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PEOPLE AND SYSTEMS FOR WATER, SANITATION AND HEALTH

Sewage waste management in the city of Lusaka

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THE DISPOSAL OF sewer waste is a day to day problem that many human settlements, whether villages, towns and cities are faced with. This is so, because unless the disposal of such waste is adequately handled, it can pose very serious dangers to both human and animal life and the environment at large.

The aim of this paper is to look at various types of sewer disposal methods in the city of Lusaka and discuss the impact that rapid growth in the population of the city has had on such systems. The possible dangers posed to both human life and the environment when such sewer disposal methods are not properly managed are also presented.

Introduction

Lusaka is the capital city and administrative centre of the Republic of Zambia. The city is quite wide spread and covers a surface area of about 400 square kilometers. The population of Lusaka is currently estimated at two million, of which less than 50% live in the metropolitan area. The rest is on the urban fringe or satellite areas.

There are primarily three types of sewage disposal methods that are utilised in the city of Lusaka, namely:

- The waterborne method, which comprises a network of pipes and sewage treatment plants.
- The on-site sanitation method which comprises septic tanks and soakaways.
- Pit latrines where sewage is left to accumulate in dug-out pits.

The water borne sewer system

The waterborne method covers about 35% of the areas where the local water and sewerage utility, the Lusaka Water and Sewerage Company, supplies water.

The company directly manages the waterborne sewer system.

The city of Lusaka sewer network pipework covers a total length of about 450 kilometers with about 10,000 manholes. The network has a total of seven sewage pumping stations. The city sewer system is divided into six catchment areas each being served by a sewage treatment plant.

There are two conventional and five non-conventional sewage treatment plants.

The conventional sewage treatment plant uses the trickling filter method of treatment where as the non-conventional plant uses waste stabilisation ponds.

The final settlement generated by these sewage treatment plants is discharged into fresh flowing streams, while the sludge is collected for use as manure and in some cases as land filling.

Current status of the waterborne system

The sewer network and sewage treatment plants were built in the late 1950s, with the most development being in 1980 when an extension was made to the Manchinchi Sewage Treatment plant.

Table 1. Plants of the city sewage system

Name of Plant	Design Capacity (m3/day)	Treatment Method
1. Manchinchi Sewage Works	36,000	Conventional
2. Changa Sewage Works	9,000	Conventional
3. Matero Stabilisation Ponds	7,100	Non-Conventional
4. Ngwerere Stabilisation Ponds	8,350	Non-Conventional
5. Kaunda Square Stabilisation Ponds	3,600	Non-Conventional
6. Chelston Stabilisation Ponds	2,700	Non-Conventional
7. Garden Maturation Ponds	36,000	Non-Conventional

The two conventional plants, Manchinchi and Chunga, are in a poor condition and substantial capital investment is required to bring them to operate at their design capacity and efficiency.

Further, none of the waste stabilisation ponds has been desludged or cleaned since construction. This has resulted into the ponds accumulating excess sludge, which has consequently reduced their volumetric capacity and efficiency of operation. In some cases embarkments separating individual ponds have failed due to the failure or absence of wave protection slabs. This has led to the final effluent not meeting Environmental Council of Zambia Disposal Standards.

Impact of rapid population growth on the waterborne sewer system

Despite Lusaka experiencing a rapid growth of population over the last 25 years, there has not been a corresponding expansion of sewerage services in the city. Many residential areas have sprung up with no waterborne sewer network in place.

In those cases where an effort has been made to make sewer connections to an existing system, volumetric overloading of the particular network occurs. This is because extra loads had not been catered for when the network and treatment plants were designed. In some cases volumetric overload is up to 30% of the design capacity. This in turn impairs sewage treatment as detention times for some unit operations are reduced considerably. The particular sewage treatment plant then fails to produce effluent which meets the Environmental Council of Zambia standards.

Other threats to the waterborne system

Lusaka is served by a waste collection system which is not combined, i.e. the sewer system is independent of the storm water collection system - which in most parts of the city is not functional or completely absent. During the rain season, a lot of run off, along with silt, finds its way into the sewer system which then causes surcharging of the sewer lines as they get flooded. The sewer system then stops functioning and collection of sewerage is impaired creating then very unsanitary conditions as run off mixes with sewage thereby exposing residents to health hazards.

Sewage pumping stations in areas without a storm water collection system also get affected as all of the run off slopes towards the pumping station. This results in the pumps having to run continuously in order to empty the flooded swamps. As a result there is accelerated wear and tear of the pumps.

In cases where the line into which the rising main discharges is surcharged, running of pumps is stopped as this would be like pumping against a closed valve. Serious flooding upstream then results exposing residents and the environment to pollution from over flowing sewage.

The on-site sanitation system

The on-site sanitation system can be divided into two methods i.e. the septic tank and soak-away method and pit latrines.

Septic tank and soak-aways

Septic tanks and soak-aways are prevalent in low density suburbs and small and large farm settlements, with a coverage of about 20%.

When septic tanks and soak-aways are filled, the owners then hire vacuum tanker operations in the private sector to empty them. The sludge and/or sewage that is removed is taken to Manchinch Sewage Treatment Plant which belongs to the Lusaka Water Sewerage Company Ltd. Disposal at this plant is at a fee.

Pit latrines

Pit latrines, which covr about 45%, find wide application in very high-density residential areas of the city. When they are filled, some are emptied by the local authority, the Lusaka City Council, or are just back filled by the owners and new ones constructed.

Impact of rapid population growth on the on-site sanitation system

Many of the new residential areas that have sprung up in the city of Lusaka are in places which have a rocky geological formation. This condition does not favour the use of septic tanks and soak-aways as effluent cannot percolate into the soil as a result of the rocks. This has created a scenario where on-site sanitation practices are costly as they get filled-up within a very short period.

There are also settlements where the ground water table is very high. These again are not suitable for on-site sanitation practices. Ground water back flows into the septic tanks and soak-aways thereby making their operation and maintenance difficult.

For settlements where the ground is able to percolate the effluent and those with a high water table, the aquifer is endangered as effluent may at times mix with ground water. This creates a water quality problem especially where there are shallow wells and boreholes nearby. Waterborne diseases, such as cholera, then become a very big threat to the population.

Conclusion

It is important that waterborne sewerage services in the City of Lusaka are improved.

A masterplan for sewerage services in the city should be developed so that future developments are taken care of.

Areas that have septic tanks and soak-aways should have a waterborne system extended to them to stop further pollution of the groundwater.

A waterborne sewer system for the whole city is therefore, recommended so that geological and groundwater problems do not interfere with sewerage services.

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