MINISTRY OF LOCAL GOVERNMENT AND HOUSING (MLGH) LUSAKA CITY COUNCIL (LCC)

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

THE STUDY ON COMPREHENSIVE URBAN DEVELOPMENT PLAN FOR THE CITY OF LUSAKA IN THE REPUBLIC OF ZAMBIA

FINAL REPORT

ANNEX III

WATER DISTRIBUTION NETWORK MODELING AND ANALYSYS FOR UFW REDUCTION

MARCH 2009

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KRI INTERNATIONAL CORP. NIPPON KOEI CO., LTD. JAPAN ENGINEERING CONSULTANTS CO., LTD.

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The Study on Comprehensive Urban Development Plan for the City of Lusaka in the Republic of Zambia

Final Report

ANNEX 3 WATER DISTRIBUTION NETWORK MODELING AND ANALYSYS FOR UFW REDUCTION

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WATER DISTRIBUTION NETWORK MODELING AND ANALYSYS FOR UFW REDUCTION

CHAPTER 1. INTRODUCTION

1.1 Background

The Study has identified that the high UFW (Unaccounted for Water) in the water distribution networks system of Lusaka could be one of obstacles for future sustainable water supply development, and has been proposing to conduct the UFW reduction program as a part of short-term development program. In this regards, JICA Study Team commenced the basic survey works for modeling and hydraulic analysis of water distribution network in the City of Lusaka in cooperation with Lusaka Water and Sewerage Company (LWSC).

A local consultant, Brian Colquhoun, Hugh O'Donnell and Partners (BCHOD) was appointed in November 2008 to undertake the survey in liaison with Lusaka Water and Sewerage Company (LWSC).

1.2 Objectives of the Survey

The objective of the survey is mainly to establish the water distribution network modeling and analysis. The other objective is to identify the UFW reduction procedures through network modeling and analysis for LWSC to prepare or modify the action plan for UFW reduction.

Specific objectives include:

- To clean up and update the existing LWSC GIS database of water distribution network;
- To establish the water distribution network model using a modeling and analyzing software (WaterGEMS V8.0);
- To stimulate, calibrate and analyze the water distribution flows in the network to identify the priority action for leak detection; and
- To strengthen the capacity of LWSC for modeling, calibration and analyzing of the water distribution network through the training courses and on-the-job training.

1.3 Target of the Survey

Pipe networks consists not only of pipes, but also miscellaneous fittings, services, storage tanks, reservoirs, meters, regulating valves and pumps. For the purpose of modeling the survey works targeted the following existing system elements:

- Water distribution pipe mains
- Boreholes,
- Booster pumps,
- Distribution reservoirs
- Valves

The pipe length in the City by materials and diameters in accordance with LWSC database is summarized as shown in Table 1.1

	Pipe Materials/Length (km)					
Pipe Diameter (mm)	Asbestos (AC)	Steel/GI	PVC/uPVC	Unknown	Total	
75	173, 125	217, 657	61, 888	15, 403	468,073	
90-110	166,448	72,159	55,092	8,838	302,537	
125-160	133,640	51,091	26,125	7,098	217,954	
200-300	71,098	49,941	18,606	5,550	145,195	
325-450	16,575	52,079	554	3,509	72,717	
600-900	0	20,032	0	1,031	21,063	
Unknown	250	3,862	2,289	72,172	78,573	
Total	591,136	466,821	164,554	113,601	1,306,112	

Table 1.3.1 Summary of Existing Network Pipes

1.4 Work Components and Methodology

1.4.1 Work Components

The works are comprised of:

- Confirmation of existing GIS Datasets and Features;
- Establishment of DMA and pipe hierarchies;
- Collection of Basic Data and Information on Existing Water Distribution Facilities;
- Collection, analysis and Input of Consumption;
- GIS Cleaning-up;
- Preparation of Network Model;
- Simulation and Analysis of Network;
- Data Transfer; and
- Training on Modeling and Hydraulic Analyzing
- 1.4.2 Methodology
 - (1) Confirmation of existing GIS Datasets and Features

Features in the existing GIS database were examined and compared with the list of existing datasets and features provided by LWSC. This was followed by field investigations to establish whether most of these features in the existing GIS database exist on the actual ground. LWSC staff spread through out the commercial branches in the DMAs was also interviewed in order to consolidate the verification process.

(2) Establishment of DMA and pipe hierarchies

In order to appreciate LWSC's water distribution network and consolidate on the outlined methodology, the Consultant made a print out of the existing water distribution layout plan that showed the boundaries of the distribution management areas (DMA) and the distribution water network as presented by LWSC. The distribution network was skeletonised leaving 125mm diameter as the minimum pipelines. Thereafter all data pertaining to GIS datasets was captured and compiled accordingly on a zonal basis. This enabled the Consultant identify missing physical data related to components of the distribution network. The data collection exercise was on a stepwise basis. The data of interest included the following:

• Pipe diameters

- Pipe construction materials
- Ground levels from contours
- Pipe lengths
- Age in order to estimate the friction factor, K_f
- Water demand as extracted from each node (either estimated or from the billing section)
- Location of physical components such as booster pump stations, reservoirs, boreholes, etc

The physical components of the network were identified by using ArcGIS 9.2. The established 69 DMAs were separated into 69 boundaries with each boundary representing a particular DMA. The pipes were also divided on the basis of the diameters into three categories namely:

- Tertiary; 125mm dia. 300mm dia.
- Secondary; 300mm dia. 600mm dia.
- Primary; 600mm dia. and above
- (3) Collection of Basic Data and Information on Existing Water Distribution Facilities

After examining all the features in the existing GIS database and their associated available attributes such as diameters, year of installation, etc in the case of pipes, the missing attributes essential for analysis were identified and collected from both the field and consultation of LWSC staff.

For the features existing on the actual ground but not in the existing GIS database established from field investigations and consultation from LWSC staff. Actual positions of the features were obtained in the field by capturing the coordinates the features using the GPS provided by LWSC. The consultant opted to use LWSC's equipment in order to main consistency in data collection. The corresponding essential attributes for these features such as heads and discharges for pumps were also obtained from both the field and records provided by LWSC.

All the features collected from the field together with their attributes were imported into the existing GIS database using ArcGIS 9.2 as part of the updating process.

(4) GIS Cleaning-up

As part of the GIS cleaning-up process, duplications in features such as pipes, boreholes, pumps, etc, in the existing GIS database were eliminated by building topology. Topology refers to well defined relationship between features. By building topology, undershoots (dangles) and overshoots in the pipe network were identified and eliminated. This was achieved by setting topology rules such as the pipes should not have dangles (overshoots or undershoots). The features not connected to the pipe network in the existing GIS database as result of digitising errors, etc, point of connection in the pipes network were established and features were later linked to the pipe network using these points.

Some of the feature datasets were also re-named appropriately, based on the feature classes contained in a particular feature dataset. For instance, the feature dataset containing features such as boreholes was named 'water sources'.

(5) Collection, analysis and Input of Consumption

The Study Team collected monthly consumption figures for May, June, July, August,

September and October 2008 and the details are appended herein in Appendix 1 at the end of the report. These are being analyzed for the purpose of identifying possible areas of water losses.

(6) Preparation of Network Model

The preparation of the network model started in ArcMAP. Features in the existing GIS database were examined and compared with the list of existing datasets and features provided by LWSC. This was followed by field investigations to establish whether most of these features in the existing GIS database exist on the actual ground. After a substantial cleaning of the database, the network work was exported to WaterGEMS were further building and cleaning of the model has continued. This is being achieved by trial simulations which are revealing some inconsistencies in the network.

(7) Simulation and Analysis of Network Model

Based on the network model as well as collected and analyzed consumption data, simulation of net work flow was carried out. To enhance accuracy of the model, the Study Team tried calibration of the model through site survey.

(8) Data Transfer

This will involve transferring the cleaned GIS database and network model to the LWSC database.

(9) Training on Modeling and Hydraulic Analyzing

The consultant commenced on-the job training in November 2008 which started with collection of basic data and information on Existing Water distribution Facilities. The programme is still going on with training on modeling and hydraulics analysis.

1.5 Organization of Work Implementation

A survey team was formulated by the local consultant. The Team Leader of the survey team performed the function of management under supervision of the Study Team. The technical project staff comprises a GIS expert (ArcGIS 9.2), hyrdraulic modeling expert, water supply engineers, junior water supply engineers and surveyors. The manager, senior engineers and GIS experts from the technical services department of LWSC were involved in the survey works.

1.6 Actual Performance Implementation

The survey works started on in November 2008 and the works were achieved in February 2009.

1.7 Output of the Works

The required output from this assignment is itemized below:

- Training Materials; these will be materials on modeling, Analyzing and calibrating.
- Final Report; raw data collected in the field and from LWSC, results of calibration and analysis, network model and conditions of simulation
- Recommendation on UFW reduction

CURRENT WATER DISTRIBUTION SYSTEM CHAPTER 2.

2.1 **Outline of Lusaka Water Supply and Distribution**

Lusaka Water Distribution Network has 71 Distribution Management Areas (DMAs) of which 2 of them are satellite systems. The names of the DMAs are appended herein at the end of the report. The most predominant pipe materials in the distribution system are asbestos cement pipes followed by steel/GI pipes and the PVC/uPVC pipes. The total pipe length is approximately 1, 306 km. This is expected to change once the network is refined and the model is running. The following table gives the outline of the current distribution system.

Item No.	Description	Quantity
1	Distribution Management Areas (DMAs)	71No. (2No. are satellite systems)
2	Pipes	504 km
3	Reservoirs and Tanks	45No.
4	Boreholes	78No.
5	Booster Stations	13No.
6	Valves	5936No.
7	District Water Meters	106No.
8	Nodes for pipe diameters above 125mm dia.	6503No.

Table 2.1.1 Outline of Current Distribution System

2.2 **GIS Database of Lusaka Water Distribution Network**

The Lusaka Water and Sewerage Company database contains the following feature dataset:

1)	Buseko	5)	Sewer
2)	Cadastral	6)	Water

2) Cadastral Water

Waterlines

7)

- 3) Chong- Luangwa- Lusaka- Feature Elements
- 4) OP-Areas

In addition to the above feature datasets, there are feature classes not in any particular feature dataset; these are indicated as follows;

- 1) Borehole
- 2) Contours
- 3) Contours Anno
- 4) District-Boundary
- 5) Greater-Lsk
- 6) ITC

- 7) Metering-Status
- 8) Tanks
- 9) Water-District
- 10) Water-District-Clip
- 11) Woodlands-District
- 12) WSD

^{2.2.1} Outline of LWSC GIS Database

2.2.2 Component of Dataset and Feature

(1) Feature Dataset: Buseko

Feature classes in Buseko are;

- 1) Drain 2) Electri-Pole
- 3) Exposure
- 4) Locations
- 5) Plots
- 6) Power-Line
- 7) Road

(2) Feature Dataset: Cadastral

Feature classes in cadastral:

1)	Avondale	27) Kabwata-ss
2)	Business-Props	28) Kabwatas
3)	Cadastral	29) Kafue-Town
4)	Chaina-Mun	30) Kalala
5)	Chandamali 1	31) Kalale-Update
6)	Chawama 8	32) Kalingalinga
7)	Chelstone	33) Kalundu
8)	Chilanga	34) Kamwa-Kab
9)	Chiles	35) Kamwala
10)	Chongwe	36) Kanama
11)	F1080	37) Kaunda SQ2
12)	F917	38) KSQ1
13)	Fairview	39) KSQ-NDA
14)	Flats	40) Lake-Road
15)	Garden	41) Latest
16)	Govt	42) Luangwa
17)	Handsworth	43) Maiwake
18)	Hel-Kaunda	44) Mandevu
19)	Ibex	45) Mass-Media
20)	Industrial-props	46) Matero
21)	Institutional –props	47) Matero-East
22)	Jack	48) Minestone
23)	Kabanana	49) Mtendere
24)	Kabulonga	50) Mwambula
25)	Kabwata s	51) New-chile
26)	Kabwata- Estates	52) N Kabwata

8) Service – stn

- 9) Street-N
- 10) Trees
- 11) Walls
- 12) WDMs 13) WTMs
- 14) Zamtel
- 53) North-Thor 54) Northmead 55) N Woodland-ext 56) Nyumbayanga 57) Olpmpia-Ext 58) Phase1 59) Phase 1a 60) Phase2 61) Phase3 62) Phase4 63) Phase5 64) Properties 65) ProspectH 66) Railway- Station 67) Rho Park 68) Roma 69) S447-s448 70) S-Wood 71) Shakespear 72) Thorn p 73) VILLA 74) WoodExt 75) Woodlands

3) Feature Dataset: Chong-Luangwa

The feature classes in chong-Luangwa are;

1)	Boundary	4)	Water-Course
2)	Buildings	5)	Way-Leave

3) Luwg-Parcel

(4) Feature Dataset: Lusaka- Feature- Elements are: Boundary- hongwe

			•	•
1)	Building	12) Hut		23) Roads-Chongwe
2)	Chongwe- Buildings	13) L- Post		24) Roads-clip
3)	Chlorinators	14) Main Roads		25) Stream
4)	Ditch	15) P ground		26) Streets
5)	Electricity	16) Playfield		27) Streets- clip

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- 6) F-bal-Ground
- 7) F-Ball-Ground
- 8) Fence
- 9) Footpath
- 10) G-Course
- 11) Hedge
- (5) Feature dataset: Sewer

The feature classes in sewer are;

- 1) Mat sewer
 - 2) Sewer-Attachment-Areas
 - 3) Sewer lines
 - 4) Sewer-ponds
 - 5) Sewer-PSTNS
- (6) Feature dataset: Water

The feature classes in water are;

- 1) Reservoir
- 2) End plug
- 3) Water Air Release
- 4) Water Fire Hydrant
- 5) Water Flow Control Point
- 6) Water Pipe Connection
- Water Pipe Diameter Change 7)
- 8) Water Pumping Station
- 9) Water Reservoir
- 10) Water Valves
- 11) Water Washout Valve

(7) Feature dataset: waterlines

The feature classes in waterlines are;

- 1) Boreholes
- 2) Valves
- 3) Hydrants
- 4) Reservoirs
- 5) SystemMeters
- 6) Tank

- 6) Sewer-IF
- 7) Sewered Areas
- 8) SMH

17) Ponds

19) Quarry

21) River

22) Roads

20) Railway

18) Power line

- 9) SW-Ponds
- 12) WEND1
- 13) BH
- 14) Water System Meter
- 15) PumpHse
- 16) Res
- 17) Pipes
- 18) Water_Standpipe
- 19) WDM
- 20) WTM
- 21) matepri
- 22) Water serviced
- 7) Fitttings
- 8) Network Junctions
- 9) Waterlines
- 10) Water Mains
- 11) Trunk Mains
- 12) Service Latral

According to the original data of the feature classes pipes (under the dataset: Water, Valves (Under the dataset: Waterlines) are as follows

- 1) Pipes = 5.019
- 2) Valves= 5,936
- 3) Network functions = 6,503

However, after carefully examining these features, it was established that there were duplications in these features in the existing database.

2.2.3 Problem of GIS Database

Problems were encountered in the following areas:

- Coordinate system
- Feature Dataset and Feature Classes

- 28) Tennis-court
- 29) T pole
- 30) Tree
- 31) Wall
- 32) Watercourse
- 33) Way leave- chongwe

• Individual and Specific Features

(1) Coordinate System

Features (Feature classes) were not projected in the same coordinate system (Datum). Some were in Geographical System while others were in Universal Transverse Mercator (UTM). A combined use of features with different coordinate systems results in a shift in the position of such features, for instance if a valve is originally supposed to be placed on a pipe, it will be placed away from the pipe if pipes and valves do not have the same coordinate system.

(2) Feature Dataset and Feature Classes

The existing GIS Database contained duplications of some of the feature datasets and feature classes. For instance, the feature class, 'boreholes' appeared in the feature dataset 'waterlines' and outside this feature dataset. This compromised the integrity of the data in the GIS database resulting in loss of time in trying to determine which feature class to use and which ions to remove as part of the cleaning process.

(3) Individual and Specific Features

Problems associated with pipes, valves and nodes, booster stations, boreholes, reservoirs and district water meters were encountered and these are elaborated in detail below:

1) Pipes

There was a duplication of some of the pipes in the pipe network and the whole pipe network lacked topology. Topology refers to a well defined relationship between features. The pipe network was not linked to most of the network distribution features such as water sources, reservoirs, valves etc. Overshoots (dangles) and undershoots in the pipe network were too a common site in the network. The network also lacked essential attributes for analysis such as diameters, material types and year of installation.

2) Valves and Nodes

Generally, the valves and nodes were not linked to the pipe network and they too had a lot of duplication. Valves lacked essential attributes for analysis such as diameters, model type and year of installation while nodes did not have pressures and flows.

3) Booster Stations

The Booster Stations on the actual ground were not as represented in the existing GIS database in terms of quantity, locations or coordinates and lacked essential attributes for analysis such as pump specifications. Generally, the booster stations in the existing GIS database (indicated as water pumping stations) were not linked to the pipe network.

4) Reservoirs

There was a mismatch of reservoirs on the actual ground and in the existing GIS database in terms of quantity, location or coordinates. The GIS data for the reservoirs lacked essential attributes such as holding capacities, maximum/minimum water levels, elevations, shapes and construction materials. Furthermore, there was no information indicating whether a reservoir is elevated, ground or underground.

5) District Water Meters

The district water meters on the actual ground were too not as represented in the

existing GIS database in terms of quantity, label (name), model type, year of installation, coordinates and status. The meters were too not linked to the pipe network.

The Engineer conducted field surveys to verify and collect missing information on all the features of the network system. Most of the features together with their attributes were picked as part of the process of cleaning and updating the existing GIS database.

2.3 Methodology of Data Collection on Current System and Supply Conditions

The following were the tools used for data collection and processing:

- Trimble GPS (RTK) supplied by LWSC
- ArcGIS Version 9.2
- TatukGIS
- AutoCAD
- WaterGEMS

Coordinates of existing boreholes, pumps, reservoirs, valves, etc were picked from the field and used to update the LWSC's GIS database. The update was achieved by importing coordinates together with their corresponding attributes into ArcMap. Further data cleaning was performed in ArcMAP in preparation for modeling in WaterGEMS.

2.4 Water Distribution Network Facilities

2.4.1 Topographic Condition of Lusaka

There are fewer areas with undulating topography in Lusaka. The elevations range from approximately 1319m around woodlands to 1195m in Eastern direction of Lusaka around Lusaka International Airport giving a fall of 124m in that direction.

2.4.2 Current DMAs

The LWSC Distribution Water Network currently has 69No. DMAs. All the 69No. DMAs have been identified and established. The names of these DMAs are appended herein at the end of the report. The consultant's field verification exercise revealed two satellite system DMAs which according to the ToR are not part of this assignment.

2.4.3 Water Resources, Reservoirs and Booster Pumps

Besides the surface water from Iolanda Water Works in Kafue, Lusaka City Water Supply is supplemented by ground water. Boreholes have been drilled in selected areas of Lusaka which are used to supplement water to various DMAs. In order to provide sufficient storage of treated water and give flexibility to a scheme to cater for the fluctuations in demand reservoirs have been sited in various locations of the water network. In cases were residual pressures are less than the desirable minimum, booster pumps in lieu of high level storage have been provided. The table below gives quantities of these elements in the network system.

Table 2.4.1	Summary	of Ground	Water Sources,	Reservoirs and	Booster Stations
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Item No.	Description	Quantity
1	Reservoirs and Tanks	45No.
2	Boreholes	78No.
3	Booster Stations	13No.

2.4.4 Pipes and Valves

All the missing information pertaining to pipes has been collected and updating of GIS database is complete.

All the information on valves pertaining to label, coordinates, valve diameters, model type and DMAs has been acquired and the GIS database updated.

PIPES			
Pipe Diameters	Length	Pipe Diameters	Length
63.0 mm	276.45 m	300mm	21,840.44 m
75.0 mm	3,160.47 m	315mm	1,057.35 m
90.0 mm	1,147.88 m	350mm	629.11 m
100.0 mm	7,303.31 m	375mm	21,935.85 m
110.0 mm	674.83 m	400mm	3,797.81 m
125.0 mm	9,281.16 m	450mm	48,971.00 m
140.0 mm	360.27 m	500mm	46.02 m
150.0 mm	189,187.8 m	600mm	14,001.60 m
160.0 mm	18,863.46 m	650mm	4,618.02 m
200.0 mm	111,500.7 m	660mm	3,741.72 m
225.0 mm	3,802.08 m	900mm	23,326.33 m
Total Length	503,444.2 m		143,965.25 m
VALVES			
Diameters	No.	Diameters	No.
125mm	13	375mm	33
150mm	820	400mm	1
200mm	328	450mm	108
250mm	20	600mm	15
300mm	65	650mm	7
350mm	2	900mm	2

Table 2.4.2 Pipes and Valves after Refining the Model

Note: Refining of the model is still on going and therefore the above quantities are subject to change or remain the same

2.4.5 District Water Meters

Field surveys revealed that there about 106No. District Water Meters in the network. No information was captured on the customer water meters.

Item No.	Description	Quantity
1	District Water Meters	106No.

Note: Information to be provided by diameters when supplied.

2.5 Analysis on Current Water Flow and Consumption Data

2.5.1 Water Supply Conditions

The water distribution network is divided into five branches and three Peri Urban Zones. These are further segmented to DMAs (See Appendix 2 for the DMAs). The branches are CBD i.e. Central Business District which LWSC refers to Central Branch, Kabwata, Chelston, Lumumba and Kabulonga. The zones are Southern, Western and Eastern Zones. Not all the branches and zones receive water on a 24 hour basis. Water supply to some of them is less than 24 hrs. According to the LWSC September 2007 Audit report, some areas in Central Branch receive water supply 24 hrs while others receive water on an average of 16 - 18 hrs. Flows to Chelston Branch range from 16 - 24 hrs. Kabulonga and Kabwata Brach is around an average of 10 - 24 hrs while Lumumba is at 16 - 24 hrs. Supply to the Western zone is about 8 - 24 hrs, Southern Zone is at 12 - 24 hrs and Eastern Zone is 16 - 24 hrs. This implies that water supply conditions in the DMAs which are a subset of these branches and zones also experience similar rationing.

2.5.2 Water Flows

According to LWSC September 2007 Audit Report, the water flows to the branches and zones are as presented below. LWSC could not provide segmented flows to each DMA.

(1) Central Branch

The total volume of water passing through Central Branch is 1,758,914m3 per month. Out of this, 491,289.6m³ is released to Lumumba, Luburma and the Eastern Zone of Peri Urban giving a net inflow of 1,267,625m³ for Central as at August 31st 2007.

(2) Kabwata Branch

The total volume of water passing through Kabwata Branch is 1,143,956.1m³ per month. Out of this, 19,584m³ is released to Central Branch giving a net inflow of 1,124,372.1m³ for Kabwata as at August 31st 2007.

(3) Chelston Branch

The total volume of water passing through Chelstone Branch is 995,466.9m3 per month. Out of this, 74,156.4m3 is released to Kalundu East in Central and the Eastern Zone of Peri Urban giving a net inflow of 921,310.5m3 for Chelston as at August 31st 2007.

(4) Lumumba Branch

The total volume of water passing through Lumumba Branch is 1,270,744.8m³ per month. Out of this, 191,529.6m³ is released to Central and Peri Urban giving a net inflow of 1,079,215.2m³ for Lumumba as at August 31st 2007.

(5) Kabulonga Branch

The total volume of water passing through Kabulonga Branch is 1,904,055.6m³ per month. Out of this, 812,560.8m³ is released to Kabwata and Kalikiliki giving a net inflow of 1,091,494.8m³ for Kabulonga as at August 31st 2007.

(6) Southern Zone

The total volume of water supplied to Southern Zone is 433,657.2m³ per month as at August 31st 2007.

(7) Western Zone

The total volume of water supplied to Southern Zone is 222,765.6m³ per month as at August 31st 2007.

(8) Eastern Zone

The total volume of water passing through Eastern Zone is 247,375.2m³ per month. Out of this, 31,560m³ is released to Central in Helen Kaunda giving a net inflow of 215,815.2m³ for Eastern Zone as at August 31st 2007.

2.5.3 Water Consumption

According to the existing billing records and database at LWSC, there are 69DMAs and 52, 777 connections receiving a service. The consultant collected monthly consumption figures for May, June, August, September and October 2008 and the details are appended herein at the end of the report. The table below shows the total consumption figures for all the DMAs per month.

Month	Total Consumption (Mil. L/month)
May	3,231.92
June	3,517.98
August	3,490.80
September	3,521.36
October	3,512.24

Table 2.5.1 Total Monthly Consumption Figures





2.5.4 Unaccounted For Water (UFW)

Due to non availability of information on total amount of water supplied to each DMA, the consultant has not been able to deduce the probable UFW in the particular DMA. However, the consultant has embarked on grouping the DMAs into branches or zones since data on water supplied to these areas as at 31st August 2007 is available. Once this has been the consultant will be able to estimate the consumption figures for the branches and zones in order to calculate the UFW. The best would have been to segment UFW to particular DMAs.

CHAPTER 3. CONDITIONS OF MODELING AND ANALYSIS

3.1 Pipes

In the initial trial system of the model, the following are the conditions set for the network analysis:

- Limiting pipe sizes; only pipes greater than/or equal to 125mm diameter were considered in the network modeling.
- The head loss in pipe lines is limited to 10m/km; the unitloss has to be between 0.1 and 10m/km for better results. Any value below 0.1m/km indicates that either the pipe is too big or is being under loaded. A value above 10m/km indicates that the pipe is being over loaded or the pipe is smaller.
- Friction losses are per Hazen-Williams Equation (Initial values used for new pipes) as follows:

Pipe Material	C-Value
Steel	100
GI	120
AC	140
PVC	150
DI	130

3.2 Water Resources, Storage and Booster Pumps

Water sources will be from Boreholes and Iolanda Water Works. Our field surveys indicate that there are 78 boreholes in the system. During simulation, the modeller will have to identify the functional and non-functional boreholes.

Storage in the system will be considered as per DMA; each DMA has its own way of operating the system depending on the production levels of water. Therefore, the trial analysis of the model will largely depend on adopting the current operating conditions in that particular DMA.

Similarly, booster pumps will also be switched on and off in accordance with the current LWSC operating conditions. For instance, those that run 24hrs will be set accordingly in our trial analysis.

3.3 Pressures

A hydraulic analysis of any water network, depending on the purpose of the network, must have guidelines on parameters to ensure better results. The most important are the unitloss and pressure. The limiting factors are as follows:

- Unitloss (hydraulic gradient); 0.1 10m/km
- Pressure; 3 50m

The pressure has to be less than 50m to prevent excessive pressure build up at times when there is less or no flow. This is usually the case at no demand situation. The 3m pressure takes care of the low buildings most common in residential areas at peak demand.

3.4 Demand Factors

There will naturally be periods when demands will exceed the average. On a monthly basis October usually has the highest demand. Within any month there will be a daily peak and during each day there will be periods of maximum usage. From our experiences and the Zambia Standards Circulation No. 1, the following peak factors will be most suitable for our initial trial simulation; peaking factors will be set in accordance to:

1) /	Average flows	-	factor 1.0 x average
2) I	Peak Month	-	factor 1.25 x average
3) I	Peak Day	-	factor 1.5 x average
4) I	Peak Hour	-	factor 2.5 x average

For subsequent simulations, the modeller will adjust the peaking factors based on the demand characteristics of the system at hand. These will be obtained from LWSC production and consumption records.

3.5 Patterns of Water Supply

The pattern of water supply for the initial trial analysis will be 24 hrs average flows. Thereafter the modeller will start adjusting the pattern to suit that of LWSC as described in section 2.5

3.6 Water Demand and UFW

As explained in section 2.5.4 the consultant has embarked on grouping the DMAs into branches or zones since data on water supplied to these areas as at 31st August 2007 is available. Consumption figures for the branches and zones will be deduced once the grouping has been done. Then the UFW will be estimated on branch and zone basis.

CHAPTER 4. INITIAL TRIAL MODELING AND ANALYSIS

4.1 Input Data for Initial Modeling and Analysis

The input data process for the initial modeling and analysis is as illustrated in the figures below. This data is on water sources, reservoirs and tanks, pipes and booster stations.



Figure 4.1.1 Borehole Input Data



Figure 4.1.2 Input Data for Tanks



Figure 4.1.3 Chelston Water Tower



Figure 4.1.4 Lumumba Pump Station



Figure 4.1.5 Input Data for Pumps at Lumumba Station



Figure 4.1.6 Input Data for Pipe Parameters

4.2 Result of Initial Trial Modeling

The model was built and transferred into WaterGEMS. The figure below shows the skeletonised LWSC model from WaterGEMS.



Figure 4.2.1 Skeletonised LWSC Bulk Water Network Model

4.3 **Problems in Initial Trial Modeling and Analysis**

The trial run results of the analysis of the model (Not Appended) have substantial errors because There are some inadequate information in the original data on the facilities such as: i) pipe diameters ii) pipe materials; iii) pipe connections; iv) valve locations and operations; v) borehole specifications; and vi) pump specifications and operations.

4.4 Identification of Necessary Site Investigation for Model Calibration

Based on detailed identification of the reasons why the initial analysis was failed, site investigations for calibration have been identified and categorized as follows:

Physical Data: This involves verification of many system characteristics that is already known or is thought to be known and that are used to create the base model. This data includes:

- Pipe roughness
- Pump head and discharge characteristics
- Regulating valve behavior
- Tank diameters, elevations, etc

These data set the physical guidelines for how the system will react to a variety of conditions. If these data are not represented accurately in the model, it will be impossible to achieve a high level of confidence.

Operational Data: This collected by continuously monitoring the system, usually for a week or two. Important areas to observe include:

• Flow and water surface elevation readings at the boundary locations i.e. groundwater wells, treatment facilities, storage tanks, etc

- Flow and pressure readings at other key locations within the system i.e. regulating valves, pump stations, etc
- Demand for high-consumption customers

<u>Reactive Data:</u> In this method, data is collected by stressing the system to simulate a fire flow, power outage or other extreme situation. The consultant is not keen to perform this type of test at the moment because of the dangers involved with this kind of a test. The test may damage the system or adversely affect the system's customers.

CHAPTER 5. CALIBRATION OF NETWORK MODEL

A water distribution network model is created from a combination of assumptions, modeling judgment and good guesses based on theoretical information. This will not always generate results that agree with the real-world system. Calibration is the process of adjusting the characteristics of the water distribution model to better reflect the behaviour of the real system.

5.1 Methodology of Calibration

The process of calibration may include changing system demands, fine-tuning pipe roughness, altering pump operating characteristics and adjusting other parameters that affect the performance of the model. The calibration method is as follows:

- Data Requirements Analysis
- Collecting Field Data
- Adjusting the Model
- (1) Data Requirements Analysis

An analysis was performed to determine exactly what data was required from the data collection exercise, and all possible categorizations and options of expected data.

(2) Data Collection

Collecting field data is a large part of the calibration process since it provides the data to which the model can be compared. Data collection has been separated into three categories namely: physical data, operational data and reactive data. Operational data, like physical data, are often collected during the development of the base model. The consultant has already embarked on this exercise. The categories of data collection have been described in detail in section 4.4

(3) Adjusting the Model

This is the most time-consuming part of calibration. It is the process of making adjustments to the model in order to bring it into agreement with the field results. Normally, if the base model has the correct physical data, the adjustment process consists primarily of making iterative changes to pipe roughness and junction demands.

The study team sets up guidelines for making adjustments which are fairly simple and relate directly to the characteristics of a pipe. When the flow is greater, or when the pipe is rougher, the pipe will have more head loss. Based on this relationship, actions can be taken to adjust the model. The guidelines are as follows:

- If the model hydraulic grade lines (HGL) are higher than field recorded values, it indicates that the model is not predicting enough head loss. To produce larger head losses, roughen the pipes or increase junction demands.
- If the model hydraulic grades are lower than field recorded values, it indicates that the model is predicting too much head loss. To produce smaller head losses, smooth the pipes or decrease junction demands.

When making comparisons between field results and modeled results, there is no mathematical reason to use pressures instead of hydraulic grades, or vice versa. This is because pressure is just a converted representation of the height of the hydraulic line above the ground elevation; the two are essentially equivalent for comparison purposes.

In essence, hydraulic grade and pressure comparisons will both lead to the same results if all other factors are equal. Pressure comparisons make it much easier to overlook errors, however, and also make it much harder to track down inconsistencies between the field and the model. Working with hydraulic grades does not require any additional effort, but it can save time during calibration troubleshooting.

5.2 Data Collection for Calibration

The data on facilities and flows for calibration were collected from each branch of LWSC. The consumption flows were not collected because of the limited time schedule. The Study Team calibrated only the model.

CHAPTER 6. ANALYSIS OF WATER DISTRIBUTION AND UFW

6.1 **Result of Simulation**

Trial simulation results for some system elements such as junctions, pump stations, pipes and tanks are shown in the figures below:

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10.0	.1-2007	J-2007	1,259.98	George	Demand	0.8	Fixed	0.8	1,277.06	17.049		
×+	J-1263	J-1263	1,280.95	Luburma	Demand	2.6	Fixed	2.6	1,298.04	17.059		
	J-1927	J-1927	1,279.66	Town/Kabelenga	Demand	1.8	Fixed	1.8	1,296.76	17.065		
	J-30	J 30	1,287.78	Zono	Domand	0.0	Fixed	0.0	1,304.88	17.068		
	J-6242	J-6242	1,287.50	Libala South	Demand	1.8	Hixed	1.8	1,304.62	17.083		
	J-793	J-793	1.260.54	George	Demand	0.8	Fixed	0.8	1.277.66	17.085		-
	J 1972	J-1972	1,302.83	Woodlands	Demand	7.2	Tixed	7.2	1,310.95	17.088		
	J-6291	J-6291	1.287.50	Libala South	Demand	0.0	Fixed	0.0	1,304.63	17.093		
	J-2428	.1-2428	1,285.24	Shakespear	Demand	39	Fixed	3.9	1,302.38	17104		
	J-225	J-225	1,287.70	Zone	Demand	0.0	Fixed	0.0	1,304.84	17.106		
	1021	J-11/6	1,2/5.00	Ntendere Disadas Dada	Demand	0.0	Fixed	0.0	1,293.16	17.128		
	1,2319	1.2219	1,200.21	Knower Park	Demand	3.3	Fixed	3.3	1,283.11	17.201		
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	J-2043	1-2043	1 279 95	Fam 917	Demand	0.7	Fixed	0.7	1,010.04	17.242		
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Figure 6.1.1 Trial Simulation Results – Junction Report

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1	P-3327	P-332/	121.92	125.0	S	130.0	Ц	0.00	Open	87.4	1,298./1	1,294.66	4.05	33.20	14.15/	1.98	
12	P-3326	P-3326	18.90	125.0	S	130.0	П	0.00	Open	87.4	1.299.33	1.298.71	0.63	33.20	14.602	1.98	
	P 2883	P-2003	3.05	150.0	GI	125.0		0.00	Open	-134.2	1,255.18	1,255.20	0.10	32.52	13.093	2.11	
	P-2882	P-2882	51.82	150.0	GI	125.0		0.00	Open	-134.2	1,253.50	1,255.18	1.68	32.52	11.453	2.11	
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	P-2339	P-2339	38.40	200.0	S	130.0		0.00	Open	-294.2	1,305.54	1,306.76	1.22	31.88	27.527	2.60	
	P-2261	P-2261	18.29	200.0	S	130.0		0.00	Open	-294.2	1,304.96	1,305.54	0.58	31.88	26.953	2.60	
	P-2340	P-2340	14.63	200.0	S	130.0		0.00	Open	-294.2	1,306.76	1,307.23	0.47	31.87	28.763	2.60	
	P-4503	P-4503	38.40	250.0	GI	125.0		0.00	Open	506.7	1,282.16	1,280.95	1.21	31.63	4.755	2.87	
	P-4162	P-4162	28.96	150.0	S	130.0		0.00	Open	134.9	1,314.90	1,314.02	0.88	30.52	39.094	2.12	
	P-6393	P 6393	124.66	125.0	S	130.0		0.00	Opon	83.5	1,291.55	1,287.75	3.80	30.50	9.066	1.89	
	P-6392	P-6392	101.80	125.0	S	130.0		0.00	Open	83.5	1,294.66	1,291.55	3.11	30.50	12,168	1.89	
	P-3733	P-3733	15.54	225.0	S	130.0	П	0.00	Open	390.6	1.283.92	1.283.44	0.47	30.34	17.638	2.73	
	P-3325	P-3325	18.29	125.0	GI	125.0		0.00	Open	79.6	1,280.17	1,279.62	0.55	30.02	-1.775	1.80	
	P-3324	P-3324	252.68	125.0	GI	125.0		0.00	Open	79.6	1,287.75	1,280.17	7.59	30.02	5.816	1.80	×
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Figure 6.1.2 Trial Simulation Results – Pipe Report

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1	KABANANA	KABANANA	Kabanana	1,244.00	1,244,50	1,245.50	1,246.80	0.0	Filling	1,245.50	43.5		
	Matero	Matero	Matero	1,281.00	1,281.50	1.282.50	1,284.80	1,133.4	Filling	1,282.50	30.3		
	Lumumba1	Lumumba 1	Industries	1,277.59	1,278.09	1.279.09	1,285.39	1,050.3	Filling	1,279.09	13.7		
	7C	7C	Chainama/Munali	1,263.04	1,263.54	1,264.39	1,266.44	383.9	Filling	1,264.39	29.4		
	Stuart Park3	Stuart Park3	Woodlands	1,304.00	1,304.50	1,305.50	1,308.70	-564.8	Draining	1,305.50	23.8		
	CHAWAMA1	CHAWAMA1	John Howard	1,301.00	1,301.50	1,302.50	1,307.00	837,8	Filling	1,302.50	18.2		
	High Court1	High Court 1	Rhodes Park	1,293.00	1,293.50	1,294.50	1,299.80	0.0	Steady	1,294.50	15.9		
	High Court3	High Court3	Rhodes Park	1,293.00	1,293.50	1,294.50	1,299.80	40.3	Filling	1,294.50	15.9		
	Lumumba2	Lumumba2	Industries	1,277.59	1,278.09	1,279.09	1,285.39	100.5	Filling	1,279.09	13.7		
	Mass Media	Mass Media	State House	1,266.00	1,266.50	1,267.50	1,271.00	818.6	Filling	1,267.50	22.2		
	High Court4	High Court4	Rhodes Park	1,293.00	1,293 50	1,294 50	1,299.80	-43.9	Draining	1,294.50	15.9		
	Chawama	Chawama	John Howard	1,285.00	1,285.50	1,286,50	1,287.00	-493.5	Draining	1,286.50	66.7		
	STONE RESEF	CHELSTONE	Chelstone	1,242.00	1,242.50	1,243.50	1,247.00	268.1	Filling	1,243.50	22.2		
	Quarries	Quarries	Town/Kabelenga	1,279.45	1,279.95	1,280.95	1,284.25	-138.6	Draining	1,280.95	23.4		
	Water Works (Lusaka Water	Libala South	1,285.00	1,285.50	1,286.50	1,288.00	5,135.7	Filling	1,286.50	40.0		-
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Figure 6.1.3 Trial Simulation Result – Tank Report

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0		Label	Elevation	Control	Intake	Discharge Pump	Discharge (m ³ /hr)	Pump Head	Calculated Water	۵	
100					Grade (m)	Grade (m)		(m)	Power (kW)		
×	CHAWAMA 1	CHAWAMA 1	1,283.61	On	1,276.38	1,286.78	93.7	10.40	2.65		
1.	NORTHMEAD 2	NORTHMEAD 2	1,255.04	On	1,251.65	1,304.25	77.9	52.60	11.14		
	Chilenje South	Chilenje South	1,287.06	On	1,275.85	1,311.46	109.3	35.61	10.59		
	WATERWORKS 1	WATERWORKS 1	1,285.76	On	1,274.55	1,300.69	585.0	26.14	41.59		
	LEOPARDS 1	LEOPARDS 1	1,287.85	On	1,267.74	1,323.49	154.0	55.74	23.34		
	LILAYI RD 2	LILAYI RD 2	1,290.90	On	1,275.88	1,309.28	141.3	33.40	12.83		
	WATERWORKS 2	WATERWORKS 2	1,285.76	On	1,274.75	1,300.46	153.1	25.71	10.70		
	SHAFT 5 No.2	SHAFT 5 No.2	1,290.00	On	1,269.15	1,317.78	435.2	48.63	57.55		
	MULUNGUSHI GH	MULUNGUSHI 6H	1,251.96	Oll	1,237.16	1,287.06	0.0	0.00	0.00		
	CHAWAMA 3	CHAWAMA 3	1,283.43	On	1,275.29	1,328.61	154.9	53.32	22.46		
	Chelstone BH 1	Chelstone BH 1	1,229.21	Off	1,196.21	1,265.03	0.0	0.00	0.00		
	NRDC2(B10-30N)	NRDC2(B10-30N)	1.201.21	On	1.183.06	1.265.64	79.1	82.58	17.77		
	Chunga F	Chunga F	1,241.00	Off	1,241.00	1,224.50	0.0	0.00	0.00		
	MALO FARM 1	MALO FARM 1	1,200.08	On	1,182.04	1,258.04	67.0	76.00	13.85		
	QUARRIES 2	QUARRIES 2	1,268.00	On	1,264.42	1,284.72	195.9	20.30	10.81		
	ROADSIDE 6	ROADSIDE 6	1,270.34	On	1,262.61	1,294.11	188.8	31.50	16.17		
	CADIDENIVATIAIA	BADIDENVATAVA	1 207 20	0-	1 305 75	1 010 05	10.1	04.00	1 10	×	
	108 of 108 element	s displayed.								Synchronized Units	
							1				
							1	2000			-
	<u>.</u>		_	_	_			<u></u>		V.CAE E10 C2 V.0 200 725 00 m C1 MATTER	1
										N.040,010.02 1.0,230,730.00 m 51 COMPUTE	J.

Figure 6.1.4 Trial Simulation Results – Pump Station Report

6.2 Identification of Necessary Action for UFW Reduction

The distribution network model was established based on the network facilities information and the simulation successfully ran. However, the model must be still corrected in some part of the network, and more water consumption flow data should be collected through field surveys and continuously monitoring.

Through the works, the necessary actions in modeling and analysis for UFW reduction to be taken by LWSC were identified as shown below.

- Collection of detailed facility information from each branch office of LWSC
- Confirmation of borehole and pump specifications
- Confirmation of valve operations and normal and emergent valve operation method for each DMA
- Continuously monitoring of water level and water flow of the boreholes
- Continuously reading of the bulk meter
- Identification of location where meters are required to be installed
- Collection of actual consumption flow data through site investigations
- Comparison between more enhanced model and actual flows

CHAPTER 7. TRAINING ON MODELING AND ANALYSIS

7.1 Training Program

The Study Team commenced on-the job training in November 2008. The main trainees were water engineer and GIS experts in the technical services department of LWSC. The training consists of: i) GIS data inputting and organizing; ii) Importing data from GIS to WaterGEMS; and iii) Modeling and analysis of water distribution networks. In addition, the Study Team conducted a training seminar for the hydraulics basics and Modeling and analyzing method on 30th January, 2009. The attendants of this seminar were not only from technical services department but also from the water supply department and branch offices of LWSC.

7.2 Trainees

The number of trainees was totally 11 as shown in the following list.

No.	Name	Position
1.	Mr. Oswell Katooka	Manager (Technical Services Dept., LWSC)
2.	Mrs. Doreen C. Bwalya	Engineer (Technical Services Dept., LWSC)
3.	Mr. Chengeta Chipata	GIS Officer (Technical Services Dept., LWSC)
4.	Mr. Evarist Simusokwe	GIS Engineer (Technical Services Dept., LWSC)
5.	Mr. Jonathan Maipambe	GIS Engineer (Technical Services Dept., LWSC)
6.	Mr. Nyonge Phiri	Engineer (Water Supply Dept., LWSC)
7.	Mr. Wychiff Kunda	Engineer (Branch Office, LWSC)
8.	Mr. Sennis Malambo	Engineer (Branch Office, LWSC)
9.	Mr. Manangi Abel	Engineer (Branch Office, LWSC)
10.	Mr. Yoram Sinyangwe	Engineer (Branch Office, LWSC)
11.	Mr. Lewis Ndnlewa	Engineer (Branch Office, LWSC)

Table 7.1.1 Attendance List of Training Program

7.3 Result of Training

It is expected that the trainees obtained the following knowledge through the training program.

- Basics of hydraulics
- Basics of water distribution network modeling and analysis
- How to use WaterGEMS for modeling, analysis and simulations

Through the training seminar, there were some discussions on the necessary actions to make the model more accurate, centralize the facility information, and identify the measures against UFW.

CHAPTER 8. RECOMMENDATION FOR UFW REDUCTION

It was seemed that the LWSC introduced relatively advanced asset management system for water distribution network facilities using a GIS software. However, the Study Team faced some difficulties in modeling and analyzing of the network because of: i) There were some missing data in the GIS system; ii) It was very difficult to collect the missing data from the branch offices; iii) Some information of pump equipment had not been updated; iv) some pipe connections were unclear; and v) operation records were not properly kept. It is conceivable that these problems are generated from insufficient system and work flows for facility maintenance and asset management. On the other hand, it was observed through the training seminar that the LWSC engineers have relatively high capacity for technical works. The LWSC is highly recommended to establish such management system. Especially, a management system for UFW reduction should be highlighted. The actions and work steps as shown in the following figure can establish a proper asset management system and the sound distribution system.



Figure 8.1.1 Recommended Actions for Proper Asset Management System

For continuing the network analysis, it is recommended to conduct the following works.

- Confirmation of unclear information on pipelines and pump specifications
- Confirmation of operation manners for valves and pumps in details
- Frequently reading of bulk meters
- Flow measuring of water production and consumption by sonic meters

The GIS system and WaterGEMS model should be updated through the works above, and simulation should be repeated to identify the followings.

- High pressure pipes
- Pipes in which actual and theoretical flows are quite different
- Locations where bulk meters are required

The pipes which have high pressure water flows are considered to have leakage if the pipe ages are very old or pipe materials are asbestos or iron. Site survey for these pipes will be one of priority.

In order to continue the works above and maintain the GIS system and WaterGEMS model, establishment of the following workflow is highly recommended.



Figure 8.1.2 Recommended Workflows

Appendix 1 - Monthly Water Consumption Figures

TER AND	Lucaka Water and Sourcesso Co	Date:	28/05/2008	
A BURNER STREET	Lusaka waler and Sewerage Co.	Time:	8:58:32 AM	
and the second	Consumption Invoices	FORM	: B 03	
CANTERNY LUMITED	Analysis per Township Area	Ref. No.		

Billing Cycle: ALL GROUPS - 15/05/2008

Township	Number of	Consumption	Amount
Area	Connections	(kl)	Invoiced ()
60/2 Invoices-Water - Water Charge			
01 Woodlands	794	72,420.00	138,770,380.00
02 Woodlands Extension	735	39,709.00	61,179,545.00
03 Kabulonga & Sunningdale	1,417	130,954.00	225,796,790.00
04 New Ibex Hill	454	42,240.00	70,438,870.00
05 Nyumba Yanga	1,110	55,496.00	89,357,505.00
06 Olympia	476	60,817.00	114,972,800.01
07 Olympia Park Extension	453	45,483.00	78,523,025.00
08 Kalundu	564	59,606.00	103,300,585.00
09 Roma	551	50,693.00	88,617,155.01
10 UNZA	4	58,606.00	165,405,550.04
11 Handsworth	226	15,332.00	23,583,115.00
12 Mwambula	202	19,214.00	34,564,570.00
13 Chudleigh	343	25,184.00	39,651,590.00
14 Rhodespark	1,302	145,379.00	284,852,365.06
15 Fairview	463	24,351.00	40,401,150.00
16 Northmead	1,016	74,048.00	125,081,455.00
17 Thornpark	256	10,685.00	16,108,810.00
18 Prospect Hill	411	92,109.00	197,487,410.00
19 Statehouse	116	80,622.00	224,415,370.00
20 Government	361	35,172.00	76,422,880.00
21 Shakespear	800	54,612.00	110,395,000.03
22 Sikanze	58	25,548.00	69,984,899.98
23 Luburma	485	29,291.00	51,188,225.00
24 Town/Kabelenga	861	100,871.00	248,038,955.00
25 Industrial Area	706	91,162.00	229,815,465.00
26 Villa Elizabetha	371	21,482.00	37,992,080.00
27 Emmasdale	1,022	81,064.00	138,646,475.02
28 Chainama	1,268	75,709.00	125,720,280.00
29 Helen Kaunda	566	27,254.00	38,893,825.00
30 Chelston	2,494	192,293.00	378,665,135.00
31 Avondale Southend	1,173	62,749.00	94,174,595.00
32 Chilenje South	2,540	105,952.00	162,589,885.00
33 Libala	1,561	73,319.00	120,551,125.00
34 Kabwata	1,448	55,452.00	82,229,550.00
35 Chamba Valley	117	8,561.00	14,491,820.00
36 New Kamwala	1,008	49,224.00	72,583,800.00

The Study on Comprehensive Urban Development Plan for the City of Lusaka in the Republic of Zambia

37 Lilanda		1,059	49,747.00	31,641,660.00
38 Matero		2,798	95,010.00	41,359,140.05
39 New Kabwata S/S		1,499	79,578.00	118,172,545.00
40 Emmasdale Bank Houses S/S		648	34,923.00	52,026,800.00
41 Kaunda Square		1,750	53,557.00	69,032,035.00
42 Kalingalinga		1,108	44,911.00	60,735,220.03
43 Chawama/Kuomboka		1,685	53,039.00	71,199,000.00
44 John Howard		379	12,135.00	16,282,975.00
45 Mtendere		2,163	66,950.00	87,970,824.84
46 Chilenje		1,531	47,680.00	62,369,530.00
47 George		1,296	81,039.00	130,512,430.00
48 Chunga		903	27,744.00	36,113,350.00
49 Chibolya		11	492.00	877,140.00
50 Kanyama		682	27,923.00	40,217,525.00
51 Garden		1,055	38,782.00	59,618,400.00
52 Kabanana		869	26,250.00	33,228,025.00
53 Marapodi		1,547	46,479.00	59,238,100.00
54 Chaisa		37	1,720.00	729,050.00
55 Chipata		15	1,130.00	2,501,800.00
56 Bauleni		299	11,065.00	13,955,425.03
57 Ng'ombe		18	4,788.00	13,097,770.00
58 Misisi		99	3,000.00	3,823,050.00
59 John Laing		32	1,486.00	2,672,750.00
60 Kafue Water Works		68	74,620.00	213,985,899.90
61 New Woodlands Extension		305	16,186.00	23,658,150.00
62 Kaunda Square STG2		915	29,505.00	38,995,405.00
63 Kamanga		365	10,950.00	13,862,700.00
64 Chandamali		507	29,371.00	43,290,280.00
65 F1080		244	13,446.00	19,502,230.00
66 F917		213	13,120.00	20,002,210.00
67 Libala South		530	31,857.00	46,592,255.00
68 Jack Compound		213	6,390.00	8,084,250.00
69 Chainda		141	4,386.00	5,621,200.00
	Total:	52 716	3 231 922 00	5 615 861 160 00
60/5 Invoices-Water - Meter Rental Charge		=	-,	-,,
01 Woodlands		724	0.00	4.020.000.00
02 Woodlands Extension		702	0.00	3.630.000.00
03 Kabulonga & Sunningdale		1,169	0.00	6.385.000.00
04 New Ibex Hill		340	0.00	1.760.000.00
05 Nyumba Yanga		967	0.00	4,935,000,00
06 Olympia		426	0.00	2.440.000.00
07 Olympia Park Extension		416	0.00	2.390.000.00
08 Kalundu		543	0.00	3 055 000 00
09 Roma		477	0.00	2 665 000 00
10 UNZA		2	0.00	30 000 00
11 Handsworth		- 219	0.00	1 185 000 00
12 Mwambula		185	0.00	1,105.000.00
13 Chudleigh		278	0.00	1,490,000,00
		210	0.00	7 400 000 00
14 Rhodespark		1 086	()()()	74700000

15 Fairview	427	0.00	2,585,000.00
16 Northmead	828	0.00	5,030,000.00
17 Thornpark	245	0.00	1,395,000.00
18 Prospect Hill	348	0.00	2,160,000.00
19 Statehouse	76	0.00	760,000.00
20 Government	251	0.00	1,795,000.00
21 Shakespear	737	0.00	4,205,000.00
22 Sikanze	5	0.00	75,000.00
23 Luburma	332	0.00	2,340,000.00
24 Town/Kabelenga	647	0.00	8,225,000.00
25 Industrial Area	441	0.00	6,485,000.00
26 Villa Elizabetha	341	0.00	2,275,000.00
27 Emmasdale	680	0.00	3,730,000.00
28 Chainama	1,162	0.00	6,270,000.00
29 Helen Kaunda	324	0.00	1,640,000.00
30 Chelston	1,939	0.00	10,035,000.00
31 Avondale Southend	998	0.00	5,110,000.00
32 Chilenje South	1,843	0.00	9,285,000.00
33 Libala	1,257	0.00	6,575,000.00
34 Kabwata	980	0.00	4,950,000.00
35 Chamba Valley	67	0.00	355,000.00
36 New Kamwala	494	0.00	2,500,000.00
37 Lilanda	298	0.00	1,720,000.00
38 Matero	161	0.00	905,000.00
39 New Kabwata S/S	510	0.00	2,650,000.00
40 Emmasdale Bank Houses S/S	513	0.00	2,645,000.00
41 Kaunda Square	30	0.00	180,000.00
42 Kalingalinga	14	0.00	160,000.00
43 Chawama/Kuomboka	1	0.00	5,000.00
45 Mtendere	4	0.00	50,000.00
46 Chilenje	158	0.00	830,000.00
47 George	926	0.00	6,250,000.00
48 Chunga	2	0.00	10,000.00
49 Chibolya	1	0.00	15,000.00
50 Kanyama	340	0.00	1,780,000.00
51 Garden	2	0.00	20,000.00
53 Marapodi	1	0.00	5,000.00
54 Chaisa	1	0.00	15,000.00
56 Bauleni	1	0.00	5,000.00
57 Ng'ombe	2	0.00	30,000.00
60 Kafue Water Works	58	0.00	350,000.00
61 New Woodlands Extension	73	0.00	365,000.00
62 Kaunda Square STG2	107	0.00	555,000.00
64 Chandamali	94	0.00	560,000.00
65 F1080	114	0.00	580,000.00
66 F917	69	0.00	385,000.00
67 Libala South	185	0.00	945,000.00
69 Chainda	3	0.00	15,000.00
Tota	: 25,624	0.00	151,320,000.00

70/2 Invoices-Sewer - Sewer Charge			
01 Woodlands	252	18,992.00	11,967,447.00
02 Woodlands Extension	695	36,584.00	15,967,209.00
03 Kabulonga & Sunningdale	39	4,441.00	2,499,840.00
04 New Ibex Hill	290	26,783.00	13,705,239.00
05 Nyumba Yanga	1,090	48,807.00	20,439,561.00
06 Olympia	10	7,829.00	8,280,018.01
08 Kalundu	2	199.00	87,270.00
09 Roma	2	317.00	170,100.00
10 UNZA	3	43,344.00	52,684,740.01
11 Handsworth	15	888.00	498,480.00
13 Chudleigh	3	157.00	61,470.00
14 Rhodespark	330	58,320.00	48,350,505.02
15 Fairview	170	9,006.00	4,471,572.00
16 Northmead	513	35,911.00	19,701,816.00
17 Thornpark	151	6,589.00	2,913,579.00
18 Prospect Hill	120	53,149.00	35,916,225.00
19 Statehouse	32	62,682.00	76,942,155.00
20 Government	141	42,968.00	47,318,220.00
21 Shakespear	688	62,962.00	55,775,702.00
22 Sikanze	4	1,405.00	1,625,940.00
23 Luburma	364	21,226.00	12,482,532.00
24 Town/Kabelenga	833	116,942.00	130,140,039.00
25 Industrial Area	370	90,319.00	140,309,685.00
26 Villa Elizabetha	71	5,821.00	6,175,959.00
27 Emmasdale	187	21,408.00	15,282,801.00
28 Chainama	1,133	69,584.00	39,168,141.00
29 Helen Kaunda	539	25,717.00	10,300,290.00
30 Chelston	1,598	103,522.00	53,927,898.00
31 Avondale Southend	3	48.00	18,540.00
32 Chilenje South	2,418	99,107.00	47,082,402.00
33 Libala	1,375	55,677.00	25,776,762.00
34 Kabwata	1,216	47,584.00	21,644,628.00
35 Chamba Valley	2	126.00	50,580.00
36 New Kamwala	811	38,686.00	16,602,540.00
37 Lilanda	65	2,660.00	794,070.00
38 Matero	2,395	65,385.00	7,791,150.03
39 New Kabwata S/S	867	44,919.00	20,146,530.00
40 Emmasdale Bank Houses S/S	571	31,004.00	12,732,432.00
41 Kaunda Square	1,571	47,630.00	17,127,540.00
42 Kalingalinga	10	370.00	145,710.00
43 Chawama/Kuomboka	17	543.00	202,140.00
45 Mtendere	2	60.00	18,000.03
46 Chilenje	1,109	34,146.00	12,661,986.00
47 George	1	24.00	0.00
48 Chunga	602	18,714.00	7,099,560.00
49 Chibolya	1	30.00	10,440.00
50 Kanyama	1	0.00	0.00
51 Garden	76	3,995.00	2,964,195.00
52 Kabanana	9	270.00	93,960.00

Final Report Annex-3 Water Distribution Network Modeling and Analysis for UFW Reduction

64 Chandamali	1	55.00	21,690.00
67 Libala South	4	220.00	86,760.00
67 Libala South	4	220.00	86,760.00
64 Chandamali	1	55.00	21,690.00
67 Libala South	4	220.00	86,760.00
61 New Woodlands Extension	1	55.00	21,690.00
62 Kaunda Square STG2	855	27,195.00	10,057,971.00
54 Chaisa	2	104.00	0.00
53 Marapodi	4	120.00	41,760.00

Total Amount Invoiced: K K6,797,538,629.10

	June 2008	Date:	25/06/2008
A COMPANY AND	Lusaka Water and Sewerage Co.	Time:	4:38:01 PM
	Consumption Invoices	FORM	I: B 03
COMPANY LIMITES	Analysis per Township Area	Ref	. No.
	Report		

Billing Cycle: ALL GROUPS - 15/06/2008

Township	Number of	Consumption	Amount
Aled	Connections	(KI)	mvoiced ()
60/2 Invoices-Water - Water Charge	704	72 208 00	152 217 850 00
01 Woodlands	794	72,200.00	70,000,540,00
02 Wooularius Extension	1 40	45,012.00	246 994 260 01
	1,410	127,032.00 E4 107 00	240,004,200.01
	409	54,107.00	104,030,770.00
	1,112	63,100.00	124,246,250.00
00 Olympia	475	56,994.00	120,565,260.02
07 Olympia Park Extension	452	44,637.00	
	567	63,237.00	123,291,470.00
	549	50,424.00	98,000,550.01
10 UNZA	4	53,583.00	185,139,600.04
11 Handsworth	228	18,782.00	33,619,690.00
12 Mwambula	201	22,006.00	45,411,190.00
13 Chudleigh	344	29,638.00	53,904,410.00
14 Rhodespark	1,305	145,543.00	327,298,870.03
15 Fairview	465	25,304.00	48,522,550.00
16 Northmead	1,015	72,794.00	137,033,080.01
17 Thornpark	257	10,856.00	18,927,930.00
18 Prospect Hill	408	130,449.00	326,795,100.00
19 Statehouse	117	121,097.00	419,307,980.00
20 Government	363	29,853.00	73,355,290.00
21 Shakespear	800	63,318.00	154,093,610.01
22 Sikanze	58	125,367.00	444,907,399.98
23 Luburma	488	39,322.00	84,735,710.00
24 Town/Kabelenga	859	105,997.00	314,012,410.00
25 Industrial Area	710	105,575.00	323,409,790.00
26 Villa Elizabetha	372	20,248.00	41,146,830.00
27 Emmasdale	1,022	69,831.00	123,724,770.03
28 Chainama	1,269	106,321.00	236,082,370.00
29 Helen Kaunda	568	27,522.00	44,609,180.00
30 Chelston	2,495	200,137.00	465,926,550.00
31 Avondale Southend	1,179	64,260.00	109,232,220.00
32 Chilenje South	2,545	105,522.00	186,965,640.00
33 Libala	1,568	74,793.00	132,035,010.00
34 Kabwata	1,451	61,249.00	103,981,450.00
35 Chamba Valley	118	9,148.00	17,680,040.00

36 New Kamwala		1,007	50,013.00	83,587,970.00
37 Lilanda		1,059	56,621.00	48,833,400.00
38 Matero		2,798	94,028.00	47,246,700.04
39 New Kabwata S/S		1,504	90,689.00	159,637,170.00
40 Emmasdale Bank Houses S/S		648	31,850.00	53,110,190.00
41 Kaunda Square		1,752	53,550.00	83,005,910.00
42 Kalingalinga		1,109	44,169.00	71,053,280.03
43 Chawama/Kuomboka		1,686	53,061.00	85,631,900.00
44 John Howard		380	12,165.00	19,556,400.00
45 Mtendere		2,163	66,463.00	104,418,569.87
46 Chilenje		1,532	47,721.00	74,737,700.00
47 George		1,296	86,701.00	157,508,900.00
48 Chunga		904	27,867.00	43,762,450.00
49 Chibolya		12	522.00	1,091,760.00
50 Kanyama		688	28,457.00	47,530,719.96
51 Garden		1,055	37,574.00	69,685,580.00
52 Kabanana		870	26,280.00	40,080,900.00
53 Marapodi		1,547	46,479.00	71,331,000.00
54 Chaisa		37	1,720.00	847,400.00
55 Chipata		15	1,130.00	2,995,600.00
56 Bauleni		300	11.184.00	17.092.650.03
57 Na'ombe		18	3,122,00	10.074.280.00
58 Misisi		99	3.000.00	4.599.600.00
59 John Laing		32	1 486 00	3 143 600 00
60 Kafue Water Works		68	68 835 00	243 491 329 90
61 New Woodlands Extension		308	17 176 00	28 658 900 00
62 Kaunda Square STG2		916	28 762 00	45 128 370 00
63 Kamanga		365	10 950 00	16 712 400 00
64 Chandamali		510	28 340 00	46 692 080 00
65 F1080		249	13 057 00	21 031 070 00
66 F917		240	13 298 00	22 382 830 00
67 Libala South		547	35 149 00	59 057 540 00
68 Jack Compound		213	6 390 00	9 747 000 00
69 Chainda		1/1	4 300 00	6 594 950 00
09 Chanda			4,300.00	0,394,930.00
	Total:	52,824	3,517,975.00	7,386,628,189.97
60/5 Invoices-Water - Meter Rental Charge		-		
01 Woodlands		726	0.00	4,944,000.00
02 Woodlands Extension		703	0.00	4,386,000.00
03 Kabulonga & Sunningdale		1,170	0.00	7,776,000.00
04 New Ibex Hill		341	0.00	2,130,000.00
05 Nyumba Yanga		968	0.00	5,948,000.00
06 Olympia		424	0.00	2,978,000.00
07 Olympia Park Extension		414	0.00	2,918,000.00
08 Kalundu		544	0.00	3,740,000.00
09 Roma		477	0.00	3,254,000.00
10 UNZA		2	0.00	40,000.00
11 Handsworth		220	0.00	1,446,000.00
12 Mwambula		186	0.00	1,368,000.00
13 Chudleigh		279	0.00	1 814 000 00

14 Rhodespark	1,086	0.00	9,274,000.00
15 Fairview	427	0.00	3,192,000.00
16 Northmead	828	0.00	6,214,000.00
17 Thornpark	245	0.00	1,708,000.00
18 Prospect Hill	348	0.00	2,676,000.00
19 Statehouse	77	0.00	1,008,000.00
20 Government	254	0.00	2,294,000.00
21 Shakespear	737	0.00	5,150,000.00
22 Sikanze	5	0.00	100,000.00
23 Luburma	332	0.00	2,930,000.00
24 Town/Kabelenga	651	0.00	10,920,000.00
25 Industrial Area	445	0.00	8,718,000.00
26 Villa Elizabetha	342	0.00	2,850,000.00
27 Emmasdale	700	0.00	4,662,000.00
28 Chainama	1,162	0.00	7,588,000.00
29 Helen Kaunda	326	0.00	1,984,000.00
30 Chelston	1,955	0.00	12,220,000.00
31 Avondale Southend	998	0.00	6,156,000.00
32 Chilenje South	1,864	0.00	11,282,000.00
33 Libala	1,252	0.00	7,918,000.00
34 Kabwata	989	0.00	6,018,000.00
35 Chamba Valley	66	0.00	424,000.00
36 New Kamwala	535	0.00	3,252,000.00
37 Lilanda	374	0.00	2,678,000.00
38 Matero	162	0.00	1,112,000.00
39 New Kabwata S/S	521	0.00	3,266,000.00
40 Emmasdale Bank Houses S/S	533	0.00	3.310.000.00
41 Kaunda Square	30	0.00	222.000.00
42 Kalingalinga	17	0.00	228.000.00
45 Mtendere	6	0.00	92.000.00
46 Chilenie	172	0.00	1.088.000.00
47 George	938	0.00	7.910.000.00
48 Chunga	2	0.00	12.000.00
49 Chibolya	-	0.00	20,000,00
50 Kanyama	356	0.00	2 248 000 00
51 Garden	2	0.00	26 000 00
53 Marapodi	- 1	0.00	6,000,00
54 Chaisa	1	0.00	20,000,00
56 Bauleni	1	0.00	6 000 00
57 Na'ombe	2	0.00	40,000,00
60 Kafue Water Works	58	0.00	432 000 00
61 New Woodlands Extension	73	0.00	438,000,00
62 Kaunda Square STG2	106	0.00	664 000 00
63 Kamanga	2	0.00	26,000,00
64 Chandamali	04	0.00	690 000 00
65 F1080	४ ५ ११६	0.00	710 000 00
66 Eq17	70	0.00	476 000 00
67 Libala South	107	0.00	1 150 000 00
	107	0.00	1,100,000.00
oa Cualinga	4	0.00	∠4,000.00

Tol2 Invoices-Sever - Sever Charge O1 Woodlands 253 22.64.00 18.447.044.00 02 Woodlands Extension 698 41.558.00 22.065.108.00 03 Kabulonga & Sunnigdale 40 3.935.00 22.661.345.00 04 New Ubex Hill 29 34.962.00 21.912.884.00 05 Nymba Yanga 1.088 51.630.00 9.654.612.00 06 Kalundu 2 147.00 77.870.00 08 Kalundu 2 147.00 67.432.980.01 11 Handsworth 15 1.024.00 717.915.00 13 Chudleigh 3 47.147.00 67.422.890.01 14 Rhodespark 329 51.633.00 54.242.07.01 15 Raindew 172 9.788.00 64.24.880.00 16 Northmead 512 36.687.00 24.094.785.00 17 Thornpark 161 6.581.00 3.521.688.941.00 18 Northmead 512 37.00 169.227.03.00 19 Statehouse 32 91.633.00 145.123.298.00 21 Shaze		Total:	25,907	0.00	188,174,000.00
01 Woodlands Extension 253 22.640.00 1.487.044.00 03 Kabulonga & Sunningdale 40 3.935.00 22.065.108.00 03 Kabulonga & Sunningdale 40 3.935.00 22.661.345.00 04 New Ibex Hill 289 34.962.00 22.617.1445.00 06 Olympia 100 7.403.00 9.654.612.00 09 Roma 2 147.00 7.810.00 09 Roma 2 147.00 7.842.980.01 11 Handsworth 15 1.024.00 717.915.00 10 UNZA 3 45.147.00 64.24.890.00 16 Northmead 512 36.887.00 64.24.890.00 16 Northmead 512 36.887.00 64.24.890.00 19 Prospect Hill 191 51.090.00 41.686.990.00 19 Statehouse 32 91.533.00 152.7683.00 21 Shakespear 67 67.927.00 69.927.603.00 22 Shakespear 67 67.927.00 69.927.603.00 23 Shakespear 68 1.450.00 6.092.376.03.00	70/2 Invoices-Sewer - Sewer Charge				
02 Woodlands Extension 698 41,558.00 22,065,108.00 04 New Ibex Hill 289 34,962.00 21,912,894.00 05 Nymba Yanga 10 74,000 8,554,612.00 06 Olympia 10 74,000 8,554,612.00 08 Kalundu 2 155.00 75,810.00 09 Roma 2 147.00 67,822,980.01 11 Handsworth 15 1,024.00 717,915.00 13 Chuidiegh 3 47,147.00 67,422,980.01 14 Rhodespark 229 51,633.00 53,422,17.01 15 Paintew 172 9,798.00 6,424.860.00 16 Northmead 512 36,887.00 24,2488.00 17 Thornpark 151 6,581.00 3,521,688.00 18 Prospect Hill 119 51,023.98.00 153,223.80.00 19 Stathouse 32 91,533.00 163,712,794.00 20 Government 42 37,00 26,962,030.00 21 Shanze 4 1,405.00 6,902,038.00 21 Subursa<	01 Woodlands		253	22,640.00	18,487,044.00
03 Kabuinga & Sunningdale 40 3,935.00 2,961,345.00 04 New Ibex Hill 289 34,962.00 21,912,894.00 05 Nyumba Yanga 1,088 51,630.00 2,61,71,445.00 06 Olympia 10 17,403.00 9,654,612.00 06 Kalundu 2 147.00 78,570.00 01 UNZA 3 43,147.00 67,432.980.01 10 UNZA 3 175.00 64,4380.00 13 Chudeigh 3 175.00 64,4380.00 14 Rhodespark 329 51,633.00 6,424,880.00 15 Fairview 151 6,681.00 3,521,688.00 16 Northmead 512 36,887.00 44,942.80.01 17 Thompark 151 6,581.00 3,521,688.00 16 Northmead 512 36,887.00 44,302.00 18 Prospect Hill 19 51,996.00 44,686.90 19 Statehouse 32 91,833.00 169,772.970.00 21 Shakespear 657 67,927.00 69,927.603.00 22 Stateh	02 Woodlands Extension		698	41,558.00	22,065,108.00
04 New Ibex Hill 289 34,962.00 21,912,894.00 06 Nyumba Yanga 1,088 51,630.00 22,117.445.00 06 Kalundu 2 147.00 7,637.00 08 Roma 2 147.00 7,637.00 10 UNZA 3 43,147.00 67,432.980.01 11 Handsworth 15 1.024.00 71,71,915.00 13 Chudleigh 3 175.00 64,432.880.01 14 Rhodespark 329 51,633.00 52,420.217.01 15 Fairlew 172 3,788.00 64,424.880.00 16 Northmead 151 6,581.00 3,521.688.00 17 Thornpark 151 6,581.00 3,521.688.00 18 Prospect Hill 199 513.300 145,613.2388.00 21 Shakespear 667 6,7927.00 69,927.603.00 21 Skatespear 667 6,7927.00 69,927.603.00 22 Skaraz 4 14,05.00 2,602.680.00 23 Skarbace 186 93.07.00 169,272.974.00 24 Sun/rkabelen	03 Kabulonga & Sunningdale		40	3,935.00	2,661,345.00
05 Nyumba Yanga 1,088 51,830.00 26,171,445.00 06 Olympia 10 7,403.00 26,171,445.00 09 Roma 2 147.00 7,8570.00 09 Noma 2 147.00 7,8570.00 10 UNZA 3 43,147.00 67,432,980.01 11 Handsworth 15 1,024.00 7,71,915.00 13 Chudleigh 3 175.00 64,4380.00 14 Rhodespark 329 51,833.00 53,420,217.01 15 Fairview 172 9,798.00 64,4860.00 16 Northmead 512 36,887.00 24,094,785.00 17 Thornpark 151 6,581.00 3,521,688.00 13 Statehouse 32 91,533.00 145,132,386.00 14 Statespear 637 67,927.00 69,927.603.00 21 Shakespear 364 30,751.00 25,062,680.00 23 Luburna 364 30,751.00 6,927,863.00 24 Town/Kabelenga 31 12,238.00 168,216,657.00 24 Town/Kabelenga <td>04 New Ibex Hill</td> <td></td> <td>289</td> <td>34,962.00</td> <td>21,912,894.00</td>	04 New Ibex Hill		289	34,962.00	21,912,894.00
06 Olympia 10 7.403.00 9.654.612.00 08 Kalundu 2 155.00 75.810.00 08 Roma 2 147.00 75.810.00 10 UNZA 3 43.147.00 67.432.980.01 11 Handsworth 15 1.024.00 717.915.00 13 Chudleigh 3 175.00 84.390.00 14 Rhodsepark 329 51.633.00 24.496.00 15 Fairview 172 9.798.00 6.424.860.00 16 Northmead 151 6.681.00 2.047.763.00 17 Thompark 151 5.133.00 14.153.2386.01 19 Statehouse 29 9.133.00 14.65.3286.01 21 Shakespear 667 67.927.00 69.927.603.00 22 Sikanze 4 14.060.0 2.062.680.00 23 Liburma 364 30.761.00 2.368.6914.00 24 Town/Kabelenga 831 122.363.00 168.216.67.00 25 Industrial Area 31 9.863.00 16.972.97.00 25 Industrial Area <	05 Nyumba Yanga		1,088	51,630.00	26,171,445.00
08 Kalundu 2 145.00 75.810.00 09 Roma 2 147.00 78.570.00 10 UNZA 3 147.00 67.432.980.01 11 Handsworth 15 1.024.00 77.915.00 13 Chudleigh 3 175.00 84.390.00 14 Rhodespark 329 51.633.00 65.424.860.00 15 Fairview 72 9.788.00 6.424.860.00 16 Northmead 512 36.867.00 24.094.785.00 17 Thornpark 151 6.581.00 3.521.688.00 18 Statehouse 32 91.533.00 145.152.398.00 20 Government 142 37.001.00 65.952.705.00 21 Stakespear 667 67.927.00 69.927.603.00 22 Luburma 364 30.071.00 25.868.914.00 24 Torm/Kabelenga 831 122.363.00 169.772.974.00 25 Luburma 74 5.450.00 6.653.0308.00 24 Torm/Kabelenga 116 5.093.00 17.028.355.00 25 Helen Kaunda	06 Olympia		10	7,403.00	9,654,612.00
09 Roma 2 147.00 78.570.00 10 UNZA 3 43,147.00 67,432,980.01 11 Handsworth 15 1.024.00 717,915.00 13 Chudleigh 3 175.00 84,390.00 14 Rhodsepark 229 51.63.30 63.420.217.01 15 Fairview 172 9,798.00 6.424.860.00 16 Northmead 512 36.887.00 24.094,785.00 17 Thorpark 151 6.581.00 3.521.888.00 18 Prospect Hill 119 51.099.00 41.688.959.00 19 Statehouse 32 91.533.00 141.512.338.00 20 Government 142 37.01.00 50.952.705.00 21 Skaraz 4 1.405.00 2.062.800.00 23 Skaraz 687 67.927.00 69.927.603.00 24 Lowm/Rabelenga 831 122.943.00 168.216.657.00 25 Industrial Area 371 98.837.00 169.72.374.00 25 Industrial Area 1132 99.056.00 86.53.098.00 2	08 Kalundu		2	155.00	75,810.00
10 UNZA 3 43,147.00 67,432,980.01 11 Handsworth 15 1,024.00 717,915.00 13 Chudleigh 3 175.00 64,390.00 14 Rhodespark 329 51,633.00 65,420,217.01 15 Fairview 172 9,788.00 64,24,860.00 16 Northmead 512 53,887.00 24,24,987.00 17 Thornpark 151 6,581.00 3,521,688.00 18 Prospect Hill 119 51,980.00 14,688,959.00 19 Statehouse 32 91,533.00 145,152,398.00.00 20 Government 142 37,001.00 50,952,705.00 21 Shakespear 687 67,927.00 69,927,603.00 22 Sikanze 43 1,405.00 2,662,680.00 23 Luburma 364 1,405.00 2,662,680.00 24 Com/Kabelenga 31 122,363.00 126,756,500 24 Chankabelenga 71 5,463.00 66,763,098.00 27 Ermasdale 136 13,093.00 7,028,355,00	09 Roma		2	147.00	78,570.00
11 Handsworth 15 1,22,400 717,915,00 13 Chudleigh 3 175.00 84,390,00 14 Rhodespark 29 51,833,00 24,04360,00 15 Fairview 172 9,798,00 6,424,860,00 16 Northmead 151 6,881,00 24,049,785,00 17 Thornpark 151 6,881,00 3,521,688,00 18 Prospect Hill 119 51,099,00 41,668,959,00 19 Statehouse 32 91,533,00 145,132,398,00 20 Government 122 37,001,00 69,927,603,00 21 Shakespear 687 67,927,00 69,927,603,00 22 Sikanze 4 1,405,00 2,062,680,00 23 Luburma 361 122,363,00 168,216,657,00 24 Town/Kabelenga 311 122,363,00 168,216,657,00 25 Industrial Area 371 9,850,00 66,563,098,00 27 Emmasdale 1,88 1,309,00 62,638,098,00 21 Avondale Southend 1,98 14,902,00 66,561,002,00 31 Avondale Southend 3 85,00 35,85,00	10 UNZA		3	43,147.00	67,432,980.01
13 Chuolleigh 3 175.00 84.390.00 14 Rhodespark 329 51.633.00 6.424.860.00 15 Fairview 172 9.798.00 6.424.860.00 16 Northmead 512 36.887.00 24.094.785.00 17 Thompark 151 6.581.00 3521.688.00 18 Prospect Hill 19 51.099.00 41.668.959.00 20 Government 142 37.01.00 50.952.705.00 21 Shakespear 687 67.92.70 69.927.603.00 22 Sikanze 48 30.751.00 2.368.614.00 24 Luburma 364 30.751.00 2.368.614.00 25 Ivalustrial Area 371 9.83.00 168.276.50.00 26 Vilae Elizabetha 71 5.450.00 6.63.098.00 27 Emmasdale 186 13.093.00 7.028.355.00 28 Helen Kaunda 1,132 99.265.00 66.53.098.00 29 Helen Kaunda 1,431 52.132.00 66.53.098.00 31 Libala 1,490.0 3.85.00 40.110.00 32 Cheliston 1,2716.555.00 58.24.923.00 53.44.923.00	11 Handsworth		15	1,024.00	717,915.00
14 Rhodespark 329 51,83.00 53,420,217.01 15 Fairview 172 9,798.00 6,424,860.00 16 Northmead 512 36,887.00 24,094,785.00 17 Thornpark 151 6,581.00 3,521,688.00 18 Prospect Hill 119 51,099.00 41,686,950.00 19 Statehouse 32 91,533.00 65,952,705.00 20 Government 142 37,001.00 50,952,705.00 21 Ishakespear 687 67,927.00 69,927,603.00 22 Iuburna 684 30,751.00 23,868,914.00 23 Luburna 634 30,751.00 23,868,914.00 24 Town/Kabelenga 831 122,363.00 168,216,657.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Villa Elizabetha 71 5,450.00 86,563.098.00 27 Emmasdale 186 13,093.00 16,2716,565.00 26 Chainama 1,132 99,256.00 86,563.098.00 27 Leinade 541 25,962.00 86,563.098.00 28 Adou Asta 1,31 59,964.00 31,402.030.00 31 Avondale Southend 3 8.00 40,110.00 32 Akaba 1,218 52,132.00 66,510	13 Chudleigh		3	175.00	84,390.00
15 Fairview 172 9,788.00 6,424,860.00 16 Northmead 512 36,87.00 324,094,785.00 18 Prospect Hill 119 51,099.00 41,668,959.00 18 Prospect Hill 119 51,099.00 41,668,959.00 19 Statehouse 32 91,533.00 145,132,398.00 20 Government 142 37,001.00 50,952,705.00 21 Shakespear 667 67,927.00 69,927,603.00 22 Sikanze 4 1,405.00 2,062,680.00 23 Liburma 364 30,751.00 23,686,614.00 24 Town/Kabelenga 371 86,837.00 168,276.50.00 25 Industrial Area 371 8,837.00 168,276.657.00 26 Villa Elizabetha 71 5,450.00 6,690.2368.00 27 Ermasdale 136 13,093.00 7,728,355.00 20 Helen Kaunda 541 25,963.00 12,716,665.00 30 Chelston 1,593 104,593.00 6,634,5012.00 31 Avorable Southend 3 85.00 14,710.00 32 Chlenje South 2,42 98,555.00 58,204,923.00 33 Libala 1,311 59,964.00 31,402.08.00 34 Kabwata 1,218 52,132.00 <t< td=""><td>14 Rhodespark</td><td></td><td>329</td><td>51,633.00</td><td>53,420,217.01</td></t<>	14 Rhodespark		329	51,633.00	53,420,217.01
16 Northmead 512 36.87.00 24,094,785.00 17 Thompark 151 6.581.00 3,521,688.00 18 Prospect Hill 119 51,099.00 41,668,959.00 19 Statehouse 32 91,533.00 145,132.398.00 20 Government 142 37,001.00 50,952,705.00 21 Shakespear 667 67,927.00 69,927,603.00 22 Sikanze 4 41,0500 2,062,680.00 23 Luburna 364 30,751.00 2,062,680.40 24 Town/Kabelenga 831 122,363.00 168,216,657.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Vilas Elizabetha 71 55,600 6,902,368.00 27 Emmasdale 1132 99,256.00 86,563,098.00 28 Helen Kaunda 541 25,963.00 12,716,565.00 30 Cheleston 1,593 14,4593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chienje South 24 98,555.00 58,204,623.00 31 Libala 1,81 59,64.00 31,430,20	15 Fairview		172	9,798.00	6,424,860.00
17 Thompark 151 6.581.00 3.521,688.00 18 Prospect Hill 119 51,099.00 41,668,959.00 19 Statehouse 32 291,533.00 145,132,398.00 20 Government 142 37,001.00 50,952,705.00 21 Shakespear 687 67,927.00 69,927,603.00 22 Sikanze 4 1,405.00 2,062,680.00 23 Luburna 364 30,751.00 23,686,914.00 24 Town/Kabelenga 811 122,383.00 169,772,974.00 25 Industrial Area 371 98,837.00 168,216,657.00 24 Town/Kabelenga 1186 13,093.00 7,028,355.00 25 Chainama 1,132 99,266.00 86,656,098.00 26 Chainama 1,132 99,266.00 86,656,098.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,933.00 66,345,012.00 31 Avondale Southend 3 8500 40,110.00 32 Chleinje South 2,420 88,555.00 58,204,823.00 31 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 26,465.01 35 Chamba Valley 2 60,510.00	16 Northmead		512	36,887.00	24,094,785.00
18 Prospect Hill 119 51,099.00 41,668,959.00 19 Statehouse 32 91,533.00 145,132,398.00 20 Government 142 37,001.00 50,952,705.00 21 Shakespear 67,927.00 69,927,603.00 22 Sikanze 4 1,405.00 2,062,680.00 23 Luburma 364 30,751.00 23,686,914.00 24 Town/Kabelenga 831 122,363.00 168,772,974.00 25 Industrial Area 371 9,837.00 168,216,677.00 26 Villa Elizabetha 71 5,450.00 60,936.80.00 27 Emmasdale 11,12 99,256.00 88,650,998.00 29 Helen Kaunda 1,132 99,256.00 88,650,998.00 20 Cheiston 1,593 104,593.00 66,451,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libai 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 20,504,259.00 35 Chamba Valley 2 120.00 00,510.00	17 Thornpark		151	6,581.00	3,521,688.00
19 Statehouse 32 91,533.00 145,132,398.00 20 Government 142 37,001.00 50,952,705.00 21 Shakespear 687 67,927.00 69,927,603.00 22 Sikanze 4 1,405.00 22,062,680.00 23 Luburna 364 30,751.00 23,686,914.00 24 Town/Kabelenga 831 122,363.00 168,772,974.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Chainama 1,132 99,256.00 86,630,98.00 27 Emmasdale 16 13,093.00 66,345,012.00 26 Chainama 1,132 99,256.00 86,630,98.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 44,110.00 32 Chainama 1,218 52,132.00 26,480,881.00 33 Libala 1,814 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 26,440,280.00 35 Chamba Valley 2 125.00 66,510.00 <td>18 Prospect Hill</td> <td></td> <td>119</td> <td>51,099.00</td> <td>41,668,959.00</td>	18 Prospect Hill		119	51,099.00	41,668,959.00
20 Government 142 37,001.00 50,952,705.00 21 Shakespear 667 67,927.00 69,927,603.00 22 Sikanze 4 1,405.00 2,062,680.00 23 Luburna 364 30,751.00 23,686,914.00 24 Town/Kabelenga 831 122,363.00 166,772,974.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Villa Elizabetha 71 5,450.00 6,902,368.00 27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,256.00 86,563,098.00 29 Helen Kaunda 3 85.00 142,716,565.00 30 Chelston 1,593 104,593.00 52,649.23.00 31 Avondale Southend 3 85.00 40,110.00 32 Chainama 1,381 59,964.00 31,430,208.00 34 Kabwata 2,128 52,132.00 26,449.83.00 32 Chainama 1,381 59,964.00 31,430,208.00 34 Kabwata 2,128 52,132.00 26,449.83.00 <td>19 Statehouse</td> <td></td> <td>32</td> <td>91,533.00</td> <td>145,132,398.00</td>	19 Statehouse		32	91,533.00	145,132,398.00
21 Shakespear 687 67,927.00 69,927,603.00 22 Sikanze 4 1,405.00 2,062,680.00 23 Luburma 364 30,751.00 23,668,914.00 24 Town/Kabelenga 831 122,363.00 168,216,657.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Villa Elizabetha 71 5,450.00 6,902,368.00 27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,266.00 86,563,098.00 29 Helen Kaunda 541 25,963.00 12,716,656.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Champa Valley 2 125.00 60,510.00 36 Natero 2,395 64,537.00 9,351,645.0	20 Government		142	37,001.00	50,952,705.00
22 Sikanze 4 1,405.00 2,062,680.00 23 Luburma 364 30,751.00 23,686,914.00 24 Town/Kabelenga 831 122,363.00 168,216,657.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Villa Elizabetha 71 5,450.00 6,902,368.00 27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,256.00 86,563,098.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chlienje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 22,050,02 39 New Kabwata S/S 571 27,207.00 33,31,478.00 41 Kaunda Square 1,573 47,690.00	21 Shakespear		687	67,927.00	69,927,603.00
23 Luburna 364 30,751.00 23,686,914.00 24 Town/Kabelenga 831 122,363.00 169,772,974.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Villa Elizabetha 71 5,450.00 6,902,368.00 27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,256.00 86,563,088.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chlineje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 68,510.00 35 Chamba Valley 2 125.00 66,510.00 36 New Kamwala 809 39,07.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 </td <td>22 Sikanze</td> <td></td> <td>4</td> <td>1,405.00</td> <td>2,062,680.00</td>	22 Sikanze		4	1,405.00	2,062,680.00
24 Town/Kabelenga 831 122,363.00 169,772,974.00 25 Industrial Area 371 98,837.00 168,216,657.00 26 Villa Elizabetha 71 5,450.00 6,902,388.00 27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,256.00 86,563,098.00 29 Helen Kaunda 511 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 65 3,062.00 1,167,765.00 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 <	23 Luburma		364	30,751.00	23,686,914.00
25 Industrial Area 371 98,837.00 168,216,657.00 26 Villa Elizabetha 71 5,450.00 6,902,368.00 27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,256.00 86,653,098.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 20,504,259.00 37 Lilanda 65 36,062.00 1,167,650.00 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Ermmasdale Bank Houses S/S 571 27,270.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.	24 Town/Kabelenga		831	122,363.00	169,772,974.00
26 Villa Elizabetha 71 5,450.00 6,902,368.00 27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,256.00 86,563,098.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,281 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,07.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00	25 Industrial Area		371	98,837.00	168,216,657.00
27 Emmasdale 186 13,093.00 7,028,355.00 28 Chainama 1,132 99,256.00 86,563,098.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 26,010.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00 45 Khendere 2 60.00 25,199.90	26 Villa Elizabetha		71	5,450.00	6,902,368.00
28 Chainama 1,132 99,256.00 86,563,098.00 29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 18,4470.00 43 Chawama/Kuomboka 17 535.00 <t< td=""><td>27 Emmasdale</td><td></td><td>186</td><td>13,093.00</td><td>7,028,355.00</td></t<>	27 Emmasdale		186	13,093.00	7,028,355.00
29 Helen Kaunda 541 25,963.00 12,716,565.00 30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 113,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00 45 Mendere 2 60.00 25,199.90 46 Chilenje 1,108 35,067.00 16,854,345	28 Chainama		1,132	99,256.00	86,563,098.00
30 Chelston 1,593 104,593.00 66,345,012.00 31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00 45 Mtendere 2 60.00 25,199.90 46 Chilenje 1,108 35,067.00 16,854,345.00 47 George 1 24.00 0.00	29 Helen Kaunda		541	25,963.00	12,716,565.00
31 Avondale Southend 3 85.00 40,110.00 32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00 45 Mtendere 2 60.00 25,199.90 46 Chilenje 1,108 35,067.00 16,854,345.00 47 George 1 24.00 0.00 48 Chunga 602 18,714.00 9,264,960.00	30 Chelston		1,593	104,593.00	66,345,012.00
32 Chilenje South 2,420 98,555.00 58,204,923.00 33 Libala 1,381 59,964.00 31,430,208.00 34 Kabwata 1,218 52,132.00 28,480,881.00 35 Chamba Valley 2 125.00 60,510.00 36 New Kamwala 809 39,307.00 20,504,259.00 37 Lilanda 65 3,062.00 1,167,765.00 38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00 45 Mtendere 2 60.00 25,199.90 46 Chilenje 1,108 35,067.00 16,854,345.00 47 George 1 24.00 0.00 48 Chunga 602 18,714.00 9,264,960.00 49 Chibolya 1 30.00 13,680.00 <t< td=""><td>31 Avondale Southend</td><td></td><td>3</td><td>85.00</td><td>40,110.00</td></t<>	31 Avondale Southend		3	85.00	40,110.00
33 Libal1,38159,964.0031,430,208.0034 Kabwata1,21852,132.0028,480,881.0035 Chamba Valley2125.0060,510.0036 New Kamwala80939,307.0020,504,259.0037 Lilanda653,062.001,167,765.0038 Matero2,39564,537.009,351,645.0339 New Kabwata S/S86855,650.0033,698,784.0040 Emmasdale Bank Houses S/S57127,207.0013,301,478.0041 Kaunda Square1,57347,690.0022,432,500.0042 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	32 Chilenje South		2,420	98,555.00	58,204,923.00
34 Kabwata1,21852,132.0028,480,881.0035 Chamba Valley2125.0060,510.0036 New Kamwala80939,307.0020,504,259.0037 Lilanda653,062.001,167,765.0038 Matero2,39564,537.009,351,645.0339 New Kabwata S/S86855,650.0033,698,784.0040 Emmasdale Bank Houses S/S57127,207.0013,301,478.0041 Kaunda Square1,57347,690.0022,432,500.0042 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	33 Libala		1,381	59,964.00	31,430,208.00
35 Chamba Valley2125.0060,510.0036 New Kamwala80939,307.0020,504,259.0037 Lilanda653,062.001,167,765.0038 Matero2,39564,537.009,351,645.0339 New Kabwata S/S86855,650.0033,698,784.0040 Emmasdale Bank Houses S/S57127,207.0013,301,478.0041 Kaunda Square1,57347,690.0022,432,500.0042 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	34 Kabwata		1,218	52,132.00	28,480,881.00
36 New Kamwala80939,307.0020,504,259.0037 Lilanda653,062.001,167,765.0038 Matero2,39564,537.009,351,645.0339 New Kabwata S/S86855,650.0033,698,784.0040 Emmasdale Bank Houses S/S57127,207.0013,301,478.0041 Kaunda Square1,57347,690.0022,432,500.0042 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	35 Chamba Valley		2	125.00	60,510.00
37 Lilanda653,062.001,167,765.0038 Matero2,39564,537.009,351,645.0339 New Kabwata S/S86855,650.0033,698,784.0040 Emmasdale Bank Houses S/S57127,207.0013,301,478.0041 Kaunda Square1,57347,690.0022,432,500.0042 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Ohibolya130.0013,680.0050 Kanyama10.000.00	36 New Kamwala		809	39,307.00	20,504,259.00
38 Matero 2,395 64,537.00 9,351,645.03 39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00 45 Mtendere 2 60.00 25,199.90 46 Chilenje 1,108 35,067.00 16,854,345.00 47 George 1 24.00 0.00 48 Chunga 602 18,714.00 9,264,960.00 49 Chibolya 1 30.00 13,680.00 50 Kanyama 1 0.00 0.00	37 Lilanda		65	3,062.00	1,167,765.00
39 New Kabwata S/S 868 55,650.00 33,698,784.00 40 Emmasdale Bank Houses S/S 571 27,207.00 13,301,478.00 41 Kaunda Square 1,573 47,690.00 22,432,500.00 42 Kalingalinga 10 370.00 184,470.00 43 Chawama/Kuomboka 17 535.00 257,280.00 45 Mtendere 2 60.00 25,199.90 46 Chilenje 1,108 35,067.00 16,854,345.00 47 George 1 24.00 0.00 48 Chunga 602 18,714.00 9,264,960.00 49 Chibolya 1 30.00 13,680.00 50 Kanyama 1 0.00 0.00	38 Matero		2,395	64,537.00	9,351,645.03
40 Emmasdale Bank Houses S/S57127,207.0013,301,478.0041 Kaunda Square1,57347,690.0022,432,500.0042 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	39 New Kabwata S/S		868	55,650.00	33,698,784.00
41 Kaunda Square1,57347,690.0022,432,500.0042 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	40 Emmasdale Bank Houses S/S		571	27,207.00	13,301,478.00
42 Kalingalinga10370.00184,470.0043 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	41 Kaunda Square		1,573	47,690.00	22,432,500.00
43 Chawama/Kuomboka17535.00257,280.0045 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	42 Kalingalinga		10	370.00	184,470.00
45 Mtendere260.0025,199.9046 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	43 Chawama/Kuomboka		17	535.00	257,280.00
46 Chilenje1,10835,067.0016,854,345.0047 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	45 Mtendere		2	60.00	25,199.90
47 George124.000.0048 Chunga60218,714.009,264,960.0049 Chibolya130.0013,680.0050 Kanyama10.000.00	46 Chilenje		1,108	35,067.00	16,854,345.00
48 Chunga 602 18,714.00 9,264,960.00 49 Chibolya 1 30.00 13,680.00 50 Kanyama 1 0.00 0.00	47 George		1	24.00	0.00
49 Chibolya 1 30.00 13,680.00 50 Kanyama 1 0.00 0.00	48 Chunga		602	18,714.00	9,264,960.00
50 Kanyama 1 0.00 0.00	49 Chibolya		1	30.00	13.680.00
	50 Kanyama		1	0.00	0.00

The Study on Comprehensive Urban Development Plan for the City of Lusaka in the Republic of Zambia Final Report Annex-3 Water Distribution Network Modeling and Analysis for UFW Reduction

51 Garden	75	3,984.00	3,807,381.00
52 Kabanana	9	270.00	123,120.00
53 Marapodi	4	120.00	54,720.00
54 Chaisa	2	104.00	0.00
61 New Woodlands Extension	1	55.00	26,430.00
62 Kaunda Square STG2	855	26,431.00	12,587,169.00
64 Chandamali	1	55.00	26,430.00
67 Libala South	4	220.00	105,720.00
Total:	23,638	1,595,299.00	1,369,783,918.95

Total Amount Invoiced: K K8,944,586,108.92

Lusaka Water and Sewerage Co.

2008/7/23 Time:

	Date:	2008/7/23 1	Time:
TownshipArea	Number of Connections	Consumption(kl)	Amount Invoiced ()
60/2	Invoices-Water - Water	[·] Charge	
01 Woodlands	793	72,178.00	148,925,340.00
02 Woodlands Extension	741	45,292.00	81,070,850.00
03 Kabulonga & Sunningdale	1,418	148,859.00	296,971,130.00
04 New Ibex Hill	463	46,635.00	86,446,600.00
05 Nyumba Yanga	1,127	53,749.00	92,645,290.00
06 Olympia	479	59,723.00	125,722,960.02
07 Olympia Park Extension	454	45,530.00	88,554,940.00
08 Kalundu	565	70,275.00	140,621,850.00
09 Roma	551	52,192.00	101,654,790.02
10 UNZA	3	50,026.00	176,580,200.02
11 Handsworth	228	18,289.00	32,739,730.00
12 Mwambula	200	22,326.00	46,152,160.00
13 Chudleigh	345	29,077.00	52,301,460.00
14 Rhodespark	1,305	157,677.00	359,434,070.04
15 Fairview	466	26,559,00	51,700,420,00
16 Northmead	1.011	75.621.00	142.987.590.04
17 Thornpark	259	12.047.00	21.607.760.00
18 Prospect Hill	408	111.761.00	276.177.570.00
19 Statehouse	117	103,511,00	353,395,830,00
20 Government	369	31 402 00	76 565 470 00
21 Shakespear	788	69.983.00	182,903,940,04
22 Sikanze	58	127 598 00	452 938 999 98
23 Luburma	485	31 318 00	63 004 690 00
24 Town/Kabelenga	846	104 508 00	304 770 570 00
25 Industrial Area	701	101,000.00	300 265 070 00
26 Villa Elizabetha	370	18,334,00	36 534 610 00
27 Emmasdale	1 016	72 177 00	137 904 260 06
28 Chainama	1,010	87 427 00	169 293 230 00
29 Helen Kaunda	569	28 656 00	46 730 350 00
30 Chelston	2 504	183 727 00	419 520 220 00
31 Avondale Southend	1 182	69 702 00	118 416 160 00
32 Chilenie South	2 555	101 566 00	181 619 990 00
33 Libala	2,000	75 491 00	135 280 640 00
34 Kabwata	1,000	57 502 00	97 761 580 00
35 Chamba Valley	120	10 047 00	19 632 290 00
36 New Kamwala	1 007	47 459 00	79 759 970 00
37 Lilanda	1,007	48 254 00	33 919 170 00
38 Matero	2 802	108 132 00	98 778 890 04
39 New Kabwata S/S	1 511	76 252 00	134 611 560 00
40 Emmasdale Bank Houses	5 646	30 520 00	50 831 130 00
41 Kaunda Square	1 755	53 738 00	83 334 430 00
42 Kalingalinga	1,700	44 589 00	72 196 190 06
43 Chawama/Kuomboka	1,105	53 061 00	85 631 900 00
44 John Howard	381	12 195 00	19 602 000 00
45 Mtendere	2 163	68 878 00	113 086 049 88
46 Chilenie	2,105	47 260 00	75 332 690 00
47 George	1,000	76 734 00	137 Q18 470 00
48 Chunga	1,230 004	27 267 00	137,310,470.00 A3 769 160 00
49 Chibolya	904 10	00.100, 12 ۵۸ ۶۵۶	1 001 760 00
50 Kanyama	685	28 128 00	1,031,700.00 48 617 500 02
oo Nanyama	002	20,120.00	+0,014,090.02

51 Garden	1,056	37,614.00	69,748,210.00
52 Kabanana	870	26,280,00	40.080.900.00
53 Marapodi	1,547	46,479.00	71,331,000.00
54 Chaisa	37	1,720.00	847,400.00
55 Chipata	15	1,130.00	2,995,600.00
56 Bauleni	299	11,035.00	16,841,600.06
57 Ng'ombe	18	2,290.00	7,079,080.00
58 Misisi	100	3,030.00	4,645,200.00
59 John Laing	32	1,486.00	3,143,600.00
60 Kafue Water Works	68	70,932.00	250,926,230.00
61 New Woodlands Extension	311	17.246.00	28,986,900,00
62 Kaunda Square STG2	915	29,464.00	46,445,120,00
63 Kamanga	365	10,950,00	16.712.400.00
64 Chandamali	531	31.810.00	54.378.570.00
65 F1080	209	11.749.00	19.609.110.00
66 F917	155	8.770.00	14.522.360.00
67 Libala South	554	32.690.00	54.000.510.00
68 Jack Compound	213	6.390.00	9,747,000,00
69 Chainda	141	4,238,00	6,496,000,00
Total:	52,777	3,450,707.00	7.215.840.650.28
60/50	Invoices-Water - Mete	r Rental Charge	1,210,010,000.20
01 Woodlands	727	0.00	4.950.000.00
02 Woodlands Extension	704	0.00	4,378,000,00
03 Kabulonga & Sunningdale	1,175	0.00	7,806,000,00
04 New Ibex Hill	342	0.00	2,136,000,00
05 Nyumba Yanga	969	0.00	5 940 000 00
06 Olympia	427	0.00	2 996 000 00
07 Olympia Park Extension	418	0.00	2 942 000 00
08 Kalundu	544	0.00	3 740 000 00
09 Roma	477	0.00	3 254 000 00
10 UNZA	2	0.00	40,000,00
11 Handsworth	220	0.00	1 446 000 00
12 Mwambula	187	0.00	1.374.000.00
13 Chudleigh	280	0.00	1 820 000 00
14 Rhodespark	1 090	0.00	9 326 000 00
15 Fairview	427	0.00	3 192 000 00
16 Northmead	827	0.00	6 194 000 00
17 Thornpark	245	0.00	1 708 000 00
18 Prospect Hill	347	0.00	2 670 000 00
19 Statehouse	79	0.00	1 034 000 00
20 Government	255	0.00	2 314 000 00
21 Shakespear	738	0.00	5 156 000 00
22 Sikanze	5	0.00	100,000,00
23 Luburma	335	0.00	2 948 000 00
24 Town/Kabelenga	655	0.00	11 000 000 00
25 Industrial Area	446	0.00	8 738 000 00
26 Villa Elizabetha	344	0.00	2 890 000 00
27 Emmasdale	701	0.00	4 654 000 00
28 Chainama	1 166	0.00	7 612 000 00
20 Chainaina 20 Helen Kaunda	326	0.00	1 984 000 00
30 Chelston	1 957	0.00	12 232 000 00
31 Avondale Southend	1 000	0.00	6 168 000 00
32 Chilenie South	1 226	0.00	
33 Libala	1 266		8 030 000 00
34 Kabwata	007	0.00	6 066 000 00
35 Chamba Valley	166 AA	0.00	424 000 00
oo onamba valiey	00	0.00	727,000.00

The Study on Comprehensive Urban Development Plan for the City of Lusaka in the Republic of Zambia

36 New Kamwala	534	0.00	3,246,000.00
37 Lilanda	375	0.00	2,698,000.00
38 Matero	162	0.00	1,112,000.00
39 New Kabwata S/S	524	0.00	3,284,000.00
40 Emmasdale Bank Houses S	535	0.00	3,322,000.00
41 Kaunda Square	30	0.00	222,000.00
42 Kalingalinga	17	0.00	228,000.00
45 Mtendere	9	0.00	124,000.00
46 Chilenje	172	0.00	1,088,000.00
47 George	939	0.00	7,916,000.00
48 Chunga	2	0.00	12,000.00
49 Chibolya	1	0.00	20,000.00
50 Kanyama	370	0.00	2,332,000.00
51 Garden	2	0.00	26,000.00
53 Marapodi	1	0.00	6,000.00
54 Chaisa	1	0.00	20,000.00
56 Bauleni	1	0.00	6,000.00
57 Ng'ombe	2	0.00	40,000.00
60 Kafue Water Works	58	0.00	432,000.00
61 New Woodlands Extension	73	0.00	438,000.00
62 Kaunda Square STG2	106	0.00	664,000.00
63 Kamanga	2	0.00	26,000.00
64 Chandamali	94	0.00	690,000.00
65 F1080	117	0.00	716,000.00
66 F917	73	0.00	494,000.00
67 Libala South	189	0.00	1,162,000.00
69 Chainda	4	0.00	24,000.00
Total:	26,023	0.00	189,024,000.00

70/2	Invoices-Sewer - Sewer Ch	arge	
01 Woodlands	252	23,946.00	18,649,734.00
02 Woodlands Extension	699	41,559.00	22,430,811.00
03 Kabulonga & Sunningdale	40	4,069.00	2,721,045.00
04 New Ibex Hill	289	30,443.00	18,101,160.00
05 Nyumba Yanga	1,087	49,929.00	25,432,155.00
06 Olympia	10	7,491.00	9,759,486.00
08 Kalundu	2	182.00	91,875.00
09 Roma	2	536.00	377,970.00
10 UNZA	2	41,140.00	66,535,380.00
11 Handsworth	15	1,183.00	926,400.00
13 Chudleigh	3	138.00	65,520.00
14 Rhodespark	328	59.012.00	59.718.099.02
15 Fairview	172	9,826.00	6,285,900.00
16 Northmead	510	44,324,00	35,312,439,00
17 Thornpark	152	6.924.00	3.757.347.00
18 Prospect Hill	119	50.046.00	40.615.719.00
19 Statehouse	32	72.097.00	113.009.664.00
20 Government	147	38,190.00	52.495.638.00
21 Shakespear	675	78.039.00	91.033.030.00
22 Sikanze	4	1.405.00	2.062.680.00
23 Luburma	358	22,150.00	15.887.475.00
24 Town/Kabelenga	817	120.887.00	164.188.810.00
25 Industrial Area	369	88.663.00	154.037.848.00
26 Villa Elizabetha	71	4.834.00	5,964,849,00
27 Emmasdale	184	17.807.00	15.324.591.00
28 Chainama	1.145	79.555.00	55.327.125.00
29 Helen Kaunda	541	26,951.00	13,259,865,00
30 Chelston	1.595	98.187.00	62.608.614.00
31 Avondale Southend	3	74.00	34,995,00
32 Chilenie South	2.417	94.432.00	56.285.298.00
33 Libala	1,380	59,350.00	30,902,310.00
34 Kabwata	1.220	48.830.00	26.789.751.00
35 Chamba Valley	2	120.00	57.960.00
36 New Kamwala	807	36.627.00	19.224.594.00
37 Lilanda	65	2.761.00	1.026.135.00
38 Matero	2.395	79,448.00	33.746.805.04
39 New Kabwata S/S	872	41.587.00	26.237.802.00
40 Emmasdale Bank Houses S	567	26,573.00	13.050.798.00
41 Kaunda Square	1.573	47.720.00	22.446.180.00
42 Kalingalinga	10	370.00	184,470.00
43 Chawama/Kuomboka	17	535.00	257,280.00
45 Mtendere	2	60.00	25,199.90
46 Chilenie	1.109	34.661.00	17.106.933.00
47 George	1	24.00	0.00
48 Chunga	602	18.714.00	9.264.960.00
49 Chibolva	1	30.00	13.680.00
50 Kanyama	1	0.00	0.00
51 Garden	75	3.985.00	3.808.767.00
52 Kabanana	9	270.00	123.120.00
53 Marapodi	4	120.00	54,720.00
54 Chaisa	2	104.00	0.00
61 New Woodlands Extension	1	55.00	26,430.00
62 Kaunda Square STG2	853	27,124.00	12,980.274.00
64 Chandamali	1	55.00	26,430.00
67 Libala South	4	220.00	105.720.00
Total:	23.613	1,543,362.00	1.329.761.840.96

	Lucaka Water and Sowarage Co	Date:	26/08/2008
	Lusaka walei and Sewerage Co.	Time:	10:44:26 AM
	Consumption Invoices	FORM:	B 03
	Analysis per Township Area	Ref. I	No.
	Report		

Billing Cycle: ALL GROUPS - 15/08/2008

Township Area	Number of Connections	Consumption (kl)	Amount Invoiced ()
60/2 Invoices-Water - Water Charge			u u
01 Woodlands	793	81,382.00	180,014,620.00
02 Woodlands Extension	739	45,888.00	81,916,790.00
03 Kabulonga & Sunningdale	1,425	165,305.00	341,325,470.00
04 New Ibex Hill	465	48,510.00	91,033,060.00
05 Nyumba Yanga	1,134	53,747.00	94,746,440.00
06 Olympia	480	65,478.00	140,603,040.02
07 Olympia Park Extension	454	47,693.00	92,515,920.00
08 Kalundu	570	65,757.00	129,732,270.00
09 Roma	560	51,814.00	101,463,790.02
10 UNZA	3	51,916.00	183,384,200.02
11 Handsworth	228	18,082.00	32,057,930.00
12 Mwambula	200	23,970.00	50,295,760.00
13 Chudleigh	347	31,619.00	57,701,870.00
14 Rhodespark	1,313	164,131.00	389,611,360.04
15 Fairview	463	26,230.00	51,040,060.00
16 Northmead	1,017	76,307.00	145,521,380.04
17 Thornpark	259	12,090.00	21,809,690.00
18 Prospect Hill	410	88,956.00	215,555,940.00
19 Statehouse	117	87,535.00	299,101,020.00
20 Government	368	32,075.00	78,699,100.00
21 Shakespear	789	70,347.00	178,452,300.02
22 Sikanze	58	123,412.00	437,869,399.98
23 Luburma	491	31,315.00	63,051,800.00
24 Town/Kabelenga	853	118,308.00	356,109,440.00
25 Industrial Area	707	91,027.00	273,234,290.00
26 Villa Elizabetha	371	26,416.00	57,303,690.00
27 Emmasdale	1,027	80,730.00	159,386,190.06
28 Chainama	1,296	88,799.00	172,435,610.00
29 Helen Kaunda	570	28,209.00	46,039,260.00
30 Chelston	2,509	168,124.00	358,221,070.00
31 Avondale Southend	1,187	71,753.00	130,005,520.00
32 Chilenje South	2,555	101,795.00	181,854,680.00
33 Libala	1,569	70,738.00	124,724,610.00
34 Kabwata	1,453	52,874.00	89,126,580.00
35 Chamba Valley	125	8,498.00	16,176,180.00
36 New Kamwala	1,009	50,065.00	84,306,700.00
37 Lilanda	1,054	53,176.00	46,244,500.00

38 Matero	2,802	100,250.00	69,299,860.04
39 New Kabwata S/S	1,511	83,850.00	144,329,900.00
40 Emmasdale Bank Houses S/S	647	35,107.00	60,300,670.00
41 Kaunda Square	1,756	53,770.00	83,371,880.00
42 Kalingalinga	1,112	44,130.00	70,589,510.06
43 Chawama/Kuomboka	1,695	53,436.00	86,262,200.00
44 John Howard	381	12,195.00	19,602,000.00
45 Mtendere	2,174	68,665.00	111,290,839.88
46 Chilenje	1,542	48,024.00	75,457,000.00
47 George	1,296	82,053.00	148,523,970.00
48 Chunga	904	27,867.00	43,762,450.00
49 Chibolya	12	522.00	1,091,760.00
50 Kanyama	693	27,905.00	47,967,700.02
51 Garden	1,059	37,639.00	69,755,300.00
52 Kabanana	870	26,280.00	40,080,900.00
53 Marapodi	1,550	46,569.00	71,467,800.00
54 Chaisa	37	1,720.00	847,400.00
55 Chipata	15	1,130.00	2,995,600.00
56 Bauleni	308	11,305.00	17,252,000.06
57 Ng'ombe	18	3,004.00	9,649,480.00
58 Misisi	101	3,060.00	4,690,800.00
59 John Laing	32	1,486.00	3,143,600.00
60 Kafue Water Works	67	94,950.00	336,939,420.10
61 New Woodlands Extension	310	16,202.00	26,840,150.00
62 Kaunda Square STG2	914	28,932.00	45,388,320.00
63 Kamanga	365	10,950.00	16,712,400.00
64 Chandamali	544	29,101.00	47,600,010.00
65 F1080	207	10,838.00	17,542,320.00
66 F917	163	9,868.00	16,578,380.00
67 Libala South	562	35,215.00	58,650,750.00
68 Jack Compound	213	6.390.00	9,747,000.00
69 Chainda	145	4,320.00	6,611,700.00
Tetel	50.070		
i otai:	52,973	3,490,804.00	7,317,014,600.36
60/5 Invoices-Water - Meter Rental Charge	707	0.00	4 050 000 00
	727	0.00	4,950,000.00
	704	0.00	4,378,000.00
	1,170	0.00	7,812,000.00
	342	0.00	2,136,000.00
	970	0.00	5,946,000.00
06 Olympia	428	0.00	3,002,000.00
07 Olympia Park Extension	418	0.00	2,942,000.00
	543	0.00	3,748,000.00
	4//	0.00	3,254,000.00
10 UNZA	2	0.00	40,000.00
	221	0.00	1,452,000.00
12 IVIWAITIDUIA	187	0.00	1,374,000.00
13 Unualeigh	280	0.00	1,820,000.00
14 KNOGESPARK	1,093	0.00	9,358,000.00
15 Fairview	430	0.00	3,210,000.00
	040	0.00	6 200 000 00

17 Thornpark	246	0.00	1,700,000.00
18 Prospect Hill	349	0.00	2,696,000.00
19 Statehouse	79	0.00	1,034,000.00
20 Government	258	0.00	2,332,000.00
21 Shakespear	739	0.00	5,162,000.00
22 Sikanze	5	0.00	100,000.00
23 Luburma	335	0.00	2,948,000.00
24 Town/Kabelenga	659	0.00	11,080,000.00
25 Industrial Area	447	0.00	8,758,000.00
26 Villa Elizabetha	350	0.00	2,940,000.00
27 Emmasdale	703	0.00	4,666,000.00
28 Chainama	1,171	0.00	7,642,000.00
29 Helen Kaunda	326	0.00	1,984,000.00
30 Chelston	1,961	0.00	12,270,000.00
31 Avondale Southend	1,000	0.00	6,168,000.00
32 Chilenje South	1,887	0.00	11,420,000.00
33 Libala	1,266	0.00	8,030,000.00
34 Kabwata	999	0.00	6,078,000.00
35 Chamba Valley	66	0.00	424,000.00
36 New Kamwala	534	0.00	3,246,000.00
37 Lilanda	375	0.00	2,698,000.00
38 Matero	163	0.00	1,118,000.00
39 New Kabwata S/S	523	0.00	3,278,000.00
40 Emmasdale Bank Houses S/S	536	0.00	3,328,000.00
41 Kaunda Square	30	0.00	222,000.00
42 Kalingalinga	17	0.00	228,000.00
45 Mtendere	9	0.00	124,000.00
46 Chilenje	172	0.00	1,088,000.00
47 George	939	0.00	7,916,000.00
48 Chunga	2	0.00	12,000.00
49 Chibolya	1	0.00	20,000.00
50 Kanyama	370	0.00	2,332,000.00
51 Garden	2	0.00	26,000.00
53 Marapodi	1	0.00	6,000.00
54 Chaisa	1	0.00	20,000.00
56 Bauleni	1	0.00	6,000.00
57 Ng'ombe	2	0.00	40,000.00
60 Kafue Water Works	58	0.00	432,000.00
61 New Woodlands Extension	73	0.00	438,000.00
62 Kaunda Square STG2	106	0.00	664,000.00
63 Kamanga	2	0.00	26,000.00
64 Chandamali	94	0.00	690,000.00
65 F1080	118	0.00	722,000.00
66 F917	73	0.00	494,000.00
67 Libala South	191	0.00	1,174,000.00
69 Chainda	6	0.00	50,000.00
Тс	otal: 26,083	0.00	189,552,000.00
70/2 Invoices-Sewer - Sewer Charge			
01 Woodlands	252	26,586.00	24,280,629.00
02 Woodlands Extension	696	41,954.00	22,559,409.00

	Total: 23,623	1,568,350.00	1,364,302,016.94
			100,020.00
67 Libala South	5	275.00	166 020 00
64 Chandamali	1	55 00	26 430 00
62 Kaunda Square STG2	852	26.621.00	12.679.179.00
61 New Woodlands Extension	- 1	55.00	26.430.00
54 Chaisa	2	104.00	0.00
53 Marapodi	4	120.00	54.720.00
52 Kabanana	9	270.00	123.120.00
51 Garden	75	3 943 00	3,761 175 00
50 Kanyama	1	0.00	۵,000.00 ۵ ח
49 Chiholya	1	30,00	13 680 00
48 Chunga	503 I	24.00 18 714 00	9 264 060 00
	1,110	24 00	۱۵,000, - ۱۵.00 ۵ ۵۵
46 Chilenie	ے 1 110	34 038 00	16 262 115 00
45 Mtendere	۱۲ ۲	60 00	257,200.00
43 Chawama/Kuomboka	10	535.00	257 280 00
42 Kalingalinga	10	370.00	184 470 00
41 Kaunda Square	1 573	47 720 00	22 446 180 00
40 Emmasdale Bank Houses S/S	567	30 355 00	15,284 625 00
39 New Kabwata S/S	2,004 871	48,465.00	27.868 740 00
38 Matero	2.394	70.364.00	18,759.300.04
37 Lilanda	65	2,750.00	1,016.520.00
36 New Kamwala	808	39,090.00	20,517,405.00
35 Chamba Valley	2	131.00	63,570.00
34 Kabwata	1,220	45,677.00	24,984,327.00
33 Libala	1,380	57,363.00	30,729,483.00
32 Chilenje South	2,413	94,032.00	56,256,261.00
31 Avondale Southend	3	69.00	31,725.00
30 Chelston	1,596	99,316.00	62,534,016.00
29 Helen Kaunda	541	26,420.00	12,989,685.00
28 Chainama	1,153	81,070.00	56,957,379.00
27 Emmasdale	184	21,708.00	20,967,756.00
26 Villa Elizabetha	68	5,050.00	6,614,209.00
25 Industrial Area	370	95,228.00	168,704,097.00
24 Town/Kabelenga	821	134,815.00	189,973,524.00
23 Luburma	362	23,055.00	16,750,845.00
22 Sikanze	4	1,405.00	2,062,680.00
21 Shakespear	674	75,831.00	84,523,106.00
20 Government	147	38,740.00	53,234,763.00
19 Statehouse	32	60,971.00	95,936,094.00
18 Prospect Hill	121	53,625.00	43,397,013.00
17 Thornpark	152	7,085.00	3,894,582.00
16 Northmead	510	44,537.00	35,701,740.00
15 Fairview	172	9,993.00	6,290,289.00
14 Rhodespark	332	64,945.00	71,750,622.00
13 Chudleigh	3	213.00	103,770.00
11 Handsworth	15	1,122.00	738,825.00
10 UNZA	2	40,590.00	65,644,380.00
09 Roma	2	259.00	158,415.00
08 Kalundu	2	198.00	98,145.00
06 Olympia	10	7,787.00	10,196,010.00
05 Nyumba Yanga	1,085	49,463.00	25,979,352.00
04 New Ibex Hill	288	30,235.00	18,155,427.00
03 Kabulonga & Sunningdale	40	4,019.00	2,696,040.00

Total Amount Invoiced:

K K8,870,868,617.30

INTER AND	Lusaka Water and Sewerage Co	Date:	2008/10/3
	Lusaka Waler and Sewerage CO.	Time:	3:56:40 PM
	Consumption Invoices	FORM	B 03
CAMPANY LIMITE	Analysis per Township Area	Ref.	No.
	Report		

Billing Cycle: ALL GROUPS - 9/15/2008

Township Area	Number of Connections	Consumption (kl)	Amount Invoiced ()
60/2 Invoices-Water - Water Charge			
01 Woodlands	796	76,251.00	161,616,980.00
02 Woodlands Extension	742	48,889.00	88,008,420.00
03 Kabulonga & Sunningdale	1,434	160,050.00	325,524,600.02
04 New Ibex Hill	474	56,992.00	110,706,500.00
05 Nyumba Yanga	1,148	56,175.00	96,826,090.00
06 Olympia	484	65,657.00	141,013,780.02
07 Olympia Park Extension	454	52,714.00	103,554,110.00
08 Kalundu	571	64,699.00	127,477,000.00
09 Roma	554	51,370.00	99,893,620.02
10 UNZA	3	53,883.00	190,465,400.02
11 Handsworth	227	18,955.00	33,597,830.00
12 Mwambula	202	23,195.00	48,063,540.00
13 Chudleigh	348	30,519.00	54,954,730.00
14 Rhodespark	1,311	169,101.00	398,386,230.12
15 Fairview	462	25,681.00	50,462,750.00
16 Northmead	1,018	78,953.00	150,132,520.04
17 Thornpark	257	12,181.00	21,232,190.00
18 Prospect Hill	410	123,524.00	308,819,580.00
19 Statehouse	118	87,111.00	296,797,580.00
20 Government	367	30,704.00	73,133,310.00
21 Shakespear	788	72,878.00	184,395,760.08
22 Sikanze	58	126,398.00	448,618,999.98
23 Luburma	490	32,688.00	67,365,520.00
24 Town/Kabelenga	856	105,087.00	309,783,980.00
25 Industrial Area	708	96,159.00	291,155,660.00
26 Villa Elizabetha	374	20,716.00	41,175,070.00
27 Emmasdale	1,026	73,590.00	137,065,100.06
28 Chainama	1,300	97,246.00	194,862,210.00
29 Helen Kaunda	570	29,507.00	48,302,520.00
30 Chelston	2,504	153,642.00	318,926,740.00
31 Avondale Southend	1,190	76,605.00	139,640,960.00
32 Chilenje South	2,568	112,688.00	200,110,880.00
33 Libala	1,570	74,269.00	135,894,450.00
34 Kabwata	1,453	57,725.00	97,482,810.00
35 Chamba Valley	127	9,149.00	17,787,910.00
36 New Kamwala	1,013	46,109.00	77,263,380.00

The Study on Comprehensive Urban Development Plan for the City of Lusaka in the Republic of Zambia

37 Lilanda		1,049	50,125.00	37,671,930.00
38 Matero		2,803	99,101.00	63,382,690.04
39 New Kabwata S/S		1,513	80,720.00	137,184,630.00
40 Emmasdale Bank Houses S/S		648	34,744.00	58,773,050.00
41 Kaunda Square		1,757	53,856.00	83,524,580.00
42 Kalingalinga		1,120	44,312.00	70,919,950.06
43 Chawama/Kuomboka		1,708	53,796.00	86,815,400.00
44 John Howard		386	12,345.00	19,830,000.00
45 Mtendere		2,188	69,190.00	112,646,559.88
46 Chilenje		1,544	46,691.00	72,995,040.00
47 George		1,296	73,482.00	126,048,130.00
48 Chunga		904	27,867.00	43,762,450.00
49 Chibolya		12	492.00	1,034,760.00
50 Kanyama		692	27,691.00	46,746,990.02
51 Garden		1,064	37,736.00	69,899,100.00
52 Kabanana		871	26,310.00	40,126,500.00
53 Marapodi		1,556	46,836.00	71,874,000.00
54 Chaisa		37	1,720.00	847,400.00
55 Chipata		15	1,130.00	2,995,600.00
56 Bauleni		319	11,635.00	17,742,200.06
57 Ng'ombe		18	5,026.00	16,928,680.00
58 Misisi		101	3,060.00	4,690,800.00
59 John Laing		32	1,486.00	3,143,600.00
60 Kafue Water Works		67	84,141.00	296,003,269.80
61 New Woodlands Extension		311	18,089.00	30,246,700.00
62 Kaunda Square STG2		914	29,242.00	46,047,720.00
63 Kamanga		366	10.980.00	16.758.000.00
64 Chandamali		567	30.891.00	50.559.230.00
65 F1080		214	11.695.00	19.107.290.00
66 F917		166	10.578.00	18.281.740.00
67 Libala South		562	34,517,00	57.677.900.00
68 Jack Compound		214	6.420.00	9.804.000.00
69 Chainda		147	4.399.00	6.733.950.00
70 Linda		1	30.00	45.600.00
71 SOS Village		7	210.00	319.200.00
	Total:	53,144	3.521.603.00	7.331.667.350.22
60/5 Invoices-Water - Meter Rental Charge		=	-,	- , , ,
01 Woodlands		727	0.00	4.950.000.00
02 Woodlands Extension		704	0.00	4.378.000.00
03 Kabulonga & Sunningdale		1,176	0.00	7,812,000.00
04 New Ibex Hill		342	0.00	2.136.000.00
05 Nyumba Yanga		970	0.00	5.946.000.00
06 Olympia		430	0.00	3.014.000.00
07 Olympia Park Extension		417	0.00	2.936.000.00
08 Kalundu		542	0.00	3.742.000.00
09 Roma		478	0.00	3,260.000.00
10 UNZA			0.00	40.000.00
		2		
11 Handsworth		221	0.00	1,452.000.00
11 Handsworth 12 Mwambula		2 221 187	0.00	1,452,000.00
11 Handsworth 12 Mwambula 13 Chudleigh		2 221 187 281	0.00	1,452,000.00 1,374,000.00 1 826 000 00

14 Rhodespark	1,094	0.00	9,364,000.00
15 Fairview	428	0.00	3,198,000.00
16 Northmead	837	0.00	6,268,000.00
17 Thornpark	246	0.00	1,700,000.00
18 Prospect Hill	350	0.00	2,702,000.00
19 Statehouse	78	0.00	1,014,000.00
20 Government	259	0.00	2,352,000.00
21 Shakespear	739	0.00	5,162,000.00
22 Sikanze	5	0.00	100,000.00
23 Luburma	336	0.00	2,968,000.00
24 Town/Kabelenga	659	0.00	11,080,000.00
25 Industrial Area	447	0.00	8,758,000.00
26 Villa Elizabetha	351	0.00	2,946,000.00
27 Emmasdale	704	0.00	4,672,000.00
28 Chainama	1,174	0.00	7,660,000.00
29 Helen Kaunda	326	0.00	1,984,000.00
30 Chelston	1,960	0.00	12,250,000.00
31 Avondale Southend	1,002	0.00	6,180,000.00
32 Chilenje South	1,888	0.00	11,426,000.00
33 Libala	1,265	0.00	8,024,000.00
34 Kabwata	1,000	0.00	6,098,000.00
35 Chamba Valley	70	0.00	462,000.00
36 New Kamwala	535	0.00	3,252,000.00
37 Lilanda	374	0.00	2,692,000.00
38 Matero	163	0.00	1,118,000.00
39 New Kabwata S/S	524	0.00	3,284,000.00
40 Emmasdale Bank Houses S/S	537	0.00	3,334,000.00
41 Kaunda Square	30	0.00	222,000.00
42 Kalingalinga	18	0.00	248,000.00
45 Mtendere	10	0.00	144,000.00
46 Chilenje	172	0.00	1,088,000.00
47 George	940	0.00	7,922,000.00
48 Chunga	2	0.00	12,000.00
49 Chibolya	1	0.00	20,000.00
50 Kanyama	370	0.00	2,332,000.00
51 Garden	2	0.00	26,000.00
53 Marapodi	1	0.00	6,000.00
54 Chaisa	1	0.00	20,000.00
56 Bauleni	1	0.00	6,000.00
57 Ng'ombe	2	0.00	40,000.00
60 Kafue Water Works	58	0.00	432,000.00
61 New Woodlands Extension	73	0.00	438,000.00
62 Kaunda Square STG2	106	0.00	664,000.00
63 Kamanga	2	0.00	26,000.00
64 Chandamali	94	0.00	690,000.00
65 F1080	118	0.00	722,000.00
66 F917	74	0.00	500,000.00
67 Libala South	191	0.00	1,174,000.00
69 Chainda	8	0.00	62,000.00
Тс	otal: 26,102	0.00	189,708,000.00

70/2 Invoices-Sewer - Sewer Charge				
01 Woodlands		252	22,076.00	16,781,385.00
02 Woodlands Extension		698	44,386.00	24,054,825.00
03 Kabulonga & Sunningdale		40	3,739.00	2,116,410.00
04 New Ibex Hill		290	37,092.00	23,373,420.00
05 Nyumba Yanga		1,086	51,176.00	26,186,865.00
06 Olympia		10	7,857.00	10,307,130.00
08 Kalundu		2	147.00	71,730.00
09 Roma		2	180.00	98,550.00
10 UNZA		2	41,091.00	66,456,000.00
11 Handsworth		15	1,055.00	603,594.00
13 Chudleigh		3	178.00	85,920.00
14 Rhodespark		330	65,748.00	70,372,131.02
15 Fairview		171	9,309.00	6,007,872.00
16 Northmead		510	44,476.00	35,088,288.00
17 Thornpark		150	7,451.00	4,162,788.00
18 Prospect Hill		120	67,651.00	56,630,331.00
19 Statehouse		32	57,553.00	90,248,805.00
20 Government		146	37,308.00	50,785,116.00
21 Shakespear		673	78,245.00	86,978,236.00
22 Sikanze		4	1,405.00	2,062,680.00
23 Luburma		360	23,706.00	17,952,882.00
24 Town/Kabelenga		820	120,326.00	166,827,769.00
25 Industrial Area		370	92,190.00	160,308,702.00
26 Villa Elizabetha		69	5,181.00	6,610,115.00
27 Emmasdale		182	15,996.00	11,339,262.00
28 Chainama		1,160	90,360.00	66,757,512.00
29 Helen Kaunda		541	27,715.00	13,664,715.00
30 Chelston		1,591	93,218.00	58,505,682.00
31 Avondale Southend		3	86.00	40,800.00
32 Chilenje South		2,414	103,944.00	61,236,201.00
33 Libala		1,380	58,447.00	32,269,350.00
34 Kabwata		1,222	49,275.00	26,845,695.00
35 Chamba Valley		2	124.00	60,000.00
36 New Kamwala		808	33,895.00	16,689,480.00
37 Lilanda		63	2,825.00	1,053,195.00
38 Matero		2,393	69,738.00	17,029,110.04
39 New Kabwata S/S		868	44,896.00	25,006,806.00
40 Emmasdale Bank Houses S/S		569	30,220.00	15,044,853.00
41 Kaunda Square		1,574	47,750.00	22,471,830.00
42 Kalingalinga		8	240.00	121,410.00
43 Chawama/Kuomboka		17	535.00	257,280.00
45 Mtendere		2	60.00	25,199.90
46 Chilenje		1,110	33,757.00	16,218,288.00
47 George		1	24.00	0.00
48 Chunga		602	18,714.00	9,264,960.00
49 Chibolya		1	30.00	13,680.00
51 Garden		75	3,938.00	3,756,900.00
52 Kabanana		9	270.00	123,120.00
53 Marapodi		4	120.00	54,720.00
54 Chaisa		2	104.00	0.00
61 New Woodlands Extension		1	55.00	26,430.00
62 Kaunda Square STG2		852	26,872.00	12,840,729.00
64 Chandamali		1	55.00	26,430.00
67 Libala South		5	275.00	166,020.00
	Total:	23,615	1,573,064.00	1,335,081,201.96

TER AND	Lucaka Water and Sowerage Co	Date:	2008/10/29
	Lusaka walei and Sewerage Co.	Time:	9:46:35 AM
	Consumption Invoices	FORM:	B 03
COMPANY LIMITED	Analysis per Township Area	Ref.	No.
	Report		

Billing Cycle: ALL GROUPS - 10/15/2008

Township	Number of	Consumption	Amount
Area	Connections	(KI)	Invoiced ()
60/2 Invoices-Water - Water Charge		05 50 4 00	
	800	85,704.00	184,349,790.00
02 Woodlands Extension	742	51,226.00	92,995,240.00
03 Kabulonga & Sunningdale	1,448	159,318.00	322,533,120.04
04 New Ibex Hill	478	64,244.00	128,435,700.00
05 Nyumba Yanga	1,161	59,480.00	104,189,590.00
06 Olympia	483	69,437.00	151,402,090.02
07 Olympia Park Extension	455	49,656.00	95,901,650.00
08 Kalundu	571	68,978.00	136,697,110.00
09 Roma	554	55,829.00	109,914,680.00
10 UNZA	3	49,103.00	173,257,400.02
11 Handsworth	227	18,866.00	33,639,450.00
12 Mwambula	203	23,551.00	49,444,840.00
13 Chudleigh	352	33,070.00	60,272,580.00
14 Rhodespark	1,325	155,047.00	355,998,760.02
15 Fairview	463	27,872.00	54,196,180.00
16 Northmead	1,018	72,037.00	135,557,370.02
17 Thornpark	257	11,569.00	20,356,340.00
18 Prospect Hill	410	92,306.00	224,593,030.00
19 Statehouse	116	57,001.00	190,082,550.00
20 Government	368	29,078.00	69,658,250.00
21 Shakespear	788	60,296.00	145,544,910.00
22 Sikanze	58	122,246.00	433,671,799.98
23 Luburma	492	32,777.00	68,099,490.00
24 Town/Kabelenga	857	104,818.00	311,426,610.00
25 Industrial Area	712	86,357.00	257,740,240.00
26 Villa Elizabetha	375	17,435.00	34,234,840.00
27 Emmasdale	1,039	72,682.00	138,786,290.06
28 Chainama	1,313	103,139.00	206,757,070.00
29 Helen Kaunda	573	30,188.00	49,344,030.00
30 Chelston	2,512	186,186.00	400,811,890.00
31 Avondale Southend	1,202	86,960.00	152,570,910.00
32 Chilenje South	2,575	109,543.00	196,914,170.00
33 Libala	1,576	76,183.00	137,452,720.00
34 Kabwata	1,454	56,974.00	95,847,860.00
35 Chamba Valley	126	8,972.00	17,272,540.00
36 New Kamwala	1,014	48,860.00	81,747,280.00
37 Lilanda	1,042	50,802.00	38,704,780.00

38 Matero	2,804	99,340.00	66,655,330.04
39 New Kabwata S/S	1,513	83,274.00	143,764,060.00
40 Emmasdale Bank Houses S/S	650	32,148.00	54,499,610.00
41 Kaunda Square	1,758	53,998.00	83,783,320.00
42 Kalingalinga	1,135	44,725.00	71,442,890.06
43 Chawama/Kuomboka	1,713	53,946.00	87,066,200.00
44 John Howard	387	12,375.00	19,875,600.00
45 Mtendere	2,207	68,068.00	107,444,869.88
46 Chilenje	1,544	47,880.00	75,028,350.00
47 George	1,295	94,299.00	180,520,470.00
48 Chunga	904	27,744.00	43,548,400.00
49 Chibolya	12	492.00	1,034,760.00
50 Kanyama	703	27,359.00	47,292,230.02
51 Garden	1,081	38,144.00	70,525,850.00
52 Kabanana	875	26,430.00	40,320,300.00
53 Marapodi	1,561	46,986.00	72,113,400.00
54 Chaisa	37	1.720.00	847,400.00
55 Chipata	15	1,130.00	2,995,600.00
56 Bauleni	344	12.385.00	18.893.600.06
57 Na'ombe	19	2 936 00	9 342 280 00
58 Misisi	101	3,060,00	4 690 800 00
59 John Laing	32	1 486 00	3 143 600 00
60 Kafue Water Works	68	82,387,00	287 695 200 00
61 New Woodlands Extension	319	18,340,00	30 631 450 00
62 Kaunda Square STG2	915	29 789 00	47 158 420 00
	010	20,100.00	T1.100.T20.00
63 Kamanga	366	10 980 00	16 758 000 00
63 Kamanga	366	10,980.00	16,758,000.00
63 Kamanga 64 Chandamali 65 E1080	366 585 217	10,980.00 32,798.00	16,758,000.00 53,785,290.00 20,710.000.00
63 Kamanga 64 Chandamali 65 F1080 66 F017	366 585 217	10,980.00 32,798.00 12,493.00	16,758,000.00 53,785,290.00 20,719,090.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libele South	366 585 217 170	10,980.00 32,798.00 12,493.00 10,606.00 26,135.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound	366 585 217 170 575 215	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound	366 585 217 170 575 215	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda	366 585 217 170 575 215 149	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda	366 585 217 170 575 215 149 1	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village	366 585 217 170 575 215 149 1 7	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00 210.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total:	366 585 217 170 575 215 149 1 7 7 5 3,419	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00 210.00 3,512,475.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge	366 585 217 170 575 215 149 1 7 53,419	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00 210.00 3,512,475.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands	366 585 217 170 575 215 149 1 7 53,419	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00 210.00 3,512,475.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension	366 585 217 170 575 215 149 1 7 7 53,419 727 704	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00 210.00 3,512,475.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale	366 585 217 170 575 215 149 1 7 7 53,419 727 704 1,179	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00 210.00 3,512,475.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill	366 585 217 170 575 215 149 1 7 7 53,419 53,419 7 27 704 1,179 345	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 2,154,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga	366 585 217 170 575 215 149 1 7 7 53,419 5 3,419 7 7 27 704 1,179 345 970	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 2,154,000.00 5,946,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia	366 585 217 170 575 215 149 1 7 7 53,419 727 704 1,179 345 970 430	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 2,154,000.00 5,946,000.00 3,014,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension	366 585 217 170 575 215 149 1 7 7 53,419 5 3,419 727 704 1,179 345 970 430 417	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 2,154,000.00 5,946,000.00 2,936,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 70 Linda 71 SOS Village 71 SOS Village 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension 08 Kalundu	366 585 217 170 575 215 149 1 7 7 53,419 7 7 704 1,179 345 970 430 417 540	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 2,154,000.00 5,946,000.00 3,014,000.00 2,936,000.00 3,730,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village 71 SOS Village 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension 08 Kalundu 09 Roma	366 585 217 170 575 215 149 1 7 7 53,419 727 704 1,179 345 970 430 417 540 479	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 5,946,000.00 3,014,000.00 2,936,000.00 3,730,000.00 3,252,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village 71 SOS Village 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension 08 Kalundu 09 Roma 10 UNZA	366 585 217 170 575 215 149 1 7 7 53,419 727 704 1,179 345 970 430 417 540 479 2	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 2,154,000.00 3,014,000.00 3,730,000.00 3,252,000.00 40,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension 08 Kalundu 09 Roma 10 UNZA	366 585 217 170 575 215 149 1 7 7 53,419 7 7 704 1,179 345 970 430 417 540 479 2	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 3,014,000.00 3,730,000.00 3,730,000.00 40,000.00 1,452,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension 08 Kalundu 09 Roma 10 UNZA 11 Handsworth 12 Mwambula	366 585 217 170 575 215 149 1 7 7 53,419 727 704 1,179 345 970 430 417 540 479 2 221 189	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 2,154,000.00 3,014,000.00 3,730,000.00 3,730,000.00 40,000.00 1,452,000.00 1,452,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension 08 Kalundu 09 Roma 10 UNZA 11 Handsworth 12 Mwambula 13 Chudleigh	366 585 217 170 575 215 149 1 7 7 53,419 7 7 7 04 1,179 345 970 430 417 540 479 2 2 221 189 281	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 210.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 2,154,000.00 3,014,000.00 3,730,000.00 3,730,000.00 1,452,000.00 1,386,000.00 1,826,000.00
63 Kamanga 64 Chandamali 65 F1080 66 F917 67 Libala South 68 Jack Compound 69 Chainda 70 Linda 71 SOS Village Total: 60/5 Invoices-Water - Meter Rental Charge 01 Woodlands 02 Woodlands Extension 03 Kabulonga & Sunningdale 04 New Ibex Hill 05 Nyumba Yanga 06 Olympia 07 Olympia Park Extension 08 Kalundu 09 Roma 10 UNZA 11 Handsworth 12 Mwambula 13 Chudleigh 14 Rhodespark	366 585 217 170 575 215 149 1 7 7 53,419 7 7 7 04 1,179 345 970 430 417 540 479 2 2 221 189 281 1,096	10,980.00 32,798.00 12,493.00 10,606.00 36,125.00 6,450.00 4,552.00 30.00 210.00 3,512,475.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	16,758,000.00 53,785,290.00 20,719,090.00 17,979,550.00 60,412,850.00 9,849,600.00 7,000,500.00 45,600.00 319,200.00 7,217,586,820.22 4,950,000.00 4,392,000.00 7,830,000.00 2,154,000.00 3,014,000.00 3,730,000.00 3,730,000.00 1,452,000.00 1,886,000.00 1,826,000.00 9,376,000.00

16 Northmead		837	0.00	6,268,000.00
17 Thornpark		246	0.00	1,700,000.00
18 Prospect Hill		350	0.00	2,688,000.00
19 Statehouse		78	0.00	1,014,000.00
20 Government		256	0.00	2,306,000.00
21 Shakespear		740	0.00	5,168,000.00
22 Sikanze		5	0.00	100,000.00
23 Luburma		336	0.00	2,968,000.00
24 Town/Kabelenga		660	0.00	11,100,000.00
25 Industrial Area		449	0.00	8,798,000.00
26 Villa Elizabetha		351	0.00	2,946,000.00
27 Emmasdale		716	0.00	4,744,000.00
28 Chainama		1,179	0.00	7,690,000.00
29 Helen Kaunda		326	0.00	1,984,000.00
30 Chelston		1,967	0.00	12,292,000.00
31 Avondale Southend		1,006	0.00	6,204,000.00
32 Chilenje South		1,889	0.00	11,432,000.00
33 Libala		1,268	0.00	8,042,000.00
34 Kabwata		1,001	0.00	6,104,000.00
35 Chamba Valley		70	0.00	462,000.00
36 New Kamwala		535	0.00	3.252.000.00
37 Lilanda		374	0.00	2.692.000.00
38 Matero		163	0.00	1 118 000 00
39 New Kabwata S/S		524	0.00	3.284.000.00
40 Emmasdale Bank Houses S/S		538	0.00	3 340 000 00
41 Kaunda Square		28	0.00	210 000 00
42 Kalingalinga		18	0.00	248,000,00
45 Mtendere		10	0.00	144 000 00
46 Chilenia		172	0.00	1 088 000 00
47 George		940	0.00	7,000,000.00
		270	0.00	12 000 00
40 Children		2	0.00	12,000.00
		270	0.00	20,000.00
50 Kallyalla		370	0.00	2,352,000.00
51 Garden		2	0.00	26,000.00
53 Marapool		1	0.00	6,000.00
54 Chaisa		1	0.00	20,000.00
56 Bauleni		1	0.00	6,000.00
		2	0.00	40,000.00
60 Kafue Water Works		58	0.00	432,000.00
61 New Woodlands Extension		73	0.00	438,000.00
62 Kaunda Square STG2		106	0.00	664,000.00
63 Kamanga		2	0.00	26,000.00
64 Chandamali		94	0.00	690,000.00
65 F1080		118	0.00	722,000.00
66 F917		75	0.00	506,000.00
67 Libala South		192	0.00	1,180,000.00
69 Chainda		8	0.00	62,000.00
	Total:	26,148	0.00	189,998,000.00
70/2 Invoices-Sewer - Sewer Charge				
01 Woodlands		251	24,234.00	19,159,911.00
02 Woodlands Extension		698	47,151.00	25,892,394.00

т	otal: 23,643	1,552,296.00	1,311,421,656.94
67 Libala South	5	275.00	166,020.00
64 Chandamali	1	55.00	26,430.00
62 Kaunda Square STG2	853	27,461.00	13,179,939.00
61 New Woodlands Extension	1	55.00	26,430.00
54 Chaisa	2	104.00	0.00
53 Marapodi	4	120.00	54,720.00
52 Kabanana	9	270.00	123,120.00
51 Garden	77	4,029.00	3,797,745.00
50 Kanyama	1	0.00	0.00
49 Chibolya	1	30.00	13,680.00
48 Chunga	602	18,714.00	9,264,960.00
47 George	1	24.00	0.00
46 Chilenje	1,108	34,686.00	16,633,845.00
45 Mtendere	2	60.00	25,199.90
43 Chawama/Kuomboka	17	535.00	257,280.00
42 Kalingalinga	8	240.00	121,410.00
41 Kaunda Square	1,574	47,750.00	22,471,830.00
40 Emmasdale Bank Houses S/S	569	27,797.00	13,868,868.00
39 New Kabwata S/S	867	47,940.00	28,025,097.00
38 Matero	2,394	70,791.00	19,707,765.04
37 Lilanda	63	2,629.00	956,835.00
36 New Kamwala	809	36,740.00	18,117,216.00
35 Chamba Valley	2	141.00	68,670.00
34 Kabwata	1,224	48,647.00	26,363,349.00
33 Libala	1,385	59,436.00	31,859,034.00
32 Chilenje South	2,419	100,746.00	60,960,744.00
31 Avondale Southend	3	110.00	52,860.00
30 Chelston	1,591	110,369.00	70,363,335.00
29 Helen Kaunda	542	28,338.00	13,970,145.00
28 Chainama	1,168	95,154.00	69,695,760.00
27 Emmasdale	181	16,464.00	14,547,159.00
26 Villa Elizabetha	69	4,646.00	6,036,355.00
25 Industrial Area	374	99,336.00	184,075,815.00
24 Town/Kabelenga	821	121,582.00	170,210,450.00
23 Luburma	361	23,711.00	18,481,230.00
22 Sikanze	4	1,405.00	2,062,680.00
21 Shakespear	673	66,892.00	71,614,723.00
20 Government	147	36,604.00	50,175,225.00
19 Statehouse	32	33,838.00	52,034,994.00
18 Prospect Hill	120	51,633.00	42,276,147.00
17 Thornpark	150	6,981.00	3,833,436.00
16 Northmead	510	42,237.00	33,912,573.00
15 Fairview	171	10,477.00	6,596,847.00
14 Rhodespark	330	52,765.00	55,935,630.00
13 Chudleigh	3	166.00	79,845.00
11 Handsworth	15	1,144.00	721,431.00
10 UNZA	2	41,008.00	66,321,540.00
09 Roma	2	17.00	7,455.00
08 Kalundu	2	95.00	46,830.00
06 Olympia	10	8,184.00	10,842,357.00
05 Nyumba Yanga	1,084	52,532.00	26,777,973.00
04 New Ibex Hill	291	41,938.00	26,795,115.00
03 Kabulonga & Sunningdale	40	4,010.00	2,811,255.00
	10		

Appendix 2 – DMAs

OBJECTID I	D NAME	PROP NO BU	JLK METER	DOM MET	CONSUMER	ANALYSIS	SUPP PERIO	W SUPPLY P	SUPPLY LEV	CATEGORY OP A	REA Shape	Leng POPU	ILATION Are	a Km2 Sh	ape Length Sha	pe Area
1	48 CHUNGA	_1725 FU	JLLY METERED	NOT METERED			16hrs Supply	- 13	AVERAGE	Peri Urban	2 15	205.57446	21299	18.700928	19205.57441	18700927.69
3	51 GARDEN	0		NOT METERED			16hrs Supply	17	GOOD	Peri Urban	1 8(31.626231	64397	4.030831	8631.62609	4030831.217
4	57 N'GOMBE	0 FU	JLLY METERED	NOT METERED			16hrs Supply	24	AVERAGE	Peri Urban	1 7.	68.085192	64928	2.635514	7768.0853	2635513.791
5	3 KABULONGA	1345 NC	DT METERED	FULLY METERED	YES		24hrs Supply	17/24	VERY GOOD		3 15	098.00896	0	7.965146	13098.00875	7965145.995
9	37 LILANDA	0 NC	DT METERED	NOT METERED			16HRS SUPPLY	14	GOOD	Peri Urban	2 24	49.560473	0	0.323289	2449.560433	323289.3567
7	47 GEORGE	0		NOT METERED			16HRS SUPPLY	14	GOOD	Peri Urban	2 2(1338.29602	0	12.796209	20338.29589	12796209.03
8	25 INDUSTRIES	1436 NC	DT METERED	PARTLY METERED	SS	SS	16 HRS SUPPLY	17	VERY GOOD		2 2(356.00124	0	16.310318	20356.00141	16310317.83
6	50 KANYAMA	0 PA	ARTLY METERED	NOT METERED			16HRS SUPPLY	24	AVERAGE BAD	Peri Urban	2 9(62.468248	198696	4.294075	9662.468334	4294075.138
10	49 CHIBOLYA	0 PE	RI URBAN	NOT METERED			16HRS SUPPLY	17	AVERAGE	Peri Urban	2	024.87259	0	1.336617	5024.87274	1336617.219
11	26 VILLA ELIZABETHA	185 NC	DT METERED	METERED	YES	16HRS SUPPLY	15	7 VERY GOOD			2 35	94.658268	0	0.728002	3594.658221	728001.8516
12	40 EMMASDALE BANK HOUSE	659		FULLY METERED	YES	YES	16HRS SUPPLY	17	GOOD		2 2,	82.368295	0	0.436964	2782.368277	436964.2919
13	27 EMMASDALE	402		FULLY METERED	Ι,	YES	16HRS SUPPLY	17	GOOD		2 8	21.908399	0	2.003369	8421.908057	2003369.099
14	38 MATERO	3822 NC	DT METERED	PARTLY METERED			2-DAY RATION	2	RATIONED AND BAD	Peri Urban	2 10	211.15635	68445	10.094372	13211.15643	10094371.91
15	55 CHIPATA	0 NC	DT METERED	NOT METERED			16HRS SUPPLY	N/A	SCHEME	Peri Urban	2 8'.	33.103279	84979	4.589565	8733.103257	4589564.803
16	54 CHAISA	0 NC	DT METERED	NOT METERED			16HRS SUPPLY	N/A	SCHEME	Peri Urban	2 3(07.202873	32512	0.747674	3607.202732	747674.3161
17	53 MARRAPODI	0 NC	DT METERED	NOT METERED			16HRS SUPPLY	2	RATIONED	Peri Urban	2 4,	48.902152	53434	1.062049	4748.902128	1062049.048
18	17 THORN PARK	136 FL	JLLY METERED	METERED	YES	YES	16HRS SUPPLY	17	VERY GOOD		1 2/	12.366209	0	0.300459	2412.366234	300459.476
19	58 MISISI	0	Ī	NOT METERED			16 HRS SUPPLY	24	AVERAGE BAD	Peri Urban	3 4.	87.144158	30045	1.084665	4287.144072	1084665.374
20	43 CHAWAMA/KUOMBOKA	0 NC	DT METERED	NOT METERED			16HRS SUPPLY	24	GOOD	Peri Urban	3	951.22727	67901 °	1.44874	4951.227357	1448740.261
21	23 LUBURMA	486 FL	JLLY METERED	METERED	YES	YES	16HKS SUPPLY		GOOD		5	231.53699	0	1.214414	5231.537063	1214413.967
22	34 KABWATA ESTATES	225 PA	ARTLY METERED	METERED	YES	YES	16HRS PERIOD	17	ERRATIC		3 29	02.661221	0	0.481459	2902.661209	481459.3913
23	20 GOVERNMENT	205 FL	JLLY METERED	PARTLY METERED	YES	YES	16HRS SUPPLY	17/24	BELOW AVERAGE		1 6.	64.195039	0	1.601271	6764.194882	1601271.5
24	22 SIKANZE	1 FL	JLLY METERED	NOT METERED	INSTITUTE	INSTITUTE	16HRS SUPPLY	17	VERY GOOD		1 2(62.598994	0	0.432972	2662.599075	432971.8174
25	21 SHAKESPEAR	186 FL	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	17	GOOD		1 52	82.345657	0	1.473079	5282.34567	1473079.026
26	15 FAIRVIEW	207 FU	JLLY METERED	METERED	YES	YES	16HRS SUPPLY	17	VERY GOOD		1 25	50.167973	0	0.521176	2950.168127	521176.4489
27	16 NORTHMEAD	639 FL	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPPLY	24	AVERAGE		1 6	71.320589	0	1.802137	6571.320702	1802137.299
28	14 RHODES PARK	958 FL	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	17/24	VERY GOOD		1 1	278.11522	0	6.364513	12278.11531	6364512.924
29	6 OLYMPIA PARK	470 FL	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	24	VERY GOOD		-	008.57984	0	1.953082	6008.579865	1953081.518
30	7 OL YMPIA EXTENSION	433 FL	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	24	VERY GOOD		1 5(83.589028	0	1.38931	5083.589094	1389309.848
31	10 UNZA	1 FL	ILLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	24	VERY GOOD		1 6.	32.050474	0	1.902153	6332.050368	1902152.969
32	13 CHUDLEIGH	327 FL	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	17	AVERAGE		4 5:	76.612379	0	1.533024	5376.61235	1533024.154
33	8 KALUNDU	409 PA	RTLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	17/24	EXTREMELY GOOD		16	834.53157	0	2.206223	6834.531662	2206222.61
34	12 MWAMBULA	409 PA	ARTLY METERED	METERED	YES	YES	16HRS SUPPLY	17/24	EXTREMELY GOOD		4 3	19.693871	0	0.885859	3819.693958	885858.7986
35	11 HANDSWORTH	100 FL	JLLY METERED	METERED	YES	YES	16HRS SUPPLY	17	TO BE ADVISED		4	092.24698	0	1.438208	5092.24687	143 8208.148
36	28 CHAINAMA/MUNALI	898 FL	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	17/24	VERY GOOD		4	852.47899	0	7.402334	12852.47909	7402334.033
15	30 CHELSIONE 4 IDEV IIIT 1	A4 C181	DATE V METERED	MELEKED FULLY METERED	YES	YES	L2HKS KALIUN	/-	GOOD		4 c	71022224	0 0	10.102404	2/ 402:026/1	10/054/4.21
00	4 IBEA HILE	271 F.F.	VI METERED	NOT METERED	110	1120	LUIINS SUFFLI	+7		Dari 114an		11600704	11031	1 671056	2100 000 0012	14102501021
41	72 HELEN KALINDA		DT METERED	METERED	VFS	VFS	1011KS SUPPLY	171	GOOD	FULUIUMI	+ 7	20202020	0	0.0120.1	20202/2010	431 227 1253
42	19 STATE HOUSE	37 FU	ILY METERED	METERED	INSTITUTE	INSTITUTE	16HRS SUPPLY	17	AVERAGE		1	239.97835	0	4.598416	12239.9785	4598416.241
43	18 PROSPECT HILL	322 FU	ILLY METERED	METERED	YES	YES	16HRS SUPPLY	17	AVERAGE		1 66	83.397424	0	2.209489	6683.397365	2209488.821
44	46 CHILENJE	2712 NC	DT METERED	METERED	YES	YES	16HRS SUPPLY	17	AVERAGE		3 62	51.555756	0	2.078723	6251.555739	2078723.084
45	1 WOODLANDS	0		METERED	YES	YES	16HRS SUPPLY	17/24	GOOD		3 85	24.922312	0	3.032799	8824.922284	3032799.184
46	56 BAULENI	0 PE	RI URBAN	NOT METERED			16HRS SUPPLY	15	AVERAGE	Peri Urban	3 64	30.392623	26142	2.51161	6430.392626	2511609.659
47	5 NYUMBA YANGA	841 FU	JLLY METERED	METERED	YES	YES	16HRS SUPPLY	24	AVERAGE		3 6(86.494216	0	2.117399	6086.494257	2117398.702
48	62 KAUNDA SQUARE II	3109 FU	JLLY METERED	METERED	PERI URBAN	PERI URBAN	16HRS SUPPLY	17	AVERAGE		4 34	65.353874	0	0.620273	3465.353704	620273.4461
49	41 KAUNDA SQUARE I	3109 FU	JLLY METERED	NOT METERED	PERI URBAN	PERI URBAN	16HRS SUPPLY	17	AVERAGE		4 32	94.864383	0	0.649831	3494.864145	649830.8539
50	9 ROMA	520 FU	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	24	AVERAGE		1 15	190.83853	0	9.606935	15190.83822	9606934.868
51	52 KABANANA	1126 FU	JLLY METERED	FULLY METERED	YES	YES	16HRS SUPPLY	24	AVERAGE	Peri Urban	1 47	83.208818	23525	1.483697	4783.208736	1483696.535
52	32 SOUTH CHILENJE	3400 MI	ETERED	METERED	YES	YES	16HRS SUPPLY	17	AVERAGE		3	123.78304	0	1.621192	6123.782919	1621191.843
53	64 CHANDAMALI	0 NC	DT METERED	NOT METERED	NO	0N	NA ATTECTION V	NA 17	NA		3 9	06.812411	00	5.685398 ^ 072007	9906.812249	5685397.911
ξ ŭ	36 KAMWALA	A3 668	INTEX METERED	MELEKEU	55	55	16HKS SUFFL1	1	GOUD		<u>v</u> c	20.449149	5 0	1.001660	3820,444000 126444,0285	8/5890./06
00	39 NEW NADWALA	1001	JLLY METERED	MELEKEU	22	25	10HKs SUFFL1	11	GUUD	_	0	ocneer/o	5	400+4N.I	006466.1044	126.4004401

DMAs

1501344.507	5468.035912	1.501345	13169	4 5468.035781	Peri Urban	AB GOOD CD BAD	15	16HRS SUPPLY			NOT METERED	054 NOT METERED	3(45 KALIKILIKI	73 4
3230109.497	8551.726035	3.230109	59121	4 8551.725973	Peri Urban	AB GOOD CD BAD	15	16HRS SUPPLY			NOT METERED	054 NOT METERED	3(45 MTENDERE	72
4063878.385	8909.850037	4.063878	0	4 8909.849976		BAD	13	16hrs Supply			METERED	535 PARTLY METEREL		31 AVONDALE	71
625115.8501	4122.268051	0.625116	26650	4 4122.267958	Peri Urban	BAD	13	16hrs Supply			METERED	535 PARTLY METEREL		69 CHAINDA	70
8215709.155	12498.38594	8.215709	12966	3 12498.38596	Peri Urban							0		68 JACK COMPOUND	. 67
1334437.565	5420.761063	1.334438	21165	4 5420.760996	Peri Urban							0		63 KAMANGA	. 99
9585186.207	15974.27949	9.585186	0	4 15974.27969		GOOD	17 HOURS	16HRS SUPPLY	YES	TES	METERED	88		35 CHAMBA VALLEY	. 65
5122540.231	9984.671082	5.12254	81634	2 9984.671061	Peri Urban							0		59 JOHN LAING	64 .
8359413.68	20790.11721	8.359414	0	2 20790.11718		VERY GOOD	51	16HRS SUPPLY	SS	S	METERED	781 FULLY METERED		24 TOWN/KABELENGA	63
1221334.88	4633.805574	1.221335	0	3 4633.805578				16HRS SUPPLY	YES	'ES	PARTLY METERED	941 FULLY METERED	5	51 NEW WOODLANDS EXTENS	62 (
982977.3372	5665.604799	0.982977	0	3 5665.604636				16HRS SUPPLY	YES	(ES	METERED	986 FULLY METERED	5	2 WOODLANDS EXTENSION	61
3066983.345	7469.849935	3.066983	0	3 7469.849952								668	`	67 LIBALA SOUTH	99
1920589.807	7047.900213	1.92059	0	3 7047.90036		AVERAGE	51	16 HRS SUPPLY	SS	S	METERED	0 PARTLY METEREL		33 LIBALA	59
3151317.007	7404.185574	3.151317	0	3 7404.185566			NA	NA	NA	V٢	NOT METERED	071 NOT METERED	2(55 FARM 1080	58 (
1338222.61	4722.305573	1.338223	0	3 4722.305418	Peri Urban	GOOD	57	16HRS SUPPLY			NOT METERED	0 NOT METERED		44 JOHN HOWARD	57 4
1437400.966	5293.899921	1.437401	0	3 5293.899818					NA	Vt	NOT METERED	592 NOT METERED		56 FARM 917	56 (