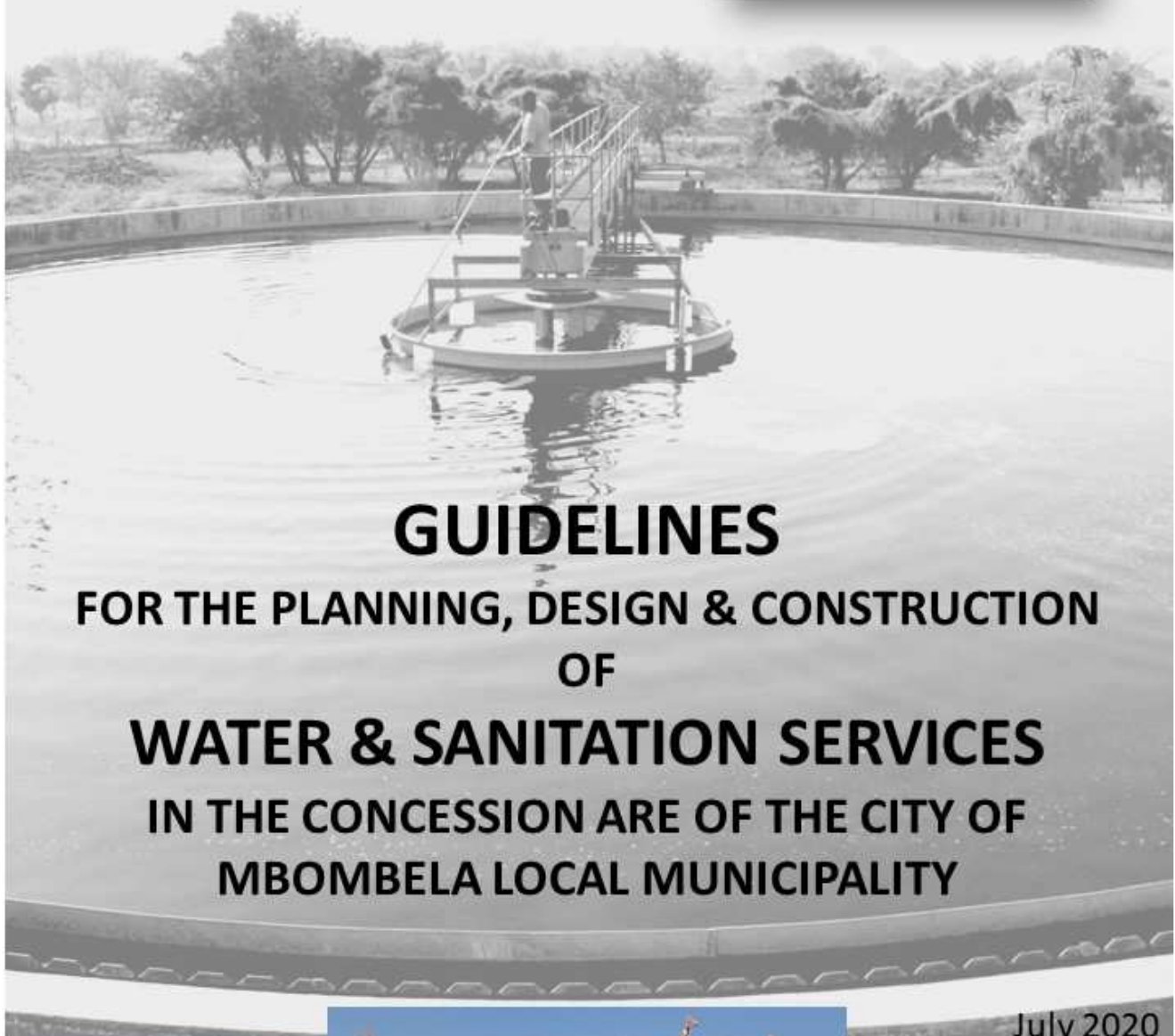




**WATER & SANITATION SERVICES
PROVIDER ON BEHALF OF:**



**GUIDELINES
FOR THE PLANNING, DESIGN & CONSTRUCTION
OF
WATER & SANITATION SERVICES
IN THE CONCESSION ARE OF THE CITY OF
MBOMBELA LOCAL MUNICIPALITY**

July 2020



Compiled and published by

Silulumanzi (RF) (Pty) Ltd



Water and Sanitation Services Provider

on behalf of

MBOMBELA LOCAL MUNICIPALITY



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Existing Silulumanzi drawings formed the basis for the set of standard drawings that accompanies this document. In addition drawings supplied by the following organisations and consulting engineers were used to produce the set of standard drawings:

- Organisations:
 - City of Tshwane (Lourens Lötter)
- Consulting Engineers:
 - Bigen Africa
 - Consolv Consulting Engineers
 - Endecon Ubuntu
 - GLS Consulting (maps of the concession area for the Guideline document)
 - PD Naidoo & Associates
 - Professional Design Services

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Silulumanzi Utilities South Africa (Pty) Ltd, trading as Silulumanzi (Silulumanzi), is responsible, as concessionaire, for water supply and sanitation within the greater Nelspruit area of Mbombela.

The Nelspruit area of Mbombela has experienced rapid growth since 1994 and new developments such as the university, a new private hospital and the high court will provide further impetus to the growth of the city.

New residential areas are generally developed by private developers, who appoint consultants to plan, design and manage construction of the necessary infrastructure, which includes, inter alia, water supply and sewerage infrastructure.

Prior to 2014 there were no guidelines, other than standardised guidelines such as the Guidelines for Human Settlement Planning and Design (the so-called Red Book), that could assist developers and their consultants during the development process. These standardised guidelines obviously do not address aspects unique to local conditions, such as the Mbombela Spatial Development Framework, Silulumanzi's Concession, Silulumanzi's master planning of services, three-party services agreements, bulk services contributions and local standards, preferences and norms.

To address this void Silulumanzi decided to compile a guideline document that will assist developers, their consultants and contractors during the development process from a water supply and sanitation services perspective.

1.2 PURPOSE OF THIS DOCUMENT

Silulumanzi's intention is to provide guidelines that will:

- Provide guidance during the development process;
- Provide information on approvals required;
- Set minimum standards;
- Ensure quality;
- Support local economic development;
- Enforce Silulumanzi's preferences; and
- Standardise construction materials, which will in turn:
 - Assist with maintenance by reducing the range of replacement materials that must be kept in stock;
 - Improve response times;
 - Curtail maintenance costs; and

- Result in the installation of equipment that will assist with effective fire-fighting.

1.3 LEGAL STATUS OF THE DOCUMENT

In Chapter 1 of the Red Book it is stated that "... engineers and urban planners need to be provided with *guidelines*, as opposed to standards. Guidelines are intended to assist decision-making, whereas standards are enforceable absolute limits (Schlotfeldt 1995a). It is recognised that both the rigid application of guidelines as well as the setting of inappropriate standards can have the opposite effect to that intended." It further states that "... the concept of "guidelines" should continue to prevail, and that the provisions of this document (*i.e. the Red Book*) could not be legally enforceable."

The technical engineering aspects of this guideline document (Chapter 5: Design Guidelines) are based on the Red Book and the intention with this document is also to not curtail or discourage innovative engineering practice. However, specific standards that are set by Silulumanzi will be enforced to ensure that the purpose of this guideline document, as set out in Section 1.2 of this Chapter, is attained.

1.4 STRUCTURE OF THE DOCUMENT

Silulumanzi's intention is to provide the user with a document that has a logical structure, is comprehensive in content though concise in conveying information, and is clear, unambiguous and easy to use.

The rationale was to not duplicate existing documents such as the Red Book, Mbombela's spatial development framework and Silulumanzi's master planning documentation, but rather to make developers and their service providers aware of such documentation, with adequate information on where it can be obtained.

Standard drawings have been prepared and these drawings must be read in conjunction with this document. These drawings form an integral part of the Silulumanzi Guidelines. The standard drawings are not bound into this document, but are bound separately into an A3 book of drawings. Information on the standard drawings is provided in Chapter 6 of this document.

This document only addresses water supply and sewerage within the concession area. Electrical components forming part of water supply and sewerage infrastructure are also addressed. Mbombela Local Municipality must be approached to obtain information regarding water supply and sewerage outside the concession area as well as information on roads, storm water drainage and electricity.

Town planning matters are only addressed to the extent that it influences Silulumanzi's approval process and impacts on the installation of water supply and sewerage infrastructure.

Users of this document are encouraged to comment on its contents and to propose amendments. Proposals must be submitted in writing to the Technical Services Manager of Silulumanzi. All proposals will be considered for possible inclusion in subsequent editions.

Ownership of the document vests with Silulumanzi. No part of the document may be reproduced in any form without the written approval of Silulumanzi. Silulumanzi will not evaluate the applicability of any intended use. Silulumanzi will not accept any liability whatsoever associated with the reproduction of any part of this document, whether it is done with or without approval. Any request to reproduce this document, as a whole or in part, must be submitted in writing to the Technical Services Manager and the request will only be considered if the applicant indemnifies Silulumanzi in writing against any liability arising from such reproduction. The indemnity must accompany the request.

CHAPTER 2

ROLE PLAYERS WITHIN MBOMBELA LOCAL MUNICIPAL AREA

2.1 INTRODUCTION

Silulumanzi is the provider of water and wastewater utilities within the concession area of Mbombela, servicing the greater Nelspruit area and the townships around Nsikasi and Matsulu.

The services are provided through a public/private partnership (PPP) initiative with Mbombela Local Municipality, which commenced in 1999. The 30 year concession with Mbombela Local Municipality is widely regarded as the pioneer of such a scheme in South Africa.

Chapter 3 of this document provides information on the concession area.

2.2 MBOMBELA LOCAL MUNICIPALITY

Mbombela is situated in the Ehlanzeni District of the Mpumalanga Province in South Africa. It serves as the capital of Mpumalanga Province.

The Mbombela Local Municipality came into being in December 2000 through the amalgamation of the previous local councils Nelspruit TRC, White River TRC, White River TLC, Hazyview TLC and the Greater Nelspruit Area Council.

The municipal area covers 3,451 km². According to the Mbombela Local Municipality's website (November 2014) the number of residential stands/households within the municipal area is 131,368 and in 2006 the Mbombela population was 734,482.

The municipality is responsible for roads, storm water drainage and electricity. It is also responsible for water supply and sanitation outside the concession area.

2.3 SILULUMANZI

Silulumanzi is responsible for water supply and sanitation within the concession area. It has a local portfolio of assets capable of producing and treating 90 mega litres (ML) water and 44 mega litres (ML) wastewater daily within the Mbombela Local Municipality area.

The population served by Silulumanzi has steadily increased from an estimated 156,200 in 1999 to around 420,000 at the end of 2013.

To date the company has become a valued organisation providing essential services to the businesses and community, working together with Mbombela Local Municipality and other local companies in developing the area that it serves.

Silulumanzi, on behalf of Mbombela Local Municipality, is an active participant in the National Department of Water and Sanitation's Blue Drop (drinking water systems) and Green Drop (waste

water systems) incentive based compliance systems. In 2012 Silulumanzi received Blue Drop and Green Drop awards which placed it in the top 10% of water service providers in the country.

Under the concession Silulumanzi manage, control, operate and maintain, inter alia, the following:

- Water Supply:
 - Five water treatment plants, ranging from 1.8 MI/day to 54 MI/day;
 - 33 Pump stations;
 - 1,174 Km bulk and reticulation water mains; and
 - 65 Reservoirs, ranging from 0.16 MI to 9.0 MI.

- Waste Water:
 - Four waste water treatment plants, ranging from 0.15 MI/day to 26 MI/day;
 - 42 Pump stations; and
 - 708 km of outfall and internal sewers.

Silulumanzi also supply 28 MI/day potable water in bulk to external consumers.

As an environmental, quality and safety conscious services provider Silulumanzi places emphasis on customer satisfaction through provision of quality services and avoidance of negative environmental impact. Silulumanzi is an organisation with ISO 9001:2000, ISO 14001:2004 and OHSAS 18001 certifications, one of the first water and sanitation companies to obtain all three standards.

Silulumanzi is a subsidiary of Silulumanzi Utilities which is a wholly owned subsidiary of Silulumanzi Industries, a leading energy, water, marine and urban development group listed on the main board of the Singapore Exchange. Silulumanzi Utilities is a trusted global water service provider with water and wastewater facilities in 16 countries across five continents. From specialised industrial wastewater treatment to water reclamation, desalination and the supply of potable and industrial water, Silulumanzi Utilities offers a comprehensive suite of effective solutions to meet even the most challenging water needs of a wide range of industries and communities. A provider of innovative solutions for clean and sustainable water, Silulumanzi Utilities manages facilities capable of producing and treating over eight million cubic metres of water and wastewater daily and serves more than five million people worldwide. Silulumanzi Utilities was named the 2011 Global Water Intelligence Global Awards' "Water Company of the Year". More information on Silulumanzi Industries can be found on their website www.Silulumanzi.com.

CHAPTER 3 CONCESSION AREA

3.1 DESCRIPTION OF THE CONCESSION AREA

Silulumanzi's concession area covers the city of Nelspruit and the main Nsikazi townships of Kanyamazane, Tekwane, Msogwaba and Matsulu. The service coverage also extends to other peri-urban areas around these townships, such as Zwelisha, Mpakeni and Luphisi. The area is under the jurisdiction of Mbombela Local Municipality.

Figure 1 below shows the Nelspruit Transitional Local Council boundaries during 1999, which were also the Concession Area boundaries at that stage. Figure 2 shows the present day Concession Area boundaries in relation to Mbombela Local Municipality.

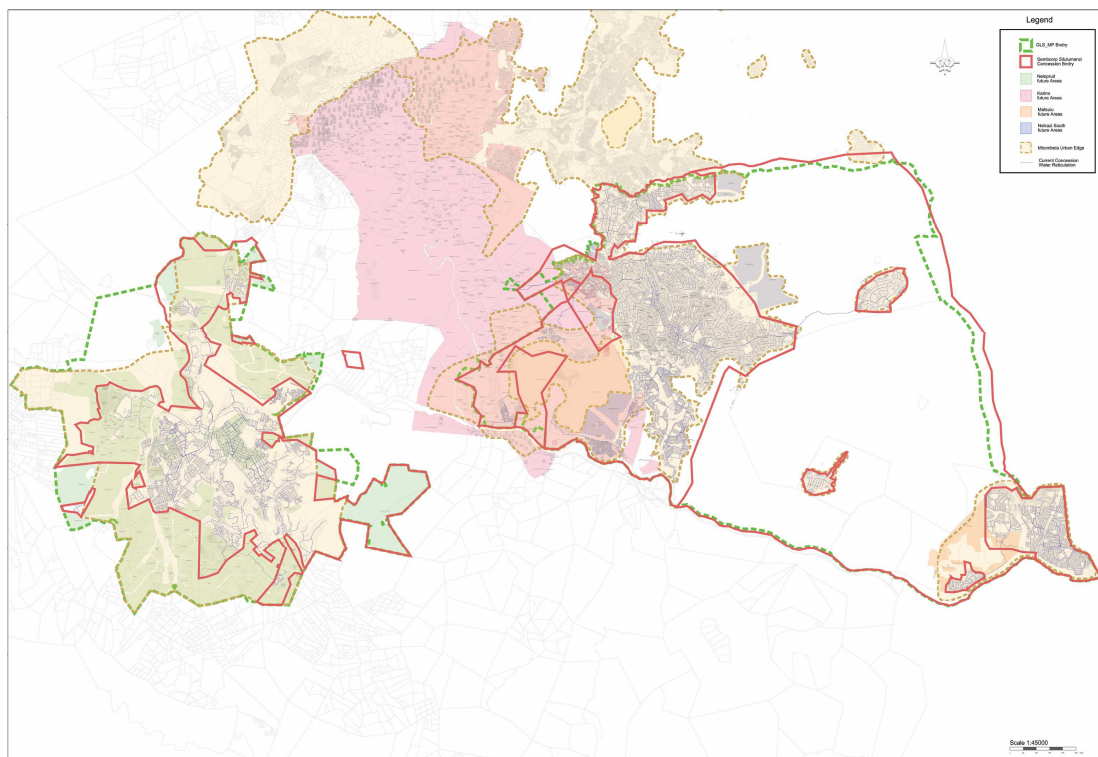


Figure 1: 1999 Concession Area

3.2 DEVELOPMENTS LOCATED OUTSIDE THE CONCESSION AREA

Mbombela Local Municipality delivers water supply and sanitation services to all areas within its area of jurisdiction that are outside the concession area. The Water and Sanitation division of the Department of Technical Services of the Municipality should be approached should a developer wish to undertake a development that is located outside the concession area.

In some cases where the development will be located outside but in close proximity to the boundary of the concession area, Silulumanzi may be in a position to effectively deliver services to the development. In such cases the concession area may be expanded to include the development and the process that will be followed is described in Section 3.3 below.

3.3 EXTENSION OF THE CONCESSION AREA

In terms of Clause 9.2 of the Nelspruit Concession Agreement, 21 April 1999, the contract between Mbombela Local Municipality and Silulumanzi makes provision for the extension of the Concession area which may be required from time to time. In brief the applicable clauses in the Concession Agreement can be explained as follows:

- Clear township boundaries exist within the Mbombela Local Municipality within which Silulumanzi is responsible for operation and maintenance of the water and sewerage infrastructure and this is known as the “Concession Boundary”;
- New developments or extensions to an existing Township may occur in terms of the Spatial Development Framework (SDF) of Council within the confines, or adjacent to, the Concession Area whereby Council will be required to provide essential water and sanitation services;
- An extension of the concession area to include such areas may be regarded as a natural progression, in terms of the Concession Agreement, of the services rendered by the Concessionaire.
- The Council and Silulumanzi should then discuss and agree the extension of pipelines and services in writing and indicate what the impact may be on the existing services.

It will be necessary to prepare a report for consideration by the municipality’s Council. The report must clearly show the benefits that will be realised by including the new development area into the Concession Area. The report will be circulated internally by the Municipality to all relevant departments for their comments.

Semcorp does not control the process and the final decision on the extension of the concession area lies with the Council of the Mbombela Local Municipality. The process can be lengthy and Silulumanzi cannot guarantee that the request to extend the concession area will be successful.

CHAPTER 4

DEVELOPMENT GUIDELINES AND CONSULTANT'S DUTIES

4.1 INTRODUCTION

This chapter provides guidelines to developers and prescribes their consultants' duties from Silulumanzi's perspective. Mbombela Local Municipality will convey its own requirements to the developer and his consultant. In the unlikely event of conflict between requirements set by Silulumanzi and the municipality, the matter will be clarified collectively by the two organisations. In any event Silulumanzi will follow Mbombela Local Municipality rules.

4.2 TOWNSHIP DEVELOPMENT PROCESS

The purpose with this section is to make developers aware of the procedures to be followed in Mbombela during the township development process. It is not the intention to provide a detailed manual on how to undertake township development. The objective is rather to provide guidance to experienced developers by making available information on elements of the process unique to Mbombela.

Township establishment takes place in terms of the Town-Planning and Townships Ordinance No 15 of 1986. Applications must be lodged with the Sub-Directorate Urban and Rural Management of the Department of Planning and Economic Development of the Mbombela Local Municipality. All applications will be linked to the Township Establishment Approval System (TEAS) and Building Application System (BAS).

The proposed land use for a new development must be in alignment with the desired land use prescribed by the Spatial Development Framework of the Municipality for the area within which the development will be located.

The Spatial Development Framework currently in use in Mbombela is the 2011-2030 Mbombela Local Municipality Spatial Development Framework (SDF), prepared for the municipality by Umsebe Development Planners.

The Spatial Development Framework can be downloaded electronically from the Municipality's website www.mbombela.gov.za. On the Home page of the website follow the popular link to "IDP, SDBIP, PA & Budgets" and then open the link "SDF Documents".

4.3 SERVICES AGREEMENTS

For each project undertaken by a developer a Services Agreement must be entered into. This will be a three-party agreement between Mbombela Local Municipality, Silulumanzi and the Developer.

The Services Agreement will set out the arrangements regarding the provision of engineering services for the development and it will stipulate the responsibilities of each party as agreed.

The Department of Technical Services: Civil Engineering Unit of the Municipality will coordinate the process. The Municipality will compile the agreement and will distribute it to Silulumanzi, the Developer and all other relevant Municipal Departments for comments.

4.4 BULK SERVICES CONTRIBUTIONS

Bulk water supply and sewerage services contributions payable by the Developer will be determined by Silulumanzi. The Municipality will calculate the bulk roads and electricity services contributions. The amounts payable and due dates for payment will be captured in the Services Agreement.

The Municipality/Silulumanzi may require the Developer to install specific infrastructure in lieu of payment of bulk services contributions.

In terms of Council Resolution A(18) of 28 November 2011 the conversion of the water rights of the property to primary rights, equal to the water demand of the township, and the transfer thereof to the Municipality or, in the absence thereof, payment of a levy equal to the market value of the water demand of the development will be required.

4.5 APPOINTMENT OF CIVIL ENGINEERING CONSULTANTS FOR PRIVATE DEVELOPMENTS

Developers will be required to appoint suitably qualified and registered civil engineers that must provide the necessary civil engineering input and information required for the township establishment process, compile services reports, execute design work and provide construction supervision of the services for all new developments. Only consultants registered in terms of the Engineering Profession Act (Act No 46 of 2000) will be accepted. Proof of sufficient professional indemnity insurance must be provided.

4.6 RESPONSIBILITIES OF CIVIL ENGINEERING CONSULTANTS

From Silulumanzi's perspective, consultants appointed by developers must be responsible, inter alia, for the following:

- To determine the availability of sufficient bulk infrastructure to serve the development, and to scope any additional bulk services that may be required. The consultant must approach the Technical Services Manager of Silulumanzi in this regard. Silulumanzi will commission their master planner to model the existing infrastructure to determine whether it will accommodate the new development, and if required, to scope upgrades and alterations necessary. All costs in this regard shall be borne by the developer. The responsibility for the installation of bulk services and the associated payment arrangements will be encapsulated in the Services Agreement.
- Design of internal infrastructure, and where applicable bulk services, in accordance with the requirements stipulated in the services agreement. Refer to Chapter 5 for design guidelines. All service providers in the area must be contacted beforehand to ascertain the presence and locality of existing services in the area of the proposed works, and design work must be done giving due consideration to the presence of these existing services.
- Arrangements for the registration of the necessary servitudes and the acquirement of way-leaves. Silulumanzi must be provided with copies of the relevant documentation. All the necessary way-leaves shall be in place before construction commences.
- Compilation of a services report in accordance with the requirements set out in Section 4.7.

- Submission of the services report to the Technical Services Manager of Silulumanzi and obtaining approval.
- Compilation of specifications for the installation of services. The specifications must be comprehensive, clear, unambiguous and be based on the applicable SANS 1200/SABS 1200 standard specifications.
- Preparation of drawings in accordance with Section 4.8. The presence and locality of known services in the area must be indicated on the drawings.
- Submission of water supply and sewerage related drawings to the Technical Services Manager of Silulumanzi and obtaining approval.
- Notify the Technical Services Manager of Silulumanzi seven days in advance of the date that construction of the services will commence. Construction may not commence prior to approval of drawings.
- The consultant must act as a liaison between the developer, the contractor, Silulumanzi and Mbombela Local Municipality at all times. The contractor will not have direct access to Silulumanzi.
- Ensure that the procedures stipulated in Section 4.10 are followed with regard to road and railway crossings.
- Ensure that the procedures stipulated in Section 4.11 and Semborp's standard Procedures QAP 7.3.17 (Connection to Municipal Supply) and QAP 7.3.24 (Planned Water Disruption) are followed regarding connections to existing water networks.
- Supervise the construction of the works. This includes:
 - Arranging with Silulumanzi personnel for inspections as well as giving at least seven days prior notice of site meetings;
 - Notifying in writing and in advance Silulumanzi, the roads and storm water and the electricity divisions of Mbombela Local Municipality, as well as telecommunications operators (where applicable), that work will commence in a certain area. At least seven days' notice will be required;
 - Prior to excavation for any service commences, ensuring that all known existing services are traced and exposed by hand excavation by the contractor;
 - Ensuring that residents and the general public who may be affected by the installation of services be informed beforehand in an appropriate way, as agreed to by Silulumanzi;
 - When work is performed on privately owned land, ensuring that the requirements stipulated in Section 4.12 are met;
 - Ensuring that engineers and other technical staff from Silulumanzi receive free access to the site at all reasonable times during the construction period for inspection of the works. Silulumanzi will, nevertheless, assign one representative who will act as the only official contact for communication regarding quality control.
- Making amendments to drawings and preparation of any further drawings that may become necessary during construction and obtaining approval thereof.
- Dealing with all complaints received from the public and other external parties.
- In the event that infrastructure is constructed in lieu of bulk services contributions, the consultant will be expected to supply Silulumanzi with copies of the applicable sections of the progress payment certificates.
- Ensuring compliance with and monitoring of all aspects of the requirements of the Occupational Health and Safety Act, 1993 (Act 85 of 1993) and its associated regulations, including all

amendments to the applicable regulations. In particular ensuring compliance with the Construction Regulations 2014, as amended.

- Reporting to Silulumanzi any damage to existing services immediately. In the case of a known service, the costs of the damage, including water losses, will be recovered from the developer.
- Arrange for pressure tests on water pipes and a CCTV camera inspection and air testing of sewers after completion of construction, but before the hand-over inspection. The costs of these inspections will be for the contractor's account. These tests must be done after all excavations and backfilling of all trenches on-site (especially those for electrical services) have been completed. CCTV camera inspections must be carried out in accordance with the requirements stipulated in Section 4.13.
- Ensure disinfection of infrastructure in accordance with Silulumanzi's standard Procedures QAP 7.3.17 (Connection to Municipal Supply) and QAP 7.3.21 (Commissioning of Infrastructure).
- Give Silulumanzi personnel at least 7 days' notice of the completion inspection.
- Issue of the completion certificate in accordance with the requirements of the relevant conditions of contract.
- Upon issue of the completion certificate, submit the following to the Technical Services Manager of Silulumanzi:
 - A copy of the signed completion certificate;
 - Quality control test results;
 - Photos of construction;
 - As-built drawings in electronic and hard copy format as prescribed in Section 4.8;
 - The final certified bill of quantities, for asset register purposes; and
 - Operation and maintenance manuals (where applicable).

The new services will only be taken over by Silulumanzi after:

- Proclamation of the development/township;
- All inspections have been carried out to the satisfaction of the Technical Services Manager of Silulumanzi;
- All items to be submitted to Silulumanzi following the issue of the completion certificate, as listed above, have been delivered;
- All payments related to temporary and permanent connections have been received by Silulumanzi; and
- The required retention monies/guarantees have been lodged.
- Be available during the retention period to attend to problems experienced with the infrastructure. Silulumanzi will report all problems, faults and breakages that are due to latent defects to the consultant. The consultant must inspect and make the necessary arrangements to reinstate the service within a reasonable period. Should the consultant fail to do so, Silulumanzi will, at the cost of the developer, do whatever is necessary to effect the reinstatement. The cost will be calculated in advance by Silulumanzi, and the developer will be required to pay this amount in cash and in advance. Should the developer fail to do so, the guarantee lodged with the municipality will be called up immediately and all work required will be funded from this guarantee. Should the cost in respect of any defect found during the retention period exceed the amount of the guarantee, the developer will be held liable for all costs incurred by Silulumanzi owing to the defects and in order to repair the system.
- Give the Technical Services Manager of Silulumanzi at least 14 days' notice of the final inspection at the end of the maintenance period.

- Issue the final certificate in accordance with the requirements of the relevant conditions of contract.

4.7 DESIGN REPORTS

The services report must be submitted to the Technical Services Manager of Silulumanzi. The report must be in English, and must include:

- The name and contact details of the developer;
- The name and contact details of the consultant;
- A copy of the letter of appointment of the consultant;
- Layout drawings of the development;
- A site description;
- Information on sub-soil conditions;
- Information on the availability of bulk services, and bulk services required;
- Proposed design parameters;
- Proposed services layouts;
- Proposed materials for pipelines, fittings and specials, manholes and house connections.
- Proposed norms and construction standards; and
- An indication of the estimated costs of external services required (where applicable) and internal services.

4.8 DRAWINGS

All proposed services drawings shall be submitted to the Technical Services Manager of Silulumanzi for approval. Two A1 and one A3 copies are required. The drawings are distributed internally within Silulumanzi for comments. Fourteen calendar days must be allowed for the approval process.

Water network layouts must contain the type of information detailed on Standard Drawing STD_DWG-W01. The standard symbols as shown in the legend of this standard drawing must be used.

Water main pipeline and sewer longitudinal section drawings must contain the type of information detailed on Standard Drawings STD_DWG-W03 and STD_DWG-S01 respectively. A reduced layout, showing the locality of the section of pipeline in the longitudinal section must be shown on the drawing.

Drawings must meet the following standards:

- Layout drawings must be drawn to an acceptable scale, such as 1:500, 1:1,000, 1:2,000 or 1:2,500. Scales such as 1:1,500 and 1:3,000 are unacceptable. Scales smaller than 1:2,500 may not be used. A development that is so large that it does not fit in on one sheet when drawn to one of the acceptable scales must be shown on more than one layout drawing and the set of layout drawings must be accompanied by a key plan.

- Layout drawings must indicate at least the following:
 - A locality plan;
 - At least three grid lines in both directions, for orientation;
 - A north arrow;
 - Sufficient cadastral information, as well as adjacent towns and/or farms;
 - Contours, and in the case of water supply layouts also peak flow design pressure contours and static water pressure contours;
 - The routes of pipelines;
 - The pipe description and diameter of each pipe;
 - The distance of pipelines and other services from boundaries;
 - The connection points to existing infrastructure;
 - In the case of water supply, the positions of all erf connections, bulk water meters, valves and fire hydrants;
 - In the case of sewerage, the positions of all erf connections and manholes;
 - Erf numbers;
 - Street names; and
 - Standard notes.
- A separate services layout drawing must be prepared, showing all existing and new services such as roads, storm water drainage infrastructure, water pipelines, sewers and electrical and telephone cables and poles. It must also show physical obstructions such as buildings, structures, swimming pools, large trees, walls and other fences, etc. The scale of this drawing must be identical to that of the water supply layout or sewer layout, as the case may be.
- Longitudinal sections for sewers and water main pipelines must be drawn to an acceptable scale, preferably horizontal 1:1,000 and vertical 1:100.
- Longitudinal sections must indicate the following:
 - Natural ground line;
 - The design ground line, after construction of terraces, roads and other features that will alter the natural ground line;
 - In the case of gravity pipelines, the pipeline falling from left to right;
 - In the case of pump lines, the pipeline in the direction of flow from left to right;
 - Manhole/valve positions;
 - Crossings with existing and future roads;
 - All known existing and future services crossing the pipeline. The locality and depth must be shown (if the depth is known);
 - The table below the longitudinal section of a water main must indicate the following:
 - Depth to invert;
 - Invert level;
 - Ground level;
 - Chainage;
 - Distance;
 - Pipe grade (slope); and
 - Pipe details (diameter, material, coating & lining) and bedding details.
 - The table below the longitudinal section of a sewer must indicate the following:
 - Manhole number;

- Chainage;
 - Ground level;
 - Invert level;
 - Depth;
 - Grades (1:x);
 - Length (m)
 - Pipe details (diameter, material and class) and bedding;
 - Design flow;
 - Capacity; and
 - Design velocity.
- Detail drawings must be clear and show sufficient information to enable contractors to construct the works from these drawings.
 - All text must be clear and easily legible, even after reproduction of drawings; and
 - Whilst Silulumanzi is not prescriptive regarding the appearance and contents of title blocks, the following minimum requirements are stipulated:
 - Project description;
 - Drawing number;
 - Revision number;
 - Date of the drawing;
 - Scale;
 - Space for certification by the consultant prior to submission for approval;
 - Professional registration number of the consultant;
 - Space to record revisions; and
 - Space for as-built certification by the consultant.

Upon approval the consultant shall re-submit the approved “issued for construction” drawings to Silulumanzi in the following format:

- Electronic:
 - One layout in .dwg, saved in model space (no X-ref's)
 - Projection: Transverse Mercator (LO 31), using the WGS 84 system; and
 - .pdf's of all layout drawings.
- Hard copies:
 - Two full sets of drawings in A1 or A0 size. Silulumanzi will sign one set and return it to the consultant; and
 - One set of layouts and longitudinal sections in A3 size.

Upon completion of construction the consultant must submit to Silulumanzi, in respect of water and sanitation services:

- A full set of surveyed as-built drawings in electronic (pdf) format. The infrastructure must be surveyed by a registered land surveyor in relation to the approved General Plan of the development. Water and sewer layouts must be submitted in dwg format as well; and
- Two full sets of hard copy as-built drawings in A1 or A0 format.
-

4.9 STANDARD SILULUMANZI PROCEDURES

The standard Silulumanzi procedures listed below in Table 1 are applicable and must be adhered to. These procedures can be obtained on request from Silulumanzi's Engineering Department. The procedures may not be reproduced in any form or by any means without the prior written permission of Silulumanzi's Managing Director.

Table 1: Standard Silulumanzi Procedures

PROCEDURE NO.	SUBJECT
QAP 7.3.1	Building Plan Approval
QAP 7.3.2	Approval of New Developments
QAP 7.3.17	Connection to Municipal Supply
QAP 7.3.18	Reinstatement of Road Surfaces and Sidewalks
QAP 7.3.21	Commissioning of Infrastructure
QAP 7.3.22	Infrastructure Planning and Development
QAP 7.3.24	Planned Water Disruption

4.10 ROAD AND RAILWAY CROSSINGS

The following procedures must be followed with regard to road and railway crossings:

- All road surfaces under the control of Mbombela Local Municipality must be repaired in accordance with the specifications of the municipality at the cost of the developer;
- In respect of roads not under the control of Mbombela Local Municipality, the appropriate authority must be contacted and the crossing must be made in accordance with that authority's requirements and approval; and
- Railway reserve crossings must be approved by Transnet or the relevant authority.

4.11 CONNECTIONS TO EXISTING WATER NETWORKS

The following procedures must be followed regarding connections to existing water networks:

- During the construction period:
 - The contractor will need water for construction and testing purposes. Should a water supply network be available in the vicinity of the development to which the contractor wishes to connect, he may apply to Silulumanzi for a temporary connection. Silulumanzi may, at the discretion of his Technical Services Manager, provide the connection at a specific position and at his standard rates. The contractor will be responsible for all costs in this regard.
 - On completion of construction, the contractor must inform Silulumanzi in writing that the temporary connection is no longer required. The connection will then be removed, the account will be finalised and the deposit will be refunded.

- Should no temporary supply from an existing water network be available, the provision of water during the construction period will remain the responsibility of the contractor, and he will be liable for all costs associated with providing the water.
- After completion of the internal water network:
 - After the new water network has been completed, tested and accepted by Silulumanzi it must be connected to the existing network in accordance with the approved design. This work will be done at the cost of the developer, who must request Silulumanzi to execute the work. Silulumanzi may also elect, at its sole discretion, to allow the contractor to make the connection under its supervision and in accordance with its specifications. Silulumanzi will not allow the connection to be made until such time as all payments related to the temporary and permanent connections have been received.

Semborp's standard Procedures QAP 7.3.17 (Connection to Municipal Supply) and QAP 7.3.24 (Planned Water Disruption) must be adhered to.

4.12 WORK ON PRIVATELY OWNED LAND

The following procedures must be followed when work is performed on privately owned land:

- Before work commences the contractor, together with the engineer's representative, must examine the property and come to an agreement with the owner regarding work procedures to be followed and the repairing of possible damage to structures, fences, services, etc.;
- The contractor must strictly control his or her employees at all times, and unnecessary damage to private property must be avoided. The specifications for the work must be strictly complied with;
- The contractor and the developer must indemnify Silulumanzi in writing against all liability for work done on private property.

4.13 CCTV CAMERA INSPECTIONS

A CCTV camera inspection must be carried out on all sewers after completion of construction, but before the completion inspection. The inspection must comply with the following:

- Only CCTV contractors approved by Silulumanzi may be used for these inspections. Silulumanzi can perform the CCTV inspection at the expense of the developer, should his contractor be unable to carry out the inspection.
- The CCTV contractor must produce a status quo report, containing inter alia the CCTV inspection reports. The status quo report must make recommendations regarding pipes which should receive remedial action, complete with maps showing the locality of identified problems.
- The CCTV status quo report and CCTV inspection reports must be submitted, in hard copy and electronic format, to the contractor, the consultant and Silulumanzi.
- Consultants must analyse the CCTV inspection results, with due cognisance of what every reported incident actually represents, and report and advise the contractor appropriately as to

what remedial action is required to ensure compliance with the standards and specifications. This recommendation must be based on adherence to the applicable construction specifications.

4.14 REQUIREMENTS OF THE OCCUPATIONAL HEALTH AND SAFETY ACT

The developer's appointed contractor must adhere to all requirements of the Occupational Health and Safety Act, 1993, and all applicable regulations, including all amendments to the act and the regulations.

The successful contractor must appoint a registered safety officer for each contract.

Safety matters must be a standing item for discussion at all site meetings.

The engineer's representative shall immediately report all incidents and accidents to the consultant and Silulumanzi's safety representative.

In the event of a death in any accident, the engineer's representative must immediately report the accident telephonically to the following persons:

- The Compensation Commissioner;
- The South African Police Service office in the area;
- The consultant;
- The Technical Services Manager of Silulumanzi; and
- Silulumanzi's safety representative.

A written Incident Report must be submitted to the consultant, the Technical Services Manager of Silulumanzi and Silulumanzi's safety representative. The report must contain:

- Full particulars of the accident;
- Confirmation of the date and time of the telephone calls to the divisional inspector; and
- The names of the persons to whom a direct report was made.

4.15 SECTION 82 CERTIFICATES

Section 82 Certificates, to the effect that building work may commence, are issued by Mbombela Local Municipality. The municipality will only do so if, amongst others, Silulumanzi supports the issue of the certificate.

Silulumanzi will only support the issue of a Section 82 Certificate when:

- A services agreement has been concluded;
- The General Plan of the development has been approved by the Surveyor-General;
- Final conditions of establishment have been approved;
- The installation of water supply and sewerage services has been completed;
- The township has been proclaimed;
- All contributions stipulated in the services agreement have been paid;

- The necessary guarantees stipulated in the services agreement have been provided; and
- All items to be submitted to Silulumanzi upon the issue of the completion certificate, as stipulated in Section 4.6, have been submitted.

4.16 REQUIREMENTS FOR CONSULTANTS APPOINTED BY SILULUMANZI

This section is applicable to consultants appointed by Silulumanzi for infrastructure projects. The consulting services required by Silulumanzi will be stipulated in the letter of appointment. However, generally the following requirements must be met over and above those stipulated elsewhere in this Guideline document:

- A project programme must be compiled and submitted to Silulumanzi for approval.
- The consultant must scope survey and geotechnical work required. The proposed scope of work for these two disciplines must be submitted to Silulumanzi for approval. Procurement procedures of professionals to do this work must be agreed with Silulumanzi. The consultant must manage the appointed professionals.
- The consultant must discuss the outcome of preliminary design work with Silulumanzi before carrying out detail design work. If required, a preliminary design report must be submitted.
- Tender documentation and drawings must be submitted to Silulumanzi for approval prior to making it available to tenderers. Tender documents must comply with the following:
 - Procurement documents shall be drawn up in accordance with the following documents:
 - SANS 10396 (2003): Implementing preferential construction procurement policies using targeted procurement procedures;
 - SANS 10403 (2003): Formatting and compilation of construction procurement documents;
 - SANS 294 (2004): Construction procurement processes, procedures and methods; and
 - Construction Industry Development Board's (CIDB) May 2010 edition of the Standard for Uniformity in Construction Procurement, which edition incorporates the amendments made in Board Notice 86 of 2010 in Government Gazette No 33239 of 28 May 2010.
 - All tender documents must be drawn up in English.
 - If so required and agreed to by Silulumanzi, the tender document format may be adapted to make special provision for emerging contractors, and less formal tender procedures may apply.
 - Documents must be based on the SAICE 2nd Edition 2010 General Conditions of Contract for Construction Works. Appropriate special conditions of contract may be stipulated.
 - The applicable SANS 1200/SABS 1200 standard specifications must be prescribed, sufficiently augmented with project specific specifications.

The consultant must prepare sufficient copies of the tender documents and tender drawings for tender purposes.

- The tender advertisement must be drawn up in English and must stipulate the non-refundable tender deposit amount as determined by Silulumanzi.

- Conduct a site inspection for prospective tenderers, compile and distribute minutes of the site inspection meeting, respond to requests for information from prospective tenderers and issue addendums if necessary.
- After the tenders have been received by the consultant, a tender report must be prepared and submitted to Silulumanzi. The report must be submitted in electronic as well as hard copy format. A minimum of five hard copies will be required. The report must address, amongst others:
 - A brief description of the works;
 - Information regarding salient dates and time lines, such as the tender closing date, period of validity of tenders, date of expiry of tenders and contractual time for completion of the works;
 - Tenders submitted, showing the original tender amounts and corrected tender amounts (if applicable);
 - Compliance with tender conditions and disqualification of tenders;
 - Qualifications and alternatives;
 - An evaluation of at least the three lowest tenderers, including an analysis of each tenderer's capabilities, expertise and experience, their financial strength and ability to service the contract's cash flow requirements, and where applicable ownership, CIDB grading and historically disadvantaged individual (HDI) claims. In order to verify HDI claims, certified copies of shareholding must be provided by tenderers. HDI claims must also comply with the requirements of the Preferential Procurement Policy Framework Act, 2000 (Act 5 of 2000); and
 - A recommendation. The total cost of the project resulting from an appointment in accordance with the recommendation, including fees, must be stated.

The consultant will be expected to present his report to Silulumanzi's tender committee.

- After appointment of a contractor, the consultant must:
 - Inform the appointed contractor in writing of his appointment, and make the necessary arrangements for site hand over; and
 - Notify the other tenderers that they were unsuccessful.
- The consultant must prepare sufficient sets of construction drawings. In addition to those required by the contractor, Silulumanzi will require two A1 sets and one A3 set of drawings.
- The consultant must ensure that the work on site is carried out strictly according to the drawings and specifications, and on completion, must certify that this has indeed been done.
- Should it be a requirement that the consultant provide full-time supervising staff, the consultant must propose an engineer's representative and submit a curriculum vitae and an associated estimate of supervision costs to the Technical Services Manager of Silulumanzi for approval.
- Should it be necessary to make changes to the design during the construction of the Works owing to existing services clashing with any new pipeline, the consultant must make these changes and submit the amended drawings to Silulumanzi for approval.
- Amendments which have no financial impact must be submitted to Silulumanzi's project manager for approval.
- Prior approval must be obtained from the Technical Services Manager of Silulumanzi for all amendments that will have cost implications for Silulumanzi, as well as for all instructions to the contractor that will cause substantial amendments to, omissions from or additions to the contract.

- Silulumanzi may also appoint the consultant as its agent in terms of the Construction Regulations 2014, as promulgated on 7 February 2014 under Section 43 of the Occupational Health and Safety Act, 1993. In such a case the consultant must:
 - If requested to do so, appoint independent environmental site officers to ensure that all aspects of the environmental management plan (EMP) and the National Environmental Management Act, 1998 (Act 107 of 1998), that are relevant to the construction work are complied with and adhered to;
 - Appoint the community liaison officer (if required) from the community and guide him or her;
 - Ensure that the principal contractor and all his sub-contractors, appointed to execute work related to the project, comply with and adhere to the Occupational Health and Safety Act, 1993, and its relevant associated regulations, including all amendments to the applicable regulations, as well as ensuring compliance with the Construction Regulations 2014;
 - Ensure that the principal contractor and all his sub-contractors, appointed for the execution of work related to the project, each appoint a full-time safety officer, if and when required, to ensure that all aspects of the Occupational Health and Safety Act, 1993 and the regulations relevant to the construction work are complied with and adhered to;
 - Prior to the commencement of any work, ensure that the Department of Labour approved safety file is counter signed by Silulumanzi; and
 - Ensure that a risk assessment and method statement is undertaken and that it is submitted for approval to the Head of Health and Safety of Silulumanzi.
- The payment of final professional fees will only be made when as-built drawings have been handed over and a completion certificate has been issued on completion of the work.

CHAPTER 5

DESIGN GUIDELINES

5.1 BASELINE GUIDELINE

Silulumanzi decided to adopt the Guidelines for Human Settlement Planning and Design (the Red Book) as its baseline guideline. The Council for Scientific and Industrial Research (CSIR) was responsible, under the patronage of the National Department of Housing, for coordinating the development of the Red Book. The various chapters of the Red Book are interrelated and the guidelines apply as a whole, but Chapter 9 (Water Supply) and Chapter 10 (Sanitation) are of specific relevance.

The Red Book can be downloaded free of charge from the CSIR's website, or it can be obtained at a cost (presently R150) on CD from the CSIR. The website address is www.csir.co.za.

This document does not attempt to re-write the Red Book to any extent. It only includes augmentations and amendments to Chapters 9 and 10 of the Red Book. In some instances, though, it will emphasize matters that Silulumanzi will enforce.

The opinion held in Chapter 1 of the Red Book that the concept of "guidelines" should continue to prevail is also supported by Silulumanzi.

However, augmentations and amendments to the Red Book contained in this document are Silulumanzi's preferences and requirements to ensure that the objectives described in Section 1.2 of Chapter 1 are attained. These required amendments and augmentations, as well as those matters emphasized by Silulumanzi, must be incorporated into designs to obtain Silulumanzi's approval of design reports and drawings.

It is acknowledged that a project may have unique elements and properly motivated deviations will be considered.

5.2 WATER SERVICES

5.2.1 General

In the case where the consultant plans to connect to an existing water supply network, or where Silulumanzi's master planning makes provision for such a connection, the consultant must:

- Check with Silulumanzi's master planners whether the master planning allows for the required flow at the proposed connection point;
- Obtain written approval for the proposed connection point from Silulumanzi's Technical Services Manager; and
- Obtain information on the residual and static pressures in the existing network at the proposed connection point from Silulumanzi's Technical Services Manager.

The consultant must, should Silulumanzi require him to do so, provide in his design for the connection of future networks at a point prescribed by Silulumanzi. Any additional cost caused by the provision for future networks will be taken into consideration when the bulk services contribution for the development is determined.

5.2.2 Amendments and Augmentations to Red Book

Table 2 below contains the amendments and augmentations to Chapter 9 (Water Supply) of the Red Book. The table must be read in conjunction with the Red Book and is not a stand alone table.

Table 2: Amendments and Augmentations to Chapter 9

ITEM	APPLICABLE RED BOOK CHAPTER 9 REFERENCE	PURPOSE	REQUIRED NORMS AND STANDARDS
Water supply options	Water Supply Options: Pages 15 to 19	Enforcement	Metered house connections to each erf, unless specifically otherwise agreed to by Silulumanzi
Communication pipes	Tables 9.8 and 9.9 on Page 19	Amendment	Regardless whether house connections are made across roads or on the near side: <ul style="list-style-type: none"> • Serving two erven: 32 mm dia, branching to two x 25 mm dia and reducing to 20 mm dia at the erf. • Serving one erf: 25 mm dia, reducing to 20 mm dia at the erf. Also refer to Standard Drawing STD_DWG-W11.
Water demand	Pages 20 to 22	Amendment	The design annual average daily demand (AADD) that must be used for all developments are shown in Table 3 below. No differentiation must be made between water demand for developing and developed areas.
Peak factors	Pages 23 to 24	Enforcement	Peak factors must be determined in accordance with Figure 9.11 on Page 24, regardless whether it is determined for a developed area or for a low cost housing development.
Pipeline sizes	Pages 25 to 26: Pipeline Design Pages 29 to 30: Distribution Net-works: General Requirements for Distribution Network Design	Augmentation	Only the following pipeline sizes will be accepted: 75 mm, 110 mm, 160 mm, 200 mm and 250 mm mm diameter. All pipe sizes larger than 250 mm are regarded as a special application which must be discussed with Silulumanzi.
Minimum cover	Pipeline Design: Basic Requirements: 11th bullet (Page 25) and General Requirements for Distribution Network Design (Page 29)	Amendment	Minimum cover below final ground level: <ul style="list-style-type: none"> • Outside road reserves: 0.6 metre • Inside road reserves: 0.8 metre • Road crossings: 1.0 metre
Pipes installed above ground	Page 26	Enforcement	No reticulation pipes may be installed above ground without specific approval by Silulumanzi.
Isolating valves	Page 26	Augmentation	Must be: <ul style="list-style-type: none"> • Resilient seal, non-rising, cap top • SABS approved • Class 16 • Clockwise closing • Placed opposite splay corners at street intersections as shown on Drawing STD_DWG-W02 • AVK or VAG or similar approved Also refer to Standard Drawing STD_DWG-W06 for isolating valve details.
Air valves	Page 26	Augmentation	<ul style="list-style-type: none"> • Must be SABS approved. • Must be VAG or Vent-o-Mat or similar approved.

ITEM	APPLICABLE RED BOOK CHAPTER 9 REFERENCE	PURPOSE	REQUIRED NORMS AND STANDARDS
Air valves (continued)	Page 26	Augmentation	<ul style="list-style-type: none"> Refer to Standard Drawing STD_DWG-W10 for air valve chamber details.
Scour valves	Page 27	Augmentation	For a typical scour valve assembly refer to Standard Drawing STD_DWG-W06.
Pressure reducing valves	Page 27: Break-pressure devices	Augmentation	<ul style="list-style-type: none"> All pressure reducing valves as well as bulk meter/pressure reducing valve combinations must be installed with a strainer upstream and an air valve downstream. Pressure reducing valves must be Bermad or similar approved. For a typical pressure reducing valve installation refer to Standard Drawing STD_DWG-W07 and for a typical bulk meter/pressure reducing valve combination installation refer to Standard Drawing STD_DWG-W08. Standard Drawing STD_DWG-W09 shows a typical bulk meter manhole cover.
Marker posts	Page 27	Augmentation	<ul style="list-style-type: none"> To be installed at all horizontal bends, on both sides of road crossings and at 50 metre intervals through open terrain. Not required inside road reserves within township areas. For typical details refer to Standard Drawing STD_DWG-G06.
Thrust blocks	Page 27: Anchorage and thrust blocks	Augmentation	Refer to Standard Drawing STD_DWG-W04 for dimensions and installation details.
Control valves	Page 27: Surge control	Augmentation	Must be Bermad or similar approved.
Valve boxes	Page 27: Valve chambers	Augmentation	<ul style="list-style-type: none"> The placement of valves in the roadway should be avoided as far as possible. Refer to Standard Drawing STD_DWG-W06 for valve box details.
Water storage	Pages 27 to 29 and Page 35	Enforcement Augmentation	<ul style="list-style-type: none"> A storage capacity equal to between 24 and 48 hours AADD (depending on master planning, to be determined in consultation with Silulumanzi) for domestic supply plus fire capacity that will adequately provide for the design fire flow obtained from Table 9.18 (Page 35) for a duration equal to at least that given in Table 9.19 (Page 35) is required for ground reservoirs. A concept design for a reservoir must be submitted to Silulumanzi for approval prior to detail design stage. Dividing reservoirs into two compartments for maintenance purposes must be considered, with due regard to water flow and the prevention of stagnant water. Must be fenced with secure gate control. Type of fencing to be agreed with Silulumanzi. Minimum clearance between structures and fencing to be 4 metre minimum, slope and other site specific restrictions permitting. On-site roads to be provided with 60mm thick interlocking paving. Access roads to reservoir sites may be constructed with armorflex or interlocking paving.
Pumping to storage	Page 28	Augmentation	A life cycle cost comparison between all practical options must be submitted to Silulumanzi before final selection of a pump installation is made.

ITEM	APPLICABLE RED BOOK CHAPTER 9 REFERENCE	PURPOSE	REQUIRED NORMS AND STANDARDS
Residual pressures	Table 9.17 on Page 29 & Residual Pressures on Page 30, as well as Table 9.20 on on Page 36.	Enforcement	<ul style="list-style-type: none"> • Minimum head under instantaneous peak demand: Strictly in accordance with Table 9.17 on Page 29. • Minimum head during fire-flow conditions: In accordance with Table 9.20 (Page 36) • Maximum head at zero flow: 90 metre.
Materials for pipelines	Pages 30 and 31: Materials for pipelines	Amendment Augmentation	<ul style="list-style-type: none"> • Only unplasticised polyvinyl chloride (uPVC), molecularly orientated polyvinyl chloride (oPVC) and high-density polyethylene (HDPE) pipe materials will be accepted for use in distribution networks. The minimum acceptable class will be Class 12. • Fibre-cement (asbestos cement, FC), modified polyvinyl chloride (MPVC) and low-density polyethylene (LDPE) pipe materials will not be accepted. • Prior approval must be obtained from Silulumanzi to use any other type of material. • Only high-density polyethylene (HDPE) pipe materials may be used for communication pipes. • Care shall be taken with the design of pipe specials to ensure adequate space for bolts and nuts and anchor blocks. Where space allows, bends must be of the long radius type. Sweep tees must be fitted with crouch plates to prevent cracks and ensure strength. All steel bends and specials must be flanged. Proper quality control, including x-rays must be prescribed.
Markers for valves and hydrants	Pages 32 and 36	Augmentation	Also refer to Standard Drawings STD_DWG-W02 & W05.
Water meters	Metering: Pages 32 to 33	Augmentation	<ul style="list-style-type: none"> • Water meters must be installed on both the supply and delivery sides of all reservoirs as well as the delivery side of all pump stations • Also refer to Standard Drawings STD_DWG-W08, and W13 – W16.
Provision of water for fire-fighting	Pages 33 to 37	Enforcement Amendment	Infrastructure in Low-risk – Group 2, 3 and 4 areas must be designed as if they are a Low-risk – Group 1 area, unless specifically otherwise agreed to by Silulumanzi. Except for the aforesaid the guidelines in the Red Book must be applied strictly.
Hydrants	Page 36	Amendment Augmentation	<p>Hydrants must be</p> <ul style="list-style-type: none"> • Tamper-proof Woodlands type and conform to the details shown on Standard Drawing STD_DWG-W05. • Placed in accordance with Standard Drawings STD_DWG-W02 & STD_DWG-W05. <p>The engineer must liaise beforehand with the electrical engineer to ensure that no other services such as electrical mini-sub are planned for the same position.</p>
Colour code	No reference	Augmentation	Refer to Annexure 1 of this Guideline Document

Table 3 below stipulates the design annual average daily demand (AADD) that must be used for design purposes.

Table 3: Annual Average Daily Demand

ZONING	LAND USE	AVG ERF AREA (m ²)	UNITS/HA	AADD kl/day/unit
RESIDENTIAL DEVELOPMENTS				
Res 1	Rural residential	> 1Ha	1	4.50
Res 1	1 Dwelling/2000–5000m ²	3,000	3	4.00
Res 1	1 Dwelling/1500-2000m ²	2,000	5	3.00
Res 1	1 Dwelling/1250-1500m ²	1,500	7	2.50
Res 1	1 Dwelling/1000-1250m ²	1,250	8	2.00
Res 1	1 Dwelling/800-1000m ²	1,000	10	1.80
Res 1	1 Dwelling/600-800m ²	500	20	1.50
Res 2	1 Dwelling/250-600m ²	400	25	1.20
Res 3	1 Dwelling/200-250m ²	250	40	1.00
Res 3				0.60/100m ²
Res 4	1 Dwelling/200-250m ²	250	40	0.70
Res 4				0.45/100m ²
Second dwelling		100		0.60
BUSINESS				
Bus 1 to 4	Offices, shops			0.40/100m ²
Bus 1 to 2	Dwelling units			0.60/100m ²
Guest house/Lodge/Hotel				0.32kl/room
Filling station				0.40/100m ²
Industrial: Dry	Workshops, commercial			0.40/100m ²
Industrial: Dry	Warehouses			0.20/100m ²
Industrial: Wet				1.00/100m ²
Industrial 2	Noxious industries			ad hoc
NON-DOMESTIC & OTHER DEVELOPMENTS				
Educational	Day school/crèche/nursery			0.02kl/cap
Educational	After school			0.015kl/pers
Educational	Hostel			0.15kl/pers
Educational	Boarding school grounds			0.14kl/pers
Hospital				0.30kl/bed
Clinic				0.50kl/100m ²
Clinic	Outpatients			0.005kl/bed
Clinic	In-patients			0.06kl/bed
Bus stations	For those persons outside the community			0.015kl/cap
Community halls	Restaurants/place of refreshment			0.09kl/pers
Community halls	Conference facilities			0.065kl/pers
Church				2.00kl/erf
Church	Seats			0.02kl/pers
Recreational	Pool area			1.00kl/100m ²
Undeveloped parks	Private open space/irrigation			2.0kl/ha
Developed parks	Developed parks/sportsground: <2ha			15.0kl/ha
Developed parks	Developed parks/sportsground: 2ha–10ha			12.5kl/ha
Developed parks	Developed parks/sportsground: >10ha			10.0kl/ha
Developed parks	Dev. parks/sportsground: High standard: <2ha			50.0kl/ha
Developed parks	Dev. parks/sportsground: High standard: 2ha–10ha			40.0kl/ha
Developed parks	Dev. parks/sportsground: High standard: >10ha			30.0kl/ha
Developed parks	Public open spaces			-
Government & municipal				0.40kl/100m ²

5.3 SANITATION SERVICES

5.3.1 General

In the case where the consultant plans to connect to an existing sewer network, or where Silulumanzi's master planning makes provision for such a connection, the consultant must:

- Check with Silulumanzi's master planners whether the master planning allows for receiving the design flow at the proposed connection point; and
- Obtain written approval for the proposed connection point from Silulumanzi's Technical Services Manager;

The consultant must, should Silulumanzi require him to do so, provide in his design for the connection of future sewer networks at points prescribed by Silulumanzi. Any additional cost caused by the provision for future networks will be taken into consideration when the bulk services contribution for the development is determined.

5.3.2 Amendments and Augmentations to Red Book

Table 4 below contains the amendments and augmentations to Chapter 10 (Sanitation) of the Red Book. The table must be read in conjunction with the Red Book and is not a stand-alone table.

Table 4: Amendments and Augmentations to Chapter 10

ITEM	APPLICABLE RED BOOK CHAPTER 10 REFERENCE	PURPOSE	REQUIRED NORMS AND STANDARDS
Average daily flow	Page 28: Design Criteria: Average daily flow	Amendment	The design average daily flow that must be used for all developments are shown in Table 5 below.
Peak design flows	Page 28: Peak design flows	Enforcement	Peak factor = 2.5. Percentage allowed for extraneous flow = 15% of peak flow.
Attenuation	Page 29: Attenuation	Enforcement	In accordance with Figure C.1.
Minimum pipe sizes	Page 29: Minimum size of sewers & Page 30: Minimum diameter	Amendment Enforcement	Gravity sewers: 150 mm minimum. Rising mains: 100 mm minimum.
Minimum full-bore velocity: Gravity sewers	Page 29: Limiting gradients	Enforcement	0.7 m/s.
Minimum sewer gradients	Pages 29 to 30: Limiting gradients	Enforcement	In accordance with Table C.2.
Velocities in rising mains	Page 30: Non-gravity systems	Amendment Enforcement	<ul style="list-style-type: none"> • Minimum: 0.9 m/s • Maximum: 2.5 m/s
Sewage pump station designs	Page 30: Non-gravity systems	Augmentation	<ul style="list-style-type: none"> • Sewage pump stations shall be avoided as far as possible and shall only be considered where absolutely necessary. • Approval for a pump station must be obtained from Silulumanzi prior to detail design. • There must be no access restrictions (24/7) • Proper property access must be registered when the pump station is located on private land. • Pump stations must be located at least 30m from any residential property boundary.

ITEM	APPLICABLE RED BOOK CHAPTER 10 REFERENCE	PURPOSE	REQUIRED NORMS AND STANDARDS
Sewage pump station designs (continued)	Page 30: Non-gravity systems	Augmentation	<ul style="list-style-type: none"> • Pump stations must be located above the 1:100 year flood line. • Pump stations must be accessible during all weather conditions. • Proper noise and odour control will be required. • Buoyancy calculations to ensure that pump stations will not float when it is empty will be required. • Emergency storage capacity <u>inside the pump station</u>: Equivalent to 4 hours average flow. • Pump selection: The design engineer shall submit a life cycle cost comparison between viable options with his design report. • Refer to Standard Drawings STD_DWG-S06 and S07 for typical wet-well and dry-well sewage pump station details respectively. • All pump stations should be fitted with two pumps, operated as duty/standby. • A generator must be installed when so required by Silulumanzi. • Submersible pumps shall be fitted with slide rails and duct foot connections. • All steel pipes shall be hot dipped galvanised, inside and outside, suitable for sewerage applications. • Isolating valves shall be resilient seal and powder coated VAG or similar approved. • Reflux valves shall be ball type and powder coated AVK or VAG or similar approved. • Sand traps must be installed with a by-pass for cleaning purposes. • Electro-magnetic flow meters must be installed on pump lines. • A 20 mm dia water connection must be provided at sewage pump stations. • Must be fitted with MIRRIE, in a separate control panel, which will operate level control and SMS any defects and alarms. • Pumps 7.5 kW and larger must be on star delta, or as application requires i.e. soft starter, VSD or direct on line starter unit. • Control panels must be equipped with overload protection, amp meters, hour meters, trip indicators on the panel door, auto/off/manual functions (and in manual function it must be possible to override all level controls), stop/start, surge arrestors, thermal/clickson protection, phase loss/rotation protection, level controls: low level – stop; high level – start one pump; high, high level – start second pump + alarm via SMS, pump trip + alarm via SMS, power loss alarm via SMS, intruder alarm via SMS, change over switch manually with welding socket – IP65, main isolator, 220 power outlet.
Pipe trenching and bedding	Page 31: Trenching, bedding and backfilling	Augmentation	Refer to Standard Drawing STD_DWG-S02 for details.

ITEM	APPLICABLE RED BOOK CHAPTER 10 REFERENCE	PURPOSE	REQUIRED NORMS AND STANDARDS
Anchor blocks	Page 31: Trenching, bedding and backfilling	Amendment Augmentation	<ul style="list-style-type: none"> • Concrete strength to be 20 MPa • Refer to Standard Drawing STD_DWG-S03 for spacing and details.
Siting of sewers	Page 32: Siting	Augmentation	Mid-block or in street reserves: 1,250 mm from stand boundary
Minimum depth and cover	Pages 30 to 31: Minimum depth and cover	Amendment	Minimum cover: <ul style="list-style-type: none"> • In servitudes: 600 mm • In road reserves: 1.0 m • Below road carriageways: 1.2 m
Curved alignment	Page 31: Curved alignment	Amendment	Not permitted
Manholes: Location and spacing	Page 32: Location and spacing	Amendment Enforcement	Manholes shall be installed: <ul style="list-style-type: none"> • At the top end of all sewer lines • At all junctions • At all horizontal direction changes • At all changes in grades • At 75 metre maximum spacing
Manhole design	Page 32: Design	Augmentation	<ul style="list-style-type: none"> • Refer to Standard Drawing STD_DWG-S04. • Pipes with different diameters must be aligned soffit to soffit at manholes. • No step irons in manholes.
Drop manholes	Page 32: Steep drops	Amendment	<ul style="list-style-type: none"> • To be constructed as shown on Standard Drawing STD_DWG-S04.
House connections	Page 32: Sewer connections	Augmentation	Refer to Standard Drawing STD_DWG-S05 for placement and details.
Materials for pipe lines	Page 33: Materials: Pipes and joints	Amendment Augmentation	<ul style="list-style-type: none"> • Sewer below ground: Heavy duty uPVC, 400 kPa. • Sewer above ground: Ductile iron. • Large diameter sewers may be concrete with spigot and socket joints with rolling rubber with 3mm integrally HDPE lining or alternatively with a sacrificial layer. • Rising (pump) main: uPVC or HDPE, minimum Class 12.
Colour code	No reference	Augmentation	Refer to Annexure 1 of this Guideline Document

Table 5 below stipulates the design annual average daily flows that must be used for design purposes.

Table 5: Average Daily Flows

ZONING	LAND USE	AVG ERF AREA (m ²)	UNITS/H A	FLOW kl/day/unit
RESIDENTIAL DEVELOPMENTS				
Res 1	Rural residential	> 1Ha	1	1.80
Res 1	1 Dwelling/2000–5000m ²	3,000	3	1.60
Res 1	1 Dwelling/1500-2000m ²	2,000	5	1.20
Res 1	1 Dwelling/1250-1500m ²	1,500	7	1.20
Res 1	1 Dwelling/1000-1250m ²	1,250	8	1.00
Res 1	1 Dwelling/800-1000m ²	1,000	10	1.00
Res 1	1 Dwelling/600-800m ²	500	20	0.90
Res 2	1 Dwelling/250-600m ²	400	25	0.80
Res 3	1 Dwelling/200-250m ²	250	40	0.80
Res 3				0.54/100m ²
Res 4	1 Dwelling/200-250m ²	250	40	0.56
Res 4				0.405/100m ²
Second dwelling		100		0.48
BUSINESS				
Bus 1 to 4	Offices, shops			0.36/100m ²
Bus 1 to 2	Dwelling units			0.54/100m ²
Guest house/Lodge/Hotel				0.288kl/room
Filling station				0.32/100m ²
Industrial: Dry	Workshops, commercial			0.36/100m ²
Industrial: Dry	Warehouses			0.18/100m ²
Industrial: Wet				0.90/100m ²
Industrial 2	Noxious industries			ad hoc
NON-DOMESTIC & OTHER DEVELOPMENTS				
Educational	Day school/crèche/nursery			0.018kl/cap
Educational	After school			0.0135kl/pers
Educational	Hostel			0.135kl/pers
Educational	Boarding school grounds			0.07kl/pers
Hospital				0.24kl/bed
Clinic				0.40kl/100m ²
Clinic	Outpatients			0.004kl/bed
Clinic	In-patients			0.048kl/bed
Bus stations	For those persons outside the community			0.012kl/cap
Community halls	Restaurants/place of refreshments			0.081kl/pers
Community halls	Conference facilities			0.0585kl/pers
Church				1kl/erf
Church	Seats			0.018kl/pers
Recreational	Pool area			0.90kl/100m ²
Undeveloped parks	Private open space/irrigation			0kl/ha
Developed parks	Developed parks/sportsground: <2ha			0kl/ha
Developed parks	Developed parks/sportsground: 2ha–10ha			0kl/ha
Developed parks	Developed parks/sportsground: >10ha			0kl/ha
Developed parks	Dev. parks/sportsground: High standard: <2ha			0kl/ha
Developed parks	Dev parks/sportsground: High standard: 2ha–10ha			0kl/ha
Developed parks	Dev. parks/sportsground: High standard: >10ha			0kl/ha
Developed parks	Public open spaces			-
Government & municipal				0.32kl/100m ²

CHAPTER 6

STANDARD DRAWINGS

6.1 BACKGROUND

Silulumanzi have compiled standard drawings depicting standard details preferred by and acceptable to it. The drawings are applicable to internal infrastructure normally found inside residential and industrial developments. Bulk supply infrastructure is generally larger and requires project specific designs and detailing.

The standard drawings are not included into this document, but are separately bound into a book of drawings, consisting of three sections titled:

- General Standard Drawings;
- Standard Water Supply Infrastructure Drawings; and
- Standard Sewerage Infrastructure Drawings.

Standard Drawings must be interpreted in conjunction with this guideline document.

Standard drawings can be downloaded in PDF format, free of charge, from Silulumanzi's website. The website address is www.Silulumanzi-silulumanzi.co.za. The drawings are also obtainable in hard copy format at a cost of R300-00 and electronic (PDF on CD) format at a cost of R100-00 from Silulumanzi's Customer Services.

Infrastructure must always be constructed in accordance with the standard drawings, unless prior written approval has been obtained from Silulumanzi to deviate from the standard drawings on a specific project.

The intention is not to discourage innovative engineering design. It is also acknowledged that there may be applications where construction in accordance with the standard drawings will be inappropriate, or where deviations from the standard design might be preferable. Well motivated deviations and alternatives will always be considered by Silulumanzi.

Users of the drawings are encouraged to submit comments to Silulumanzi for its consideration. Comments and amendment proposals must be submitted in writing to Silulumanzi's Technical Services Manager.

6.2 CONDITIONS OF USE

The applicable standard drawings must be bound **unaltered (including the title block)** into the design engineer's book of drawings on any project undertaken within the concession area. Copyright is reserved, and the drawings may not be used for any project outside the Mbombela Concession Area, nor may it be replicated for any other purpose without the written approval from Silulumanzi. In

such a case Silulumanzi will not evaluate the applicability of any intended use. Silulumanzi will not accept any liability whatsoever associated with the reproduction of any part of any drawing for any purpose other than using it on a project within the concession area, whether it is done with or without approval. Any request to reproduce a standard drawing, as a whole or in part, must be submitted in writing to the Technical Services Manager and the request will only be considered if the applicant indemnifies Silulumanzi in writing against any liability arising from such reproduction. The indemnity must accompany the request.

6.3 LIST OF AVAILABLE DRAWINGS

The standard drawings currently available are:

6.3.1 General Standard Drawings:

STD_DWG-G01:	Contract nameboard
STD_DWG-G02:	Contract nameboard: MIG projects
STD_DWG-G03:	Diamond razor mesh fencing
STD_DWG-G04:	Palisade fencing
STD_DWG-G05:	Concrete palisade fencing
STD_DWG-G06:	Pipeline marker
STD_DWG-G07:	Services layout in road reserves

6.3.2 Standard Water Supply Infrastructure Drawings:

STD_DWG-W01:	Example water network layout
STD_DWG-W02:	Typical placement of hydrants, valves, house connections and markers
STD_DWG-W03:	Example longitudinal section
STD_DWG-W04:	Thrust blocks
STD_DWG-W05:	Fire hydrant
STD_DWG-W06:	Isolation valve and scour valve
STD_DWG-W07:	PRV installation
STD_DWG-W08:	Bulk meter and PRV installation
STD_DWG-W09:	Typical bulk meter manhole cover
STD_DWG-W10:	Air valve chambers
STD_DWG-W11:	Erf connections
STD_DWG-W12:	Large consumer stand connection
STD_DWG-W13:	Below ground customer bulk meter installations
STD_DWG-W14:	Above ground customer bulk meter installations
STD_DWG-W15:	Domestic water & electrical installation
STD_DWG-W16:	Domestic above ground water meter detail

6.3.3 Standard Sewerage Infrastructure Drawings:

STD_DWG-S01:	Example longitudinal section
STD_DWG-S02:	Pipe trenching and bedding
STD_DWG-S03:	Anchor blocks and rodding eye

STD_DWG-S04:	Precast manholes
STD_DWG-S05:	House connections
STD_DWG-S06:	Typical wet-well sewage pump station detail
STD_DWG-S07:	Typical dry-well sewage pump station detail

CHAPTER 7
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ANNEXURES

ANNEXURE 1

COLOUR CODE

Silulumanzi adopted the Departmental Colour Code of the Department of Water and Sanitation as set out in the department's Standard Specification DWS 9900, Section C2: Corrosion Protection of Equipment for Reservoirs and Purification Works, Annexure C2.

The colour code is stipulated in the tables below.

MECHANICAL AND GENERAL

ITEMS	COLOUR	SABS 1091 CODE
Structural steel, Gates	Light grey	G29
Hydraulic power pack	Strong blue	F11
Hydraulic oil	Salmon pink	A40
Hazardous objects/areas (restricted headroom, crane hook etc)	Golden yellow with black chevron	B49*
Handwheels and levers	Golden yellow	B49
Handrails: - vertical - horizontal	Black Golden yellow	G49
Handrails on dam walls - Aluminium - Stainless steel - Galvanized	Un-coated Un-coated Light grey	G29
Floors: - safe and walking areas - restricted areas - open flooring (gratings) – MS galvanized 3CR12 Stainless steel	Emerald green Golden yellow Un-coated Un-coated Un-coated	E14 B49*
Fire protection equipment	Signal red	A11*
Control panels	Eau de nil	H43

PUMP STATIONS

ITEMS	COLOUR	SABS 1091 CODE
Electric motors	Light beige	C57
Pumps/control valves: for raw water for chem-treated water	Apple green Middle blue	H29 F07
Fan and coupling guards	Signal red	A11*
Base plates	Black	
Overhead travelling cranes	Golden yellow	B49
Isolating valves: for raw water for chem-treated water	Brilliant green Arctic blue	H10 F28

