BULK INFRASTRUCTURE
STATUS QUO TECHNICAL NOTE:
KWAMASHU A (TEMBALILHE & DUFFS ROAD)
This report represents a working draft report for the:

**Bulk Infrastructure Status Quo:**
Technical Node

Prepared on 13 March 2015 for:
**eThekwini Municipality**
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1 Introduction

1.1 Objective

This report summarises the findings of the status quo of the engineering services investigation. These services include water supply, sanitation and storm water management in the KwaMashu A (Central hostels and Eastern), KwaMashu B (Western), Cross roads (North Eastern) and Duffs Road (South Eastern) study boundary.

1.2 List of Abbreviations

- KwaMashu - KM
- Waste water treatment works - WWTW
- Storm water - SW
- Pump station - PS
- Asbestos Cement - AC
- Megalitre (per day) - Ml/(d)
- Meters per second - m/s
- Study area - SA
2 Water supply

2.1 Existing Infrastructure (Figure 2.1)

- The Study Area (SA) as well as adjacent areas is supplied from KwaMashu (KM) 2 (23.5 Ml capacity) and Aloes reservoir.
- Two 300mm diameter bulk mains emanate from KM 2 into KM A (hostel area)
- Organised reticulation network are evident in the eastern and western bounds of the SA. KM A (hostel area) consists of standpipes and illegal connections and there is a fundamental lack of knowledge of the network due to poor serviceability and records.

2.2 Operation and challenges

- The bulk main supplying KM A from Aloes has collapsed under a road. This supply has been decommissioned and the SA is now fed exclusively from KM 2 reservoir.
- The average daily consumption (meter readings) from KM 2 reservoir is approximately 18 Ml/d and an estimated 10.6 Ml/d consumption occurs within study boundary.
- The Storage capacity of KM 2 reservoir is estimated at 30 hours.
- Poor maintenance and condition of the network results in losses estimated to be as high as 6 Ml/d through the KM A zone during periods of low flow.
- Due to the bowl type topography of the SA, with KM A located at the low point, losses through the system can starve water supply to other areas.
- Losses through KM A controlled by valves on the trunk mains feeding the zone, with maintenance teams restricting flows to reduce losses.

Figure 2.1: Water Supply Network of the Study Area

2.3 Planned upgrades

- The replacement of the existing asbestos cement (AC) water main network with PVC has commenced.
- The inability to locate (due to informal settlements) and decommission existing AC pipes results in new pipes operational with existing pipes.

2.4 Design considerations

- Water demands and peak flow are a function of the proposed land use development and densities.
- The Reservoir capacity is to provide 48 hours storage.
- Velocities at peak flow in pipelines to be between 1 – 2 m/s.
- Residual pressures in network to be minimum 2.4 bar.
- Position and number of fire hydrants and fire flows are dependent on risk factors associated with land use development.
3 Sanitation

3.1 Existing Infrastructure (Figure 3.1)

- The sanitation network is waterborne.
- The SA falls on the watershed boundary of the Northern and KM Waste water treatment works (WWTW).
- Reticulation pipes convey sewage from residential housing within the SA and to a trunk main (1200 diameter) that collects flows from surrounding areas and gravity feeds to KM WWTW.
- A pump station (PS) exists on the eastern boundary of the SA which pumps flow from the low lying area into the gravity network to KM WWTW.
- The Duffs road area originally pumped sewage into the gravity system to KM WWTW. This PS has since been abandoned and all flows now gravity feed to Northern works.
- Installation of modular toilet facilities has been completed in the area. These modular toilets tie in to the existing water borne sanitation system.
- Estimated sewage flows generated from the SA are estimated to be between 7 and 8 Ml/d.

3.2 Operation and challenges

- KM A (Central) consists of many informal settlements without formal sanitation fixtures.
- The condition of the system has deteriorated due to poor and infrequent maintenance.
- Maintenance personnel do not frequent the area due to safety concerns as well as inaccessibility due to the location of informal housing developments directly above underground services.
- The system appears to have sufficient capacity to cater for the current sewage generated.
- A single modular toilet installation can cater for approximately 75 informal households however; instances of vandalism reduced the amount of informal households serviced.
- There is a significant problem with rainwater infiltration and sewage outflows in the network.
- Operations teams have requested that the pump station be relocated out of the flood plain to prevent damage to electrics due to potential flooding.

Figure 3.1: Sanitation Infrastructure Network of the Study Area
3.3 Planned upgrades
- The modular toilet installations are nearly complete in the area; no further upgrades are expected in the near future.

3.4 Design considerations
- The amount of sewage generated, like water demand, is a function of land use development and density.
- Reticulation and trunk main sizes need to be checked for any future increased flows to ensure that current that the current capacity of the system is adequate.
- Minimum and scour velocities (0.6m/s) and pipe grades need to be considered.
- The sewerage pump station sump, pumps and rising main sizes need to be checked to cater for additional flows.
4 Storm water

4.1 Existing Infrastructure (Figure 4.1)
- Collector pipes collect overland storm water (SW) flow and discharge it into the KM stream tributaries (Piesang river).
- The Eastern and Western areas of the study boundary have formalised SW systems but the central area is inadequate.

4.2 Operation and challenges
- Poor record information pertaining to existing SW networks and outfalls.
- No condition assessments have been undertaken for the SA, although there is a region wide condition assessment of all SW assets being undertaken currently.
- As with water and sanitation, the condition of existing assets is in a state of disrepair. Poor maintenance and little understanding of the existing system has contributed to this state.

4.3 Planned upgrades
- No upgrades or projects are planned.
- Maintenance projects generally follow a reactive plan where areas requiring servicing are upgraded as and when they become problematic.

4.4 Design considerations
- SW design is based on the proportion of overland rain water flow which has been surface hardened (post development) compared to that which would have occurred naturally in the pre-development phase.
- Traditionally municipal SW infrastructure is designed on the assumption that 40% of the developed area is a hardened surface, with the remainder being natural vegetation.
- Future SW design must be based on the 1 in 50 year storm occurrence.
- The land developer is required to provide a SW management plan and provide attenuation for the difference in flows between post and pre-development overland flows.
- Emphasis is placed on the preservation of natural water courses that SW outfalls discharge into.
- SW pipes are based on a design velocity of 1.5 m/s.

Figure 4.1: Storm Water Infrastructure Network of the Study Area
5 References

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11) Guidelines for Human Settlement (Red book)
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