

STATUS QUO TECHNICAL NOTE

INFRASTRUCTURE

South Eastern District Local Area Plan

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This Technical Note represents part of the Phase Two Deliverable for the South Eastern District Local Area Plan.

Contract No. SCM 66 of 11/12

Prepared for:

Msunduzi Municipality



Prepared by:

Ian Rushton (Ian.Rushton@rhdhv.com)

Angus Ovendale (Angus.Ovendale@rhdhv.com)

Royal HaskoningDHV (Pty) Ltd.



In association with:



Glen Robbins
Yasmin Coovadia

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1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

The Msunduzi Municipality (MM) has appointed Royal HaskoningDHV (Pty) Ltd, under Contract No. SCM 66 of 11/12, to assist the municipality with the preparation of a Local Area Plan (LAP) for the South Eastern District (SEDis) of Pietermaritzburg. The purpose of this document is to provide input into the Local Area Plan (LAP) preparation process for the South Eastern District (SEDis). The document provides a Technical Note describing the status quo of the SEDis with regards to engineering infrastructure, in particular the bulk water and sanitation infrastructure and needs relevant to the SEDis area. This Technical Note represents part of the Phase Two deliverable for the SEDis LAP.

1.2 DETAILS OF THE STUDY AREA

The project study area is situated in the south easterly part of the Msunduzi municipality, falling under Wards 18 and 37, and is approximately 113km² in extent (Refer to Figure 1). The area comprises predominantly agricultural land, with limited development and sparsely populated, although there are a number of planned residential areas. These include Ashburton, comprising smallholdings, Lynnfield Park, a medium density higher-income residential area and a portion of Ambleton which is a low income planned residential area (Ambleton and Foxhill) as well as neighbouring Shenstone on which unplanned settlement is taking place.

There is also a major plan for a mixed use development area, known as Hilcove Hills, between the suburb of Bellevue and the Ashburton Horse Training Centre.

Most of Ashburton was zoned as 'Special Residential Zone 3, with minimum lot sizes of 4 000 square meters, whereas most of Lynnfield Park was zoned as 'Special Residential Zone 1, with minimum lot sizes of 1 600 square meters. Table 7.2 provides information on a total 455 water users in these areas, of which 396 had house connections to the reticulated supply, others making use of boreholes, dams and rivers. The areas commonly known as Ambleton and Foxhill (portion of Ambleton) are

high density planned residential areas with an average stand size of around 240 square meters.

The municipally owned area of Shenstone adjoining Ambleton, although not zoned for housing development, has been subject to land invasion over the past several years and has a rapidly growing collection of dwelling units of mixed standards with irregular stand sizes and unplanned settlement pattern. By contrast with the planned settlement areas there is presently no planned provision of bulk services in Shenstone although the planned Umgeni Water bulk water pipeline to Richmond will traverse the area. A reservoir is planned on high ground overlooking Shenstone in connection with this bulk supply to Richmond. It is understood that Umgeni Water's plans do not include a supply to Shenstone.

The land earmarked for the Hilcove Hills comprises 483,4 hectares and is presently undeveloped.

1.3 METHODOLOGY

This phase of the project has been based primarily on a desktop study that reflects the synthesis of information relevant to the understanding of, and planning for the SEDis. Where necessary, the information contained in existing reports has been augmented by information derived from interviews with key municipal and private stakeholders.

2 WATER SERVICES

2.1 AVAILABLE WATER RESOURCES FOR THE STUDY AREA

The primary bulk water system supplying Msunduzi is the Upper Mgeni or 'Izintaba' System of Umgeni Water. The source of raw water for the supply to Msunduzi is Midmar Dam, which is augmented from the Mooi River via the Mooi-Mgeni Transfer Scheme (MMTS-1). Once Spring Grove dam and the second phase of the Mooi-Mgeni

Transfer Scheme (MMTS-2) have been commissioned the 99% Assured Supply from Midmar dam will be increased from the present 322,5 Ml/day to 476,2 Ml/day¹.

The Mooi-Mgeni water resource system is presently fully committed to the supply of the Environmental Reserve and existing municipal and other consumers. This is expected to remain the case until the Mkomazi Water Scheme is inaugurated to relieve the supply needs of eThekweni Metropolitan Municipality.

The assured yield from Midmar dam is shared between three municipal bulk water customers, namely Msunduzi Municipality, uMgungundlovu District Municipality and eThekweni Metropolitan Municipality. As of October 2011 the supply from the Upper Mgeni System was measured as 300,5 Ml/day and this was distributed as follows:

- Msunduzi Municipality (58%)
- eThekweni Metropolitan Municipality (29%)
- uMgungundlovu District Municipality (13%)

This balance of water supply distribution is expected to change through the implementation of eThekweni's Western Aqueduct project, with an increased proportion of supply expected to be drawn by eThekweni Metropolitan Municipality.

As the system resources are shared between the three municipalities a growth in demand in any one area can only be met in the short term by restricting supply to the other areas.

2.2 BULK WATER SERVICES IN AND ADJACENT TO THE STUDY AREA

The bulk water services provider throughout Msunduzi Municipal area is Umgeni Water. There is a network of bulk water pipelines that border and traverse the South Eastern Districts (SEDs) area. These pipelines are all supplied from the '61 Pipeline' sub-section of Umgeni Water's Izintaba System that is committed to the three municipal bulk water customers and that has a total supply capacity of 330 Ml/day.

¹ Umgeni Water Infrastructure Management Plan 2012, Executive Summary

The parts of the Umgeni Water Inland network bordering on and traversing the South Eastern Districts are shown on Figure 1. Umgeni's bulk distribution network includes three offtakes from the 61 Pipeline that presently serve settlements within the SEDs area, whilst several larger offtakes supply Edendale and the central areas of the City. The supply to Edendale includes the offtakes labelled ED1 to ED4 from which supply is provided into some neighbouring areas of SEDs.

The three offtakes from the 61 Pipeline that service the demands of settlements within the South Eastern Districts are the Ambleton takeoff, which supplies Ambleton & Foxhill, the Ashburton takeoff supplying Ashburton and Lynnfield Park and the 63 Pipeline that supplies Manderston, Thornville, Bainesfield and Hopewell, which lie along the southern boundary of SEDs, and also offers limited supply to adjacent consumers in the SEDs area. In addition there are numerous small-bore individual farm offtakes to properties traversed by the 61 Pipeline.

The future bulk water pipeline to Richmond, also supplied from the 61 pipeline, will traverse the Shenstone area. However the capacity of the pipeline system and the associated reservoir storage were sized without consideration of a local supply to Shenstone, which would require a planning revision by Umgeni Water and possible provision of additional infrastructure. The planned Richmond supply will include a 5 Ml balancing reservoir on a high site overlooking Shenstone. A gravity offtake from this system will connect to the Thornville Reservoirs and will replace the present pumped supply via Manderston. This new supply to Thornville may provide further opportunity for supply to water users along the western areas of SEDs.

The present Shenstone Reservoir, although situated within the SEDs area, was designed for the needs of adjacent Emantshaneni and Slangspruit and will be supplied from neighbouring Slangspruit and Imbali via the ED2 & ED4 supply zone area.

Although the 61 Pipeline and its offtakes traversing the SEDs have potential to meet water developing water service needs within the South Eastern Districts, the planning needs to be conducted well in advance and communicated to the bulk water supplier so that the provision of any needed additional capacity can be duly programmed and

implemented. It must also be noted in water supply planning that the Umgeni Water system provides only balancing storage for the bulk water transport function and that adequate reticulation and emergency storage must be provided by the bulk water purchaser in line with regulatory requirements.

2.3 WATER SUPPLY NEEDS WITHIN THE STUDY AREA

The water supply needs of the current settlements in the South Eastern Districts were studied under the 'Finalisation of Water Master Plan' study by Consultants HR Africa and Ninham Shand, completed in November 2004.

The Ambleton offtake from the 61 Pipeline presently supplies all or most of the water used in Ambleton and Foxhill. The 2004 Master Plan study notes that 'Ambleton and Shenstone' (around the area known as Foxhill) are growth areas in water demand. However the areas are treated in the study as part of the supply zones of Imbali and Slangspruit and their demand is not separately calculated in the study. There is thus no differentiation in the study of water supplied in the SEDis part of the greater area.

The Umgeni Water Infrastructure Master Plan does not report the volume supplied to the Ambleton tank but the pipeline was designed to supply a population of 34 000 at a service level of 130 liters per capita per day. The Municipality intends to expand its low income housing in the Shenstone/Ambleton area but the Masterplan notes that these developments will be supplied via reservoirs in the Slangspruit area outside of the SEDis area that is supplied from the ED2 & ED4 offtakes from the 61 Pipeline. A change in sanitation service level from VIPs to water-borne sanitation in Ambleton and Foxhill will entail a steep increase in water demand for these areas. Water supply infrastructure between the source and points of supply needs to be upgraded accordingly. This includes adequate water storage facilities for balancing and emergency purposes, usually requiring 48 hours of storage at average daily demand.

The Thornville pipeline was built to supply Hopewell, Bainesfield and the settlement around Thornville junction. Average flow in the Thornville pipeline in 2011 was reported as 2,5 MI/day².

² Umgeni Water Infrastructure Master Plan, volume 2, 2012

The 2004 Master Plan study refers to the water supply of Ashburton and Lynnfield Park as (then) newly incorporated areas within the Msunduzi Municipality. With respect to these areas this report draws on the previous works for the Ashburton Health Committee, 'Report on Upgrading the Water Reticulation' by Ninham Shand (Pty) Ltd, May 1992 and the Ashburton TLC, Integrated Development Plan, Mark Puttick & Associates, 1999. The Ninham Shand report assessed the condition of the existing infrastructure in Ashburton and Lynnfield Park, and made recommendations regarding upgrading and replacement of elements based on current and projected demand. All of the recommendations in the report were implemented and therefore the 2004 Master Plan report concluded that the bulk infrastructure has the capacity to meet the need of the projected population growth assumed in the report.

The Umgeni Water Infrastructure Master Plan reports that the average flow in the Ashburton pipeline in 2011 was 1,2 MI/day (34% of pipeline capacity). This supply was used in Ashburton and Lynnfield Park. The existing supply thus has comfortable 'headroom' for expansion of demand in the foreseeable future. The existing storage capacity for Ashburton and Lynnfield Park, however, falls far short of the regulatory emergency storage requirements of 48 hours supply at Average Annual Daily Demand. There have been proposals to construct an additional 2 MI reservoir at a site off A.P. Smith Drive and to refurbish the existing disused filter beds and convert them to an additional water reservoir. These measures would only be adequate as long as no further development is planned in the area of the previously proposed Mpushini Industrial Park.

With reference to the 2010 Wastewater Treatment Plant study, it can be seen³ that the anticipated future water demand for Ashburton Development Extensions and Lynnfield Park, together with the Mpushini Industrial Development, was assessed as 5,5 to 6 MI/day. This would require a second offtake pipeline from the 61 Pipeline, with a supply capacity of at least 40% more than the present pipeline, but this assumes that the development will occur to the west of the N3 highway. This is not the case with the proposed Hillcove Hills development which is situated to the east of the N3. If the stalled development of the Mpushini Industrial Park goes ahead at

³ Wastewater Treatment Plan Report, 30 September 2010, TLS Civils & Project Managers, Ziyanda Consulting, Liebenberg, Jenkins & Partners 2010, p37

some point in the future it would be necessary to increase both the offtake pipeline capacity and the storage provided for the Ashburton connection for 48 hours storage at the capacity of the supply (actual value to be determined by detailed analysis of system and demand peaking factors).

The proposed Hilcove Hills development is described in the report: 'Hilcove Hills Development, Bulk Services Report – Civil Engineering Services', Revision 4, May 2012, SSI Engineers & Environmental Consultants (Pty) Ltd. The total estimated average daily water demand for the Hilcove Hills development is 1,9 ML per day. The development plan provides for the water demand to be met by the Msunduzi municipal reticulation network, via the Bisley and Bellevue reservoirs.

The development of Hilcove Hills will thus not affect the demand on the Ashburton connection from the 61 Pipeline. This supply will, however, depend on the continued availability of spare capacity on the supply route from Balancing Reservoirs (at the disused HD Hill WTW near Signal Hill) via the Masons Reservoir to the Bisley and Murray Road reservoirs. This supply route is shared with the western end of the CBD and nearby areas of the City. Surplus capacity is presently available on this route, but the continued availability of supply capacity thus depends on other developments within the City, especially within the CBD and surrounding areas.

The majority of the Hilcove site can be served by the existing Murray Road reservoir next to Bellevue. The higher lying sites adjacent to the Bellevue/Crestview residential area (Phases 2 and 3) can be supplied by extending the existing reticulation networks supplying Bellevue. These networks are supplied from the Bisley reservoir and will serve approximately 10% – 12.5% of the future development area.

2.4 WATER SUPPLY INFRASTRUCTURE WITHIN THE STUDY AREA

The 61 pipeline itself traverses the SEDis area (see Figure 1). The original pipeline was constructed around 1979 and is generally 800mm in diameter. The pipeline is presently being duplicated over its entire length, between the Richmond offtake and the Umlaas Road reservoir site, with a parallel pipeline of 1100mm diameter due for completion in 2014. Although the main consumer off the 61 Pipeline is Ethekwini Water Services (via the reservoirs at Umlaas Road waterworks), several small

consumers along the route receive supply via small diameter (generally 25mm) connections. This supply is largely restricted to properties directly affected by the pipeline.

The Ambleton and Foxhill housing areas are supplied by the Ambleton pipeline, which is an offtake from the 61 pipeline. This 2,0km pipeline is the bulk connection to the Ambleton Reservoir. The Ambleton pipeline is a DN300 pipeline with a design flowrate of 76 l/s. The pipeline was designed to supply 34 000 people at a service level of 130 liters per capita (including losses) and a peak demand factor of 1,5 (an average Daily Demand of 4,4 ML/day x 1,5 seasonal peak factor).

The only storage observed at the terminal of the Ambleton pipeline is a sectional steel tank that appears too small, with regard to the population supplied, to absorb diurnal peaks and probably offers near to zero emergency storage in case of interruption of pipeline service. Adequate storage at the pipeline terminal to support distribution via a reticulation network would be the responsibility of the municipality and not the bulk water provider.

Ashburton and Lynnfield Park are supplied via the Ashburton pipeline, which is an offtake from the 61 pipeline that was completed around 1994. This 2,7km pipeline is a DN150 Galvanised Mild Steel pipeline with an estimated supply capacity of 3,5 ML/day and delivers water into the Ashburton High Level Reservoir, from where water is distributed to Ashburton and Lynnfield Park.

The 63 Pipeline from Umlaas Road to Thornville pipeline is an offtake from the 61 pipeline and skirts the southern area of SEDis and several minor offtakes of diameters 25 & 50mm supply properties to both sides of the pipeline. The 63 pipeline is constructed in various grades of Galvanised Mild Steel & Fibre Reinforced Cement (AC) pipeline of diameters varying between 150mm and 225mm with an estimated supply capacity of 2,2 ML/day⁴. This pipeline supplies the 2,0 ML Thornville Reservoir and Galaxy Tank via the Manderston Pumpstation. The major supply from the 63

⁴ Telephone conversation; I Rushton: Mark Scott, Umgeni Water, 30 April 2013

Pipeline is provided via gravity distribution mains to Thornville, Bainesfield and Hopewell outside of the SEDis area.

2.5 SUMMARY OF EXISTING AND PROPOSED WATER SUPPLY

Area Name	Zoning	Estimated No. of Sites			Available Potable Water Volume MI/Day	Estimated Ultimate Required MI/Day	Comments
		Residential	Industrial / Commercial	Potential			
General					330 MI/day	Exceeds 330 MI/day	Assured supply from Upper Mgeni System of Umgeni Water 322,5 MI/Day increasing To 476,2 MI/Day by 2014. Shared between: Msunduzi Municipality 58% Ethekwini Municipality 29% Umgungundlovu DM 13% Any growth in demand in one area will in the short term be met by restricting supply to other areas. Capacity of the 61 Pipeline sub-system is approximately 330 MI/day
Ashburton	Small Holdings	500	60	1800	1,2 (2011 Consumption)	6	Supplied via Ashburton Take-Off from 61 Pipeline, Capacity 3,5 MI/Day
Lynnfield Park	High Income	150					
Ambleton	Low Income	2536					Supplied via Ambleton Take-Off from 61 Pipeline Designed For 4,4 MI/Day In future supplied via adjacent Slangspruit area through Msunduzi Municipality reticulation, which draws supply from the ED2 & ED4 take-offs from the 61 Pipeline
Foxhill	Low Income	15					Supplied Via Ambleton Take-Off From 61 Pipeline
Shenstone	Unplanned						No formal supply, 61 Pipeline to Richmond sized without consideration for Shenstone
Hillcove Hills		1135				1,9	Proposed to supply via Msunduzi Municipality's distribution network through Bisley and Murray Road Reservoirs

3 SANITATION SERVICES

3.1 PRESENT LEVEL OF SANITATION WITHIN THE STUDY AREA

The Ambleton and Foxhill residential zones presently make use of on-site sanitation mainly in the form of VIPs and other forms of pit latrines⁵. A similar situation could be expected within the irregular and unplanned Shenstone developments, although some occupants may have implemented internal plumbing with septic tanks or other form of on-lot disposal of wastewater.

The Ashburton area also makes use of on-site sanitation mainly in the form of septic tanks. This is a viable option for this area where a significant portion of Ashburton is zoned 'Garden Lot Zone 1' and 'Garden Lot Zone 2', with minimum lot sizes of one and two hectares respectively. On these relatively large size properties, sewage disposal using septic tanks with soakaways is normally adequate unless the soil permeability is particularly low. There are reportedly no properties within either of these zones where soakaways are problematic.

There are however also portions of land zoned 'Special Residential Zone 2', 'Commercial' and 'Administration' with minimum lot sizes of between 1 000 m² and 2 000 m². The Wastewater Treatment Plan Report, 30 September 2010 reports that the total number of properties with the lot size of 1,000 m² was estimated to be somewhat less than 60 and that several zoning applications for smaller lot sizes of 600 m² had been processed.

If the trend of reducing stand size continues the function of soakaways may become problematical for these smaller sites. In addition the volume of effluent generated by the commercial and administration sites is usually significantly more than that generated by the residential sites. Because of the limited soakaway capacity, conservancy tanks are needed. These tanks need to be emptied on a regular basis (sometimes weekly) and therefore rely on the existence of an economical and reliable suction tanker service as well as an approved sewage disposal site within an

⁵ Wastewater Treatment Plan Report, 30 September 2010, TLS Civils & Project Managers, Ziyanda Consulting, Liebenberg, Jenkins & Partners

economical haulage distance from the users. The 2010 Wastewater Treatment Plan Report concluded that there is dire need for water borne sewerage network and outfall construction to service Ashburton as the current level of service (septic tanks) is no longer adequate.

Most of Lynnfield Park is zoned “Special Residential Zone 1’ with minimum lot sizes of 1 600 m². This area is already fully serviced with a waterborne sewerage system draining to the Lynnfield Park Sewage Works. The sewerage infrastructure comprises a 160mm diameter outfall and a small package Wastewater Treatment Works (WWTW). The Lynnfield Park treatment works is a small modular plant employing convention activated sludge processes with Sequential Batch Reactors (SBR). According to the Ninham Shand Report: “Darvill Attenuation Dam – First Dam Safety Inspection Report”, November 2005 the sludge from the Lynnfield Park WWTW is mechanically de-watered and removed from site to Darvill WWTW.

The Lynnfield Park wastewater treatment works was constructed by developers and as part of the development agreement was handed over to the Municipality for ownership, operation and maintenance. The Lynnfield Park works was constructed in the 1980’s and the last major upgrade was done in 1993. Although the community was reported to be comfortable with the operations of the works at the time of the 2010 Wastewater Treatment study, there are also reports⁶ that the Works are reportedly unable to cope with the current inflows from the existing community and there are reported blockages attributed to the small outfall sewer, which is only 160mm diameter discharging to the works. The actual works and its associated units require a complete overhaul.

The capacity of the Lynnfield outfall sewer is estimated as 0,47 MI/day and the peak capacity of the Lynnfield WWTW is estimated as 0,2 MI/day (this figure may refer to the Peak Wet Weather Flow or PWWF). Allowing for a 1,5 daily peak factor the Lynnfield WWTW is thus adequate for up to 150 No. residential stands at a average unit flow rate of 1 000 liters per stand per day. The works were therefore meant for the treatment of wastewater from the Lynnfield development and hence the small

⁶ Wastewater Treatment Plan Report, 30 September 2010, TLS Civils & Project Managers, Ziyanda Consulting, Liebenberg, Jenkins & Partners

rated design capacity and have no capacity to provide for growth in demand for waterborne sewage services in the area.

3.2 SANITATION NEEDS AND PLANNED SANITATION IMPROVEMENTS WITHIN THE STUDY AREA

It is noted that Msunduzi Municipality is presently extending the Slangspruit sewer in the direction of Shenstone, Ambleton and Foxhill. It is understood that the intention is to sewer these areas and that these areas will fall under the sub-catchment of neighbouring Slangspruit, outside of the SEDis area.

Based on the existing land-use zoning, no current sanitation services backlog was identified in Ashburton and Lynnfield Park in the studies up to 1999.⁷ Since 1999, however, Ashburton has seen a move to the subdividing of many of the larger erven and indications are that there will be an increase in the applications for subdivisions in future, whereas Lynnfield Park has been converted to water-borne sewerage.

The “Report on Sewage Disposal Options” (Ninham Shand, 1997) recommended that the “Special Residential – Zone 3”, “Special Residential – Zone 2”, “Commercial” and “Administration” zones be serviced with a small-bore sewerage system. The areas zoned “Special Residential – Zone 2 and Zone 3”, “Commercial” and “Administration” were identified as most likely to develop sewage disposal problems in the future where septic tanks and soakaways are used. These are the areas zoned for the smaller plot sizes of between 1 000 m² to 4 000 m².

The abovementioned report recommended that subdivisions resulting in erven of 4 000 m² and smaller should only be allowed if each proposed erf has passed a percolation test. Furthermore it was recommended that, should plans be made in future for the rezoning of any areas in Ashburton, that any erven of less than 4 000 m² in size be serviced with some form of sewerage system.

⁷ Refer to the ‘Ashburton IDP’, Mark Puttick and Associates, 1999 and the ‘Report on Sewage Disposal Options’, Ninham Shand, September 1997

The conversion of Ashburton to water-borne sewage would entail an entire study to establish the preferred design and configuration of the sewer reticulation and the location, selection and design of wastewater treatment technology. The previous recommendation of small-bore sewers probably refers to the continued use of septic tanks with the overflow of the septic tanks being routed into the small bore sewer, in this way aiming to remove solids by settlement and digestion within the septic tanks as well as possibly achieving reduction in the BOD/COD load of the supernatant effluent. Based on experience with small-bore sewers in Southern Africa and worldwide however, we recommend full water-borne sewerage in preference to small bore sewers, which have proved problematical to operate and maintain.

Where isolated subdivided plots are not near a collector sewer, the 2004 Masterplan recommended conservancy tanks to avoid excessive need for sewage pump stations in areas below the trunk sewer line. Conservancy tanks, however, are expensive to operate and demanding on the environment in the form of frequent haulage and the need for control of the disposal of raw sewage. We would therefore recommend the continued use of septic tanks for any sites below the sewer outfall line where plot sizes allow for their operation without nuisance.

The 2010 Wastewater Treatment Plant study shows the anticipated future flows⁸ from Ashburton Development Extensions to be 1,8 Ml/day from an anticipated 1 800 stands. In view of recent developments the status of this development needs to be reconfirmed.

We endorse the recommendation of the Ninham Shand 2003 Master Plan Study that the land-use plan for Ashburton be revised and that specifically the future subdivision of plots be investigated in order to develop a firm basis for sanitation planning.

In Lynnfield Park the existing sewage treatment works is reported in the 2003 Master Plan Study to have a rated capacity of 130 kl/day average dry weather flow from a total contributing population of 1 350 people. The study reported an estimated

⁸ Wastewater Treatment Plan Report, 30 September 2010, TLS Civils & Project Managers, Ziyanda Consulting, Liebenberg, Jenkins & Partners, p37

current (2003) contributing population of 450 persons and an estimated ADDF is 90 kl/day, thus an average sewage contribution of 200 liters per person per day, which is in line with the Red Book⁹ parameter for residential properties classified as Higher Income. On this basis the WWTW can be expected to adequate service a population equivalent of only 650 people in total. The spare capacity was made available to treat septic tank effluent from non-sewered areas. However it is noted that more and more residential stands are becoming available due to the re-zoning by different developers in this area. Thus it can be anticipated that a ceiling of wastewater handling capacity will be reached, if this has not already happened. It was also noted in the Master Plan Study that, from a treatment process point of view, it is undesirable to exceed a flow ratio of 1:1 normal waterborne sewage to septic tank effluent.

No actual inflow records could be obtained for the Lynnfield Park WWTW. However it can be observed that there is eutrophication of the small storage dams adjacent to the sewage pumpstation and adjacent to the WWTW. This is indicative of failure, or overloading, of wastewater infrastructure. It can therefore no longer be assumed that the sanitation needs are being adequately met. We therefore recommend that the entire system of sewer reticulation, sewage pumping, wastewater treatment and disposal of solid and liquid effluents in Lynnfield Park be reviewed. This may result in a need for rehabilitation and repair of civil infrastructure, replacement or refurbishment of pumping equipment and replacement of the package treatment plant with a facility of more durable and sustainable design.

The 2010 Wastewater Treatment Plant study shows the anticipated future flows¹⁰ from Lynnfield Park Industrial Development to be 2,55 Ml/day from an anticipated 85 hectares development. We are informed that the present developer of Mpushini Business Park has halted development plans and is in the process of auctioning the land. There is therefore uncertainty surrounding development plans in this area.

⁹ Guidelines for Human Settlements Planning and Design

¹⁰ Wastewater Treatment Plan Report, 30 September 2010, TLS Civils & Project Managers, Ziyanda Consulting, Liebenberg, Jenkins & Partners, p37

Considering the anticipated wastewater flows from Ashburton and Lynnfield Park, as considered in the 2010 Wastewater Treatment Plan report a sewerage conveyance system and wastewater treatment capacity of 4,35 Ml/day is required. The current capacity of the Lynnfield Park WWTW will not allow any significant growth to be accommodated. There is thus a need to consider additional wastewater facilities. There are a number of strategic options available to accommodate the increase in demand that have been considered by the Msunduzi Municipality, as reported in the 2010 Wastewater Treatment Study. These are discussed below, including the comments by the authors of the 2010 Wastewater Treatment Study.

- Allowing the developers to build small treatment plants to service their developments. This approach will result in the proliferation of many small treatment plants that will be difficult to monitor their performance and may result in effluent non-compliance with the DWA standards. The Department of Water Affairs is not in support of this arrangement and this approach has since been discouraged.
- Upgrading the Lynnfield Park Treatment works to accommodate additional demand. Due to financial constraints it has been agreed in principle by the DWA, the Municipality and the developers that Lynnfield Park works be upgraded at the expense of the developers and thereafter handover the plant to the Municipality for operation and maintenance. The private developers subsequently engaged engineers to conduct a feasibility study for the upgrade of the works. The proposal was to upgrade the works to a maximum hydraulic capacity of 2Ml/day. We are informed by Sukuma Consultants¹¹, however, that the property developer of the Mpushini Business Park, Cherry Moss, has now put a stop to engineering inputs and is in the process of auctioning off the property.
- Apart from the capital required for scheme development, any increase in capacity of waterborne sewerage and sewage treatment means that the Municipality must improve its managerial and technical capacity to operate and maintain the works. A decision is therefore required for the future arrangement for the ownership, operation and maintenance of any works.

¹¹ Telephone conversation; Ian Rushton :Presh Jangali, Sukuma Consulting Engineers, 25 April 2013

In the broader Masterplanning framework of Msunduzi Municipality there is a proposal to construct another major WWTW plant downstream of both Darvill and the Lynnfield Park works near the confluence of the Msunduzi and Mpushini rivers. This site offers the potential benefit of being able to receive sewage by gravity from the projected growth areas of the Mkondeni and Mpushini catchments without need for pumping.

The 2003 Master Plan Study had discounted the concept of a WWTW downstream of Darvill and the Lynnfield Park, based mainly on a stated lack of state land in the vicinity. The 2010 Waste Water Study includes an evaluation¹² of three competing proposals for providing the needed future wastewater treatment capacity for Msunduzi Municipality and evaluated this option of a future downstream WWTW as the most favoured of the three. This finding is included in the report recommendations¹³ as the preferred long-term measure, based on the limited area of land for extension at Darvill and the observation that sewage from future developments in the Mpushini and Mkhondeni catchments would be able to gravitate to the proposed lower site.

As an interim measure the Waste Water Study report recommended the phased extension of the Lynnfield Park WWTW to an ultimate capacity of 1,8 Ml/day as an interim measure.

- The Special Residential zone in the east (Phase One) will utilize on-site sanitation in the form of individual septic tanks and soakaways. During percolation tests it was found that the ground conditions are suitable for constructed percolation drains.
- Phases 2, 3 and 4A will be served via a new sewage pump station that will pump into an existing pump station in Morgan Road. The existing pump station and rising main will be upgraded to accommodate the additional effluent volume. This sewer will discharge through the existing gravity main to Darvill Works

¹² Executive Summary, p5 and p62

¹³ Section 7: Recommendations (Recommendation 1)

(additional work will be required to verify the available spare capacity of this sewer). The capacity of the Darvill works will be increased by 2015.

- A wastewater treatment works will be required to serve all other phases of the development.

The pipe sizes within the sewerage reticulation will have a minimum diameter of 160mm with individual plot connections.

Dominic Collett of Royal HaskoningDHV confirmed, in the context of the proposed Hilcove development in SEDis that no decision had been made by Council on any additional WWTW capacity for the SEDis area. Hence it was decided that a WWTW will be developed by Hilcove with an initial capacity of 1,9 MI/day with a site footprint to allow development to a future 6 MI/day capacity. The WWTW has been positioned within the Hilcove site at the low point of the development near the north eastern boundary. The geotechnical conditions and the topography have been found to be adequate for this infrastructure.

The development of the further capacity is planned with a view to also open up the upstream catchment to development. Although the sewer reticulation is not sized to receive sewage inflows from the upstream catchment, servitude allowance will be made to provide for a future service link for this sewage connecting to the Hilcove WWTW site.

3.3 SUMMARY OF EXISTING AND PROPOSED SANITATION

Area Name	Zoning	Estimated No. of Sites			Available WWTW Capacity MI/Day	Estimated Ultimate Required MI/Day	Comments
		Residential	Industrial / Commercial	Potential			
Ashburton	Small Holdings	500	60	1800	On Site	4,35 Combined	Soak pits commercial sites problematic waterborne proposed
Lynnfield Park	High Income	150			Adequate		No additional capacity, WWTW in need of rehabilitation
Ambledon	Low Income	2536			On Site		VIP's, upgrading to waterborne sanitation with proposed extensions to Slangspruit interceptor under

							construction
Foxhill	Low Income	15					As per Ambledon
Shenstone	Unplanned						Squatted
Hilcove Hills		1135				6	On site, initially to Darvill, 1,9 MI/Day new works with footprint for 6 MI/Day

4 KEY FINDINGS

The tables below provide a summary of the existing and proposed water supply and sanitation infrastructure issues in SEDis:

4.1 WATER SUPPLY

The key findings for water supply infrastructure are outlined below:

Water Supply Issues	Key Findings	Implications
Bulk Water Supply System	<ul style="list-style-type: none"> Despite recent and ongoing water resource developments, resources in the Upper Mgeni system remain stretched and this is likely to remain the case at least until the commissioning of the Mkomazi Water Supply Scheme (see Section 2.1). 	<ul style="list-style-type: none"> There is limited scope for water supply growth in the Upper Mgeni supply area, however, extension of water supply to new housing areas and upgrading of water supply service levels is a social imperative. This is going to create a squeeze on availability of water for expansion and any major new water use will need careful planning and possibly an offset by water savings through conservation measures elsewhere in the municipality.
Umgeni Water	<ul style="list-style-type: none"> Umgeni Water's 61 Pipeline sub-system is the main channel of water supply to the major part of the SEDis area (see Section 2.2). 	<ul style="list-style-type: none"> There are existing supply routes to meet potential water needs. However, changes in water usage pattern need advance planning and interaction with Umgeni Water.
61 Pipeline Sub-System	<ul style="list-style-type: none"> The 61 Pipeline sub-system supplying Msunduzi has inherent hydraulic supply constraints (see Section 2.2). Available capacity is already committed to developments 	<ul style="list-style-type: none"> The supply to Msunduzi, eThekweni and surrounding areas is an integrated system in which a change in any one part affects the other parts. Extension of bulk water infrastructure involves fairly long

	such as the eThekweni Western Aqueduct, Richmond Bulk Water Supply and developments in Greater Edendale.	lead times. Any planned change in water usage needs advance consultation with Umgeni Water.
Water Supply Capacity	<ul style="list-style-type: none"> Msunduzi Municipality has limited water reticulation within the SEDis area and this is focused in the Ambleton and Foxhill area and in Ashburton and Lynnfield Park. 	<ul style="list-style-type: none"> Whilst a limited level of development within presently reticulated areas can be achieved using existing infrastructure, major expansions or supply to new areas will need creation of new water supply infrastructure.
Water Storage	<ul style="list-style-type: none"> The provision of reticulation in all cases requires provision of adequate balancing and emergency storage in line with regulatory requirements. 	<ul style="list-style-type: none"> At least 48 hours of water storage at Average Annual Daily Demand needs to be provided by the developer for each new water supply area.
Sanitation Upgrades	<ul style="list-style-type: none"> A change in sanitation service level from VIPs to water-borne sanitation in Ambleton and Foxhill will entail a steep increase in water demand for these areas. 	<ul style="list-style-type: none"> Water supply infrastructure between the source and points of supply needs to be upgraded accordingly. This includes adequate water storage facilities for balancing and emergency purposes.
Shenstone	<ul style="list-style-type: none"> Unplanned housing development in the Shenstone area will put pressure on the Msunduzi Municipality with regard to services response, health and hygiene and environmental issues. 	<ul style="list-style-type: none"> Planning responses needs to consider scenarios for the Shenstone development.
Eastern Area	<ul style="list-style-type: none"> Development plans in the eastern parts of the SEDis area have gone through several changes resulting in uncertainty about the details and location of needed water supply and sanitation. 	<ul style="list-style-type: none"> Investment into the area has not materialized, possibly due to the level of uncertainty attached to development plans. Different forms of partnership may be required to support infrastructure investments in future.
Hilcove Hills	<ul style="list-style-type: none"> Plans for the planned Hilcove Hills development show that the water supply will be received via the existing City reticulation system fed from Murray Road reservoir. This 	<ul style="list-style-type: none"> This supply will depend on the continued availability of spare capacity on the supply route from Balancing Reservoirs (HD Hill) via the Masons Reservoir to Murray Road reservoir. This depends in turn

	route, from Balancing Reservoirs (HD Hill) via the Masons Reservoir to Murray Road reservoir is shared with the western end of the CBD and nearby area of the City. Initial indications are that surplus capacity is available on this route.	on other developments, especially within the CBD and surrounding areas.
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4.2 SANITATION

The key findings for sanitation infrastructure are outlined below:

Sanitation Issues	Key Findings	Implications
Wastewater Treatment Facilities	<ul style="list-style-type: none"> Wastewater treatment facilities in SEDis are limited to the Lynnfield Park WWTW. Rezoning is resulting in more and more residential stands becoming available. Indications are that the Lynnfield Park WWTW facility is presently overloaded and/or not functioning effectively (see Section 3.2). 	<ul style="list-style-type: none"> Water supply and sanitation planning ought to be first and foremost in any planned land use change, including the rezoning and subdividing of sites. Any expansion of network or intensification of wastewater generation will require an entirely new WWTW facility.
Lynnfield Park	<ul style="list-style-type: none"> Low to medium density settlement with existing WWTW and Sewage Pumpstation providing waterborne sewerage. Discharge of septic tank effluent into Lynnfield Park sewer system appears to be threatening the successful functioning of the wastewater treatment system. 	<ul style="list-style-type: none"> The capacity limitation at Lynnfield Park WWTW needs to be studied and quantified. An improved plan for handling of septic tank contents from Ashburton area should be devised.
Ashburton	<ul style="list-style-type: none"> Small holdings/low density settlement with on site sanitation. If the trend of reducing stand size in Ashburton continues the function of soakaways may become problematical for the 	<ul style="list-style-type: none"> In the event of continued densification of development in Ashburton area construction of a water-borne sewerage network, outfall and additional WWTW facilities would be needed to service Ashburton. Small bore

	smaller sites (see Section 3.2).	sewers are not recommended as an interim or final solution.
Ambleton/ Foxhill/ Shenstone	<ul style="list-style-type: none"> • Ambleton/Foxhill is a low income planned residential area. • Shenstone is a rapidly growing informal/unplanned settlement without bulk services and no planned water or sanitation provision. 	<ul style="list-style-type: none"> • Msunduzi Municipality is presently extending the Slangspruit sewer in the direction of Shenstone, Ambleton and Foxhill. It is understood that the intention is to sewer these areas and that these areas will fall under the sub-catchment of neighbouring Slangspruit, outside of the SEDis area.
Hilcove Hills	<ul style="list-style-type: none"> • Undeveloped and unserviced area with significant development proposed. 	<ul style="list-style-type: none"> • New WWTW proposed to service future Hilcove Hills development.

5 ANNEXURES

- Figure 1: Bulk Water Infrastructure
- Figure 2: Bulk Water Infrastructure and Proposed Developments
- Figure 3: Bulk Sanitation Infrastructure
- Figure 4: Bulk Sanitation Infrastructure and Proposed Developments