily due to illness and premature death from the public health impacts of poor water, sanitation and hygiene. The economic burden of poor sanitation falls most heavily on the poor as the poor are most likely to have inadequate sanitation facilities.

Overall Benefits and Beneficiaries of Project Implementation

5. The beneficiaries of the proposed Project include:

i. **LWSC sewerage customers**—The project will upgrade existing sewers and main collectors and expand the sewerage system to new customers. The investments will provide 4,100 new connections (serving 33,000 people) assuming 50% of the households in the sewered areas connect to the sewer. 82 kms of sewers will be upgraded.
ii. **On-site sanitation customers**—180,000 people are expected to benefit from 10,000 on-site sanitation facilities, and 450,000 from improved FSM services.

iii. **LWSC water customers**—All LWSC customers with water connections—currently 1.4 million people using 91,342 connections—will benefit from improved protection of the groundwater and avoid further water treatment costs that would have been passed onto the water supply customers by LWSC.

iv. **Greater Lusaka residents**—the Project will indirectly benefit non-LWSC customers in the intervention areas and beyond by: (i) reducing the contamination of surface- and ground-water which they consume, (ii) increasing the capacity to monitor (and correct) effluents from WWTPs, of surface- and ground-water quality, and of disease outbreaks.

Methodology

6. A cost benefit analysis was carried out for Components 1 and 2. The analysis assumes that the time period in which the benefits from the on-site sanitation investments will occur is 20 years. A supplemental description providing details of the methodology is included at the end of this Annex.

Description of Benefits

7. This analysis does not attempt to model the impacts of improved sanitation but draws on anecdotal and empirical evidence of other studies—by local and global stakeholders on the state of water and sanitation interventions in the region and globally—to demonstrate the potential benefits.

8. To estimate indirect benefits and essential health benefits expected from the Project, the analysis used methodology developed by the World Health Organization (WHO), which comprises the following benefits from water and sanitation interventions: (i) avoided direct health expenditure due to decrease in illness, (ii) income gained as a result of decrease in illness-related absenteeism in working age population, (iii) income gained as a result of decrease in child illness related absenteeism among caretakers of targeted school age population; (iv) opportunity cost of school absenteeism among the targeted school age population; (v) estimated value of loss-of-life avoided as a result of improvements in water and sanitation; and (vi) estimated value of time savings resulting from improved convenience of access to sanitation. The impact of poor sanitation on chronic malnutrition (stunting) through, so called, environmental enteropathy, has been recently proven. However, the WHO methodology used does not yet include the well-known negative effects on the learning ability and lifelong earning potential of stunted children.

9. For the sewerage improvements, the analysis also includes a *land value benefit*. The LCC requires owners closer than 61 meters to the sewer to connect, making reference to Regulation 9 of the Public Health Act which requires "if the building or closet is located within 61 meters of any sewer ... to connect the water closet to said sewer" and "where sewer provided, cesspools or septic tanks, etc. [are] no longer to be used for the reception of drainage".[11] The analysis assumes a corridor of 50 meters on each side of the sewer benefitting from the investment, and increase in land value of two percent.

[11] Lusaka City Council, Public Health Act, page 119/1158.

10. It is noted that, in addition to the benefits above, there are many other potential benefits that are not factored into the analysis described here because of lack of usable data, difficulty quantifying and monetizing, or difficulty drawing a direct link between the proposed investments and the costs avoided (for instance, environmental costs). Water quality issues, for instance, are proving to be a heavy financial and social burden for the government. The investments in Component 1 in particular will significantly improve the environmental conditions in the project areas, improve the quality of groundwater, and improve the conditions downstream. The social and health benefits associated with these water quality interventions are immense—likely over and above the benefits quantified here.

11. It should also be recognized that the real benefits accruing to the population may not be financial or economic in nature—for instance, improved sanitation provides comfort and dignity. Therefore, the estimated benefits from the Project's components described in this analysis can be considered conservative, and it can reasonably be assumed the actual benefits will be larger.

Estimated Costs

12. The estimated costs in this category include hardware investment costs, and operation and maintenance expenses. The investments are summarized in Annex 5 in Component 1 and 2.

Estimated Benefits

13. *Avoided direct health expenditure*. The calculation results in about US$33.60 of annual health expenditure per person for all WASH-related diseases. The project team estimated that about 30 percent of the total WASH-related disease incidents can be prevented as a result of the project interventions (based on global WHO estimates). As a result, each beneficiary is calculated as saving $10.08 of annual health expenditures. Applied to the total number of beneficiaries targeted under the project (360,000), the total annual benefit of the project in this category is US$2,047,248.

14. *Income gained due to avoided days lost from work.* The analysis estimates 0.54 days off work can be avoided as a result of the project interventions. The number of avoided sick days, combined with the opportunity costs of time (based on minimum wage) estimate for working adults, results in about US$608,735 annual benefit in this category.

15. *Days of school absenteeism avoided.* The analysis estimates about 0.81 absent days can be avoided per person of school age population. This estimate, together with the estimated opportunity cost of time of school-age target population, results in about US$423,680 total annual benefit.

16. *Income gained due to avoided days lost from work as a result of child illness.* The analysis estimates about US$706,132 of yearly savings for the targeted population.

17. *Value of loss-of-life avoided.* The project intervention is expected to avoid the loss of 1,890 years (30 percent of the total). When combined with the minimum income per year, this estimate results in just over US$4 million as the value of total avoided DALYs per year.

18. *Convenience time savings.* The analysis results in 125,000 productive days' equivalent saved per year in the entire targeted population, which in combination with the opportunity cost of capital (daily minimum wage) leads to an annual savings of about US$1,409,109 in this category.

19. *Land value increase.* The analysis results in an increase in land value of just over $1.5 million

Conclusions

20. The following table summarizes annual value of the above project health benefits as well as present values of these benefit streams over the duration of different intervention options.

Benefit from Project On-Site Sanitation Interventions	**Annual Benefit Amount (US$) from On-site Sanitation (2020-2035)**
Avoided health expenditure	2,047,248
Avoided income loss (working adult)	608,735
Avoided school absenteeism	423,680
Avoided income loss (caretakers for sick child)	706,132
Avoided loss of life	4,090,701
Convenience time saving	1,409,109
Total benefits	**$9,285,605**

21. *ERR sensitivity - total project cost.* A sensitivity analysis was carried out for various risk factors. These are summarized in the following table:

Table A6.1 Sensitivity Analysis - Total Project Cost

Criteria	**ERR**
Increase in costs	
10% increase in total cost	9%
20% increase in total cost	7%
50% increase in total cost	2%
Decrease in benefits	
10% decrease in benefits	9%
20% decrease in benefits	6%
40% decrease in benefits	0%
Combined increase in total cost and decrease in benefits	
Increase in costs and decrease in benefits by 5%	9%

Criteria	ERR
Increase in cost and decrease in benefits by 10%	7%
Increase in cost and decrease in benefits by 30%	-1%
Combined decrease in total cost and increase in benefits	
Decrease in cost and increase in benefits by 5%	13%
Decrease in cost and increase in benefits by 10%	16%
Decrease in cost and increase in benefits by 30%	27%
Decrease in wage	
Decrease of 10%	9%
Decrease of 20%	7%
Decrease of 30%	5%

Supplementary description of methodology

22. The economic analysis does not include an assessment of the DEWATS, which were included at appraisal, and will be assessed during implementation.

23. These benefits have been determined under the assumption that the participatory process, along with the implementation of a hygiene and sanitation behavior change campaign targeted at low-income households will produce the expected behavior change and associated benefit streams.

24. It is noted that the assumptions about the value of time may also overestimate the opportunity cost of time and the actual economic value of some of the benefits. It also assumes that, for the beneficiaries concerned, the situation without the project is having no access to sanitation. Because of unemployment and underemployment, in some cases, the changes in time usage will lead to income gains, but in others, they will simply lead to more non-productive time available to the targeted population. While this additional non-productive time surely still has intangible value for the targeted population, the economic value of it can be more questionable. Similarly, the analysis might be double counting—for instance avoided health care costs and increased income from disease are also measured by DALYs. For the analysis to remain conservative in its conclusions, some of the assumptions related to estimating the opportunity cost of time were reduced from the levels suggested in the WHO study. The following paragraphs describe the methodology for each of the benefits of sanitation interventions under the project.

- *Avoided direct health expenditure.* The calculation of this benefit is based on the WHO's estimated burden of environmental diseases and, more specifically, the estimated share of diseases that can be attributed to water, sanitation, and hygiene (WASH) risks. The analysis takes into account only diarrheal diseases. The burden of diseases attributable to lack of WASH services (at 30 percent of the total diseases) is combined with the project's team's estimated monthly health expenditures per capita.

- *Income gained due to avoided days lost from work.* This benefit is calculated based on the estimated total incidence of sickness per person in the targeted areas, multiplied by

the working age population targeted by the project. Out of an estimated three incidences of sickness in the target population, about 30 percent are estimated to be WASH-related based on the burden of the disease mentioned above, and the project intervention is projected to prevent about 30 percent of the incidence of sickness. This translates to two days per incident according to the WHO study.

- *Days of school absenteeism avoided.* This benefit uses the same assumptions as the previous benefit for estimating the total avoided incidence of WASH-related sickness in targeted school age population. The number of absent days per episode of sickness—three days per incident for school-aged population based on WHO data—is applied, together with the estimated opportunity cost of time of school-age target population. The opportunity cost of time for this segment of the population is taken at 50 percent of the adult working population's figure. Even though most of the school age population is probably not productively employed, it can be argued that school absenteeism affect the future earning potential of the target population and therefore assigning economic value to this benefit based on the population's estimated future earnings potential is justified for this analysis.

- *Income gained due to avoided days lost from work as a result of child illness.* The calculation methodology for this benefit is similar to the previous two categories in that it is based on the total incidence of sickness in the targeted population: 0-59 months. According to the WHO study, the duration of illness in this target population is 5 days. This estimate was then combined with the opportunity cost of caretakers' time to calculate the benefit. In order to avoid overestimating this benefit, and taking into consideration the likelihood that not all caretakers in the targeted population may be productively employed, opportunity costs were estimated at 50 percent of the adult population's opportunity cost of time (based on minimum wage), as per the WHO methodology.

- *Convenience time savings.* The final benefit quantified for this analysis is the convenience time savings as a result of improved sanitation access. Time savings occur as a result of, for example, closer access to latrines and shorter waiting times at public latrines. These time savings potentially translate to more productive activities or more leisure time. The value of convenience time savings is estimated by assuming a daily time saving per individual for access to sanitation facilities, and then multiplying these by the estimated opportunity cost of time (in this case, minimum wage). The 2004 WHO study estimates that time save per day due to less distant sanitation facilities and less waiting time is about 30 minutes per person. For this analysis, a more conservative estimate of 15 minutes per day was used, resulting in about 2.5 days' equivalent of sanitation access time saved per person per year as a result of the project's planned improvements.

Assumptions	Value	Unit	Source, if applicable
Land value increase due to sewerage	2%		Project team estimate
Zambian minimum wage (kwacha) / month	700	kwacha/month	MCC Project Team

Current exchange rate	6.69996	kwacha/$	www.xe.com, 2/10/15
Zambian minimum wage	$104.48	$/month	Calculation
Zambian minimum wage	$0.59	$/hour	Assuming 8 hours of work, 22 days a month
Urban Lusaka unemployment rate	0.15	%	International Labor Organization
Opportunity cost of time, 15-64	$1,065.68	$/year	Calculation
Opportunity cost of time, 15-64	$88.81	$/month	Calculation
Opportunity cost of time, 15-64	$11.10	$/day	Assuming 8 hours of work, 22 days a month
Opportunity cost of time, 15-64	$0.50	$/hour	Assuming 8 hours of work, 22 days a month
Opportunity cost of time, 0-14/caretakers	$44.40	$/month	50% of adult working population's figure
Opportunity cost of time, 0-14/caretakers	$5.55	$/day	50% of adult working population's figure
Opportunity cost of time, 0-14/caretakers	$0.25	$/hour	50% of adult working population's figure
Number of people per household	5	people	Project team
Annual health expenditures	$112.00	$/person	Project team
Annual health expenditures result of WASH related diseases	$33.60	$/person	Calculation
Percentage of WASH-related diseases incidents prevented as a result of project	30%	%	Project team
Cost per latrine	$1,000	$	Project team
Cost of emptying the latrine per year	$100	$	Project team
Cost of maintenance per latrine per year	$10	$	Project team
Percentage of population 15-64	50%	%	Census information
Percentage of population 0-14	46%	%	Census information
Percentage of population 0-59 months	18%	%	Census information
Incidence of sickness	3	person/year	Project team
Number of days per incident (working age)	2	days	Project team
Number of days per incident (school age)	3	days	WHO Estimates
Number of days per incident (1-5)	5	days	
Incidences WASH related	30%	%	Project team
Project intervention prevention rate	30%	%	Project team
Sick days avoided due to project intervention (working age)	0.54	days	Calculation
Days of school absenteeism avoided	0.81	days	Calculation
Sick days avoided, 0-59 months	1.35	days	Calculation
Time savings per year per person	2.5	days	WHO estimates it's 30 mins per person per day, we have used more conservative 15 mins
DALYS lost per year, per 1,000 people	63	DALYs	Zambia WASH Sector Brief, AusAid

FINANCIAL ANALYSIS

Summary

25. A full financial assessment of LWSC, including affordability analysis is on-going through a consultancy financed by KfW, a co-financier of the LSP. The objective of the financial analysis performed here for Component 1 is to determine the required increase of the sewerage tariff which ensures that LWSC collects sufficient incremental cash to cover all project related expenses i.e. to ensure a positive cash-flow. The model shows that the project component is financially viable if the sewerage tariff is increased by 0.16 US$/m³ gradually over the project period. This corresponds to a 20% increase of the current sewerage tariff from 30% to 50% of the water supply tariff for domestic and from 45% to 65% for other customers.

26. The objective of the financial analysis of Component 2 is to determine the required charge per latrine emptied which ensures all operation costs of fecal sludge collection and treatment at the FSM station are covered. The analysis shows that the project component is financially viable at a charge of US$75 per latrine emptied. Based on the ongoing pilot plant operation, the current charge is US$49 per latrine emptied. Assuming a gradual increase of the charge from US$49 to US$75 over the project implementation period, and an operational subsidy of US$763,000 to cover the financing gap for the years 2018-2020, the component is financially viable. This amount is included in the project budget which will be entirely on-granted to LWSC.

27. The LSP includes three components

- Component 1—Sewerage Improvements, which includes extension of the sewerage system to new areas and upgrading of existing collectors and sewage treatment facilities. The investor and asset owner will be LWSC.

- Component 2—On-site sanitation, which includes the construction of new on-site sanitation facilities (improved pit latrines, septic tanks etc.), construction of 2 fecal sludge management (FSM) stations, development and procurement of equipment for the latrine emptying teams, marketing and hygiene promotion programs and performance based contracts for management and implementation of all activities. The owner of the pit latrines will be the latrine users. The project will provide through LWSC a grant contribution for their construction. The owner and operator of the FSM facilities will be LWSC. The operation of the emptying of the on-site facilities will be contracted out by LWSC to third parties. The financial analysis for Component 2 does not included the DEWATS which were included at appraisal, and will be assessed during implementation.

- Component 3—Institutional strengthening, covers expenses of LWSC for project management and technical assistance to LWSC such as training, consultancy services for preparation of design and tender docs for further projects and equipment for sewer maintenance. It further includes a comprehensive monitoring program for the Lusaka Sanitation Program with the involvement of Ministry of Health and Lusaka City Council. The owner of this component is also LWSC.

Applied Methodology

28. The objective of a financial analysis is to demonstrate that a project is financially viable and beneficial from the perspective of the project owner / investor. This means, only financial streams which are relevant for the investor are taken into consideration. For a sewerage project,

these are the investment costs, operation and maintenance costs and financing costs versus revenues collected from sewerage sales.

29. The typically applied indicators for the financial viability of a project are the net present value (NPV) and the financial internal rate of return (FIRR). The applicable discount rate is either agreed based on country and project particulars, or is determined by calculating the weighted average cost of capital. The project is considered financially viable if the NPV is greater than zero at the applied discount rate and if the FIRR is greater than the applicable discount rate. Commercial banks include usually the debt service coverage ratio (DSCR) as an additional indicator. It indicates to what factor the available cash exceeds the annual debt service, after project operation costs have already been met. To achieve commercial viability of a project from the perspective of a private entrepreneur, the FIRR would need to be clearly higher than the discount rate.

30. Water and sewerage utilities generally aim at providing good quality service at the lowest possible tariff for the customers. Capital expenditures are in most cases subsidized by grant contributions from the city/ municipal administration in order to keep tariffs low. The classical viability indicators NPV and FIRR are therefore not well suited for water supply and sewerage projects managed and operated by public utilities. The most important criterion for a water utility is cash liquidity. So, the tariffs charged must be sufficient to cover at least all operation expenses including maintenance. Sometimes, tariff calculations include depreciation resulting in so called full cost tariffs (economic tariffs). However, water supply and sewerage infrastructure are long term investments and assets have often been devalued by inflation over the years, leading to much too low depreciation values, which then result in too low tariffs. The cash-flow approach is therefore a quick and efficient methodology to determine the required (incremental) tariffs. So, the following financial analysis is directed to establishing the amount by which current tariffs need to be increased to ensure coverage of all operation, maintenance and financing costs for the utility due to the project.

31. Tariffs of LWSC need to be approved by the national regulator NWASCO. The applied methodology is such that direct costs for water supply services and sewerage services are determined separately, but at the end, sewerage tariffs are not spelled out in form of absolute tariff figures (ZMW/m^3) but as a percentage of the water supply tariff. Three different consumer categories exist i.e. domestic, industry and public. The current average sewerage tariffs are 30% of the water tariff for domestic and 45% for other consumers. Block tariffs are in force with progressive rates depending on water consumption which further complicates the determination of a concrete sewerage tariff in ZMW/m^3 terms.

32. The financial analysis performed here below is a cash-flow analysis. It determines the cash-out flows considering investment costs (unless grant financed), operation costs and cost of finance and divides these total costs by the amount of water sold. The so arrived tariff (ZMW/m^3) shows the necessary increase of the current tariff due to the project. Since this is a cash-flow model, it is necessary to take also into consideration the revenue collection efficiency. As it is generally less than 100%, the tariff increase must be proportionally higher to ensure the actual cash collected (not the billed amount) is sufficient to cover all costs. According to the LWSC annual report it was 96% in 2012.

33. Separate financial analyses were performed for project Components 1 and 2 as they are completely different and separate. None was performed for Component 3 as this is purely an institutional strengthening component. The investor and asset owner for Component 1 is LWSC. The funding for this component will be on-lent at IDA terms to LWSC. The financial analysis determines what tariff increase LWSC needs to introduce to cover the incremental costs caused by this project component.

34. The financing for Component 2 will be on-granted to LWSC. The asset owners of the on-site sanitation facilities will be the users. So, these elements are not taken into consideration in the financial analysis. The asset owner for the FSM facilities including emptying equipment will be LWSC. The operation may be contracted out. The financial analysis performed for this activity determines what tariff the operator will need to charge per latrine emptied, to have all operation expenses covered.

Assumptions and Data Base

35. Feasibility studies are available for the proposed sewerage investments included under Component 1, except for two investments. Technical data and cost figures are taken from the feasibility studies or, if not available at the time of the analysis, from the Sanitation Master Plan.

36. A pilot project has been implemented for construction and operation of on-site sanitation facilities, two FSM stations and latrine emptying in Kanyama and Chazanga districts of Lusaka. It has been implemented by the respective Water Trusts under LWSC and with assistance by an NGO. This provides valuable experience and a relatively good data base for the proposed project. Tariffs charged by LWSC for water supply and sewerage services need to be approved by the regulator, the National Water Supply & Sanitation Council (NWASCO). A standard tariff model has been developed which is attached to any tariff adjustment proposal. This is another good data source, as this data is checked and approved. The following table shows the source of input data and assumptions made for performing the two financial analyses.

Input data for Financial Analysis Component 1 – Sewerage Improvements

Parameter	Applied value	Data source
Investment costs	See calculations	Feasibility study
Loan conditions	IDA	IDA terms 1/1/2015
On-lending conditions	Same as loan	Min. of Finance
Sewer maintenance costs	1% of CAPEX	Team estimate
Energy consumption sewage pump stations	See calculations	Feasibility study
Electricity tariff	0.31 ZMK/kWh 55.09 ZMK/month	Energy Regulation Board press statement 1 June 2014
Incremental OPEX Ngwerere sewage ponds	1.5% (0.5% on top of sewerage maint.)	Team estimate
Administrative expenses	120% of direct OPEX	LWSC Financial statements 31 December 2013
Sewerage sales (m^3/year) in 2014	19,093,192 m^3	LWSC
Sewerage charge, domestic	30% of water	NWASCO
Sewerage charge, others	45% of water	NWASCO
Revenue collection efficiency	85%	NWASCO benchmark
Current average water supply tariff of LWSC	5.418 ZMK/m^3	NWASCO app. 2013

Discount rate	10%	Team estimate
VAT	16%	Government publ.
Exchange rate	6.70 ZMK/US$	Team estimate

Input data for Financial Analysis Component 2 – On-site Sanitation

Parameter	Applied value	Data source
No. of latrines emptied (new and existing ones)	10,000 ultimately	Team estimate
No. of latrines constructed	10,000 ultimately	Team estimate
No of people served by latrine (includes communal)	18 in average	Team estimate, pilot project
Construction costs for FSM stations	600,000 $	Team estimate, pilot project
Construction costs of improved latrines	1000 $	Team estimate, pilot project
Equipment costs for 10 latrine emptying teams	800,000 $	Team estimate, pilot project
On-lending conditions	Grant	Min. of Finance
FSM site running costs	12,000 $/a	Team estimate, pilot project
Cost per staff and year	8,500 $/a (50% of average LWSC staff cost)	LWSC annual report 2012
Number of personnel	50	Team estimate, pilot project
Transport cost for latrine emptying	10 $/trip	Team estimate, pilot project
Variable costs for latrine emptying	7 $/latrine	Team estimate, pilot project
Admin & other expenses (overheads)	20% of personnel	Team estimate, pilot project
Maintenance costs for FSM facilities	1% of CAPEX	Team estimate
Maintenance costs for latrine emptying equipment	5% of CAPEX	Team estimate

37. The models have been prepared in real terms, price level 2015.

Financial Analysis Results

Component 1

38. The following table shows the cumulative required tariff increases due to the project. The figures in US$/m³ indicate the required absolute increase. The increase in % refers to the required change of the sewerage rate compared to the currently applied 30% for domestic and 45% for others. The table shows that a gradual tariff increase up to 0.16 US$/m³ (1.09 ZMK/m³) is required until 2021. The third line in the table shows that the 30% sewerage charge will have to be gradually increased to 50% (30+20) of the water supply tariff for domestic customers and to 65% (45+20) for other customers.

Required tariff increases of LWSC for water and sewerage services

Tariff increase	2016	2017	2018	2019	2020	2021
Tariff increase over current tariff (US$/m³)	0.00	0.03	0.04	0.07	0.10	0.16
Tariff increase over current tariff (%)	0%	4%	5%	9%	13%	20%

Component 2

39. The project foresees the construction of 10,000 improved latrines with the construction being subsidized. The activity will be supported by a comprehensive sanitation marketing and hygiene promotion program. Based on the Kanyama pilot experience, in average 18 people are served by a latrine, resulting in 180,000 beneficiaries in total.

40. The Kanyama experience shows that one team is able to empty 4 latrines per day, if the gang is well equipped with tools, machines and transport. 10 emptying teams will be able to empty approx. 10,000 latrines per year (10 x 4 x 250 working days). Assuming a latrine shall be emptied once in 2 years, the proposed FSM facilities will be able to sustain 20,000 latrines. Based on 18 people served per latrine this results in 360,000 beneficiaries. Two FSM facilities shall be constructed with a combined capacity of receiving fecal sludge from 10,000 latrines every year.

41. The financial model calculates the necessary average charge for emptying a latrine based on full coverage of all operation costs. Capital expenditures are totally grant financed. Below table shows that the initial costs will be US$279 per latrine emptied, decreasing gradually to 74 until 2021.

42. Different tariffs are currently charged for latrine emptying, depending on the size of the latrine. The rates are 250, 380 and 450 ZMW/pit. Based on the Kanyama pilot project, the current average charge for latrine emptying is 330 ZMW/pit (49 US$/pit). The operators inform that their true cost for emptying a large pit would be 750 ZMW (110 US$) which is clearly higher than the tariff of 450 ZMW/pit.

43. Below table also shows the proposed tariffs to be charged by the FSM operator. Since the current charge is approximately US$50 per latrine emptying, it is proposed to start off at this tariff and to gradually increase the rate to US$75 per latrine till 2021, the project end. The latter tariff will then be cost covering. This approach creates a financing gap in the period 2018-2020 which needs to be covered by an operational subsidy. The required amount is US$763,000 and needs to be provided for under the project (part of the investment subsidy for latrine construction).

Costs, required tariffs and required operation subsidy for emptying of pit latrines

Tariff increase / Year	Total	2018	2019	2020	2021
Cost per pit emptying (US$)		279	172	98	74
Proposed tariff per pit emptied (US$)		50	60	70	75
Required operation subsidy (US$)	763,000	229,000	337,000	197,000	0

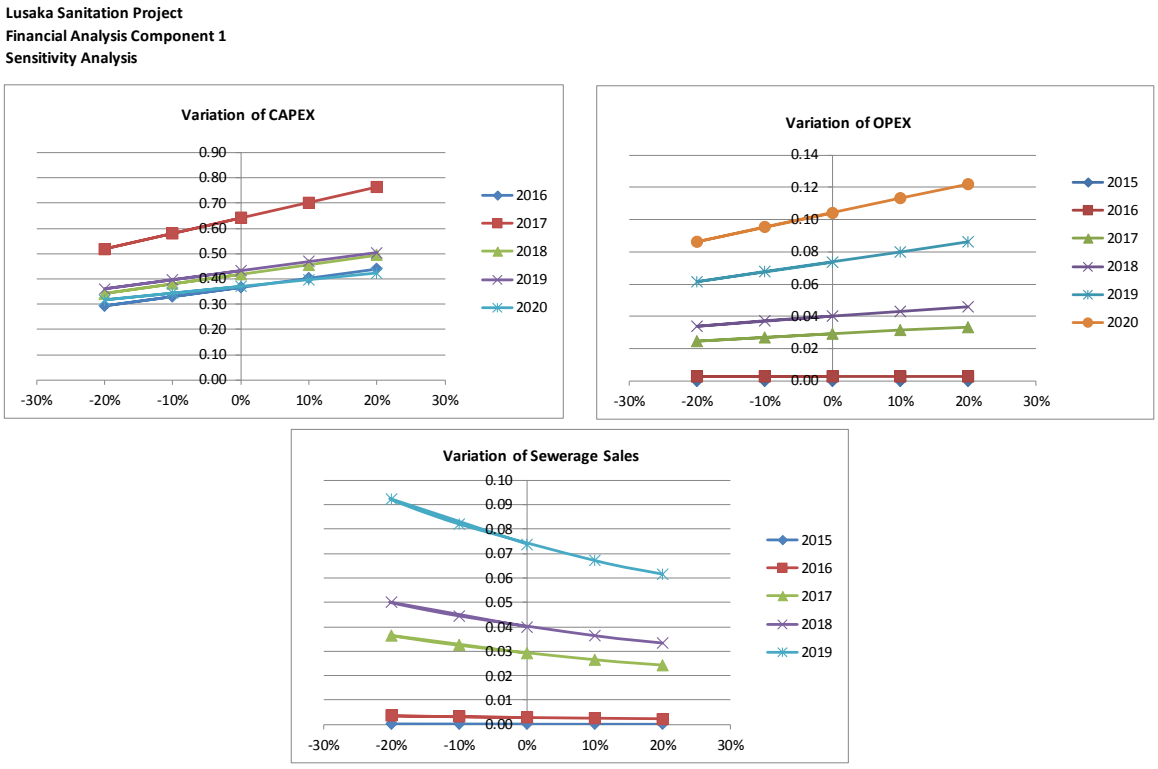
Sensitivity Analysis

Component 1

44. Sensitivity analyses have been performed by varying capital expenditures, operating expenses and the sewerage sales (amount of wastewater billed). Below figures show the effects of such variations on the required incremental sewerage tariff for the initial years (2015 to 2019).

45. The tariff reacts moderately on a variation of capital expenditures. The variation of operating expenses has only a minimal impact. The variation of sewerage amount billed (sewerage sales) has a considerable impact on the required sewerage tariff increases.

Chart A6.1: Sensitivity analysis for component 1



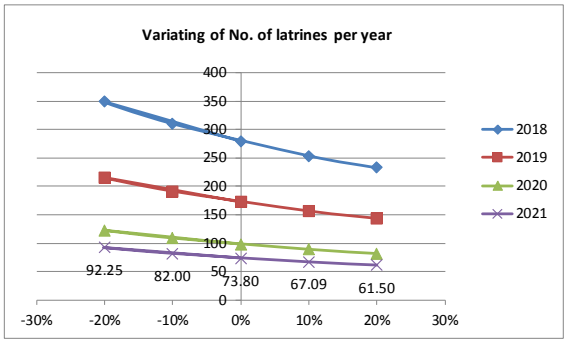
Component 2

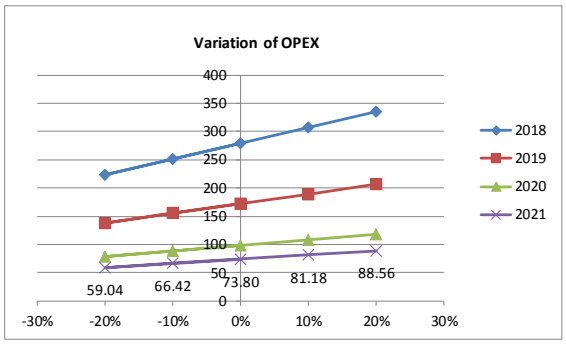
46. Sensitivity analyses have been performed by varying the number of latrines emptied and for varying OPEX. Below figures show the effects of such variations on the required tariff to be charge per latrine emptied for the initial years (2018 to 2021).

47. The tariff reacts considerably on a variation of OPEX and also considerably on the variation of number of latrines emptied per year. A 20% reduction of the number of latrines emptied per year leads to a cost increase from 73.80 to 92.25 ZMW/latrine. An increase of OPEX by 20% leads to an increase of the unit costs from 73.80 to 88.56 ZMW/latrine.

Chart A6.2: Sensitivity analysis for component 2

Lusaka Sanitation Project
Financial Analysis Component 2
Sensitivity Analysis

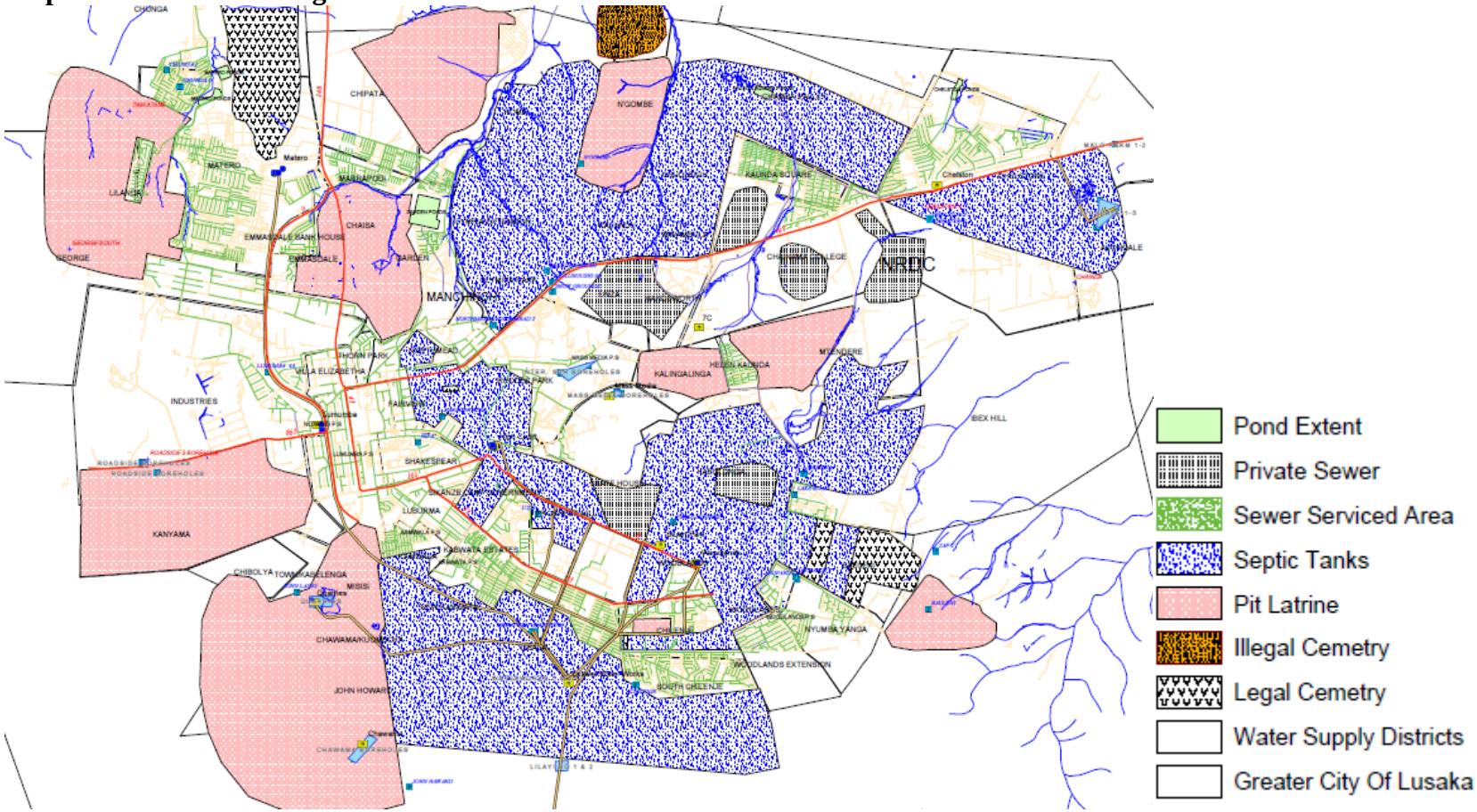




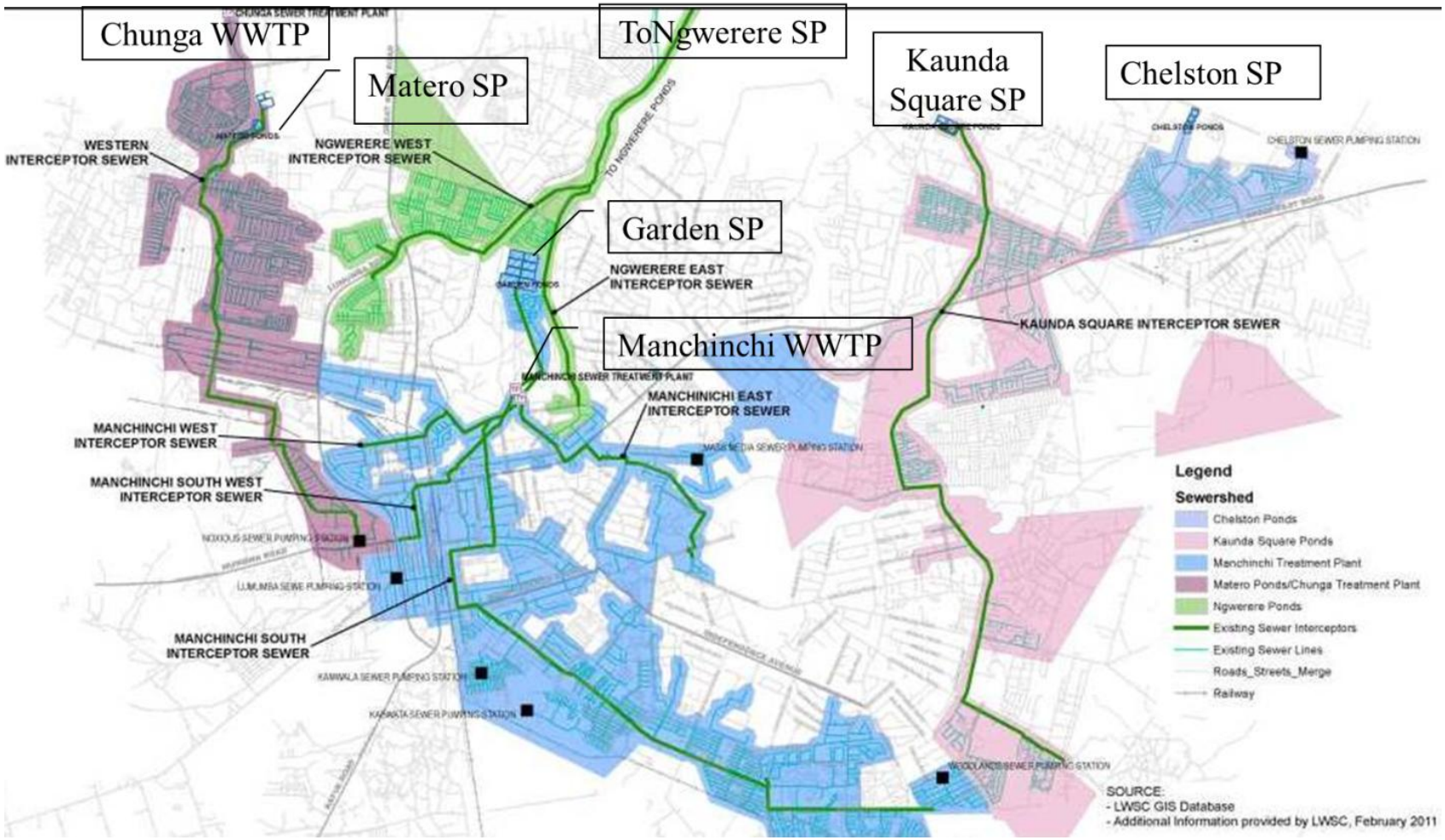
Annex 7: Maps
ZAMBIA: Lusaka Sanitation Project

Map 1: Map of Zambia/Lusaka

Map 2: Sanitation coverage in Lusaka

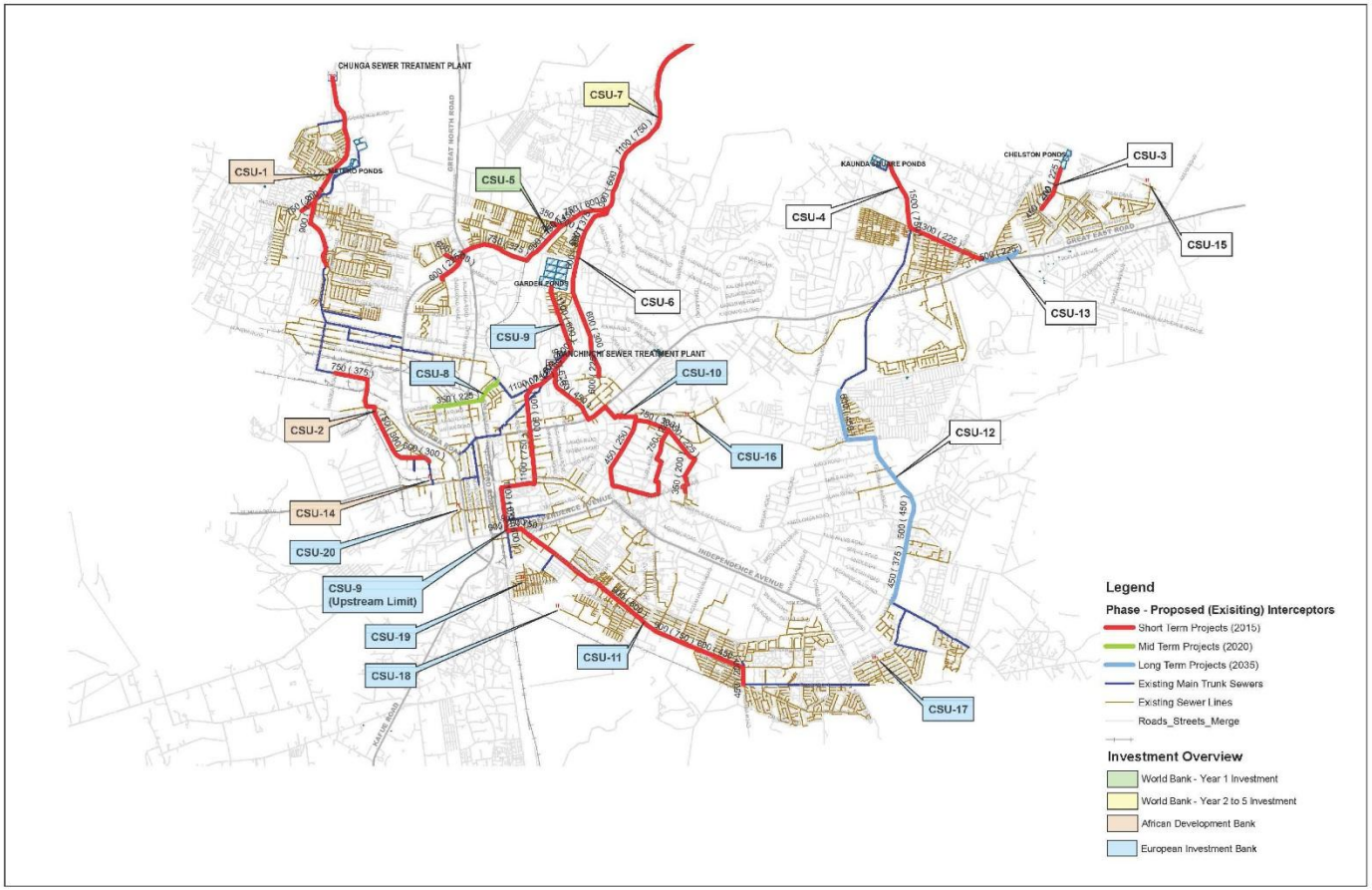


Map 3: Sewersheds of Lusaka City

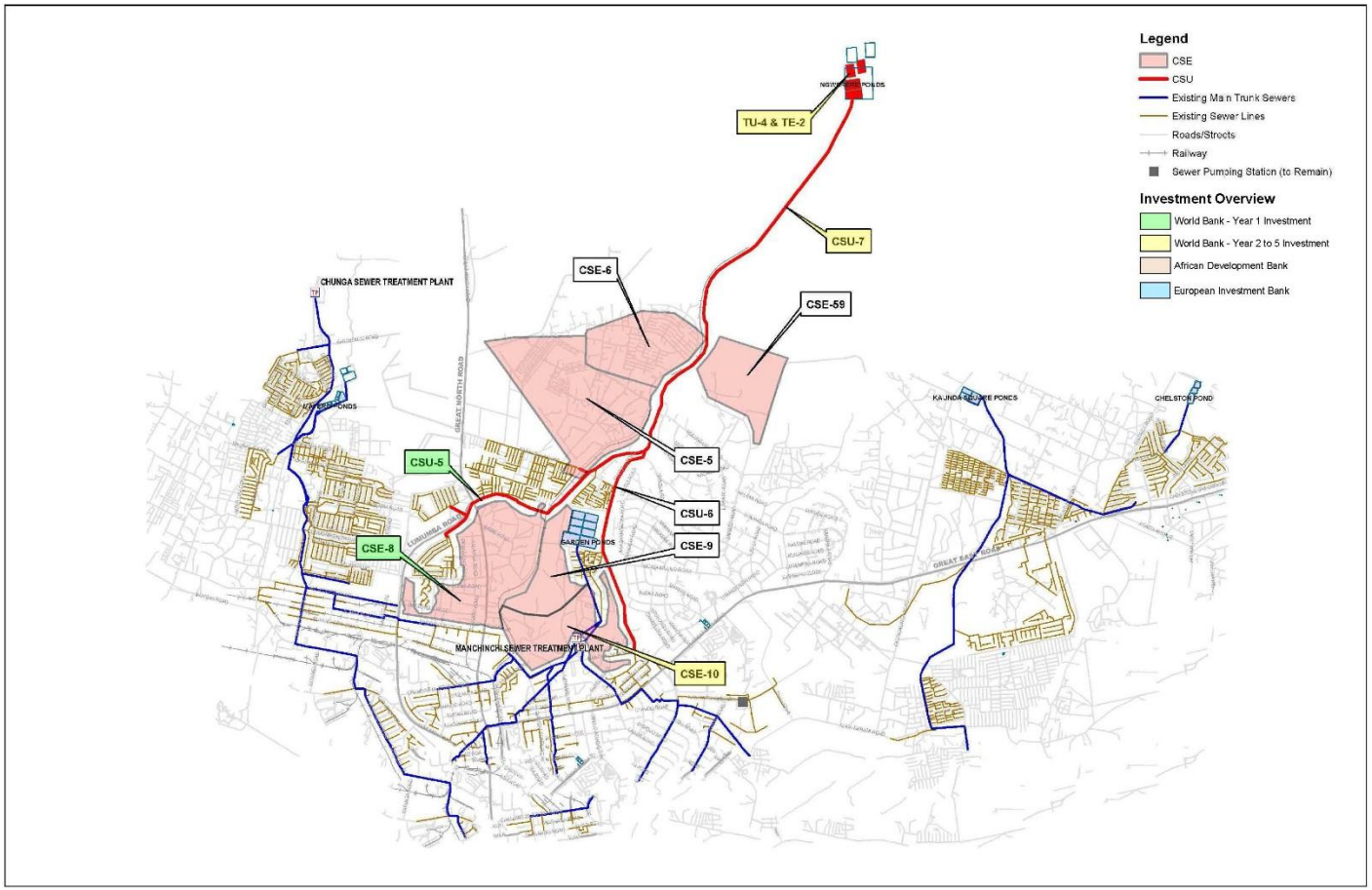


Map 3: Sewersheds of Lusaka City: 1. Chunga/Matero, 2. Manchinchi, 3. Ngwerere, 4. Kaunda Square, 5. Chelston and location of existing sewage treatment plants.

Map 4: Location of investments financed under the Project – Collection System Upgrade (CSU) projects



Map 5 - Manchinchi Sewershed Sub-projects



Map 6 -- Ngwerere Sewershed Sub-projects