# SEWER MASTER PLAN OF PRINCE ALBERT LOCAL MUNICIPALITY

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## TABLE OF CONTENTS:

**LIST OF TABLES**

**LIST OF FIGURES**

## LIST OF ABBREVIATIONS & ACRONYMS

AC - Asbestos Cement pipe

ACE - Africoast Consulting Engineers

AADD - Annual average daily demand

ADDWF - Average daily dry weather flow

AMP - Asset management plan

AR - Asset register

DBSA - Development Bank of South Africa

GIS - Geographic Information System

Ha - Hectare

HDPe - High Density Polyethylene pipe

kℓ - Kilolitre

kℓ/d - Kilolitre/day

km - Kilometre

ℓ/day/UE - Litre/day/unit erf

ℓ/s - Litre/second

m - Metre

mm -Millimetre

million $m^3/a$ - Million cubic meters per annum

m a.s.l . - Metres above mean sea level

Mℓ - Megalitre

NRW - Non-revenue water

O&M - Operation and Maintenance

PALM - Prince Albert Local Municipality

PDF - Peak day factors

PDDWF - Peak daily dry weather flow

PHD - Peak hour demand

PHF - Peak hour factors

PS - Pumping station

SWP - Sewer Master Plan

TWD - Total annual water demand

UAW/UFW - Unaccounted-for-water

UE - Unit erf

uPVC - Unplasticised polyvinylchloride

V - Flow velocity (in m/s)

VAT - Value added tax

WWTP – Waste Water treatment plant

## 1. INTRODUCTION

AfriCoast Consulting Engineers has been appointed by Development Bank of South Africa (DBSA) as the suitably qualified and experienced service provider to conduct a comprehensive update the Sewer Master Plan (SMP) for PALM.

### 1.1 STUDY AREA

The location of PALM within the Western Cape is shown on Figure 1.1. The towns within the boundary of the PALM are:

- Prince Albert
- Leeu Gamka
- Klaarstroom

Figure 1.1: Prince Albert Locality Plan

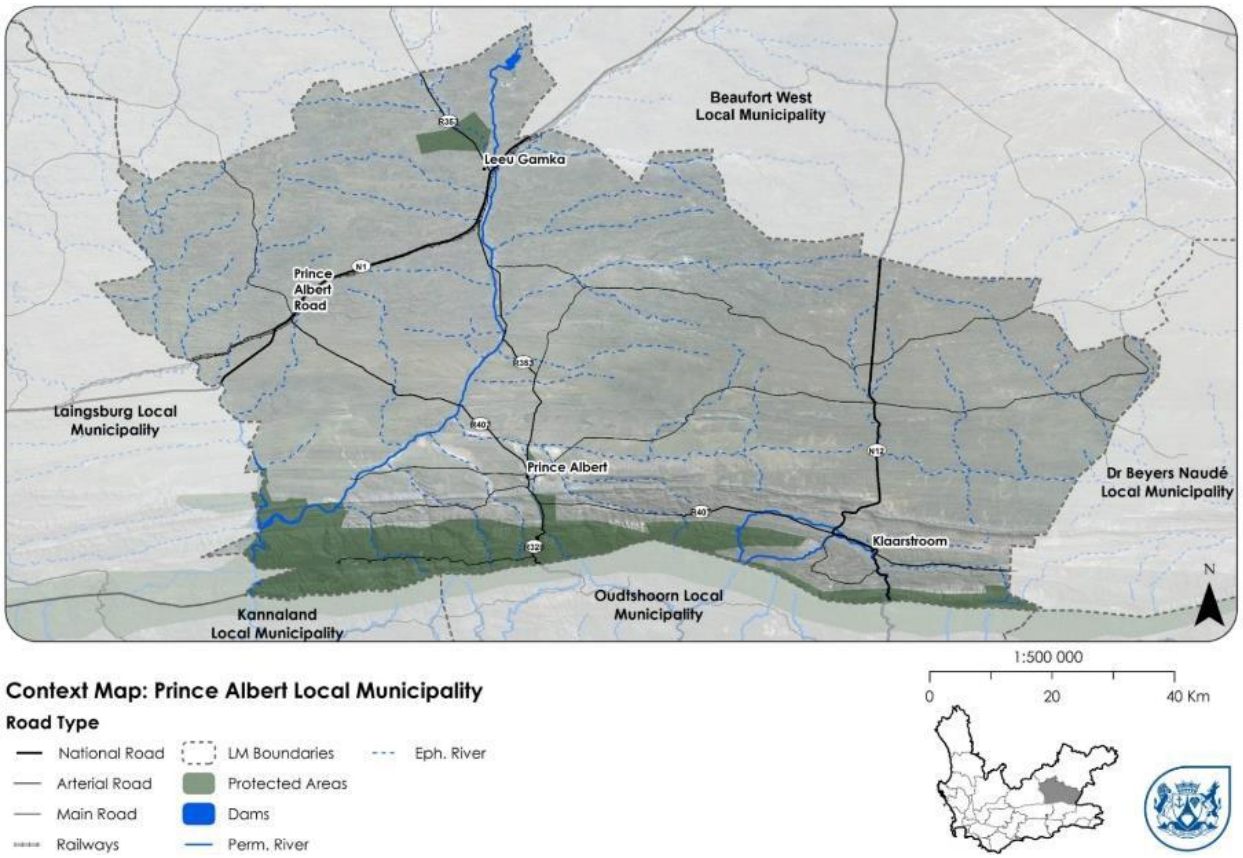



Figure 1.2 shows the suburbs with suburb names that will be entered during this assessment for all records in the GIS database. The total area of these suburbs indicates the study area of this document.

## 1.2 PREVIOUS MASTER PLANNING

Community Engineering Services conducted a water master plan study in November 2008 for the PALM for the towns of Prince Albert, Leeu Gamka and Klaarstroom.

## 1.3 STRUCTURE AND SCOPE OF REPORT

This report addresses the distribution of sewerage within the PALM area. This study is confined to the sewerage networks and therefore the process and sufficiency of the wastewater treatment plants (WWTP's) are beyond the scope of this study.

## 1.4 DISCLAIMER

The investigation has been performed and this report has been compiled based on the information made available to ACE. The information supplied to ACE by the PALM and other Consultants at the outset of this master planning process is assumed to be the most accurate representation of the existing system up to date hereof.

After the completion of the data capturing, the layout plans including the relevant attributes, were handed back to the Municipality so that the information could be verified by the Client. ACE can therefore under no circumstances be held accountable by any party for any direct, indirect, special, or consequential damages as a result of inaccurate information received pertaining to the components of the existing system.

The information in this report is intended for use by the PALM only.

# 2. EXISTING SYSTEM

## 2.1 EXISTING SEWER INFRASTRUCTURE

### 2.1.1 Sewer Reticulation System Layout and Operation

The sewer layouts of the existing system are shown on Figures 2.1a to Figure 2.1c, for each area as follows:

- a – Prince Albert
- b – Leeu Gamka
- c- Klaarstroom

Each system is operated in a main drainage area with a WWTP, which in turn could be sub-divided into several sub-drainage areas each are shown in Figures 2.2a to Figure 2.2c

There are no pumping stations in the Prince Albert system, there is one in the Leeu Gamka system and there are two in the Klaarstroom system as indicated on Figures 2.1 and 2.2.

Table 1 to 3 provides a summary of sewer infrastructure, pipes, wastewater treatment plants and pump stations in the Prince Albert Sewer Existing System.

**Table 1:** Existing Sewer Infrastructure Summary

| AREA | INFRASTRUCTURE TYPE | EXTENT | CAPACITY |
|---|---|---|---|
| Prince Albert | Waste Water Treatment Plant | 1 | 623kl/d |
| | Pumpstation/s | 0 | - |
| | Pipe Length | 16.04km | - |
| Leeu Gamka | Waste Water Treatment Plant | 1 | 160kl/d |
| | Pumpstation/s | 1 | 3.4l/s |
| | Pipe Length | 6.5km | |
| Klaarstroom | Waste Water Treatment Plant | 1 | 61kl/d |
| | Pumpstation/s | 2 | 2.8l/s |
| | Pipe Length | 1.14km | |

**Table 2:** Existing sewer system summary - Pipes

| Breakdown of pipe lengths according to diameter | | |
|---|---|---|
| **Nominal Pipe Diameter** (mm Ø) | **Gravity Pipes** (km) | **Rising Mains** (km) |
| **Prince Albert** | | |
| ≤ 125 | 6.2 | 0.0 |
| > 125 ≤ 175 | 7.34 | 0.0 |
| > 175 ≤ 225 | 2.5 | 0.0 |
| > 225 ≤ 275 | 0.2 | 0.0 |
| > 275 ≤ 325 | 0.0 | 0.0 |
| > 325 ≤ 375 | 0.0 | 0.0 |
| **Sub-total** | **16.04** | **0.0** |
| **Leeu Gamka** | | |
| ≤ 125 | 0.0 | 0.4 |
| > 125 ≤ 175 | 6.5 | 0.0 |
| > 175 ≤ 225 | 0.0 | 0.0 |
| > 225 ≤ 275 | 0.0 | 0.0 |
| > 275 ≤ 325 | 0.0 | 0.0 |
| > 325 ≤ 375 | 0.0 | 0.0 |
| **Sub-total** | **6.5** | **0.4** |
| **Klaarstroom** | | |
| ≤ 125 | 0.0 | 0.5 |
| > 125 ≤ 175 | 1.14 | 0.0 |
| > 175 ≤ 225 | 0.0 | 0.0 |
| > 225 ≤ 275 | 0.0 | 0.0 |
| > 275 ≤ 325 | 0.0 | 0.0 |
| > 325 ≤ 375 | 0.0 | 0.0 |
| **Sub-total** | **1.14** | **0.5** |
| | | |
| **Total** | **23.68** | **0.9** |

**Table 3:** Existing sewer system summary – Waste Water Treatment Plants and Pumps

| Details of bulk discharge points and wastewater treatment plants (WWTP's) | | |
|---|---|---|
| **Name** | **Capacity** (kl/d) | **Process** |
| Prince Albert WWTP | 623 | Oxidation Pond |
| Leeu Gamka WWTP | 160 | Oxidation Pond |
| Klaarstroom WWTP | 61 | Oxidation Pond |

| Existing Pump Stations | | | |
|---|---|---|---|
| **Town or Zone** | **Name** | **Capacity (l/s)** | **Diameter of rising main (mm)** |
| Prince Albert | None | | |
| Leeu Gamka | Leeu Gamka PS | 15 l/s @15.5m head | 100 |
| Klaarstroom | Klaarstroom PS 1 | * | 100 |
| Klaarstroom | Klaarstroom PS 2 | 2.8 | 100 |

*to be verified

### 2.1.2 Present PDDWF

The present PDDWF of the drainage areas in Prince Albert are summarised in Table 4. The “Actual” PDDWF scenario varies between 59% to 88% of the actual present AADD for the towns in the Municipal area.

Table 4 lists the actual and potential fully occupied present peak daily dry weather flow (PDDWF) of the drainage areas.

**Table 4:** Existing Sewer Drainage areas and PDDWF's

| Drainage Areas | PDDWF of existing developments in area (kl/d) | |
|---|---|---|
| | **Actual, based on % of actual AADD and for all occupied erven (Land Use)** | **Potential, based on % of theoretical AADD at full occupation of all erven (Land Use)** |
| **Prince Albert WWTP Drainage Area** | | |
| North | 719 | 825 |
| South * | 81 | 92 |
| **Sub-total Prince Albert** | **800** | **917** |
| **Leeu Gamka WWTP Drainage Area** | | |
| Leeu Gamka | 296 | 315 |
| **Sub-total Leeu Gamka** | **296** | **315** |
| **Klaarstroom WWTP Drainage Area** | | |
| Klaarstroom | 44 | 55 |
| **Sub-total Klaarstroom** | **44** | **55** |

### 2.1.3 Waste Water Treatment Plants

2.1.4 Description

The three towns in the Prince Albert Municipal area each have their own wastewater collection and treatment facility. Prince Albert, Klaarstroom and Leeu-Gamka have oxidation pond systems for WWTP, whereas Prince Albert Road is served by a communal septic tank and soak-away.

2.1.5 Prince Albert

The Prince Albert WWTP which has a design capacity of 623kl/day. The waste water treatment works consists of an inlet structure, three anaerobic ponds, six oxidation ponds, outlet structure and pump station building with mobile pumping works for irrigation purposes. The sanitation system consists of a waterborne system as well as conservancy tanks. These conservancy tanks are serviced by means of a

sanitation team with appropriate equipment and vehicles who collect sewerage and deposit it at the WWTP.

### 2.1.6 Leeu Gamka

The treatment plant is a pond system. Leeu Gamka WWTW has a design capacity of 160 kl/d. Sewage from Bitterwater drain by gravity to the central sewer pump station. The wastewater is screened at the pump station before being pumped to the WWTW. The sanitation system consists of a waterborne system as well as conservancy tanks. These conservancy tanks are serviced by means of a sanitation team with appropriate equipment and vehicles who collect sewerage and deposit it at the WWTW.

The WWTP currently comprises of inlet works, grit channel, (distributor chamber) split box with four outlets, four primary ponds in parallel, three secondary ponds in series, one tertiary pond, sump, disinfection and pumped to holding pond then pumped for irrigation.

### 2.1.7 Klaarstroom

The sanitation system for Klaarstroom comprises of a full waterborne system. Klaarstroom WWTP has a design capacity of 130 kl/day; the WWTP was recently upgraded and the plant currently comprises of inlet works, two primary screens, two grit channels, two anaerobic pond, one facultative pond, two aerobic ponds in series, biological filtration (reedbed), and an effluent reservoir from which the final effluent is irrigated onto an adjacent field. Klaarstroom is entirely served by a full water-borne sanitation system that drains to 1 sewage pump that drains to the Klaarstroom WWTP.

## 2.2 EXISTING CONDITION OF THE SEWER INFRASTRUCTURE

### 2.2.1 Sewer Pumpstation

It is only Klaarstroom and Leeu Gamka towns that have sewer pumpstations. The physical condition of the pump stations is good. The pump stations are all situated within a formal building and are electrically operated. The pumps operate 24 hours per day and each have a standby pump set available. The Klaarstroom pumpstation building needs to be refurbished.

### 2.2.2 Waste Water Treatment Plants

Each town has its own Waste Water collection and treatment facility. All the three towns have oxidation pond system for the WWTW. Klaarstroom WWTP was recently upgraded in 2021, Leeu Gamka WWTP was upgraded in 2019 and Prince Albert WWTP was last upgraded in 2015.

The physical condition of all the facilities is good. There is no fixed maintenance plan in place for all the facilities, maintenance is conducted on demand. The operating hours on all the treatment works is 24hrs. All the facilities are operational.

### 2.2.3 Sewer Pipeline Infrastructure

Prince Albert has 23.68 km of gravity pipes ranging from 120mm diameter to 275mm diameter uPVC pipes and 0.9km of 100mm rising main between Leeu Gamka and Klaarstroom. The condition of the pipeline is good to fair with minimal blockages. The infrastructure is maintained on demand.

### 2.2.4 Pictures

See below photos of Existing Sewer Infrastructure per Area:

**Prince Albert Photos**

Inlet Works


Sign Board


Anaerobic pond

Aerators Oxidation Pond

## Klaarstroom Pictures


Sign Board

WWTW (Inlet Works)


Sewer Pumpstation

Split Box

Aerobic Ponds

Meter

**Leeu Gamka Pictures**

Inlet Works

Grit Channel


Sewer Pumpstation

Primary Ponds

Final Storage dam

Circulation and Reticulation Pumps

## 2.3 IDENTIFICATION OF THE SECTOR PLANS

The table below shows the Prince Albert Sector Plans and the status. All the sector plans are outdated and needs urgent attention.

**Table 5:** PALM Sector Plans

| Sector Plan | | Status |
|---|---|---|
| 1 | CKDM Bulk Infrastructure Master Plan 2010 | Needs updating |
| 2 | Water Master Plan (Draft) 2008 | Needs updating |
| 3 | Sanitation Master Plan (Draft) 2008 | Needs updating |
| 4 | Water Service Development Plan 2008 | Urgently needs updating |
| 5 | Water Conservation and Water Demand Management Strategy | Needs updating |
| 6 | Integrated Infrastructure Maintenance Plan | To be developed |
| 7 | Climate Change Response Strategy | In process of development with Central Karoo District Municipality |

The table below shows the district actions or projects from the Central Karoo District Municipality which are relevant to PALM.

**Table 6: CKDM Projects relevant to PALM**

| District wide action or project | Time Frame | Role-Players |
|---|---|---|
| Ensure that all efforts towards building water resilience in the municipality, and responses to the persistent drought conditions, consider the proposals of Policy A2 around building water resilience. | Ongoing | Central Karoo District Municipality<br>Beaufort West Local Municipality<br>Laingsburg Local Municipality<br>PALM<br>Provincial Department of Transport and Public Works<br>National Department of Water and Sanitation |
| Ensure the District Municipality and all local municipalities develop and implement asset management and infrastructure maintenance policies and plans as per guideline C3 to ensure all infrastructure and assets are well maintained. | 2020-2025 | Central Karoo District Municipality<br>Beaufort West Local Municipality<br>Laingsburg Local Municipality<br>PALM |
| Establish a Central Karoo Shared Service Centre for municipal planning and possibly a GIS function, and potentially other functions, within the Central Karoo. | 2020-2025 | Central Karoo District municipality<br>Beaufort West Local Municipality<br>Laingsburg Local Municipality<br>PALM |

## 2.4 EXISTING LEVEL OF SERVICE

### 2.4.1 Sanitation Service Delivery Levels

PALM has a duty to all customers or potential customers in its area of jurisdiction to progressively ensure efficient, affordable, economical, and sustainable access to sanitation services that promote sustainable livelihoods and economic development. Good sanitation services exist across the PALM area, with a total of 2406 households having access to flush toilets connected to the sewerage system and 452 to a flush toilet with septic tank.

The table below provide a summary of the level of service for sanitation services within the urban edge area for the financial years 2019/2020 and 2020/21.

Table 7: Sanitation Service Delivery Levels

| Description | 2019/20 | 2020/21 |
|---|---|---|
| | Actual | Actual |
| **Household** | | |
| **Sanitation / sewerage: (above minimum level)** | | |
| Flush toilet (connected to sewerage) | 2411 | 2406 |
| Flush toilet (with septic tank/conservancy) | 330 | 452 |
| Chemical toilet | 0 | 0 |
| Pit toilet (ventilated) | 0 | 0 |
| Pit toilet without ventilated | 0 | 0 |
| Other toilet provisions (below minimum service level) | 0 | 0 |
| Minimum service level and above sub-total | 2741 | 2858 |
| Minimum service level and above percentage | 98.7% | 99% |
| Sewer: (below minimum level) | | |
| Bucket toilet | 36 | 0 |
| Other toilet provisions (below minimum service level) | 0 | 0 |
| No toilet provisions | 0 | 0 |
| Below minimum service level sub-total | 36 | 0 |
| Below minimum service level percentage | 1.3% | 0 |
| Total number of households (formal and informal) | **98.70%** | **99.0%** |
| **The above table 2020/21 are populated as per the Census 2011 data for Toilet Facilities by type of dwelling and include all dwellings* | | |

### 2.4.2 Public Amenities Summary

PALM has 4 health facilities and Ambulance Depot and 5 Education facilities and all have adequate services. See table 8 below:

**Table 8:** Service Level Profile for Public Amenities

| No. | Associated Services Facility | Number of Facilities | Water | | Sanitation | |
|---|---|---|---|---|---|---|
| | | | Adequate | Inadequate | Adequate | Inadequate |
| **Education Plan** | | | | | | |
| 1 | Schools | 5 | 5 | 0 | 5 | 0 |
| **TOTAL** | | **5** | **5** | **0** | **5** | **0** |
| **Health Plan** | | | | | | |
| 2 | Hospitals | 1 | 1 | 0 | 1 | 0 |
| 3 | Clinics | 3 | 3 | 0 | 3 | 0 |
| 4 | Ambulance Depot | 1 | 1 | 0 | 1 | 0 |
| **TOTAL** | | **5** | **5** | **0** | **5** | **0** |
| **Public Amenities** | | | | | | |
| **TOTAL** | | **10** | **10** | **0** | **10** | **0** |

## 2.5 CURRENT DEMAND

### 2.5.1 Current Water Demand

The table below provide a summary of the current water demand for PALM for the period 1 July 2021 to 30 June 2022.

**Table 9: Present Water Demand Summary**

| USER | ACTUAL PRESENT AADD (kl/d) - 2022 |
|---|---|
| **PRINCE ALBERT** | |
| Existing formal Stands | 2 000 |
| **SUB-TOTAL** | **2 000** |
| **LEEU GAMKA** | |
| Existing formal Stands | 600 |
| **SUB-TOTAL** | **600** |
| **KLAARSTROOM** | |
| Existing formal Stands | 120 |
| **SUB-TOTAL** | **120** |
| **TOTAL** | **2 720** |

### 2.5.2 Current Sewer Discharge

The table below provide a summary of the current sewer discharge for PALM for the period 1 July 2021 to 30 June 2022.

**Table 10: Present Sewer Discharge**

| USER | ACTUAL PRESENT PDDWF (kl/d) - 2022 |
|---|---|
| **PRINCE ALBERT** | |
| Existing formal Stands | 800 |
| **SUB-TOTAL** | **800** |
| **LEEU GAMKA** | |
| Existing formal Stands | 296 |
| **SUB-TOTAL** | **296** |
| **KLAARSTROOM** | |
| Existing formal Stands | 44 |
| **SUB-TOTAL** | **44** |
| **TOTAL** | **1 140** |

## 2.6 OPERATION AND MAINTENANCE

The effectiveness of Operation and Maintenance plays a vital role in the infrastructure as it extends the service life of the assets. PALM does not have an Operation and Maintenance Plan in place. All maintenance of the water and sanitation assets is conducted on an ad hoc basis. It is recommended that for PALM to be able to monitor properly all water and sanitation assets, an operation and maintenance plan is to be developed and maintained.

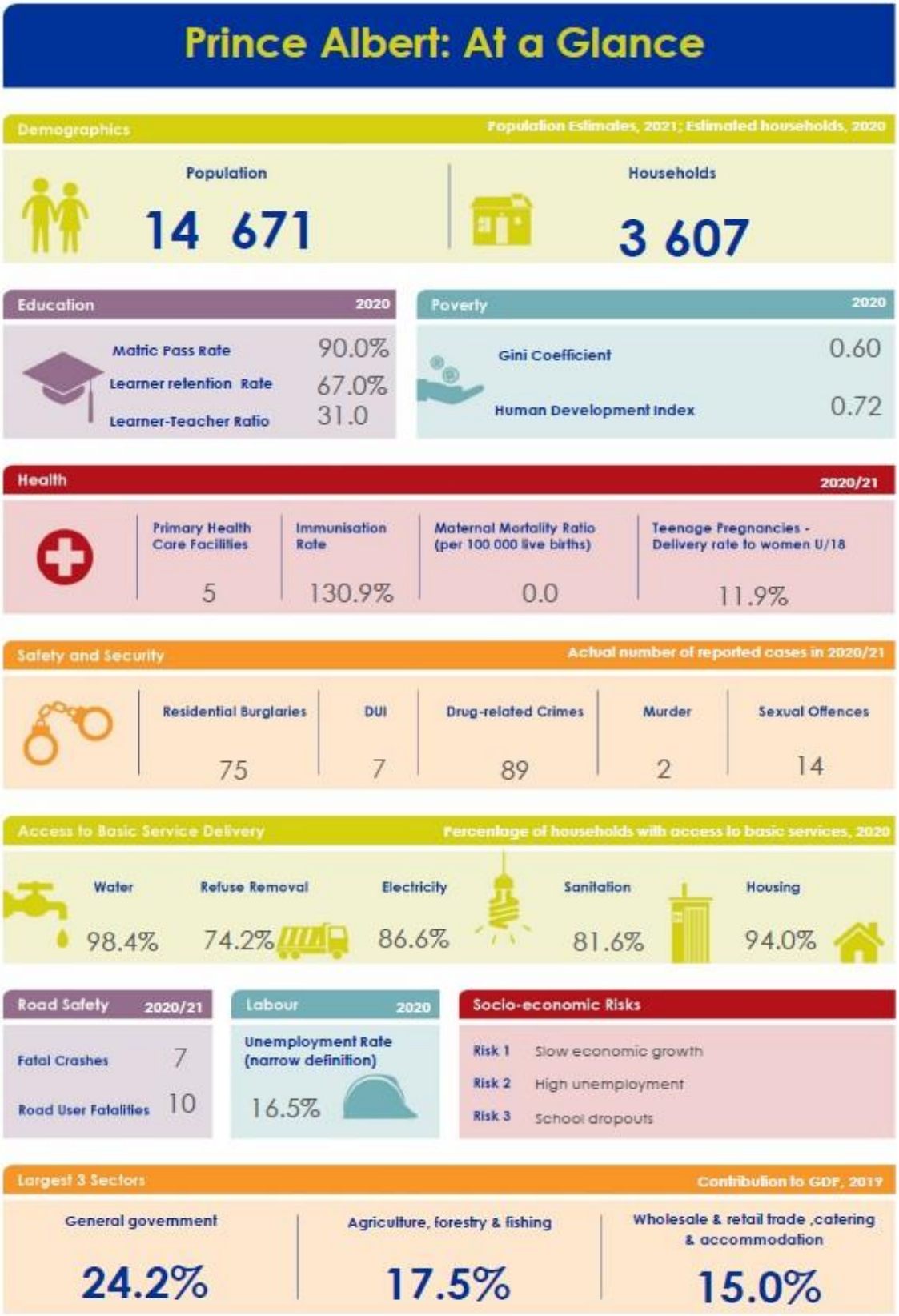
## 2.7 ASSET REGISTER AND GIS

PALM currently have an asset register in place. PALM does not have GIS information in place. Municipality must ensure that the asset register and the GIS information is continuously being updated.

## 2.8 ASSET MANAGEMENT PLAN

It is recommended that the current databases and master planning results be extended and applied to support the Asset Register (AR) and Asset Management Plan (AMP).

## 3. PRINCE ALBERT SITUATION ANALYSIS




The following section will provide a brief overview of the information above.

## 3.1 Introduction

The importance of understanding demographics as a decisive factor in shaping our current socio-economic reality is critical for government, economists, and politicians alike. The following section provides a concise, yet meaningful overview of the most prominent demographic indicators relevant for municipal planning and budgeting in the Prince Albert Municipality. It is contended that the population and household statistics provided hereto will assist the Prince Albert municipality to set accurate and credible service delivery targets across the new 5-year integrated development cycle.


### 3.1.1 Description of Prince Albert

Prince Albert lies on the south edge of the Great Karoo, nestling under the majestic Swartberg Mountains. Prince Albert was found in 1762 on the loan farm De Queek Vallei with Zacharias De Beer as its first incumbent. Originally known as Albertsburg, when it obtained municipal status in 1845 it was renamed Prince Albert in honour of Queen Victoria's consort, Prince Albert of Saxe-Coburg.

The village has many well-preserved Cape Dutch, Karoo and Victorian buildings, thirteen of which are National Monuments. There are several olive farms and other very large export fruit farms in the area, as well as sheep farms, an export mohair trade. Birding, hiking, cycling and stargazing are other pursuits for visitors. The area is well known for its hardy endemic veld plants and is frequently a destination for botanists from all over the world. Visitors also enjoy excellent dining on fine Karoo lamb and cheese from the local dairy.

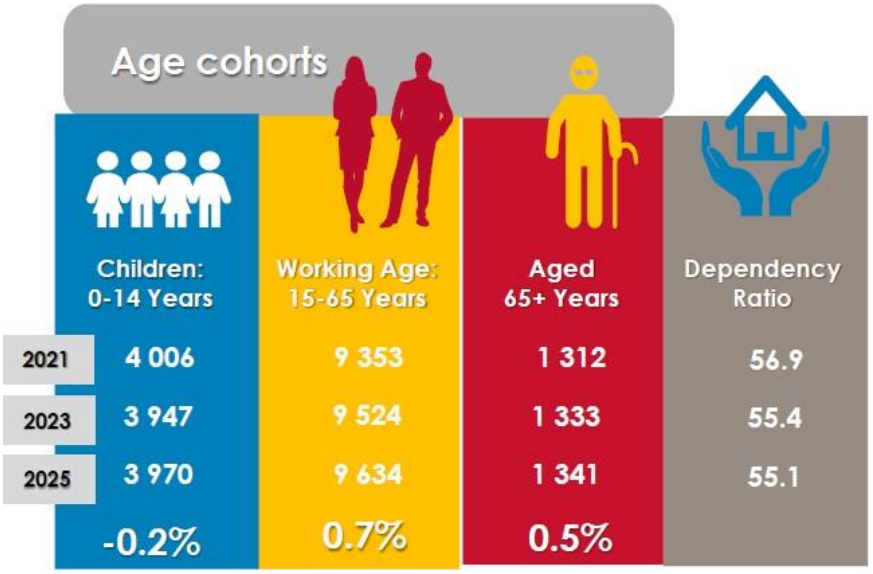
### 3.1.2 Climate

Prince Albert enjoys a beautifully healthy climate with high temperatures in summer and comfortable sunny but crisp conditions during winter with cold nights, reaching midwinter minimums of 2 ˚C, with frost in places. Summer and winter blend into one another, leaving only a matter of weeks for spring and autumn. Prince Albert's dry heat is ideal for anyone suffering from chest conditions and many people feel the health benefits of living here. This dry heat may spike up to 40 ˚C on a few days in the summer with an average of 33 – 35 ˚C, and 17 ˚C in the winter months (Source: eco impact environmental practitioners, 2018).

### 3.1.3 Geography

The municipality covers an area of 8,153 square kilometers (3,148 sq mi) in the Great Karoo immediately north of the Swartberg Mountains. It abuts on the Beaufort West Municipality to the north, the Dr Beyers Naudé local Municipality to the east, the Oudtshoorn and Kannaland Municipalities to the south, and the Laingsburg to the west.

The main town in the municipality is Prince Albert, which as of 2011 has a population of 7,054. North of Prince Albert on the N1 national road is the village of Leeu-Gamka (population 2,727), while Klaarstroom (population 584) is to the east of Prince Albert at the mouth of Meiringspoort.



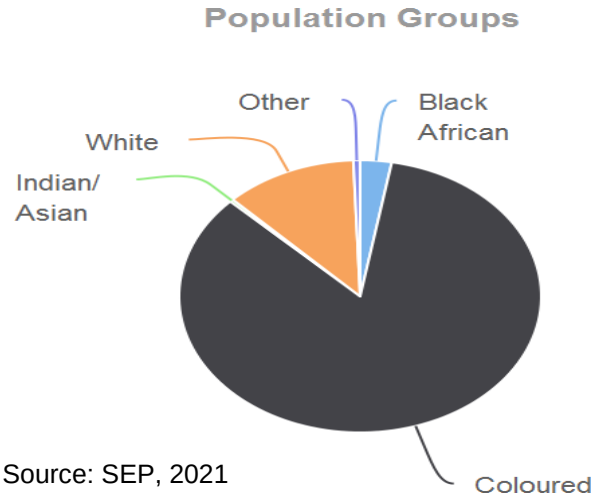

### 3.1.4 Gender

The below graph illustrates the Prince Albert Municipality's (PAM) population within their respective age groups for males and females respectively. The age distribution in a society is also a determinant for the government institutions to supply appropriate social investments for the relevant age groupings. At a municipal level the age group between 15 to 35 years, this is categorized as youth, the most dominant in PAM. This is the same group that forms part of the active labour group, which is also sexually active. This is the most vulnerable group to the social ills including unemployment, prone to HIV/ Aids and other infections, involvement in crime and drugs etc. Improper handling of this group may result to negative social challenges. The huge numbers of this age group call for a need for creation of employment opportunities, provision of educational facilities to cater for their needs. Failure to do so will result to a

huge influx of youthful members of PAM to other major towns for better employment and education opportunities. Thesenior citizens record the lowest number in the PAM.

### 3.1.5 Population Groups

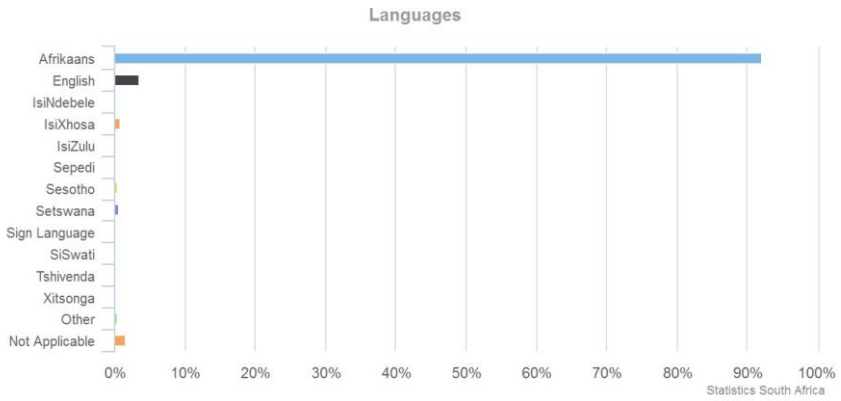
According to the Socio-Economic Profile, 2021 the municipality has a population of 14 671 people in 3 607 households. Of this population, 84.5% is, “Coloured”, 11.8% “White” and 2.8% as “Black African.



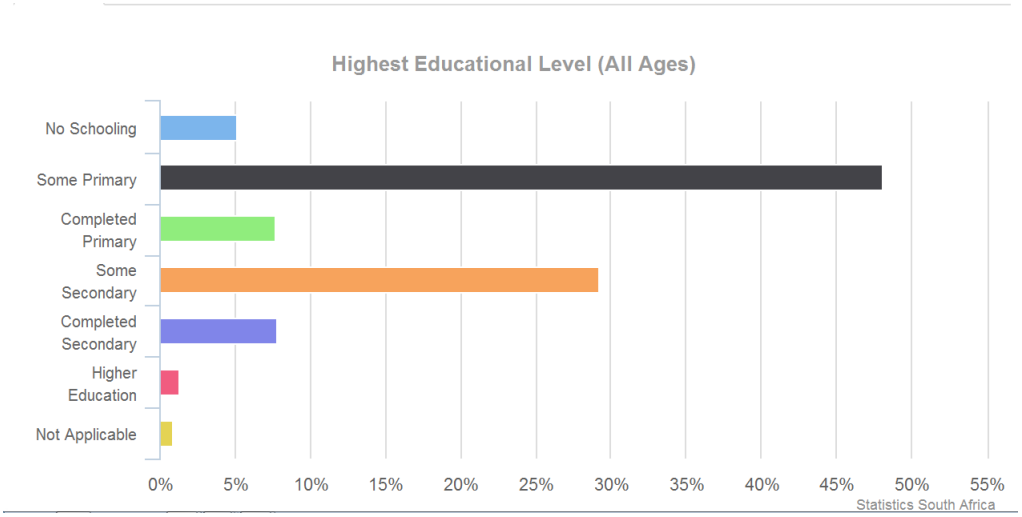

Source: SEP, 2021

### 3.1.6 Language

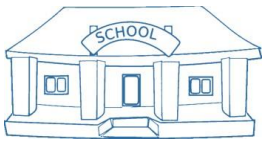
Afrikaans is the most prominent language spoken by residents, with 93.5% of the population, while 3.6% speak English and 0.9% speaks Xhosa as shown in the graph below.



## 3.2 Education levels




Source: Stats SA




The above diagram illustrates the literacy levels in the greater Prince Albert municipal area. The graphs indicate that 8% of the population had finished secondary school, while 2, 5% had higher education. Twenty-nine per cent had not finished their secondary education, while 48% had not finished their primary education. It should also be noted that this part seeks to address strategic objective 6: To commit to the continuous improvement of human skills and resources To deliver effective services

The Department of Social Development defines people aged 14 years and older as literate if they have successfully completed 7 years of formal education (passed Grade 7). An illiterate person would therefore be someone aged 14 years and older with less than 7 years of formal education completed. The literacy rate in Prince Albert was recorded at 69.9 per cent in 2016 which is lower than the average literacy rates of the Central Karoo District (73.4 per cent) the Western Cape (87.2 per cent) as well as the rest of South Africa (80.9 per cent)

### 3.2.1 Learner-teacher ratio


The learner-teacher ratio within Prince Albert was at its lowest in 2012 at 21.9 learners per teacher, increased to above 30 per teacher in 2016 and 2018 and increased further drastically to 58.4 learners per teacher in 2020. According to the Department of Education the number of learners per teacher was 30.3 in 2010. Factors' influencing the learner-teacher ratio includes the ability of schools to employ more educators when needed and the ability to collect school fees (Source: Western Cape Department of Education, 2020).

### 3.2.2 Grade 12 Drop-Out Rates

The drop-out rate for learners in Prince Albert that enrolled from grade 10 in 2016 to grade 12 in 2020 was recorded at 48.1 per cent, which is lower than the average drop- out rate for the Central Karoo District over the same period. The high levels of high school drop-outs are influenced by a wide array of factors, including socio-economic factors such as teenage pregnancies, poverty, indigent households, and unemployment (Source: Western Cape Education Department, 2020).

The availability of adequate education facilities such as schools, FET colleges and learning facilities equipped with libraries and media centres will have a positive effect on academic outcomes. The Prince Albert municipal area currently has no higher learning institutions, the nearest FET colleges (South Cape) are in Oudtshoorn and Beaufort West.

In 2018, there were a total of 5 schools in Prince Albert that had to accommodate 2 239 learners. Given the current extent of economic hardship, increasing living costs are putting additional strain on parents to afford school fees. To alleviate some of the funding challenges and to grant children access to their fundamental right to basic education, the Western Cape Department of Education offered certain fee-paying schools to become no fee schools. To this extent, most schools within Prince Albert (80 per cent) were considered no fee schools in 2020, which bodes well to improve access to quality education.

Prince Albert town now hosts three private education schools as an alternative to parents sending their children to schools outside the boarders of the municipality. The numbers of students are ever increasing and recently one of the schools has been approached by parents outside of the municipal area to accommodate their children at the private schools.

As it has been well documented that there is a strong relationship between access to media centres and academic achievement, the fact that 4 out of 5 schools in Prince Albert had a media/library centre in 2020, bodes considerably well for future improved educational outcomes. The Municipality strengthened access to media centres in partnership with the Office of the Premier by establishing Access Centres in Klaarstroom, two in Prince Albert and two in Leeu Gamka. These Access Centres provides free after-hours computer access and training to not only school students, but also entrepreneurs, NGO’s and the general public. There is however, a need to enhance the training provided to the visitors and participants at the Access Centres to maximise the potential benefits of the Centre.

There is a need to establish a secondary school in Leeu-Gamka that will provide education to the learners of Prince Albert Road, Leeu-Gamka and Merweville. At present, children must be transported to Beaufort-West at huge cost to both government and parents. The vast travelling also undermines quality of life and increases the risk of road fatalities. It is understood that there is no funding to build an

additional school building, but consideration should be given to build extra class rooms to the existing school and then to accommodate the secondary learners there.

Several student parents have opted for a home school option. This option is followed as parents believe it will provide quality education and allows them the opportunity not to send their children away for schooling. The challenge with this school is that it operates as an illegal land use activity and is thus not viable.

### 3.2.3 Further Educational Facilities

The establishment of a Community Learning Centre might be the greatest game changer with the most long-term benefits proposed for Prince Albert municipal area and is one of the Municipality's goals. It is believed that it could single handily change the future of Prince Albert for the better. It will influence the mind-set of the town as well as that of individuals. It has the potential to awake sleeping giants and strategically position Prince Albert and individuals, entrepreneurs with vision as worldly role players. The Prince Albert Municipality has, with the support of Department of Environmental Affairs constructed an Environmental Education Centre (EEC) that can facilitate the establishment of a Community Learning Centre. This Community Learning Centre will be our gateway to the world. By equipping it with broadband/fibre Prince Albert can link with learning institutions, universities, and FET colleges.

This has already been done with the opening of the Access Centre at the same venue. Students are afforded the opportunity, not normally afforded to rural areas, to attend accredited courses at affordable cost. The Centre is also equipped with business corners and training venues/facilities. In other words, without necessitating traveling and accommodation, more people can participate and use their disposable income proactively or effectively, for betterment will be within their reach. If this can happen then social ills will be countered for disposable income expenditure can be directed towards opportunities of betterment instead of leisure. The community learning centre facilitates partnerships and collaborative networking with reputable institutions, thus opening Prince Albert to the world and the world to Prince Albert. Satellite computer centres to facilitate community learning are available at Klaarstroom library and Leeu Gamka library. An additional computer access and training centre is situated within the Leeu Gamka community.

Prince Albert do not have any training colleges or entities where residents can further their education. As the area is considered as a poverty pocket within the Central Karoo and Western Cape, residents do not have the necessary funding to further their education and broaden their skills base. Though there may be bursaries to cover the cost of further studies, the accommodation and travel cost are not always included, and makes further education unaffordable. Bursaries are also targeting only youth and do not address those already out of school. It also does not speak to pre-completion exits of scholars. As

indicated above, the skills levels are also not aligned to the needs of the job market. This situation condemns residents to lives as unskilled labourers and do not support the business sector.

The high cost of traveling and accommodation to educational facilities outside the boundaries of the municipality makes further education unaffordable. It encourages early drop-out in schools as students realise their parents will not be able to pay for further studies and they will be limited to first-entry jobs. This situation limits residents' employment and income generating opportunities as low skills levels implies low remuneration. Many of the young people that cannot afford the cost of higher education ends up as participants in the Expanded Public Works Programme or Community Works Programme that provides a safety net against poverty, but have no real potential of developing marketable skills in the employment sector, dooming participants to a life of borderline poverty.

With a community condemned to poverty, social ills such as substance abuse, family and gender violence, criminal activity and grand dependency fosters a hand-out dependency culture which is detrimental to the sustainability of the town. The Municipality tries to address these challenges by facilitating training that will enhance the community members' skills base to make them more competitive in the labour market. Training courses is provided free of charge to participants on subjects such as call centre skills development, project management, plumbing, water processing, road construction, entrepreneurship and sports administration and coaching. These initiatives are done in partnership with government and the private sector with the Central Karoo District Municipality playing a pivotal role.

### 3.2.4 Matric pass rate

The matric pass rate for Prince Albert was 71.2% in 2018, and dropped to 57.4% in 2019 and increased to 90.0% in 2020. This measurement is vital as it impacts learner access to higher education institutions in order to broader access employment opportunities.

The decrease in some years can be attributed to several socio-economic factors such as increased teenage pregnancies, extent of substance abuse, learner-teacher ratios, etc. (Source: Western Cape Department of Education, Annual Survey of public and independent Schools (ASS) 2018)

It should however be noted that despite these negative figures and even though matric pass rates are an important education indicator, it is not the sole measure of quality education.

### 3.2.5 Early Childhood Development (ECD)

There are seven (7) ECD Centres in the Prince Albert area, four (4) in Prince Albert, two (2) in Leeu-Gamka and one (1) in Klaarstroom. The communities especially, Leeu Gamka highlighted the need for the ECD centre to be relocated closer to the community as there is a high risk crossing the N1.

## 3.3 People living with disabilities

Although the Constitution of South Africa protects the rights of people with disability and prohibits discrimination on the basis of disability, limited facilities currently exist in the Prince Albert area for people living with disability. Currently public amenities such as libraries, community halls, municipal offices & buildings and road infrastructure do not cater for people with disabilities. Council has however lately demonstrated more cognizance of this fact and new buildings and renovations to existing infrastructure are developed in such a way that access for people with disability are provided for. These include the main municipal building and the local magistrate's court. The municipality has recently embarked on a survey to determine which public facilities and businesses are disabled-friendly. In addition to the Municipality's constitutional obligation in this regard, it is imperative that greater consideration be given to disabled access, for the area to grow as a tourist destination. At present only five tourist establishments (out of the more than 100 establishments) are disabled-friendly. Consideration should be given in ensuring that disabled access be made conditional on approval of building plans and land use applications.

Many municipalities, such as Prince Albert, have not yet taken important steps to eliminate or reduce barriers to full participation in society by people with disabilities. The Constitution record government's commitment to attaining social justice and improving the quality of life for everyone, placing a high premium on human dignity for all. In order to ensure that Prince Albert Municipality delivers on these Constitutional rights the Municipality tasked three disabled people in our municipal area to evaluate the status quo in respect of access in our area. The results included:

- Infrastructure not accessible (potholes, gravel)
- Businesses and open spaces difficult to access (no ramps, potholes, etc)
- No recreational facilities or events
- No job opportunities
- Negative Social attitude

The Municipality will thus in future embark on the following initiatives:

- Sensitize community and staff on the needs and reality of disabled people
- Ensure that all municipal buildings and recreational facilities are disabled friendly
- Embark on a program to repair potholes and ensure access and mobility to disabled
- Enforce disabled requirements in all public buildings / businesses
- Improve communication with disabled persons

- Encourage and facilitate participation of people with disabilities in local government structures, including the provision of transport to and from consultative meetings.
- Provide books in libraries for people with sensory needs.
- Encourage the forming of partnerships with disabled people's organizations.
- Continue support to Health Sector in repair of wheelchairs.

### 3.4 The Elderly

The elderly are often neglected in municipal planning, especially the poorer and more vulnerable people who cannot afford decent housing. While there are a facility catering for the wealthier retirees and aged, the same cannot be said for the bottom-end of the market. Recreational activities for the aged are mostly organised by the wealthier retirees amongst themselves, leaving the poorest of the poor fending for themselves. The municipality will support and facilitate programs of the Department of Social Development to ensure the protection of the rights of the aged in our communities as per the signed Memorandum of Agreement with this Department.

A special engagement with the sector servicing the Elderly was held and the following input were provided by them: Huis Kweekvallei provides permanent care to 69 elderly residents and an additional 13 elderly who receive meals daily. They receive subsidies for 40 residents at R2 200 per person, but must subsidise the rest out of own funding. Huis Kweekvallei facilitates sport and recreational games for residents and is supported by 40 volunteers from within the community. The municipal library service visits them on a weekly basis. The Prince Albert Service Centre provides breakfast and lunch to fifteen elderly persons. They only receive subsidies for fifteen people.

Challenges faced by the Elderly include the following:

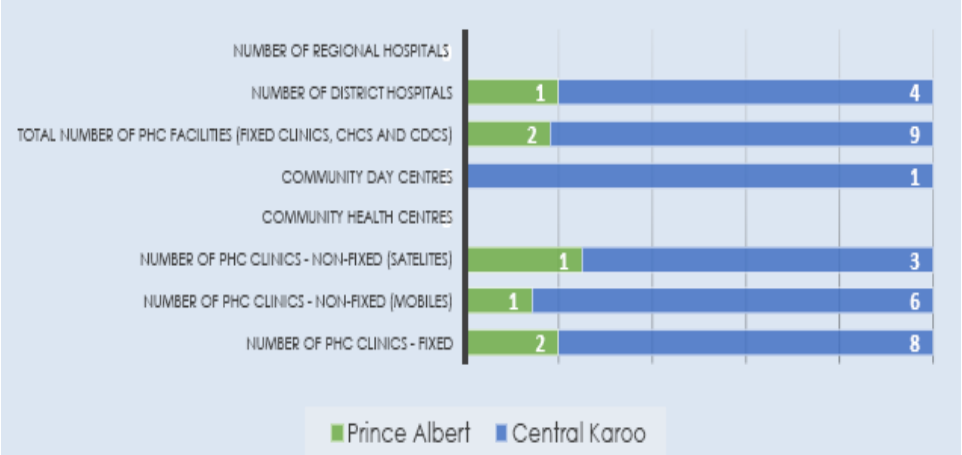
- A machine to process nappies in order to allow for save, environmentally friendly disposal
- Infrastructure that is suitable for the aged (no potholes)
- Transport for the service centre
- Financial support

### 3.5 Health

Good health is vital to achieving and maintaining a high quality of life. A diverse range of factors play a role in ensuring the good health of communities and that disease, especially preventable and contagious/communicable ones, are kept at bay. Some of the factors include lifestyle features that also depend on the provision of high

quality municipal services, such as clean water, sanitation, and the removal of solid waste. The information provided by the Department of Health as detailed in this section, pertains only to public sector healthcare institutions.

All citizens' right to access to health care services are directly affected by the number and spread of facilities within their geographical l reach. South Africa's healthcare system is geared in such a way that people must move from primary, with a referral system, to secondary and tertiary levels.




Source: 2020 SEP report

The Central Karoo District has a range of primary healthcare facilities which includes 8 fixed clinics, 9 mobile/satellite clinics, 1 community day centre and 4 district hospitals. Of these facilities, 2 fixed clinics, 2 mobile/satellite clinics and 1 district hospital are situated within the prince Albert municipal area.

### 3.5.1 EMS

| Health indicator | Prince Albert | Central Karoo |
|---|---|---|
| **EMS operational Ambulances** | 5 | 15 |
| **Population (2020)** | 14 671 | 78 022 |
| **No of operational ambulances per 10 000 people** | 3.58 | 2 |

Source: 2020 SEP report

Access to emergency medical services is critical for rural citizens due to rural distances between towns and health facilities being much greater than in the urban areas. Combined with the relatively lower population per square kilometre in rural areas, ambulance coverage is greater in rural areas in order to maintain adequate coverage for rural communities. Within the Central Karoo District, Prince Albert has 3.58 ambulances per 10 000 population, higher than the district average of 2.

Though these statistics may be within the Health Departments' norm of acceptable standards, the fact remains that the long distances between the respective towns and medical centra are a non-debatable life-threatening reality. This is more so now that the services at the local provincial hospital in Prince Albert have been further curbed in that the hospital is not allowed to accommodate birthing mothers except if they are already in labour. Pregnant women must be re-routed to medical centres outside the municipal borders, often nearly 200 kilometres away to have their babies. The medical theatre and staff is not equipped to deal with anything but the most basic care. This is seriously hampering not only medical care, but has a very negative impact on the finances of the vulnerable in the community. An accompanying problem that arises is the difficulty that the young parents have in obtaining the correct documentation to register their new borne. Late registration due to difficulty in obtaining the correct documentation may lead to delays in registration of children, resulting in hefty fines for parents.

The role that the home-based care health care programme plays in ensuring the health of community members cannot be emphasised enough. The Home-Based Care givers cover the towns of Klaarstroom, Prince Albert and Leeu Gamka and provide a safety net to the vulnerable in our communities.

### 3.5.2 HIV

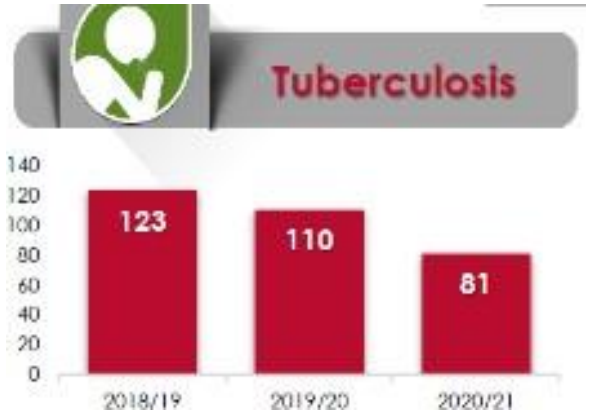
| Health Indicator | Prince Albert | Central Karoo |
|---|---|---|
| **Total registered patients receiving ART** | 279 | 2 037 |
| **No of new ART patients** | 15 | 326 |
| **HIV transmission rate** | 0.0% | 3.4% |

Source: 2020 SEP report

Patients receiving anti-retroviral treatment in the Prince Albert municipal area decreased by 33 between 2019 (312) and 2020 (279). The 279 patientsreceiving anti-retroviral are treated at 3 ART clinics/treatment sites. A total of 2 037 patients received anti retro viral treatment in CKD in 2020, down from 2050 in 2019.

In addition to improving the quality of life of the patient, anti-retroviral treatment to mothers both before and at birth, also decreases the chances that infants will contract HIV from their mothers. The most recent information for Prince Albert indicates a mother-to-child transmission rate of zero per cent which is lower than the 3.4 per cent District and the 1.4 per cent Provincial rate.

### 3.5.3 Tuberculosis (TB)




Source: 2020 SEP report

The number of TB patients in the Prince Albert decreased over the past few years, reaching 81 in 2020/21 treated at 6 clinics or treatment sites.

## 3.6 Child health

| Health indicator | 2019 | 2020 |
|---|---|---|
| **Immunisation** | 122.4% | 130.9% |
| **Neonatal mortality rate** | 26.3 | 0.0 |

Source: 2020 SEP report

A fall in the NMR may indicate improvement in new-born health outcomes, or it may potentially reflect reporting constraints.

### 3.6.1 Maternal health

| Health indicator | Prince Albert | Central Karoo |
|---|---|---|
| **Maternal Mortality ratio** | 0.0 | 0.0 |
| **Delivery rate to women under 18 years** | 16.9% | 13.3% |
| **Termination of pregnancy rate** | 0.0 | 0.0 |

**Maternal mortality rate:**

Prince Albert's most recent figures show a maternal mortality ratio of zero per 100000 live births which is the same as the district's ratio. The province has a maternal mortality ratio target of 65 per 100000 live births by 2020.

Births to teenage mothers: In 2020, the delivery rate to women under 20 years in the district was 17.7 per cent. At 11.9 per cent, Prince Albert's rate is lower than the district rate.

Termination of pregnancy: Prince Albert's termination of pregnancy rates of zero per 1000 live births is the same as the districts.

Overall, approximately half of the indicators for child and maternal health have improved in the last year which indicates that Prince Albert is making progress towards reaching its health targets. A concern is with regards to malnutrition rate which has increased sharply in the last year.

## 3.7 BASIC SERVICE DELIVERY

Basic service delivery is the primary responsibility of municipalities and plays an important role in poverty alleviation. In order to carry out this mandate, sufficient investment in infrastructure is necessary. Basic service infrastructure investment is not only essential to improving livelihoods, but also aids in the creation of jobs during development and maintenance and improving the competitiveness of private businesses. The data presented in this section analysed the state of basic services delivery, basic services infrastructure investment and revenue generation within Prince Albert.

The levels of access to basic services will be discussed below in terms of access to water, sanitation, energy, refuse removal and housing.

### 3.7.1 Households

In order to ensure basic service delivery to all, municipal budget allocations should be informed by credible and accurate assumptions regarding the number of households within a municipal area.

According to the latest available information from Quantec research for 2019. The latest official statistics was collected by Statistics South Africa for the 2016

Community Survey; the 2021 Census will provide the official statistics. There were 3 607 households within the greater Prince Albert region.

### 3.7.2 Water

According to the National Development Plan (NDP) all households must by 2030 have access to potable water above the minimum service level. This minimum service level is defined as any household with access to piped water less than 200 meters from their dwelling.

Access to piped water within the Prince Albert Municipal area stands at 98.4%. The municipality only has two informal settlements and access to water is shared between two structures. The Municipality is therefore on track to achieve the minimum servicelevel target as envisaged by the NDP.

### 3.7.3 Sanitation

Adequate sanitation can be defined as households with access to a flush toilet connected to a sewerage system. The biggest source of sanitationwas access to flush toilets connected to a sewerage system/chemical toilet whilst only 2.1 per cent of households make use of other sources of sanitation. Access to flush toilets/chemical toilets sits at 81.6%. A total of 94 households in Leeu-Gamka, PRASA area however still do not have any access to flush/chemical toilets.

### 3.7.4 Electricity

Adequate electricity can be defined as households with access toelectricity as primary source of energy for lightning purposes.

The biggest source of energy for lighting purposes in Prince Albert in 2020was electricity whilst 3.0 per cent of households make use of other sources of energy. Access to electricity within the municipal area sits at 95.3%.

### 3.7.5 Refuse removal

Adequate refuse removal can be defined as households whose waste is removed by a local municipality at least weekly.

Most households in Prince Albert have their refuse removed by local authorities at least weekly (95.4 per cent). Refuse removal takes place twice a week in Prince Albert as to curb illegal dumping.

### 3.7.6 Housing

The provision of affordable housing units remains a high priority for the Council of Prince Albert Municipality in order to restore the dignity of poor people and provide them with proper shelter asenshrined in Section 26 of the Constitution of South Africa, 1996. Housing can be defined as a formal dwelling. The three spheres of government (national, provincial, and local) share the responsibility for delivery of adequate housing.

The majority of households in the Prince Albert area reside in formal dwellings (93.9 per cent) whilst 6.1 per cent of the households reside either in informal, traditional and other dwellings.

## 3.8 SAFETY AND SECURITY

### 3.8.1 Murder

Within the Prince Albert area, the number of murders decreasedfrom 3 in 2019/20 to 2 in 2020/21. Prince Albert's murder rate (per 100 000 people) decreased from 18 in 2019/20 to 13 in 2020/21, while the murder rate (per 100 000 people) for the Central Karroo District also decreased from 33 in 2019/20 to 28 in 2020/21. The murder rate within Prince Albert area is below the district average

| MURDER | | 2018/19 | 2019/20 | 2020/21 |
|---|---|---|---|---|
| **Actual number** | Prince Albert | 2 | 3 | 2 |
| | Central Karoo District | 19 | 25 | 21 |
| **Per 100 000** | Prince Albert | 16 | 18 | 13 |
| | Central Karoo District | 25 | 33 | 28 |

### 3.8.2 Sexual Offences

*Sexual offences include rape (updated to the new definition of rape to provide for the inclusion of male rape), sexwork, pornography, public indecency and human trafficking.*

In 2020/21, there were 14 sexual offences in the Prince Albertmunicipal area compared to the 66 reported cases in the Central Karoo District. The incidence of sexual offences (per 100 000 people) in Prince Albert (95) was above the district average (89).

| SEXUAL OFFENCES | | 2018/19 | 2019/20 | 2020/21 |
|---|---|---|---|---|
| **Actual number** | Prince Albert | 21 | 15 | 14 |
| | Central Karoo District | 103 | 83 | 66 |
| **Per 100 000** | Prince Albert | 146 | 105 | 95 |
| | Central Karoo District | 138 | 111 | 89 |

### 3.8.3 Drug related offences

*Drug-related crimes refer to the situation where the perpetrator is found to be in possession of, under the influence of, or selling illegal drugs.* Drug-related crime within the Prince Albert area increased from 75 cases in 2019/20 to 89 cases in 2020/21. The Central Karroo District's drug-related offences also increased sharply from 545 in 2019/20 to 711 in 2020/21. When comparing Prince Albert area and the district's rate per 100 000 people, with 610 drug related offences per 100 000 people in 2020/21, the Prince Albert area is below the District's 946.

| Drug related offences | | 2018/19 | 2019/20 | 2020/21 |
|---|---|---|---|---|
| **Actual number** | Prince Albert | 187 | 75 | 89 |
| | Central Karoo District | 853 | 545 | 711 |
| **Per 100 000** | Prince Albert | 1 291 | 511 | 610 |
| | KarooDistrict | 1 138 | 725 | 946 |

### 3.8.4 Residential Burglaries

*The unlawful entry of a residential structure with the intent to commit a crime, usuallya theft.*

The number of residential burglaries in the Prince Albert area increased from 62 in 2019/20 to 75 in 2020/21. However, Prince Albert's rate of 511 per 100 000 population was below the district's 625 for 2020/21.

| RESIDENTIAL BURGLARIES | | 2018/19 | 2019/20 | 2020/21 |
|---|---|---|---|---|
| **Actual number** | Prince Albert | 54 | 62 | 75 |
| | Central Karoo District | 518 | 597 | 469 |
| **Per 100 000** | Prince Albert | 372 | 422 | 511 |
| | Central Karoo District | 692 | 794 | 625 |

### 3.8.5 Driving under the influence (DUI)

A situation where the driver of a vehicle is found to be over the legal blood alcohol limit. The number of cases of driving under the influence of alcohol or drugs in the Prince Albert municipal area shows a decrease from 8 in 2019/20 to 7 in 2020/21. This translates into a rate of 47 per 100 000 people in 2020/21, which is below the district's 66 per 100 000 people in 2020/21.

| DRIVING UNEDR THE INFLUENCE | | 2018/19 | 2019/20 | 2020/21 |
|---|---|---|---|---|
| **Actual number** | Prince Albert | 9 | 8 | 7 |
| | Central Karoo District | 186 | 240 | 50 |
| **Per 100 000** | Prince Albert | 60 | 53 | 47 |
| | Central Karoo District | 248 | 319 | 66 |
| **Fatal crashes** | Prince Albert | 6 | 4 | 7 |
| **Road user fatalities** | Prince Albert | 29 | 6 | 10 |

### 3.8.6 Indigent households

The Prince Albert municipal area experienced an increase in the number of indigents between 2017 and 2022, which implies an increased burden on municipal resources. The table below is based on the targets for the respective financial years.

| Services | Households 2017/18 | Households 2018/19 | Households 2019/20 | Households 2020/21 | Households 2021/22 |
|---|---|---|---|---|---|
| **Water** | 900 | 1 100 | 1 200 | 1 400 | 1 400 |
| **Electricity** | 900 | 1 100 | 1 200 | 1 400 | 1 400 |
| **Sanitation** | 900 | 1 100 | 1 200 | 1 400 | 1 400 |
| **Refuse removal** | 900 | 1 100 | 1 200 | 1 400 | 1 400 |

## 3.9 THE ECONOMY

### 3.9.1 Sectoral Overview

In 2019, the economy of Prince Albert was valued at R500. 5 million (current prices) and employed 3 878 people. Historical trends between 2015 and 2019 indicate that the municipal area realised an average annual growth rate of 0.6 percent which can mostly be attributed to the tertiary and secondary sectors that registered overall average annual growth rate of 1.9 percent and 0.6 percent, respectively.

In terms of sectoral contribution, the agriculture forestry & fishing sector (R87.5million in 2019 or 17.5 percent of total GDPR) was the main driver of growth in the Primary sector, while the General Government (R121.0 million or 24.2 percent), whole sale and retail trade, catering and accommodation (R74,7 million or 15.0 percent), transport, storage & communication (R44.1million or 8.8 percent) and finance, insurance, real estate and business services (R42.1 million or 8.4 percent) sectors were the main drivers that contributed to the positive growth in the tertiary sector.

The agriculture forestry & fishing sector is estimated to have performed relatively well in 2020, coming in with estimated growth of 11.6 percent. General government is also estimated to have grown strongly at 2.0 percent in 2020.

Employment creation for 2020 was poor overall, with most sectors registering poor employment growth or contractions in the number of jobs per sector. Overall, 192 jobs were shed, mostly through the losses in Community, social & personal services (loss 56 jobs), the wholesale & retail trade, catering & accommodation (loss of 51jobs) and Agriculture, forestry & fishing (loss of 42 jobs).

### 3.9.2 Formal and informal employment

It is estimated that Prince Albert's total employed will in 2022 amount to 3 686 workers of which 2 770 (75.1 percent) are in the formal sector while 916 (24.9 percent) are informally employed.

Most of the formally employed consisted of low-skilled (44.5 percent) and semi-skilled (38.2 percent) workers. Although the skilled category only contributed 17.2 percent to total formal employment (2020), it outpaced the other two categories in terms of average annual growth – between 2016 and 2020, the skilled cohort grew on average by 1.3 percent (albeit off a small base) while the semi-skilled and low-skilled categories grew at 0.6 and-1.3 percent, respectively. The growth in the skilled category reflects the market demand for more skilled labour. Evidently, the demand for skilled labour is on the rise which implies the need to capacitate and empower low-skilled and semi-skilled workers.

### 3.9.3 Unemployment

Prince Albert's unemployment rate of 16.5 percent in 2020 was the second lowest in the Central Karoo District (20.3percent). It was however notably lower than that the Western Cape's unemployment rate of 18.9 percent. The unemployment rates are concerning given that this estimate is based on the narrow definition of unemployment i.e., the percentage of people that are actively looking for work, but unable to find employment. In turn, the broad definition refers to people that want to work but are not actively seeking employment (excludes those who have given up looking for work).

| SECTOR | GDP R | | | EMPLOYMENT | | |
|---|---|---|---|---|---|---|
| | R million value 2019 | Trend 2015 – 2019 | Real GDP R growth 2020e | Number of jobs 2019 | Average annual change 2015 – 2019 | Net change 2020E |
| Primary sector | 87.5 | -2.6 | 11.6 | 1 352 | 37 | -42 |
| Agriculture, forestry &fishing | 87.5 | -2.6 | 11.6 | 1 352 | 37 | -42 |
| Mining & quarrying | - | - | - | - | - | - |
| Secondary sector | 69.7 | 0.6 | -13.4 | 281 | -2 | -41 |
| Manufacturing | 17.3 | 3.2 | -2.6 | 42 | 0 | -4 |
| Electricity, gas & water | 14.7 | 2.2 | -4.4 | 11 | 0 | -1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Tertiary sector** | 343.3 | 1.9 | -4.1 | 2 245 | 59 | -109 |
| **Wholesale & retail trade, catering & accommodation** | 74.7 | -0.2 | -10.7 | 674 | 13 | -51 |
| **Transport, storage & communication** | 44.1 | 1.6 | -14.8 | 110 | 2 | -3 |
| **Finance, insurance, real estate &business services** | 42.1 | 3.8 | -2.2 | 210 | 6 | -9 |
| **General government** | 121.0 | 2.2 | 2.0 | 578 | 7 | 10 |
| **Community, social & personal services** | 61.4 | 2.6 | -1.4 | 673 | 20 | -56 |
| **Prince Albert** | 500.5 | 0.6 | -18 | 3 878 | 84 | -192 |

| Skills level | Skill level | Average | number of jobs | |
|---|---|---|---|---|
| **Formal employment** | **Contribution (%)** | **growth (%) 2016 - 2020** | 2019 | 2020 |
| **Skilled** | 17.2 | 1.3 | 491 | 477 |
| **Semi-skilled** | 38.2 | 0.6 | 1 100 | 1 059 |
| **Low skilled** | 44.5 | -1.3 | 1 303 | 1 235 |
| **Total** | 100.0 | -0.2 | 2 894 | 2 770 |
| | | | | |

| **Informal employment** | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| **Number of informal jobs** | 1 113 | 1 034 | 1 057 | 1 023 | 984 | 916 |
| **% of total employment** | 29.0 | 27.1 | 27.5 | 26.5 | 25.4 | 24.9 |

| **Unemployment rate** | **2015** | **2016** | **2017** | **2018** | **2019** | **2020** |
|---|---|---|---|---|---|---|
| **Prince Albert** | 17.0 | 17.7 | 18.3 | 17.6 | 18.4 | 16.5 |
| | | | | | | |

### 3.9.4 PRINCE ALBERT SWOT ANALYSIS

The following table illustrates the Prince Albert municipality's main strengths, weaknesses, opportunities and threats that are based on the municipalities seven strategic goals:

| **Strengths** | **Weaknesses** |
|---|---|
| • Relatively low crime<br>• Tourism destination<br>• Good Agricultural sector<br>• High temperatures<br>• Well managed town<br>• Stable political environment<br>• Functioning ward committees<br>• Stable community<br>• Good public participation record<br>• Audit committee established and functional<br>• Clean environment<br>• Close to national roads, N1 & N12<br>• Silent and calm environment<br>• Popular place for adventures sports, cycling routes and hiking trails | • Some rural communities still have gravel roads<br>• Potholes in some areas<br>• Inadequate storm water drainage in some areas;<br>• Ageing service infrastructure<br>• Water storage capacity<br>• Limited public transport options<br>• Limited marketing<br>• Professional capacity shortage<br>• Division in the private sector, rather than cooperation<br>• Objections to reasonable and needed development<br>• Geographic isolation<br>• Apartheid spatial legacy |
| **Opportunities** | **Threats** |
| • Many developments opportunities<br>• Improve Public Transport Capitalising on the Extended Public Works Programme<br>• SMME Development<br>• Agri-processing | • HIV & AIDS<br>• Increase in crime<br>• ESKOM price increase<br>• Government Grant Dependency<br>• Increasing climate change, Droughts<br>• Brain drains<br>• Covid-19 pandemic |

# 4. FUTURE DEMAND ASSESSMENT

## 4.1 DEMOGRAPHICS PROFILE

### 4.1.1 Population and Households

Prince Albert's municipal area is divided into four wards. Ward, one includes the Leeu Gamka and Prince Albert Road areas, including surrounding farms, while ward 2 represents Klaarstroom, the farming areas surrounding Seekoeigat, Oukloof Dam and Drie Riviere as well as South End, Ward three includes the portion of Prince Albert North End surrounding the Pentecostal Protestant Church, while ward 4 includes the area of Rondomskrik and West end in Prince Albert. According to the 2020 projection population and household growth, PALM has a total population of 14 381 people, of which 84,5% are coloured, 11,8% are white, with the other population groups making up the remaining 3,7%.

Table 11 shows the 10-year (2020-2030) population and household projections for what are considered in the Municipal Spatial Development Framework as low (0.67%), medium (1.1%) and high (1.73%) growth scenarios.

**Table 11:** Projected 10-year (2020-2030) Population and Household Growth and Land Requirement Scenarios for each Sub Place and Town

| Area | Growth Rate % | Rank | Base Population 2020 | Base No. of Households 2020 (Household size 3.8) | Projected Population 2025 | No. of Households 2025 | Projected Population 2030 | No. of Households 2030 | Additional People 2020-2030 | Additional Households 2020-2030 | Land Required @ 25duha | Land Required (ha) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Prince Albert TownSP | 0.67 | Low | 1153 | 303 | 1192 | 314 | 1233 | 324 | 80 | 21 | 0.84 | 34 |
| | 1.1 | Med | | | 1218 | 321 | 1287 | 339 | 134 | 35 | 1.41 | |
| | 1.73 | High | | | 1257 | 331 | 1371 | 361 | 218 | 57 | 2.29 | 38 |
| North End SP | 0.67 | Low | 6595 | 1736 | 6820 | 1795 | 7052 | 1856 | 457 | 120 | 4.81 | |
| | 1.1 | Med | | | 6968 | 1834 | 7362 | 1937 | 767 | 202 | 8.07 | 44 |
| | 1.73 | High | | | 7191 | 1892 | 7841 | 2063 | 1246 | 328 | 13.11 | |
| Bitterwater SP | 0.67 | Low | 2290 | 603 | 2368 | 623 | 2449 | 644 | 159 | 42 | 1.67 | 16 |
| | 1.1 | Med | | | 2419 | 637 | 2556 | 673 | 266 | 70 | 2.80 | |
| | 1.73 | High | | | 2497 | 657 | 2723 | 716 | 433 | 114 | 4.55 | 17 |
| Welgemoed & Leeu Gamka SP | 0.67 | Low | 654 | 172 | 676 | 178 | 699 | 184 | 45 | 12 | 0.48 | |
| | 1.1 | Med | | | 691 | 182 | 730 | 192 | 76 | 20 | 0.80 | 19 |
| | 1.73 | High | | | 713 | 188 | 778 | 205 | 124 | 33 | 1.30 | |
| Klaarstroom | 0.67 | Low | 644 | 169 | 666 | 175 | 689 | 181 | 45 | 12 | 0.47 | 6 |
| | 1.1 | Med | | | 680 | 179 | 719 | 189 | 75 | 20 | 0.79 | 7 |
| | 1.73 | High | | | 702 | 185 | 766 | 201 | 122 | 32 | 1.28 | 7 |
| Non-urban | 0.67 | Low | 3045 | 801 | 3149 | 829 | 3256 | 857 | 211 | 56 | 2.22 | 2 |
| | 1.1 | Med | | | 3217 | 847 | 3399 | 894 | 354 | 93 | 3.73 | 4 |
| | 1.73 | High | | | 3320 | 874 | 3620 | 953 | 575 | 151 | 6.05 | 6 |
| Total Municipal Area | 0.67 | Low | 14381 | 3784 | 14871 | 3913 | 15378 | 4047 | 997 | 262 | 10.49 | 59 |
| | 1.1 | Med | | | 15194 | 3998 | 16053 | 4225 | 1672 | 440 | 17.60 | 66 |
| | 1.73 | High | | | 15680 | 4126 | 17097 | 4499 | 2716 | 715 | 28.59 | 77 |

## 4.2 PROPOSED FUTURE LAND DEVELOPMENTS

For the future land use and water demand scenario the potential future developments for the area were considered. Much of the growth population is likely to take place in the towns of Prince Albert (particularly North End) and Leeu Gamka. The potential areas for future developments are information gathered from the Spatial Development Frameworks prepared for Prince Albert, Leeu Gamka and Klaarstroom.

The potential areas for future developments were identified per town and are shown on Figure 3.1a to 3.1c as follows:

### 4.2.1 Prince Albert

P1 to P5 (24.9 ha) can accommodate 622 units at 25 dwelling units per hectare (du/ha). P2 can also accommodate a primary / high school.

All future vacant infill totals 62 ha, which can accommodate up to 1624 units at densities between 25-50 du/ha. These areas will take more than 15 years to be developed. See Figure 3.1a

### 4.2.2 Leeu Gamka

All future vacant infill totals 27 ha which can accommodate 675 units at 25 du/ha, these vacant infills will not be developed within 15 years. A total 19ha of land has been designated for future business, which only if there does become enough opportunity, should housing be pursued in this area. L4 and L5 as per table 23 will See Figure 3.1b

### 4.2.3 Klaarstroom

All future vacant infill totals 2.29 ha which can accommodate 56 units at 25 du/ha. A total 0.7ha of land has been designated for future business, namely a filling station. See Figure 3.1c

The table 12 below shows the Future Development Areas.

Table 12: Potential Future Land Development Areas

| Future Development Name | Anticipated Land use | Area (ha) | Density (Units per ha) | No of units | Time Relating Phasing |
|---|---|---|---|---|---|
| Prince Albert | | | | | |
| P1 | RDP Housing and Primary School | 15 | 50 | 350 - 521 | Medium Term |
| P2 | | 5 | 50 | 250 | Medium Term |
| P3 | Group housing | | 50 | 69 | Short to Medium Term |
| P4 | Group housing | 3.8 | 50 | 190 | Medium Term |
| P5 | Group housing | 2.5 | 50 | 125 | Medium Term |
| Total Prince Albert | | **83.3** | | **984** | |
| Leeu Gamka | | | | | |
| L1 | RDP Housing | | | 147 | Short to Medium Term |
| L2 | Group housing | | | 20 | Short to Medium Term |
| L3 | Residential | | | 92 | Short to Medium Term |
| L4 | Business | 19 | | | Long Term |

| | | | | | |
|---|---|---|---|---|---|
| L5 | Mixed Use | 27 | 25 | | Medium to Long Term |
| Sub-Total Leeu Gamka | | **46** | | **259** | |
| Klaarstroom | | | | | |
| K1 | Affordable housing | 0.57 | | 14 | Short to Medium Term |
| K2 | Affordable housing | 0.42 | | 10 | Short to Medium Term |
| K3 | Affordable housing | 1.3 | | 33 | Short to Medium Term |
| K4 | Business | 0.7 | | | Long Term |
| Sub-Total Klaarstroom | | **2.99** | | **57** | |

## 4.3 FUTURE WATER AND SANITATION DEMAND

### 4.3.1 Future Water Demand

For the purposes of this report, the following land use planning was used to calculate the water and sanitation demand based on The Neighbourhood Planning and Design Guide (2019) published by the Department of Human Settlements:

The table below shows the water demand for the potential future land developments:

Table 13: **Future Water Demand**

| Description | Unit | Qty | Water Demand (kl/unit/d) | AADD (kl/d) | Est. Real losses (%) | Total AADD (kl/d) |
|---|---|---|---|---|---|---|
| **Prince Albert** | | | | | | |
| Stands for low-income housing (waterborne sanitation) | Units | 984 | 0,4 | 394 | 25% | 493 |
| **Leeu Gamka** | | | | | | |
| Stands for low-income housing (waterborne sanitation) Add 31kl/d for Business 0,55kl/d was used for Mixed Use | Units | 259 | 0,4 | 130 | 25% | 162 |
| **Klaarstroom** | | | | | | |
| Stands for low-income housing (waterborne sanitation) Add 4kl/d for Business | Units | 57 | 0.4 | 23 | 25% | 34 |

### 4.3.2 Future Sewer Discharge

The sanitation demand (peak daily dry weather flow) was calculated based on 90% of the AADD. See table below:

Table 14: **Future Sewer Discharge**

| Description | Unit | Qty | Sewer flow (kl/unit/d) | PDDWF (kl/d) | Groundwater Infiltration (%) | SW Infiltration (%) | PDWWF (kl/d) |
|---|---|---|---|---|---|---|---|
| **Prince Albert** | | | | | | | |
| Stands for low-income housing (waterborne sanitation) | Units | 984 | 0,36 | 354 | 10% | 30% | 987 |
| **Leeu Gamka** | | | | | | | |
| Stands for low-income housing (waterborne sanitation) | Units | 259 | 0,36 | 93 | 10% | 30% | 392 |
| **Klaarstroom** | | | | | | | |
| Stands for low-income housing (waterborne | Units | 57 | 0.36 | 20 | 10% | 30% | 119 |

### 4.3.3 Water Demand Projections

A summary of the projected water demand for the next 15 years is provided in Table 15 below.

Table 15: **Current and Future Demand Summary Projections**

| USER | ACTUAL PRESENT AADD (kl/d) - 2022 | POTENTIAL FUTURE AADD (kl/d) - 2037 |
|---|---|---|
| **PRINCE ALBERT** | | |
| Existing formal Stands | 2 000 | 2 120 |
| Potential Future Developments | | 493 |
| **SUB-TOTAL** | **2 000** | **2 613** |
| **LEEU GAMKA** | | |
| Existing formal Stands | 600 | 655 |
| Potential Future Developments | | 162 |
| **SUB-TOTAL** | **600** | **817** |
| **KLAARSTROOM** | | |
| Existing formal Stands | 120 | 135 |
| Potential Future Developments | | 34 |
| **SUB-TOTAL** | **120** | **169** |
| **TOTAL** | **2 720** | **3 599** |

### 4.3.4 Waste Water Discharge Projections

**Table 16: Current and Future Discharge Projections**

| USER | ACTUAL PRESENT PDDWF (kl/d) - 2022 | POTENTIAL FUTURE PDDWF (kl/d) - 2037 |
|---|---|---|
| **PRINCE ALBERT** | | |
| Existing formal Stands | 800 | 917 |
| Potential Future Developments | | 354 |
| **SUB-TOTAL** | **800** | **1 271** |
| **LEEU GAMKA** | | |
| Existing formal Stands | 296 | 315 |
| Potential Future Developments | | 93 |
| **SUB-TOTAL** | **296** | **408** |
| **KLAARSTROOM** | | |
| Existing formal Stands | 44 | 55 |
| Potential Future Developments | | 20 |
| **SUB-TOTAL** | **44** | **75** |
| **TOTAL** | **1 140** | **1 754** |

## 4.4 IMPACT OF PROJECTED FUTURE DEMAND

The impact that the projected future demand will have on the water and sanitation infrastructure per town is as follows:

### 4.4.1 Prince Albert Sanitation Infrastructure

**Discharge:** The existing daily flow is 800 kℓ/d, which will increase to 1 271 kℓ/d when proposed development areas are developed.

**Waste Water Treatment Plants:** The existing capacity at the WWTP is 623 kℓ/d (Green Drop Report 2022). This indicates that the plant currently is operating above its design capacity. An upgrade of 700 kℓ/d will be required.

### 4.4.2 Leeu Gamka Sanitation Infrastructure

**Discharge:** The existing daily flow is 296 kℓ/d, which will increase to 408 kℓ/d when proposed development areas are developed.

**Waste Water Treatment Plants:** The existing design capacity of the WWTP is 160 kℓ/d. This indicates that the plant currently is operating above its design capacity. An upgrade of 340 kℓ/d will be required.

### 4.4.3 Klaarstroom Sanitation Infrastructure

**Discharge:** The existing daily flow is 44 kℓ/d, which will increase to 75 kℓ/d when proposed development areas are developed.

**Waste Water Treatment Plants:** The existing capacity at the WWTP is 130 kℓ/d which means that with the developments being developed, there will be spare capacity to service the proposed residential areas' flow.

## 4.5 HYDRAULIC ANALYSIS AND MODELLING – EXISTING SYSTEM

## 4.6 SEWER FLOW AND PEAK FACTORS

### 4.6.1 Present and future

Existing systems were evaluated based on their maximum potential present PDDWF, i.e., as though all presently developed stands are occupied based on their land use. For planning of future systems, PDDWF's of all potential future developments were added

### 4.6.2 Peak factors

The peak factors used for this study are dependent on type of land use in the area under consideration, and the magnitude of water demand in the area, and are prescribed in Table J9 of The Neighbourhood Planning and Design Guidelines (Guidelines for Human Settlement Planning and Design - Dept. of Housing, July 2019).

## 4.7 OPERATIONAL CRITERIA

### 4.7.1 Maximum and minimum pressures, Firefighting flows

The minimum gradient of gravity mains should be such that a minimum flow velocity of > 0,6 m/s at full flow capacity, can be maintained.

### 4.7.2 Flow velocities – Gravity mains

A minimum of 0,6 m/s should be maintained in all gravity mains to ensure that sufficient scouring of the mains takes place. The maximum flow velocity under full flow conditions should be no more than 2,5 m/s to prevent damage to the pipelines, although a higher flow velocity of up to 4,0 m/s may be acceptable over short pipe lengths and for short periods. Flow velocity criteria are summarised as per Table K.15 of The Neighbourhood Planning and Design Guidelines.

### 4.7.3 Flow velocities – Rising mains

Flow velocities must be limited in order to protect pipeline coatings and reduce the effects of water hammer. The preferred maximum allowed is 1,8 m/s, but an absolute maximum of 2,2 m/s is acceptable where only intermittent peak flows occur.

## 4.8 EXISTING SANITATION SYSTEM

### 4.8.1 Overview

The Civil Designer program was used to inspect the state of the existing sewer systems in the different areas. The cadastral information received, pipe sizes and topographical survey were used to calculate the flows of the existing system. The modelling of the sewer system was done using the unit flows and the peak factor was determined by use of the attenuation curve which relies on the number of erven contributing to the system.

The results of the existing sewer system analysis are presented in the following figures:

- Figure 3.2 shows the existing sewer spare capacities.
- Figure 3.3 shows the existing sewer full flow velocities under full flow conditions

### 4.8.2 Required Existing Work

- No pipe upgrades at PALM to be done as the existing sewer system is adequate. See Figure 3.6

## 4.9 FUTURE SEWER DRAINAGE AREAS AND SEWER FLOWS

### 4.9.1 Extended drainage areas

The proposed extended and new drainage areas for the future systems are shown on Figure.3.7

### 4.9.2 Spare Capacities

Figure 3.4 shows the relative spare capacities in the future PALM system under IPDWF. All pipes were planned in accordance with the IPDWF philosophy for spare capacity > 30%.

### 4.9.3 Flow velocities under peak flow conditions

All future pipes were planned for v > 0,6 m/s under full flow conditions. A few existing pipes with sufficient capacity but low velocities are however still present as indicated on Figure 3.5

### 4.9.4 PRINCE ALBERT

A new main outfall sewer is proposed for future development areas P1 to P5 and the existing erven in the South drainage area that are currently not connected to the existing sewer system. See Figure 3.8a

### 4.9.5 LEEU GAMKA

The existing Leeu Gamka drainage area is increased to accommodate the areas of future development area L1 that falls within this drainage area. As shown on Figure 3.8b

A new Future pump station PS 1 drainage area is proposed for future development areas. A new pump station and rising main that discharges into future pump station 3 should be constructed for this new drainage area.

A new Future pump station PS 2 drainage area is proposed for future development areas in Leeu Gamka. A new pump station and rising main should be constructed for this new drainage area.

A new Future pump station PS3 drainage area is proposed for future development areas east of the N1 national road in Leeu Gamka. A new pump station and rising main should be constructed for this new drainage area that discharges into the existing Leeu Gamka drainage area

When the existing Leeu Gamka pump station reaches capacity, it should be upgraded to a capacity of 21 l/s and the existing rising main should be upgraded to a diameter of 160 mm.

### 4.9.6 KLAARSTROOM

The existing Klaarstroom drainage area is increased to accommodate future development areas that fall within this drainage area.

A new Future pump station K1 drainage area is proposed for future development areas in Klaarstroom. A new pump station and rising main should be constructed for this new drainage area that discharges into the existing Klaarstroom drainage area see Figure 3.8c

A new pump station K2 and rising main should be constructed from the informal settlement area.

## 5. INSTITUTIONAL ARRANGEMENTS AND REQUIRED AUTHORIZATIONS

### 5.1.1 Introduction

Institutional arrangements are policies, systems, processes, and structures used by the municipality to legislate plan and manage their activities efficiently and effectively coordinate with others in fulfilling their mandates.

## 5.2 Existing PALM Water Services Institutional Arrangements

### 5.2.1 Water Service Authority Functions and Outputs

PALM is the official Water Services Authority (WSA) within this municipality. Its functions and outputs are briefly summarised in the following table.

**Table 17:** Functions and Outputs

| WSA functions / output | In place? (YES/NO/ N/A) | Resources available to perform function? (YES/NO/N/A) | | | | If NO, when will it be in place? | Support required (YES/NO) |
|---|---|---|---|---|---|---|---|
| | | Budget | Bylaws | Infra-structure | Personnel | | |
| **Policy development** | | | | | | | |
| Indigent policy | Yes | Yes | No | Yes | Yes | - | No |
| Free basic water policy (including equitable share) | Linked to Indigent Policy | Yes | No | Yes | Yes | - | No |
| Free basic sanitation policy | Linked to Indigent Policy | Yes | No | Yes | Yes | - | No |
| Procurement policy | Yes | Yes | No | Yes | Yes | - | No |
| Credit control & debt collection policy | Yes | Yes | No | Yes | Yes | - | No |
| **Regulation & tariffs** | | | | | | | |
| Water services bylaws with conditions as required by the Water Services Act | **No** | No | N/A | Yes | No | 2009 | **Yes** |
| Mechanisms to ensure compliance with bylaws | **No** | No | No | Yes | No | 2009 | **Yes** |
| Tariff structure | Yes | Yes | No | Yes | Yes | - | No |
| Tariffs promulgated | Yes | Yes | No | Yes | Yes | - | No |
| **Infrastructure development (projects)** | | | | | | | |
| Mechanisms to undertake project feasibility studies | Yes | Yes | N/A | Yes | Yes | - | **Yes** |
| Criteria for prioritizing projects | Yes | Yes | No | Yes | Yes | - | **Yes** |
| Mechanisms to assess and approve project business plans | Yes | Yes | No | Yes | Yes | - | No |
| Mechanisms for selecting, contracting, managing, and monitoring implementing agents | Yes | Yes | No | Yes | Yes | - | |
| Mechanisms to monitor project implementation | Yes | Yes | No | Yes | Yes | - | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Water conservation and demand management** | | | | | | | |
| Water conservation and demand management strategy | Draft proposed in WSDP | No | No | Yes | No | 2008 | **Yes** |
| **Performance management and monitoring** | | | | | | | |
| Performance management systems | **No** | No | No | Yes | Yes | 2008 | **Yes** |
| Water service monitoring and evaluation (M&E) system | **No** | No | No | Yes | Yes | 2008 | **Yes** |
| **WSDP** | | | | | | | |
| WSDP information system | **No** | No | No | Yes | No | 2008 | **Yes** |
| Mechanisms for stakeholder participation | Yes | Yes | No | Yes | Yes | - | No |
| Mechanisms to monitor and report on WSDP implementation | **No** | No | No | Yes | No | 2008 | **Yes** |
| **WSDP institutional arrangements** | | | | | | | |
| Criteria to select appropriate WSPs | **No** | No | No | Yes | No | 2009 | **Yes** |
| Mechanisms to contract, manage and monitor WSPs | **No** | No | No | Yes | No | 2009 | **Yes** |
| Mechanisms to approve WSP business plans | **No** | No | No | Yes | No | 2009 | **Yes** |
| **WSA overall capacity** | | | | | | | |
| Sufficient staff and systems to fulfil all WSA functions. | **No** | No | No | Yes | No | 2009 | **Yes** |
| Other (state) | - | - | - | - | - | - | - |

### 5.2.2 WSA Capacity Development

Training and awareness development is continuously promoted by the PALM although funding limits the extent of these awareness campaigns. Wherever new or upgrade developments occur the end users are informed of the benefits and management of these services

Table 18: Public Awareness and Skills Development

| Training and skills development interventions | Up to NQF Level 1 | NQF Level 2 | NQF Level 3 | NQF Level 4 | NQF Level 5 | NQF Level 6 | NQF Level 7 | NQF Level 8 | Total |
|---|---|---|---|---|---|---|---|---|---|
| ABET | 1 | | | | | | | | 1 |
| Client service | | | | 3 | | | | | 3 |
| Computer Literacy | 3 | | | 9 | | 1 | | | 13 |
| Financial | 3 | | | 2 | | 1 | | | 6 |
| Project Management / Planning | 3 | | | 5 | | 1 | | | 9 |

### 5.2.3 By laws affecting water services

The by-laws for the provision of water and sewer are not in place for the Prince Albert Municipality.

### 5.2.4 Retail water service providers

The PALM is the Water Services Provider for retail water. PALM acts as both WSA and WSP to the consumers in Prince Albert, Leeu-Gamka and Klaarstroom.

Table 19: **Water and Sanitation Resource Availability (Bulk and Retail Functions)**

| Bulk & Retail Functions | | Resources available to perform function? (YES/NO) | | | |
|---|---|---|---|---|---|
| | | Budget | Bylaws | Infrastructure | Personnel |
| 1. | Water services providers (retail water) | Yes | No | Yes | Yes |
| 2. | Water service providers (sanitation) | Yes | No | Yes | Yes |
| 3. | Water service providers (bulk water) | Yes | No | Yes | Yes |
| 4. | Water service providers (bulk sanitation) | Yes | No | Yes | Yes |
| 5. | Support service agents (water) | Yes | No | Yes | Yes |
| 6. | Sanitation promotion agent | No | No | No | No |
| 7. | Support service contracts | Yes | No | Yes | Yes |
| 8. | Water service institutions | No | No | No | No |
| 9. | WSP staffing levels: water | Yes | No | Yes | Yes |
| 10. | WSP staffing levels: sanitation | Yes | No | Yes | Yes |
| 11. | WSP training programme | Yes | No | Yes | Yes |

### 5.2.5 WSP training programmes

Given the importance of building capacity, and the role which training plays, the WSDP needs to include information on training as it relates to the provision of water services. Both accredited training programmes and non-accredited training should to be identified, together with the number of person days of training per year provided for, over five-year period.

### 5.2.6 Required Authorizations

The municipality does not have plans in place for all authorization requirements in terms of water and sanitation infrastructure.

PALM, as the authority responsible for ensuring access to and delivery of water supply and sanitation services, is authorised by the WSA to choose the appropriate institutional arrangement for providing these services. The process for determining a provider of municipal services may be a rigorous one, but it is important to ensure that providers have the capacity and are well suited to deliver these services.

Once a municipality has selected a preferred institutional arrangement, municipalities, water service providers and water boards must work together in a coordinated way to ensure everyone has access to water services. This entails adequate and coordinated planning, sufficient financial resources, and coordinating tariff structures that are affordable and sustainable. The financial

capabilities of the institution, however, pose problems to effective service deliver– which impacts on all other areas of managing water services.

Managing water services is a complex process that involves different institutions working together in a coordinated way. If one institution is not functioning optimally it adversely affects the chain of service delivery, implicating constitutional rights in the process.

### 5.2.7 Recommended Capacity Development

Capacity building is the process of strengthening a system or organization in order to increases its effectiveness, impacts, and achieve its goals and sustainability over time.

So institutional arrangements for capacity building are the necessary policies, systems and structures used to plan and manage the process of capacity building for an organization in a holistic manner.

It is important for municipality to consider additional measures to boost their capacity.

Below are the recommendations to assist the municipality capacitate the water and sanitation department:

- A focus by the municipality to be on organizational capability development rather than individual capacity building.
- The municipality to have a capacity building programme with clear outcome targets for the water and sanitation department
- The municipality should focus on long term improvements rather than short term fixes.
- Transfer of skills
- Education, training, and public awareness
- Municipality could also request the assistance of MISA with the qualified personnel to assist on a contract basis with the agreement that the municipality will absorb the staff.

## 6. PROJECT PRIORITIZATIONS AND COST ESTIMATES

The table below indicates the prioritized current water and sanitation projects, funded projects, proposed projects as per WSMP

Table 20: Water and Sanitation Projects

Table 21: Proposed works, cost estimates & phasing – Future system for Prince Albert

| Item No. | Description | Estimated Cost* (R-yr 2022/2023 value) | Time Related Phasing | Comments |
|---|---|---|---|---|
| **Prince Albert** (Ref. Fig. 3.8a) | | | | |
| **Distribution System Items** | | | | |
| PAS1.1 | 318 m x 160mm dia new outfall sewer | R 460 479.00 | 2030 | New outfall sewer for future P1 |
| PAS1.2 | 330 m x 160mm dia new outfall sewer | R 476 566.00 | 2030 | New outfall sewer for future P2 |
| PAS1.3 | 1049 m x 160mm dia new outfall sewer | R 2 402 937.00 | 2030 | |
| | | | | |
| **Sub-totals Distribution System Items** | | **R 3 339 982.00** | | |
| **Totals** | | **R3 339 982.00** | | |

Table 22: Proposed works, cost estimates & phasing – Future system for Leeu Gamka

| **Item No.** (Ref. Fig. 3.8b) | **Description** | **Estimated cost *** (R-yr 2022/23 value) | **Time Related Phasing** | **Comments** |
|---|---|---|---|---|
| **Leeu Gamka** | | | | |
| **Distribution System Items** | | | | |
| LGS1.1 | 1500 m x 160mm dia new sewer pipe | R 2 298 375.00 | 2025 | Additional demand from new developments |
| LGS1.2 | 1800 m x 160 mm dia new sewer pipe | R 2 681 437.00 | 2025 | Additional demand from new developments |
| LGS1.3 | 1100 m x 160 mm dia new sewer pipe | R 1 532 250.00 | 2030 | Additional demand from new developments |
| LGS1.4 | 520 m x 160 mm dia new sewer pipe | R 766 125.00 | 2030 | Additional demand from new developments |
| **Sub-totals Distribution System Items** | | **R 7 278 187.00** | | |
| **Bulk Supply Items** | | | | |
| LG BS 1 | Upgrade Leeu Gamka pump station to 21l/s | R 426 295.00 | 2030 | Additional demand from new developments |
| LG BS 2 | New 9l/s Future PS | R1 055 684.00 | 2030 | Additional demand from new developments |
| LG BS 3 | New 3l/s Future PS | R 900 850.00 | 2030 | Additional demand from new developments |
| LG BS 4 | New 5l/s Future PS | R 900 850.00 | 2030 | Additional demand from new developments |
| **Sub-totals Bulk Supply Items** | | **R 3 283 679.00** | | |
| | | | | |
| **TOTALS** | | **R 10 561 866.00** | | |

Table 23: Proposed works, cost estimates & phasing – Future system for Klaarstroom

| **Item No.** (Ref. Fig. 3.8c) | **Description** | **Estimated cost *** (R-yr 2022/23 value) | **Time Related Phasing** | **Comments** |
|---|---|---|---|---|
| **Klaarstroom** | | | | |
| **Distribution System Items** | | | | |
| KS1.1 | 1000m x 125 mm dia sewer pipe | R 780 201.00 | 2030 | Additional flow from new developments |
| KS1.2 | 120m x 110 mm dia sewer pipe | R 170 920.00 | 2030 | Additional flow from new developments |
| | | | | |
| **Sub-totals Distribution System Items** | | **R 951 121.00** | | |
| **Bulk Supply Items** | | | | |
| KS BS 1 | New PS | R 900 850.00 | 2030 | New pump station for future areas |
| **Sub-totals Bulk Supply Items** | | **R 900 850.00** | | |
| | | | | |
| **TOTALS** | | **R 1 851 971.00** | | |

## 7. FUNDING AND IMPLEMENTATION ARRANGEMENTS

Below is the list of all the sources of funding for Prince Albert Municipality:

### 7.1.1 Sources of Funding

- Municipal Infrastructure Grant – Human Settlement Network
- Taxes on water, houses, market, and vehicles
- Tariffs and Levies
- Municipal Drought Relief Grant - Boreholes
- Water Services Infrastructure Grant – Sewer and Water Mains
- Working for Water - DWAF
- CRR (Cumulative Risk Ratio) – WTW & WWTW; Pumps
- DBSA

The Municipality has a total budget of R 75 920 182.41 for water and sanitation projects for 2022 – 2025.

### 7.1.2 Green Bond Framework / Projects

Green bonds are specifically destined for the funding of projects that are sustainable and socially responsible in areas as diverse as renewable energy, energy efficiency, clean transportation, and responsible waste management.

The green bond framework should be aligned with Green Bond Principles and as such it should rests on the values of transparency, disclosure, and reporting. The green bond principles are set out in terms of four key components, viz. use of proceeds, process for project evaluation and selection, management of proceeds and reporting.

The Municipality to have an independent service provider to review its green bond programme and its compliance with its green bond framework.

PALM during their Local Economic Development review process have identified the Alternative Green Energy Project (develop solar energy, wind farms and waste to energy) with the objective of developing new energy industries to encourage green growth and sustainable development.

The municipality to take the following actions / activities in terms of green projects:

- Research green energy projects relevant to PALM and identify possible business opportunities and investors.
- Source in expertise through external funding to assist municipality to get policies and by-laws in place as prescribed by legislation and regulatory bodies.

### 7.1.3 Project Implementation

The municipality strive to put people and their concerns first and ensuring constant contact with communities through effective public participation platforms and create conditions for decent living by consistently delivering municipal services to the right quality and standard.

# 8. RISK MANAGEMENT

## 8.1 CRITICAL ASSETS TO THE WATER SYSTEM

First, a little about determining which assets should be considered critical to your water system. Critical assets are defined as assets that sustain your water or wastewater systems performance. Determining the criticality of assets is based on an asset having a high risk of failure, and, major consequences if it does fail.

Water and wastewater systems are made up of assets. Some of these assets are buried and are "invisible" while others are visible. Water system assets include **wells, pipes, valves, storage tanks, pumps, water treatment plants** and any other components that are necessary to operate the water system. Wastewater system assets include ponds, mechanical plants, pumps, lift stations, valves, collection lines, force mains, manholes and any other components that are necessary to operate the wastewater system. As a water and/or wastewater system ages and deteriorates, the assets will lose value over time. As this happens, the level of service that the utility's customer's desire may become compromised, operation and maintenance costs can increase and the WSA may have extreme costs that it cannot afford.

## 8.2 IMPACTS OF FAILURE AND RISK OF CRITICAL ASSETS

### 8.2.1 Water sources

Contamination and reduced water quantity are two concerned problems associated with water sources. Contamination of source water is of concern because contaminants can enter surface or ground water sources and make it difficult removed in the treatment utilities. Reduced water quantity is of concern because customers would not have enough water if this happened.

The variations of water quantity and quality are important characteristics of a water source since they influence the operations of the following water treatment and the finished water supplied to the customers (WHO, 2004). A water source is vulnerable to multiple external hazards or threats, and would thus be contaminated or in the condition of reduced capacity. Generally, the potential hazards or threats are categorised as natural and human-caused factors. Important natural factors include drought, flood, underground minerals, etc. Human-related factors include sewage discharge, industrial discharge, wilful chemical/biological contamination, etc. For example, discharge of municipal wastewater can be a major source of pathogens; urban runoff and livestock

can contribute substantial microbial load; and serious drought can dramatically reduce the quantity supplied to customers, etc. (WHO, 2004) Associated with these hazards, relative failure states and risks are identified for the water source object and summarised in Table 24.

### 8.2.2 Water treatment plant

Water treatment, the primary barrier to prevent contaminants from reaching the customer, may not be effective due to failures inside the treatment plant, and thus introduce contaminants to the distribution system analysed the reliability of water supply system by including the reliability of treatment plant operations.

Water treatment plant is the most important facility in a water supply system to remove contaminants in raw water, disinfect treated water, and produce drinkable water to consumers. However, hazards may be introduced during the process of treatment, or hazardous circumstances may allow contaminants to pass through treatment in significant concentrations. Constituents of drinkable water can be introduced through the treatment process, including chemical additives used in the treatment process or products in contact with water. Furthermore, suboptimal filtration following filter backwashing can lead to the introduction of pathogens into the distribution system. Meanwhile extreme natural hazards, wilful human attacks, or interdependency failures (e.g., power failures) can all introduce risks in water treatment process.

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**Table 24:** Hazards or threats associated with basic components in a water supply system

| Basic components | Failure states | Hazards/Threats | Relative risk |
|---|---|---|---|
| Water source | Natural hazards failure | Drought | Reduced water quantity |
| | Natural hazards failure | Flood<br>Underground minerals | Water contamination |
| | Human-caused threat | Sewage discharge<br>Industrial discharge<br>Livestock<br>Chemical/biological | Water contamination |
| | Interdependence failure | Spills<br>Contaminated site | Water contamination |
| Water treatment plant | Natural hazards failure | Earthquake<br>Flood | Reduced water quantity and water contamination |
| | Human-caused threat | Chemical/biological | Water contamination |
| | Operational failure | Process control<br>Equipment failure<br>Alarm and monitoring<br>Inadequate backup<br>Inappropriate treatment | Reduced water quantity and water contamination |
| | Interdependence failure | Power failure | Reduced water quantity and water contamination |
| | Interdependence failure | Contaminated material | Water contamination |
| Pipe | Natural hazards failure | Earth movement | Reduced water quantity |
| | | Flood | Reduced water quantity and water contamination |
| | Operational failure | External load<br>Temperature<br>Internal pressure<br>Natural deterioration | Reduced water quantity |
| | Operational failure | Regrowth of organism<br>Leaching of chemicals | Water contamination |
| | Interdependence failure | Contaminated water<br>Contaminated soil | Contamination |
| Pump | Natural hazards failure | Earthquake<br>Flood | Reduced water quantity |
| | Human-caused threat | Bombing | Reduced water quantity |
| | Operational failure | Control failure<br>Equipment failure<br>Alarm and monitoring<br>Inadequate backup<br>Age | Reduced water quantity |
| | Interdependence failure | Power failure | Reduced water quantity |
| Storage | Natural hazards failure | Animal<br>Rainfall | Water contamination |
| | Human-caused threat | Disruption of structure | Reduced water quantity |
| | Human-caused threat | Chemical/biological<br>Contaminated water | Water contamination |

### 8.2.3 Pipes

Pipelines are the most important part in a water distribution network. Extensive research has been performed to analyse the risks associated with them among which are leakage, deterioration, corrosion, contamination intrusion, etc. Leakages of pipes can occur from multiple reasons such as slow deterioration caused by mechanical cycling of pipes, joints, and fittings; corrosion of the internal or external surfaces of network components; specific events and situations such as ground movement, stresses from road traffic, excessive water pressure; and/or faulty workmanship or construction

Leakage rates can range from a slow leak or “drip” to large compromise of integrity called a “main break.” Examples of typical drips include loose joints, gaskets, or service connections. Typical examples of a break include a longitudinal crack in a pipe body or end bell, a circumferential crack in a pipe body, or a through-wall penetration of a network component. Drips usually result in loss of water. While main breaks in large transmission lines could result in wide spread outages and/or present the potential for contamination.

Normally, water contamination events in the pipelines in distribution system can be influenced by five major categories as (Kleiner 1998):

- Intrusion of contaminants into the distribution system through system components whose integrity was compromised or through misuse;
- Regrowth of micro-organisms in the distribution network;
- Microbial/Chemical breakthrough and by-products and residual chemicals from water treatment plant;
- Leaching of chemicals and corrosion products from system components into the water; and
- Permeation of organic compounds from the soil through system components into the water supplies.

Based on the above discussion, Table 24 summarises the hazards, relative failure states and risks associated with pipes in the water supply systems.

### 8.2.4 Pump

Pumps also play the important roles in the process of delivering water. However, hazards or threats sometimes more easily affect pumps than pipes because it is visible and its normal operation depends highly on control, equipment reliability, and human proper activity. In risk analysis of pumps, analysts must consider all the four failure states, i.e., natural hazard failure, human-caused failure, operational failure, and interdependence failure. Hazards to pumps in a water supply system are listed in Table 24.

### 8.2.5 Storage

Water storages are another important part contributing to water quality problems in distribution systems besides pipes. Contamination can occur within the distribution system through open or insecure treated water storage reservoirs and tanks, as they are potentially vulnerable to surface runoff from the land and to attracting animals and waterfowl as faecal contamination sources and may be insecure against vandalism and tampering (WHO, 2004). Meanwhile water quantity can also be decreased due to cracks of storage facilities. Table 24 lists the hazards, failure states, and relative risks of storage in water supply systems.

## 8.3 IMPACT OF LOAD SHEDDING ON THE WATER AND WASTEWATER SYSTEMS

### 8.3.1 Water and Sewer Treatment Plant

All the Water Treatment Plants in Prince Albert have backup generators, i.e., Klaarstroom and Leeu Gamka have automatic generators and Prince Albert's has a manual generator. Only Leeu Gamka WWTP has a manual generator. Only Leeu Gamka WWTP has a generator.

With the current state of electricity, the situation of water supply is exacerbated especially where Municipalities are already battling to supply water full time to their communities.

### 8.3.2 Pumps

We need to understand that when a water pump ceases to operate it is not as simple to replace. There are certain municipal supply chain procedures that must be followed by the Municipality to get the pump either repaired or replaced. This can take weeks or even months. Load shedding does not only stop pumps from working but the whole plant. There are many stages that water goes through in order to be safe for consumption after abstraction from a river or borehole and most processes are done electronically. When the power goes off it means that the plant ceases to operate. PALM to install automatic pumps with back-up power supply in the case of load shedding.

### 8.3.3 Conclusion

The main challenge for the municipality is enhancing and further developing the current bulk service offering. The municipality stated that power outages and load-shedding have had a notable impact on the operational aspect of water services and other bulk services. This has thus impacted on the overall bulk service security.

Power outages have a noticeable impact on PALM water services infrastructure. Not only have power outage caused damage to existing equipment, but they also have necessitated the purchase of further equipment. Power outages have negatively affected the delivery of potable water to end

users. Pumping is the most critical function in the distribution of water from boreholes and pump stations (used in water/wastewater treatment plants and those used for the reticulation of water).

Power outages have caused damage to infrastructure: telemetry equipment (which electronically interlinks the operation of water systems) and motor equipment are often damaged; pumps are sometimes caused to overheat when power outages impact on normal processes within water and wastewater treatment facilities, as well as the distribution of water to end users. The costs associated with the replacement and repair of broken and damaged infrastructure, due to power outages, is estimated to be ±R 250 000 per year for the total PALM.

Loadshedding not only causes serious damage to expensive machinery and equipment, but also leads to an increase in crime and infrastructure vandalism which is already costing municipalities millions of rands in repair work and replacements – money that was destined for crucial maintenance.

Even though load shedding is the enemy of all, it teaches us a valuable lesson for future planning. As communities continue to grow and more Water and Waste Water Treatment Plants are constructed, backup power supply should be included as part of the plan.

The following Plants require generators:

- Prince Albert WWTP, Klaarstroom WWTP
- Prince Albert WTP has a manual generator this must be changed to an automatic generator in cases where load shedding occurs after hours.

As per MTREF project list for 2022 to 2025 financial years, PALM requires an estimated R 3 000 000.00 to purchase power generators to provide back-up for its water services during periods of load-shedding.

# ANNEXURES

Figure 1.2a: Prince Albert Town and Suburbs

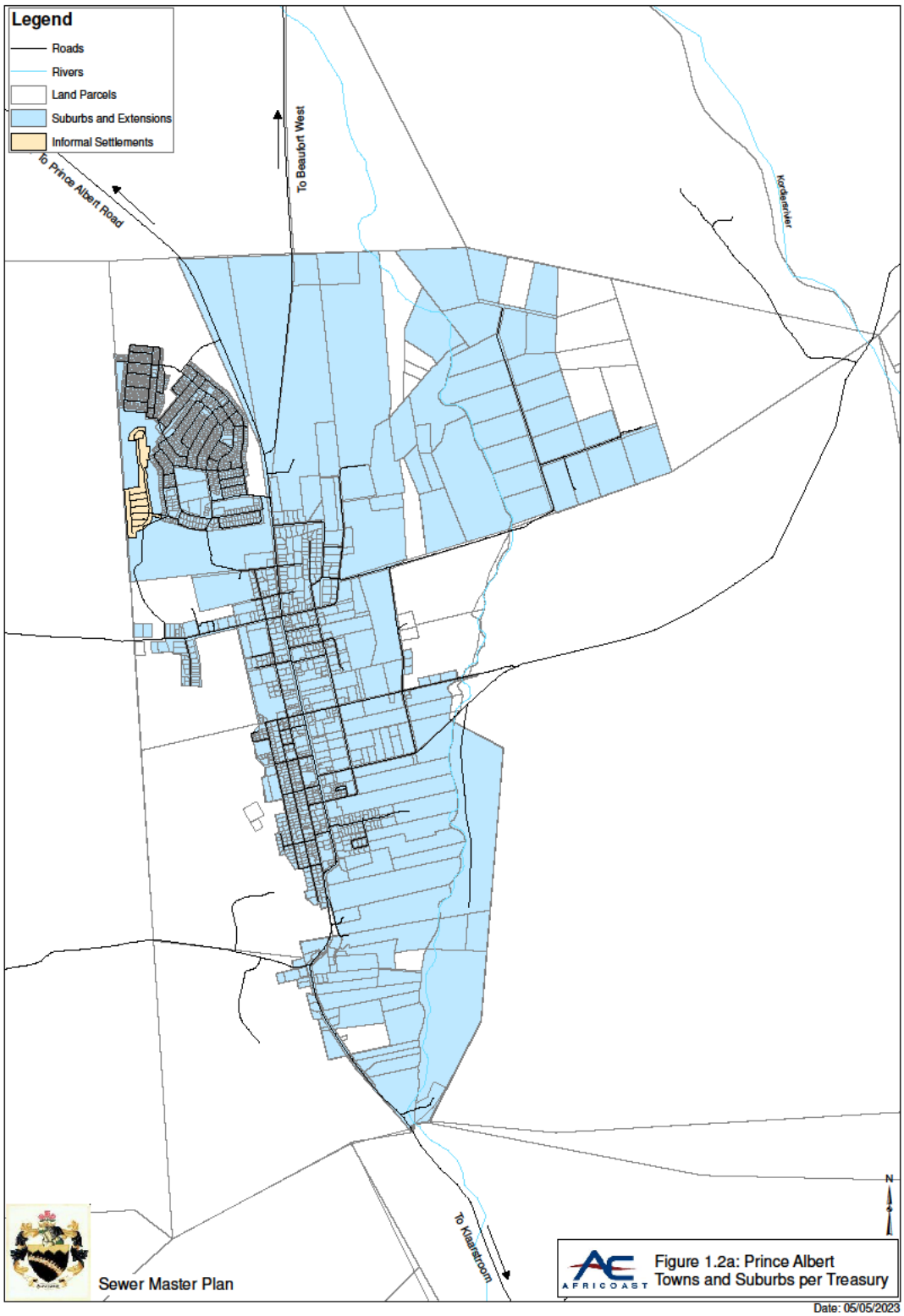

Figure 1.2b: Leeu Gamka Town and Suburbs

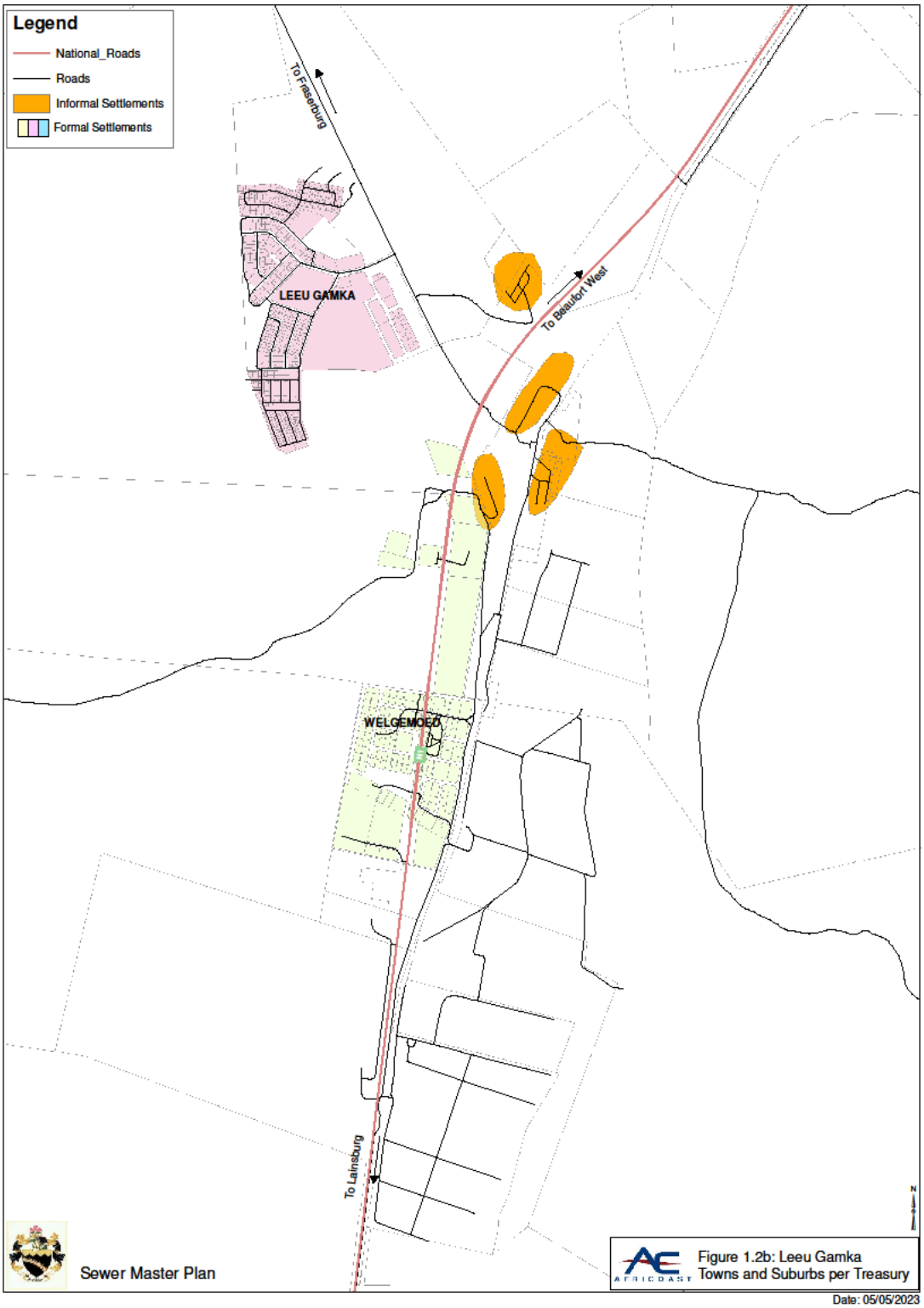

Figure 1.2c: Klaarstroom Town and Suburbs

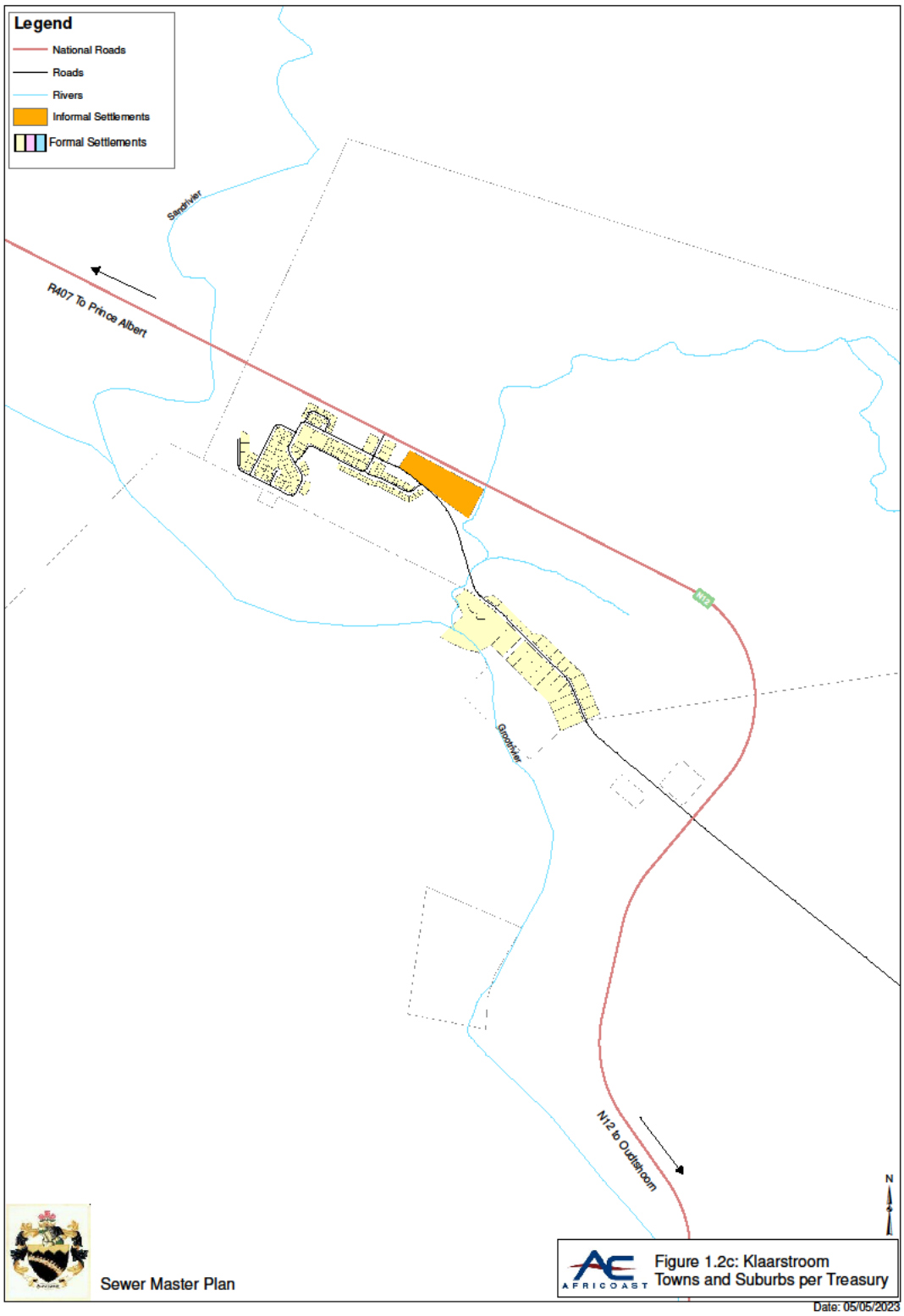

Figure 2.1a: Prince Albert Existing Sewer System Layout

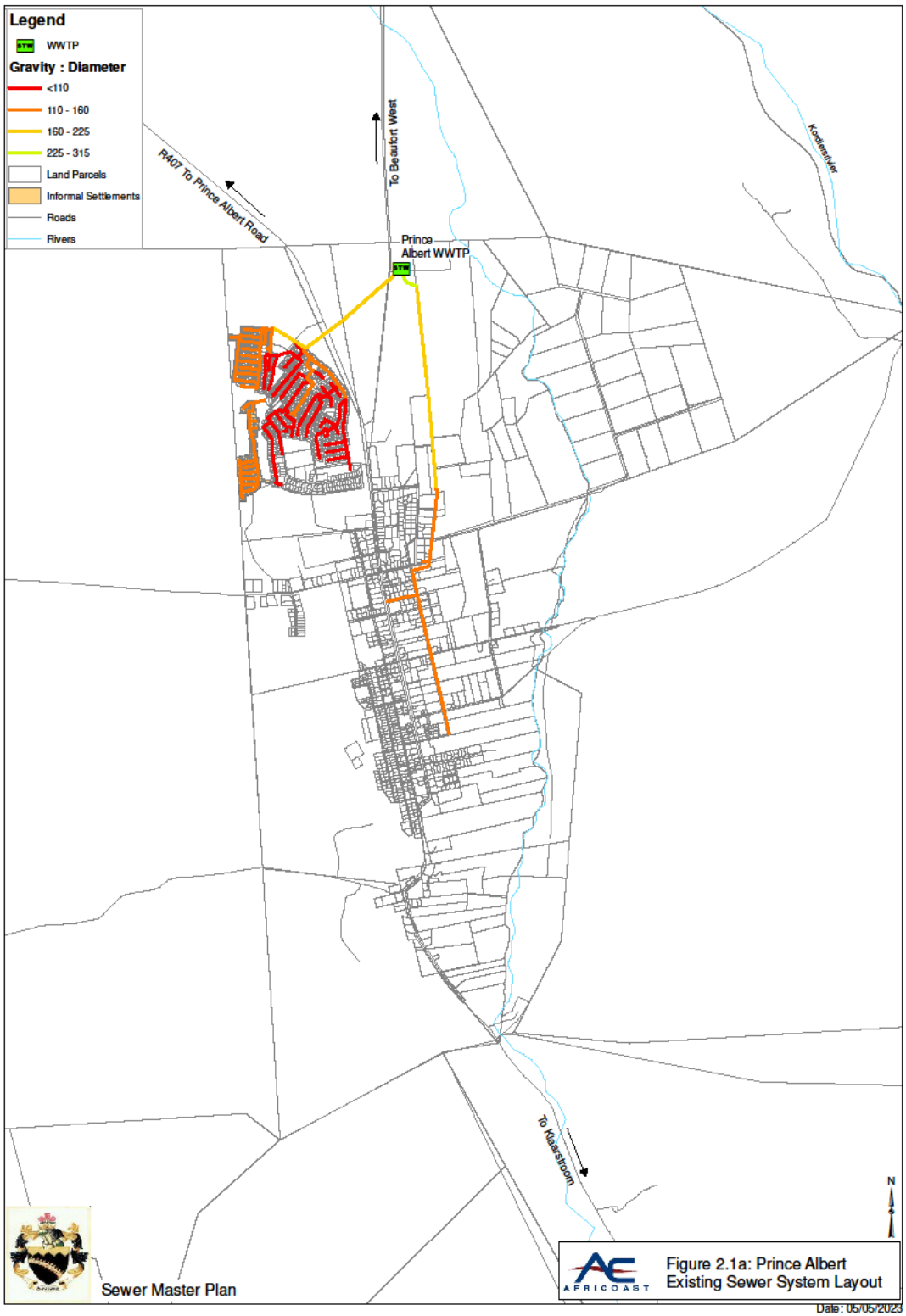

Figure 2.1b: Leeu Gamka Existing Sewer System Layout

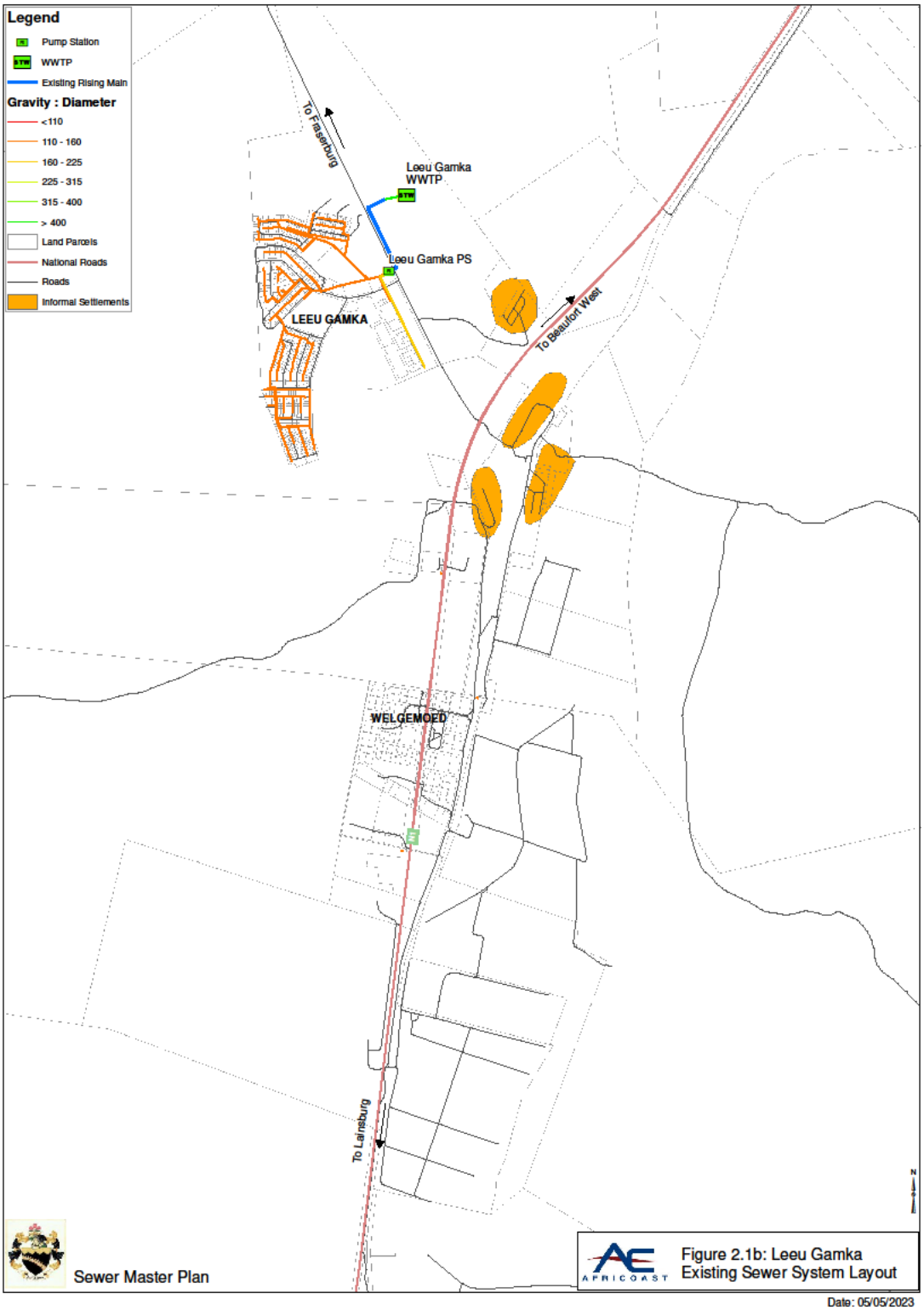

Figure 2.1c: Klaarstroom Existing Sewer System Layout

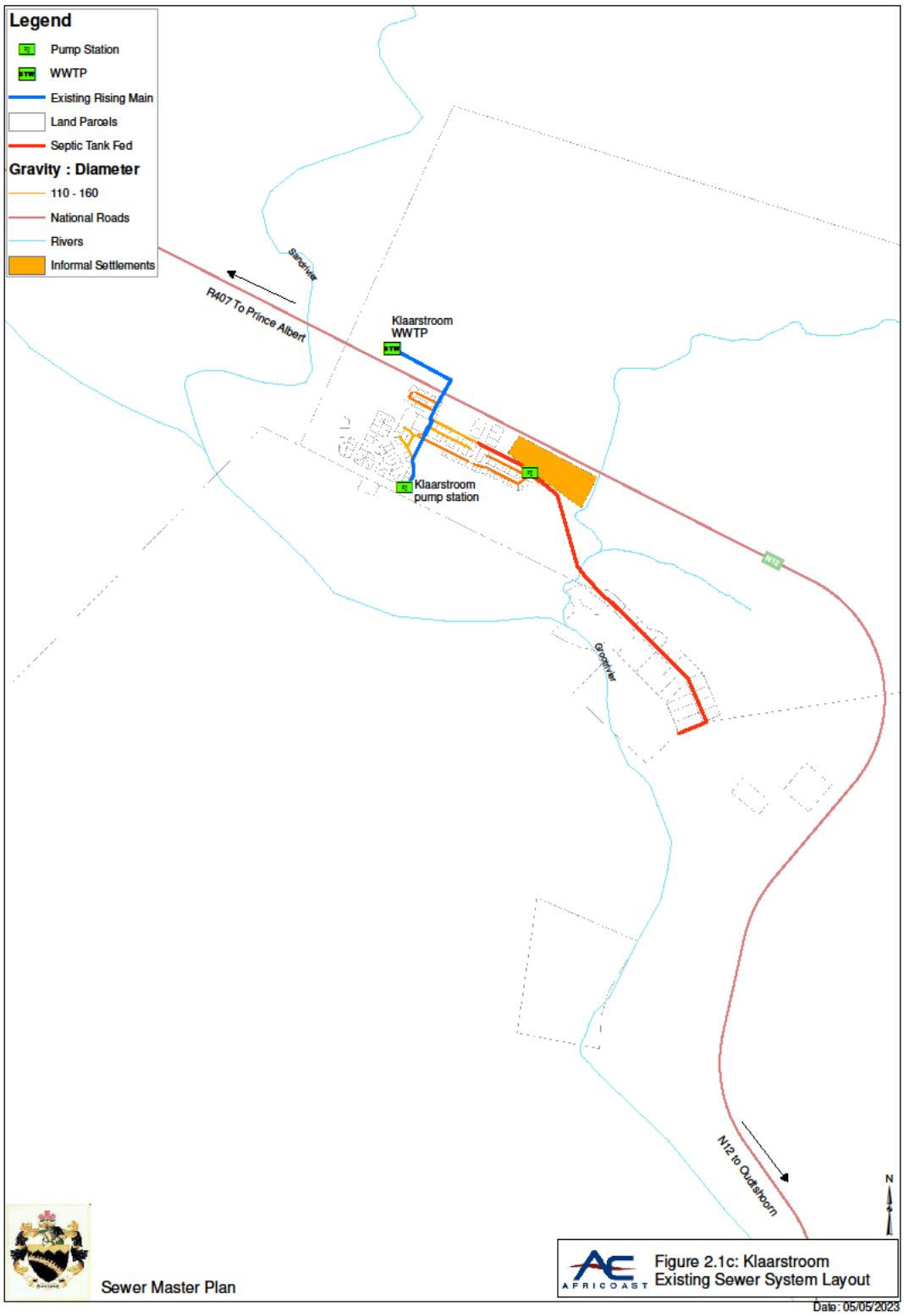

Figure 2.2a: Prince Albert Existing Sewer Drainage Areas

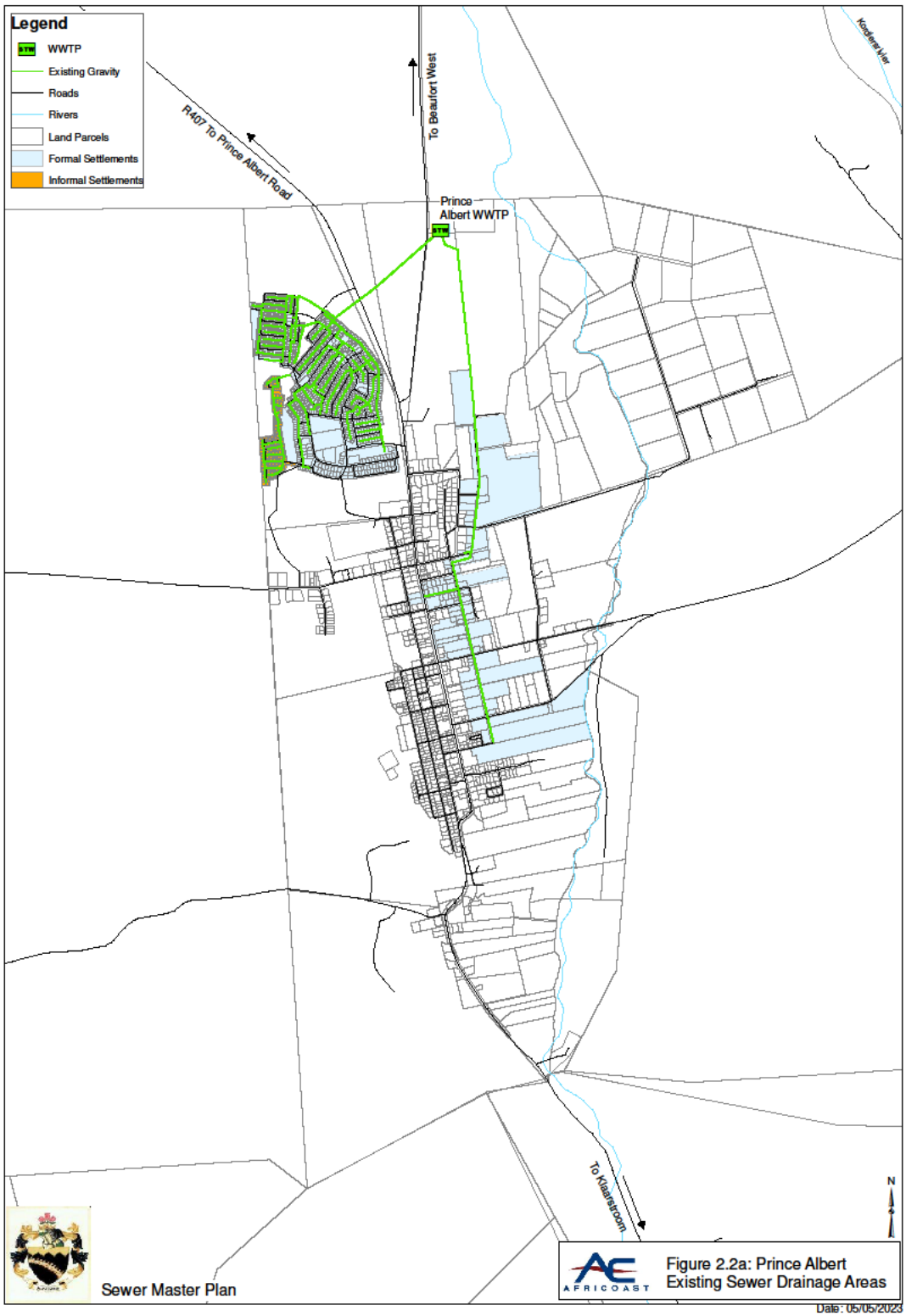

Figure 2.2b: Leeu Gamka Existing Sewer Drainage Areas

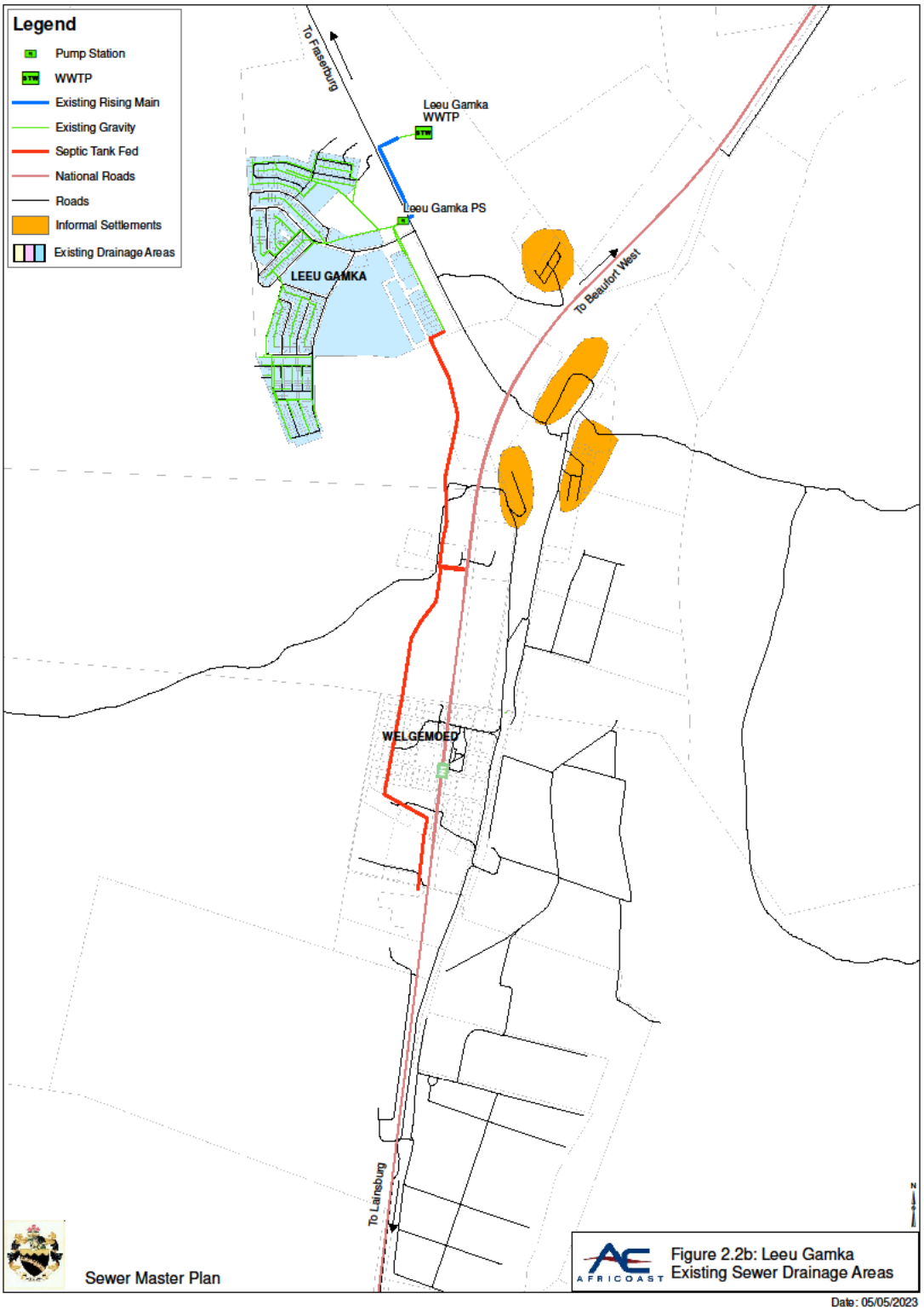

Figure 2.2c: Klaarstroom Existing Sewer Drainage Area

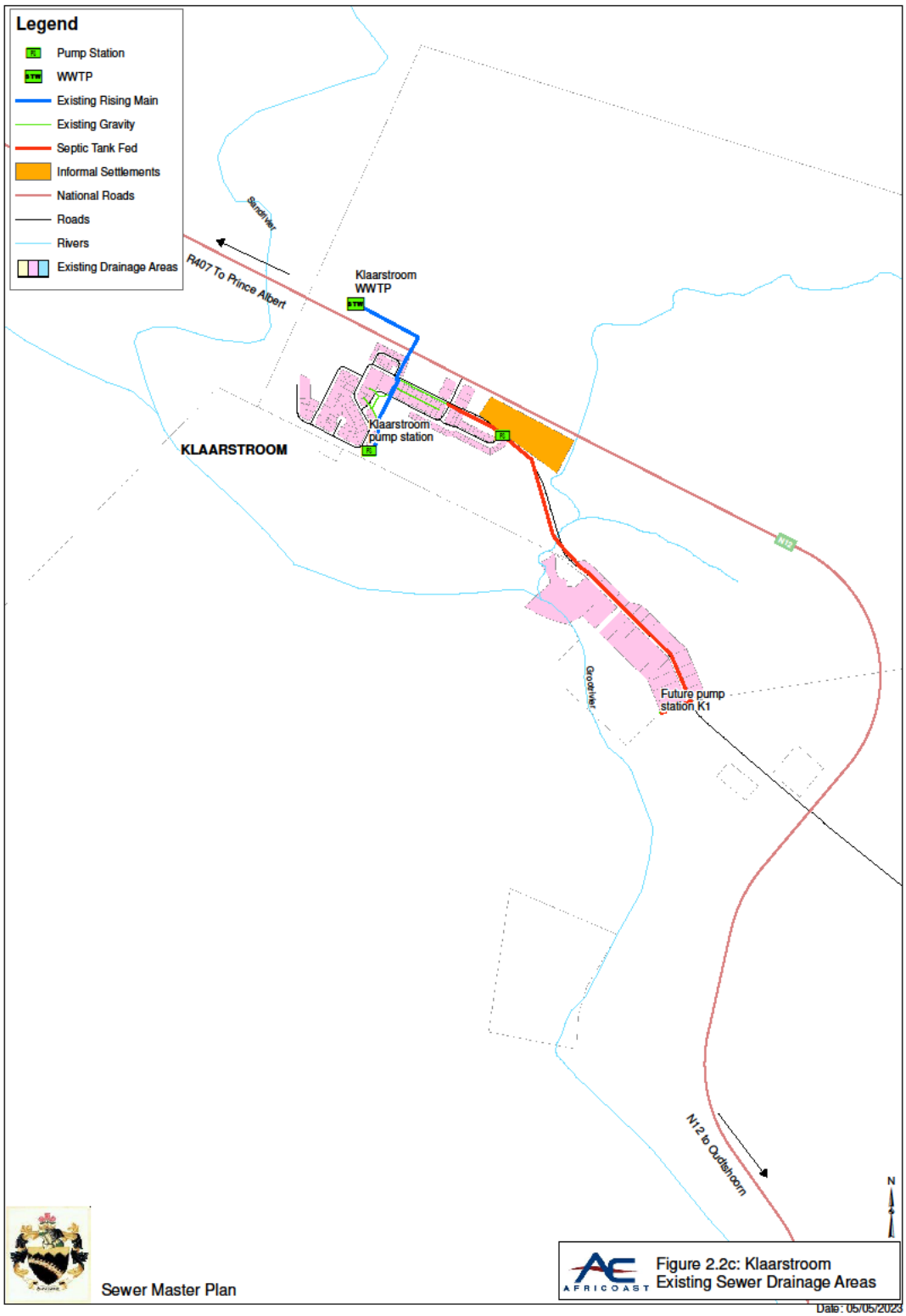

Figure 3.1a: Prince Albert Potential Future Developments

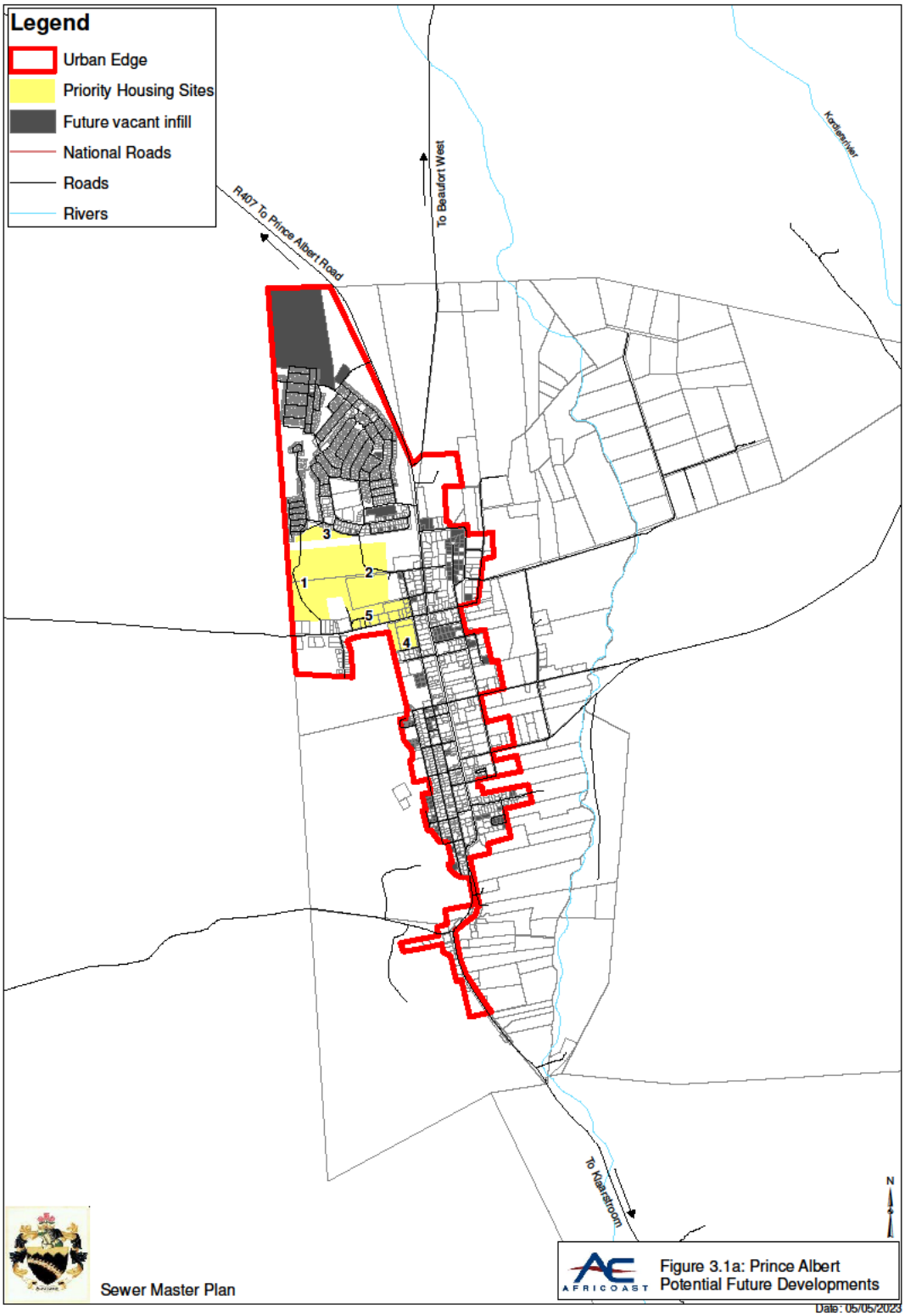

Figure 3.1b: Leeu Gamka Potential Future Developments

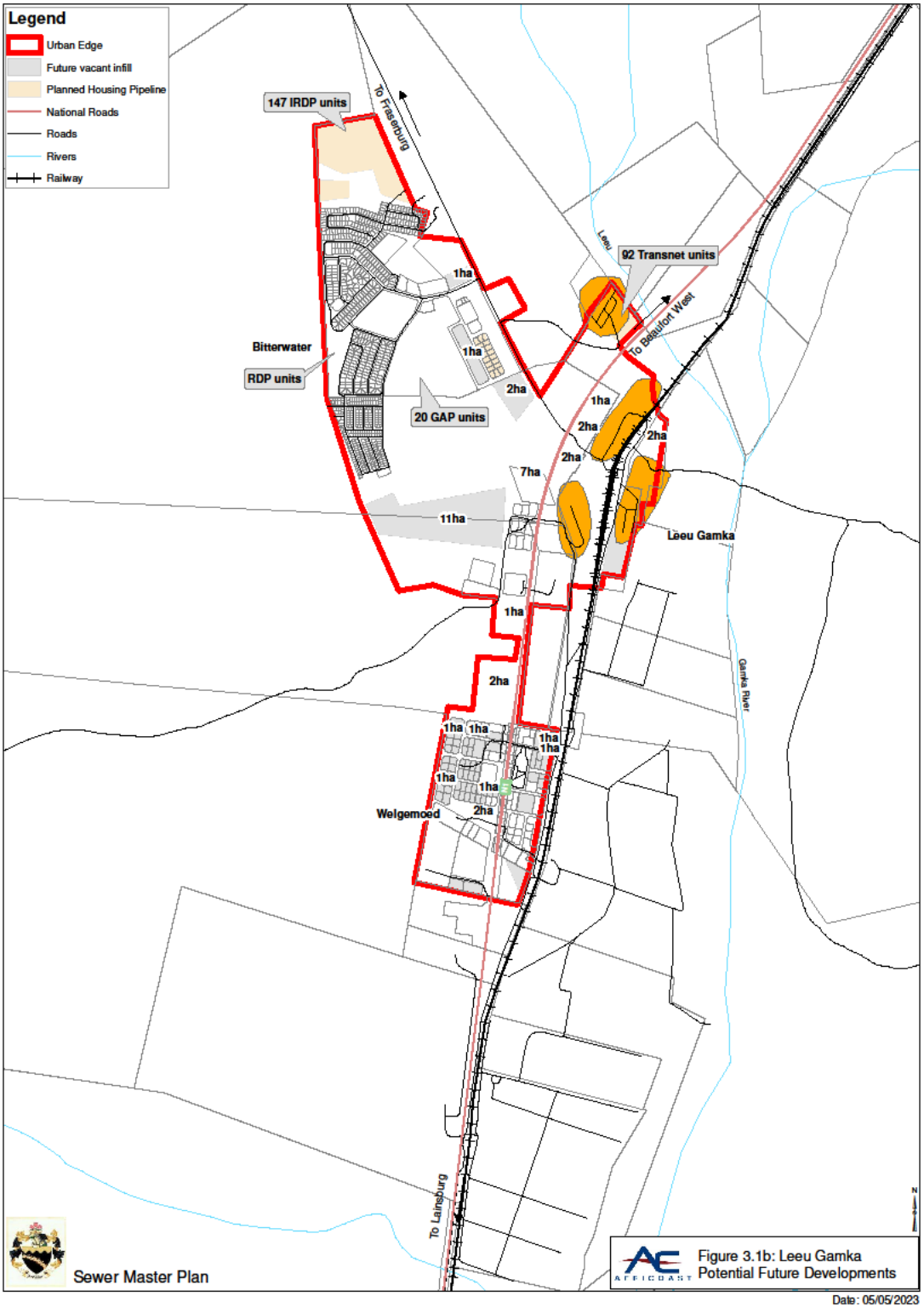

Figure 3.1c: Klaarstroom Potential Future Developments

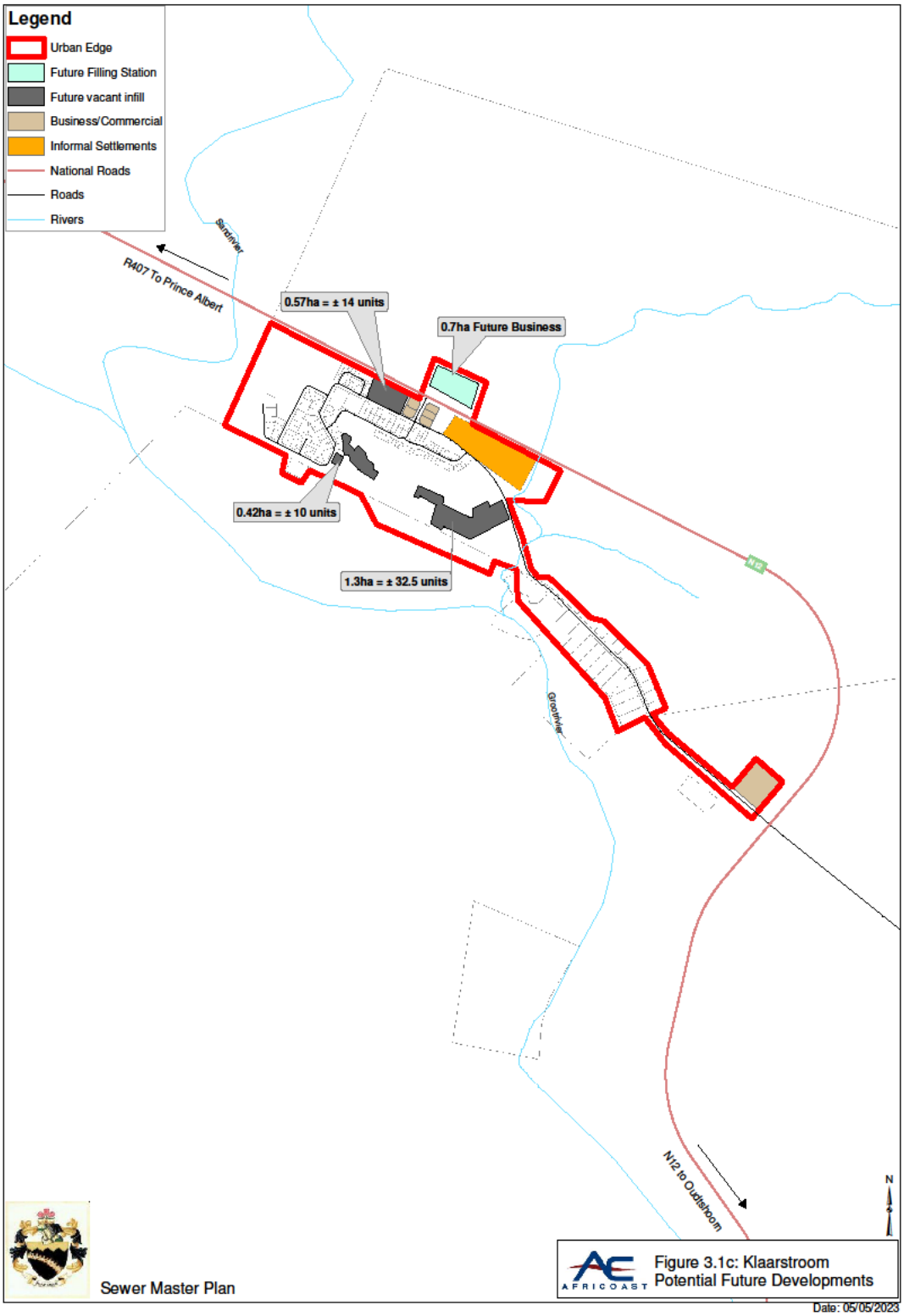

Figure 3.2a: Prince Albert Existing Sewer Spare Capacities

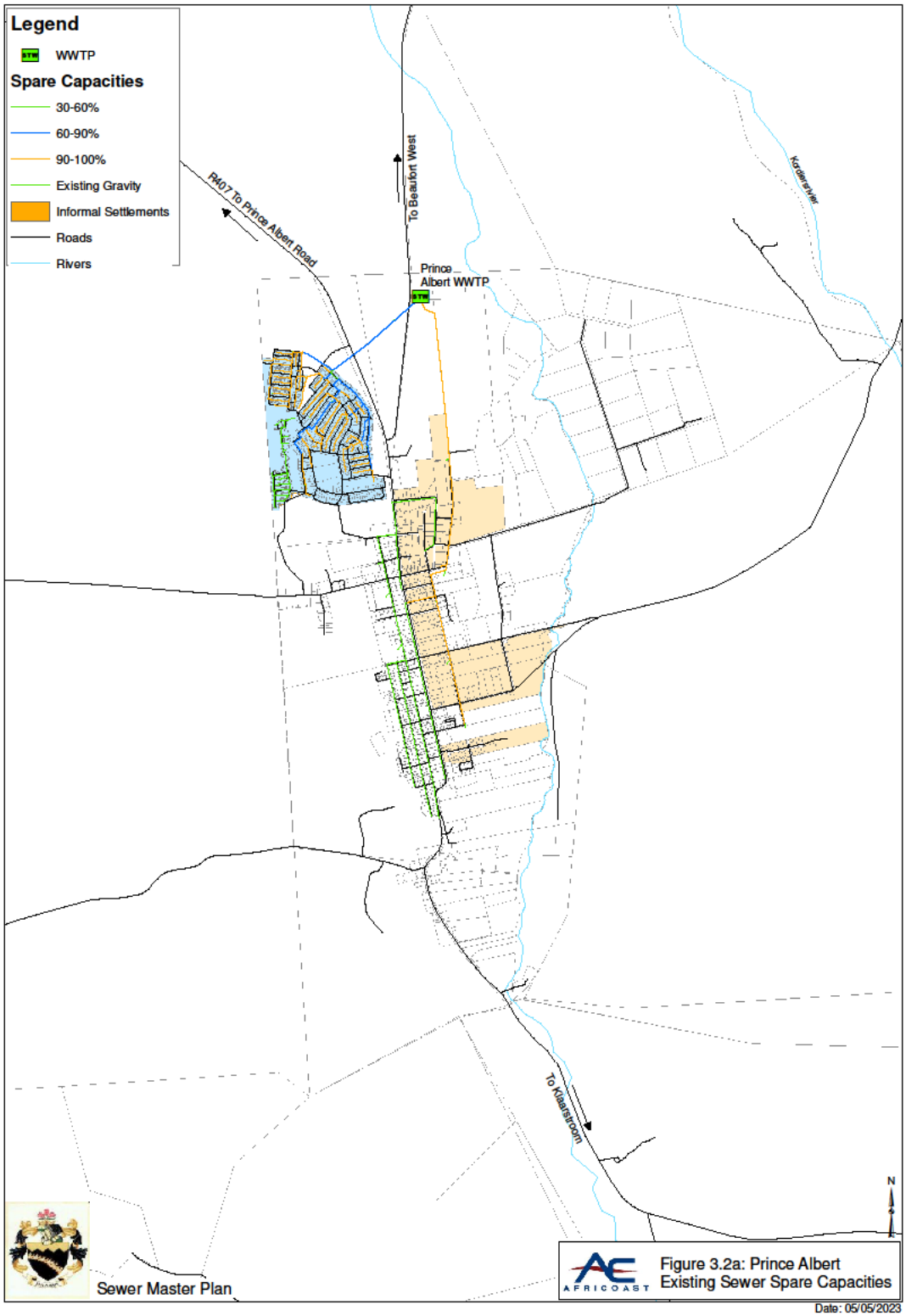

Figure 3.2b: Leeu Gamka Existing Sewer Spare Capacities

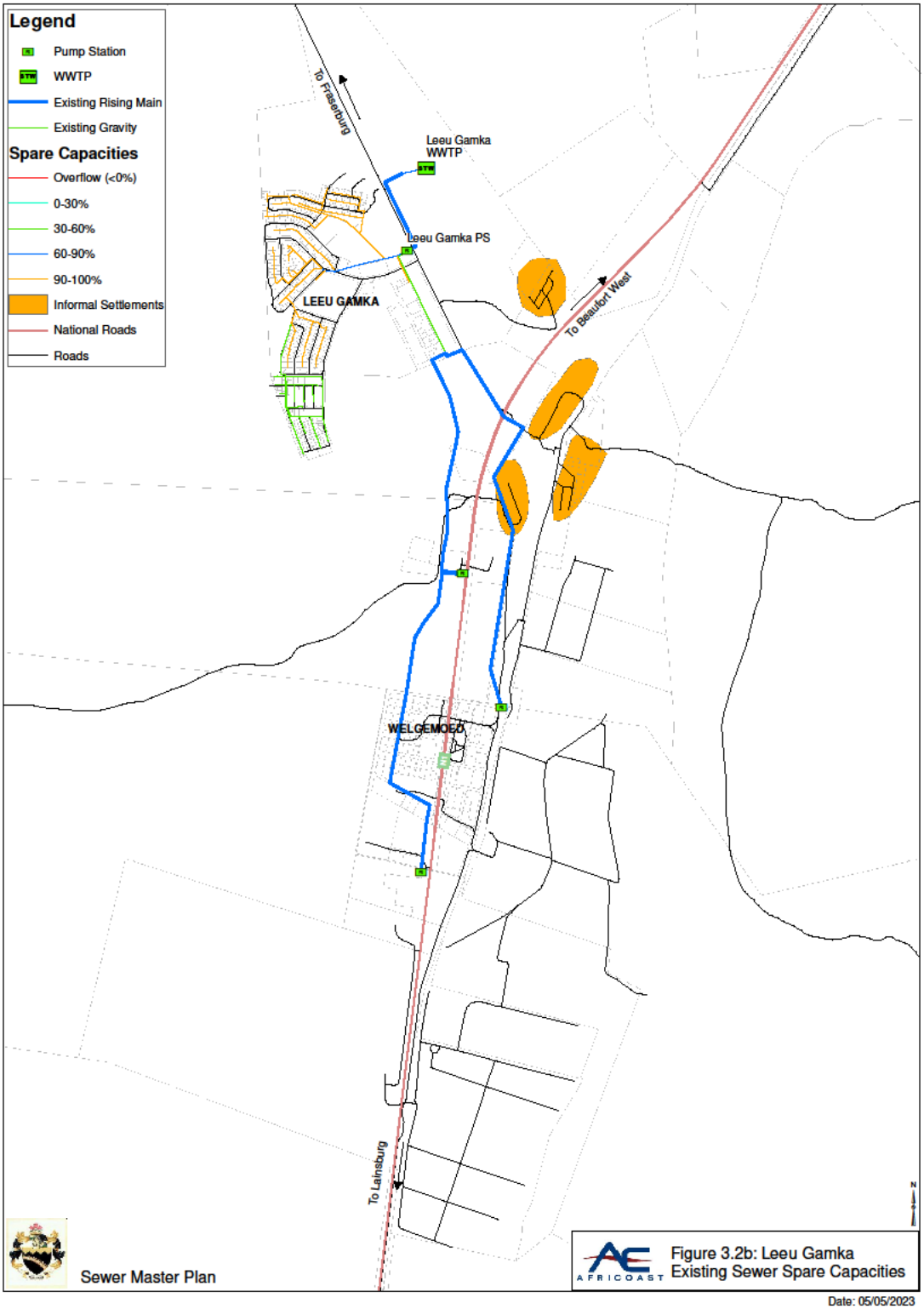

Figure 3.2c: Klaarstroom Existing Sewer Spare Capacities

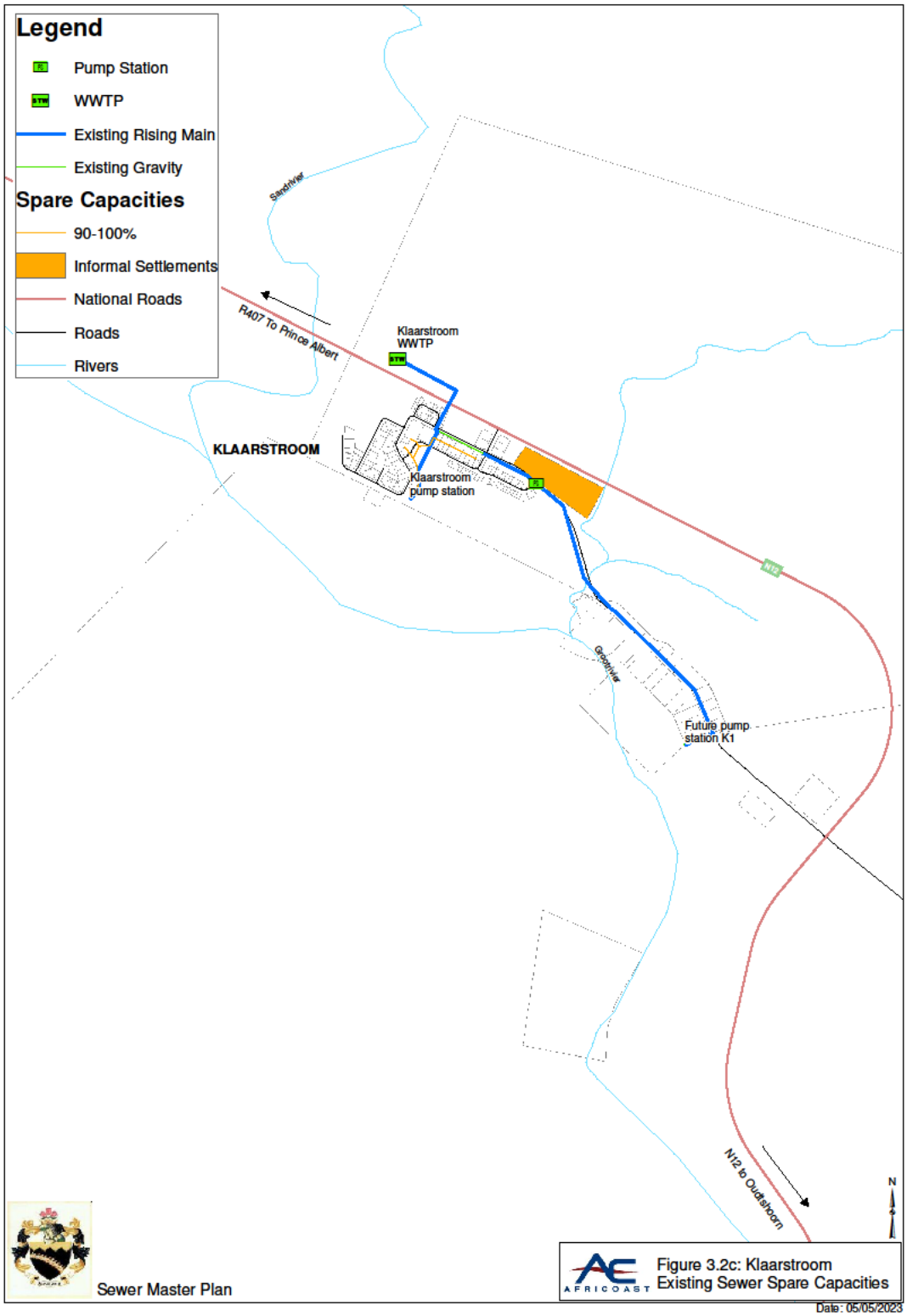

Figure 3.3a: Prince Albert Existing Sewer Full Flow Velocity

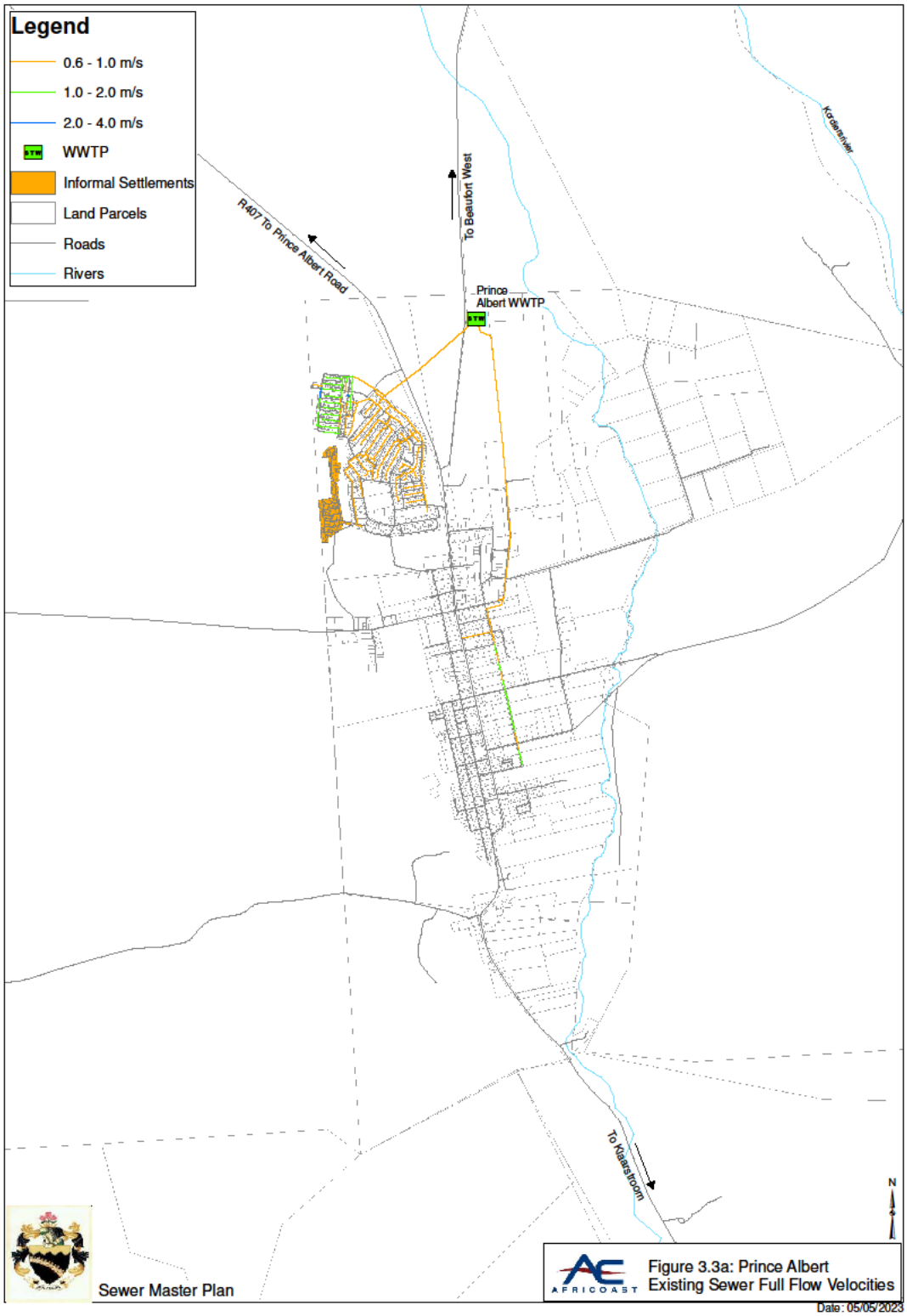

Figure 3.3b: Leeu Gamka Existing Sewer Full Flow Velocity

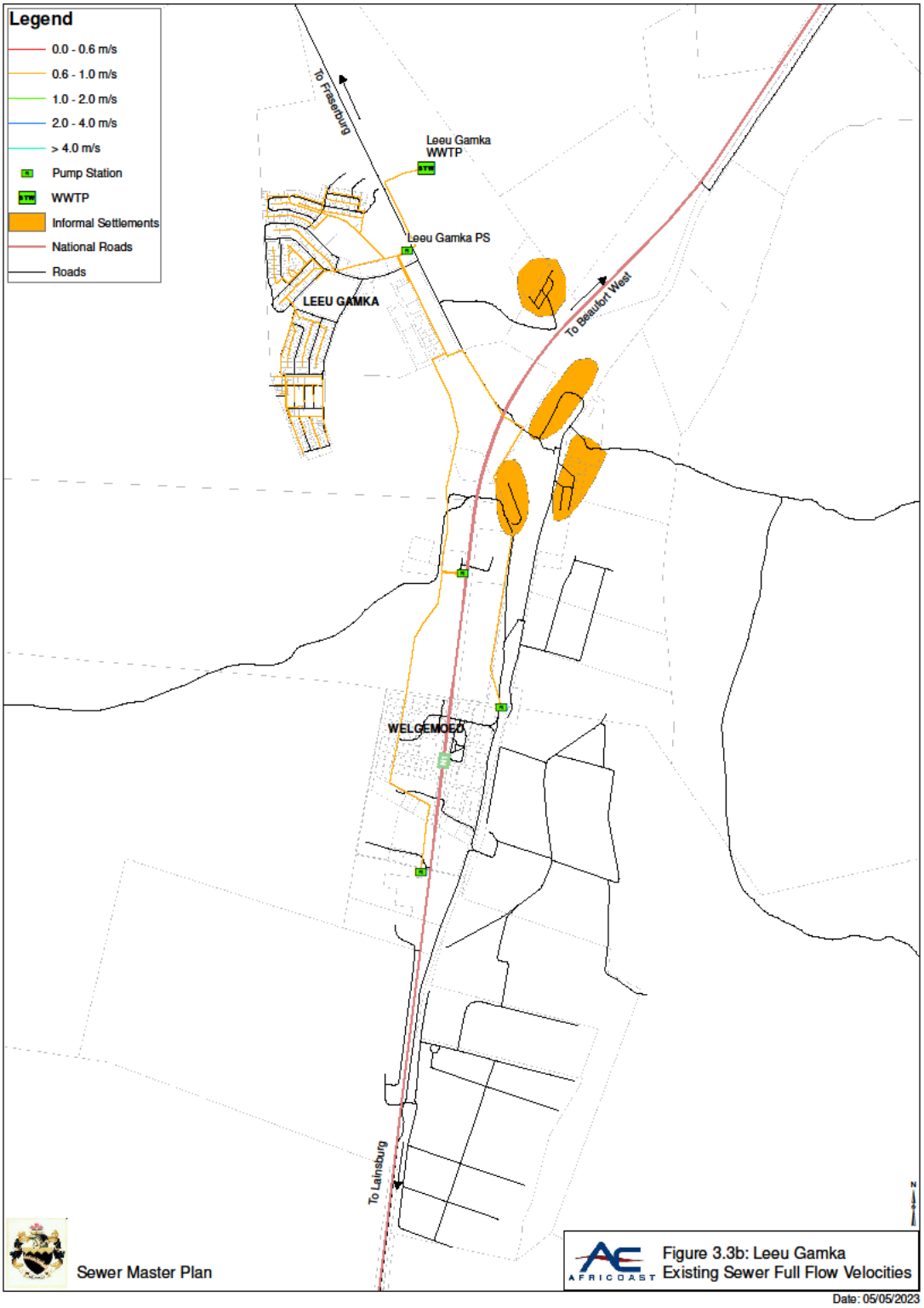

Figure 3.3c: Klaarstroom Existing Sewer Full Flow Velocity

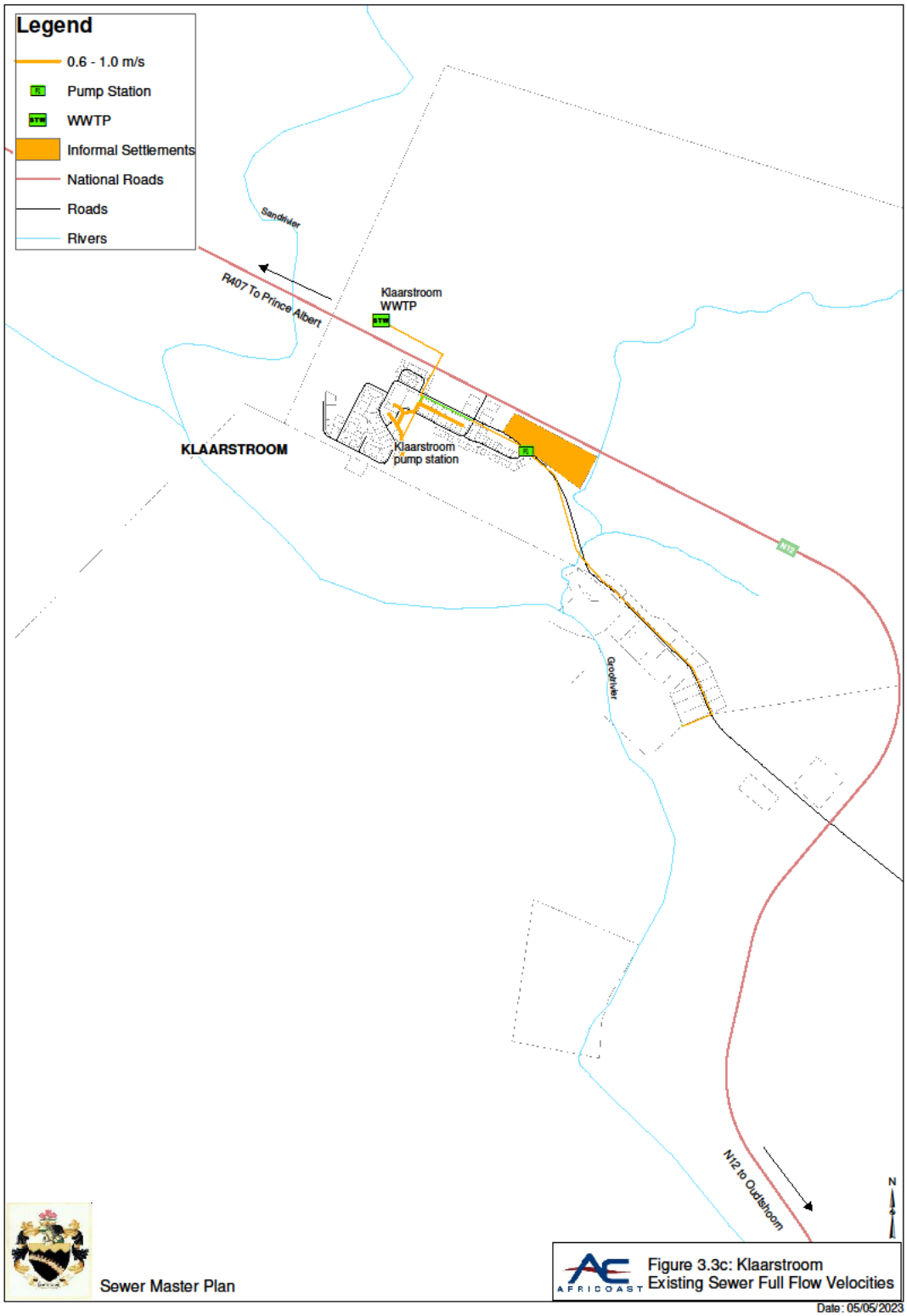

Figure 3.4a: Prince Albert Future Sewer Spare Capacities

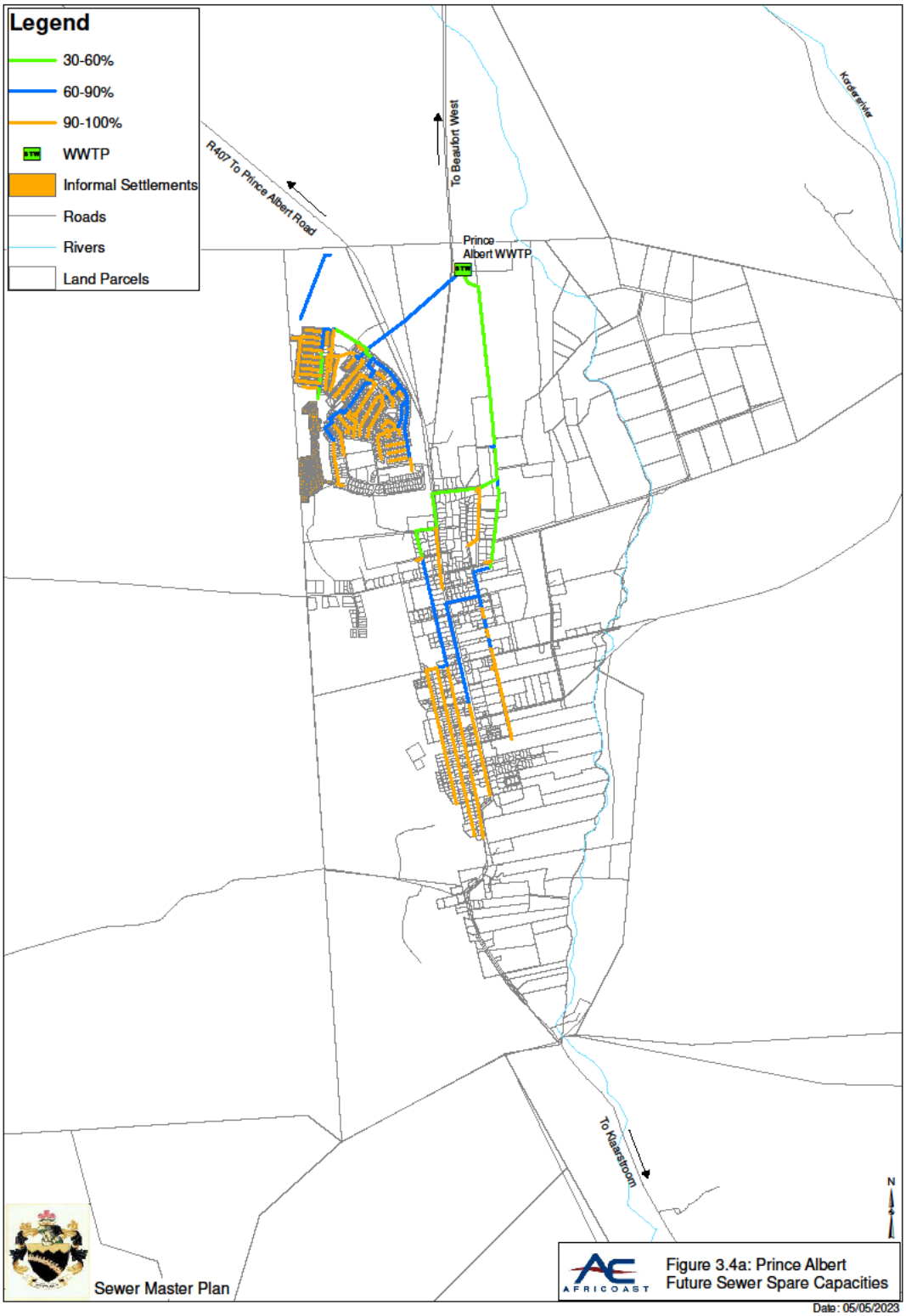

Figure 3.4b: Leeu Gamka Future Sewer Spare Capacities

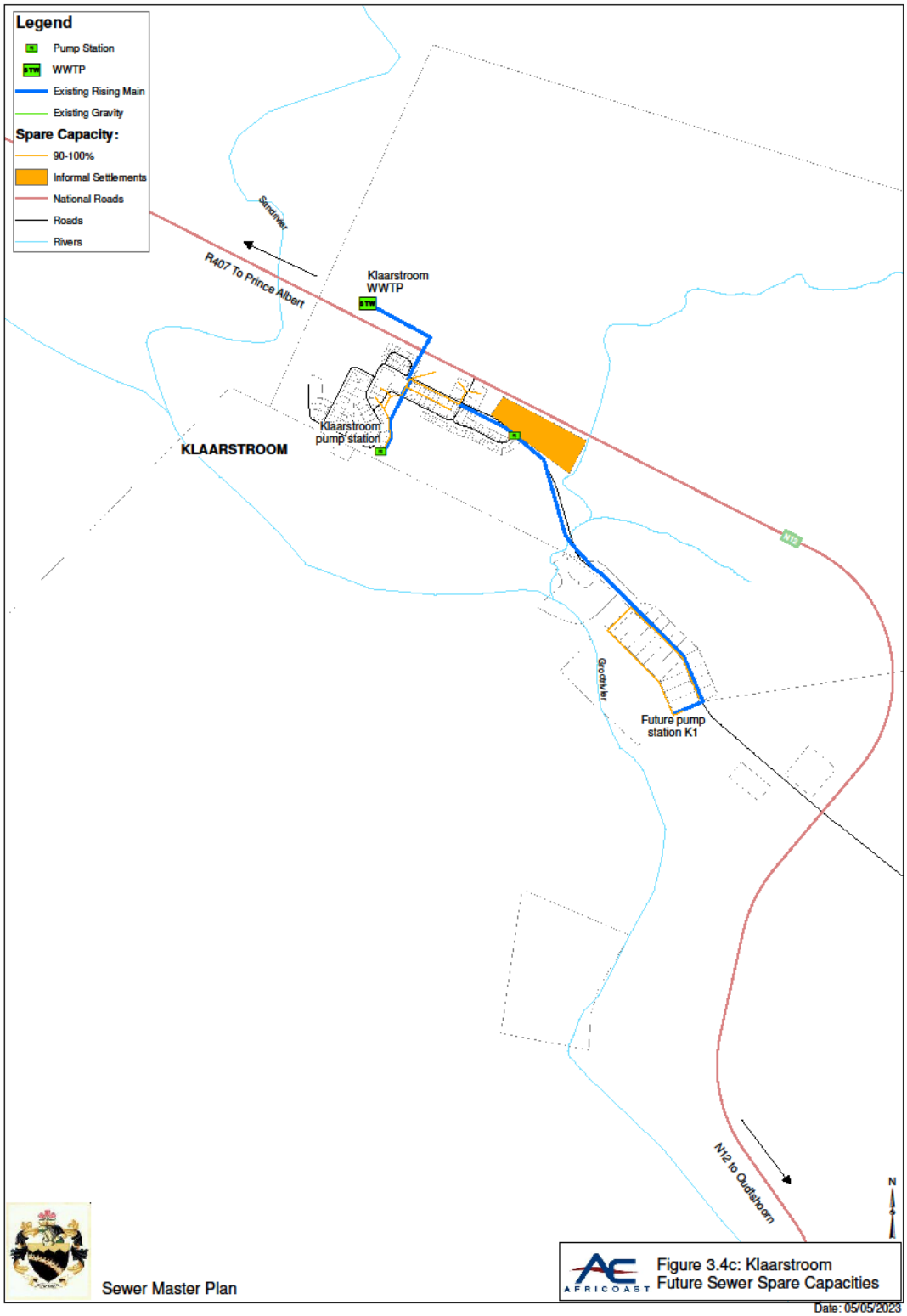

Figure 3.4c: Klaarstroom Future Sewer Spare Capacities

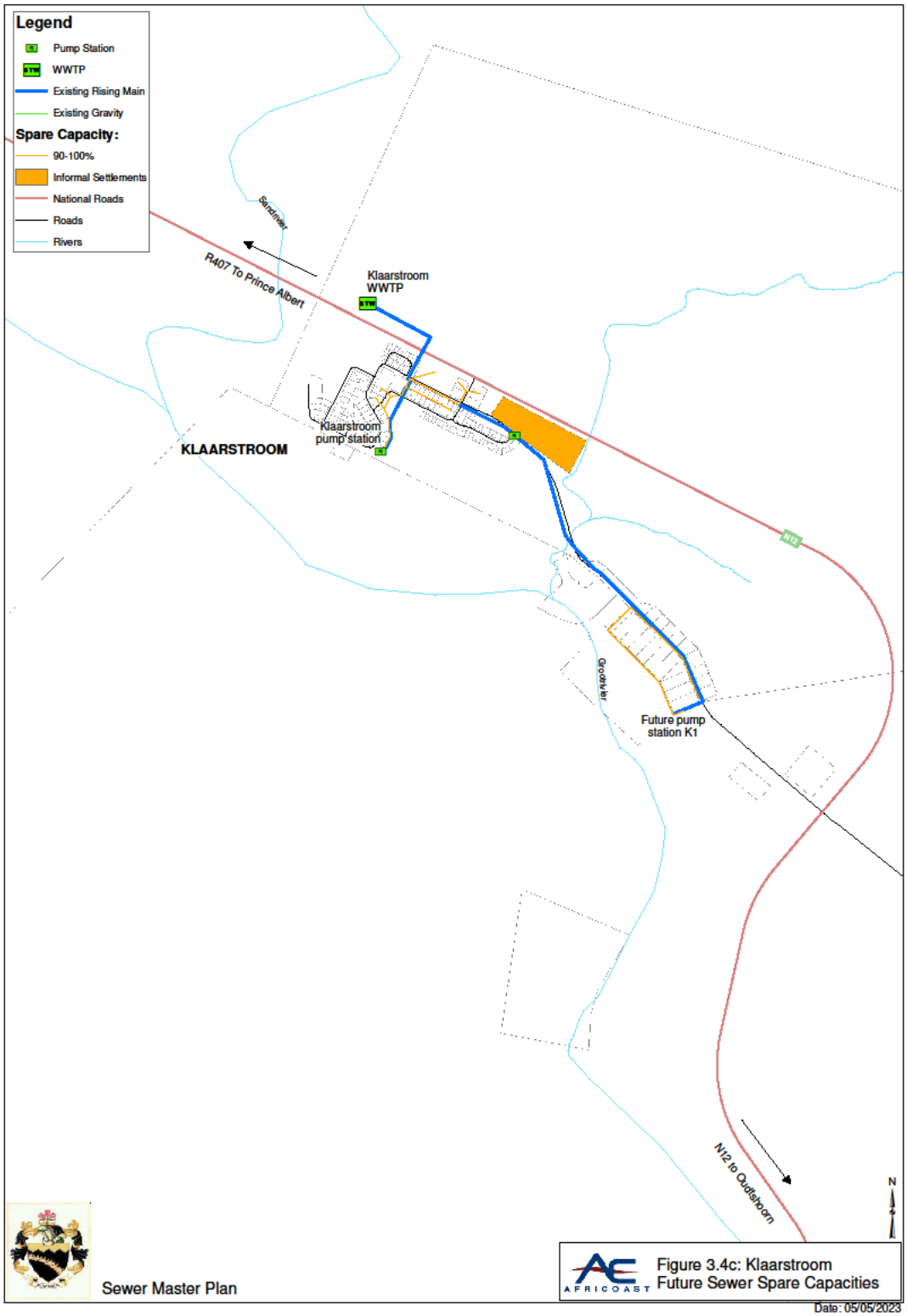

Figure 3.5a: Prince Albert Future Sewer Full Flow Velocities

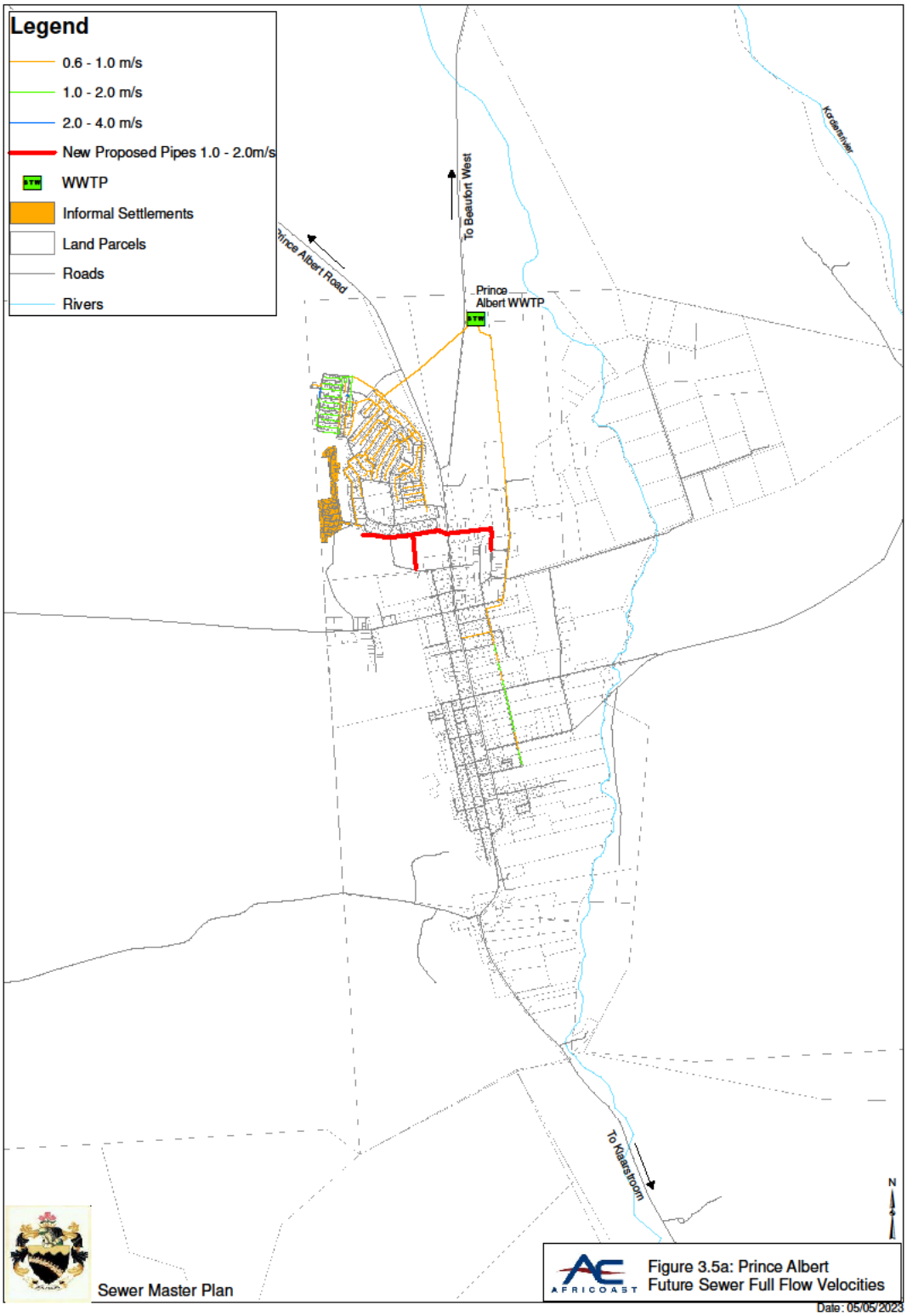

Figure 3.5b: Leeu Gamka Future Sewer Full Flow Velocities

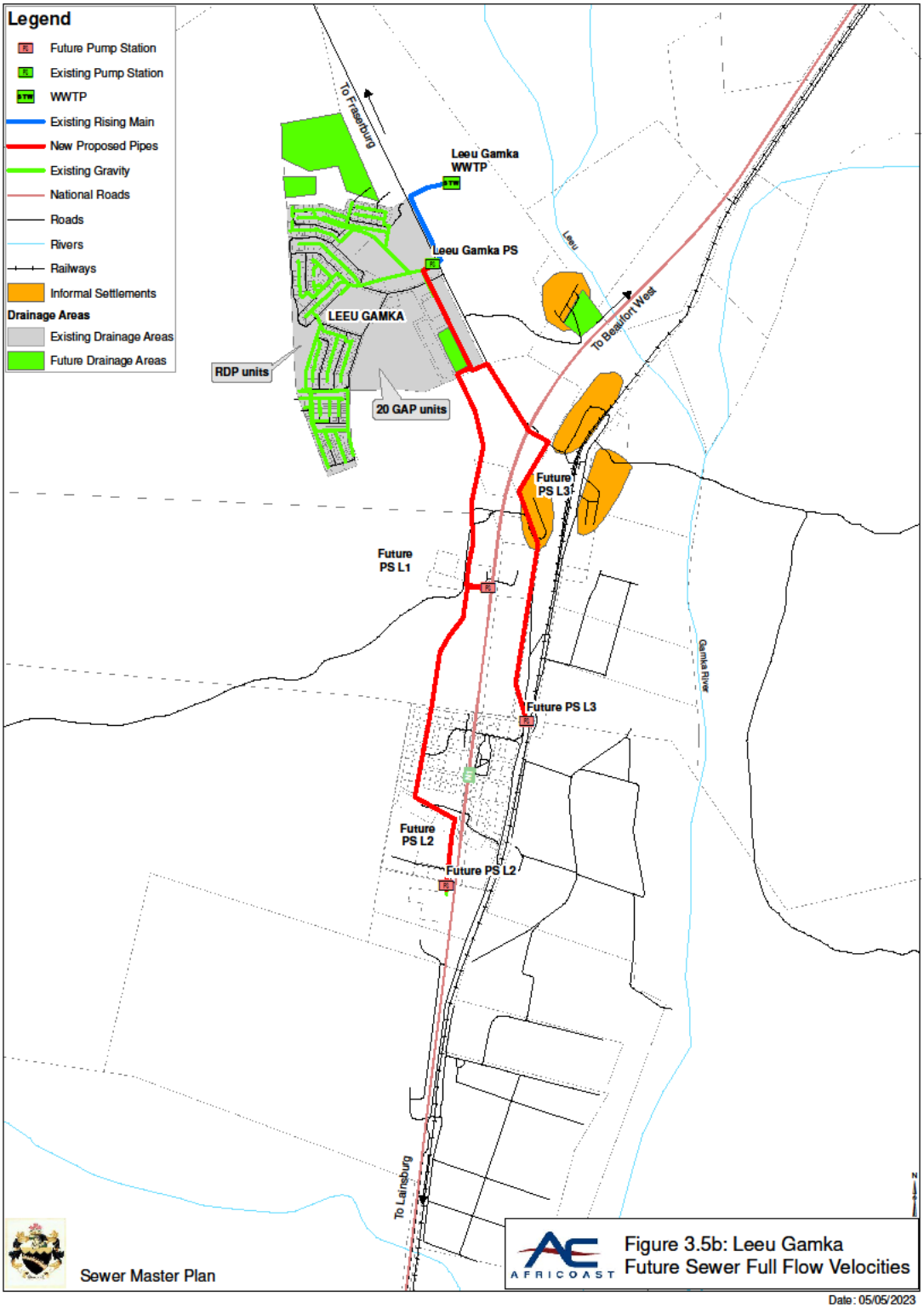

Figure 3.5c: Klaarstroom Future Sewer Full Flow Velocities

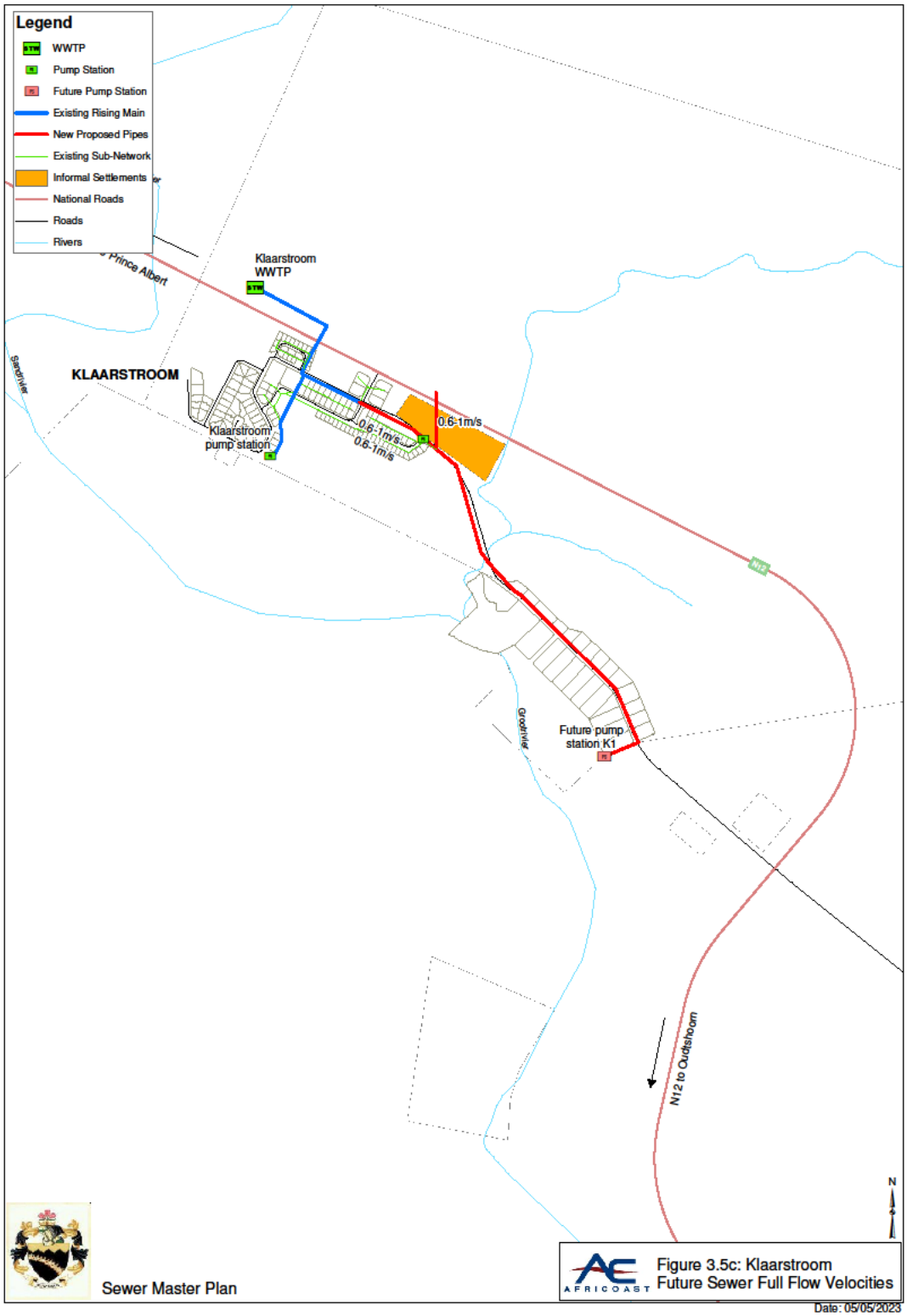

Figure 3.6a: Prince Albert Existing Sewer Required Work

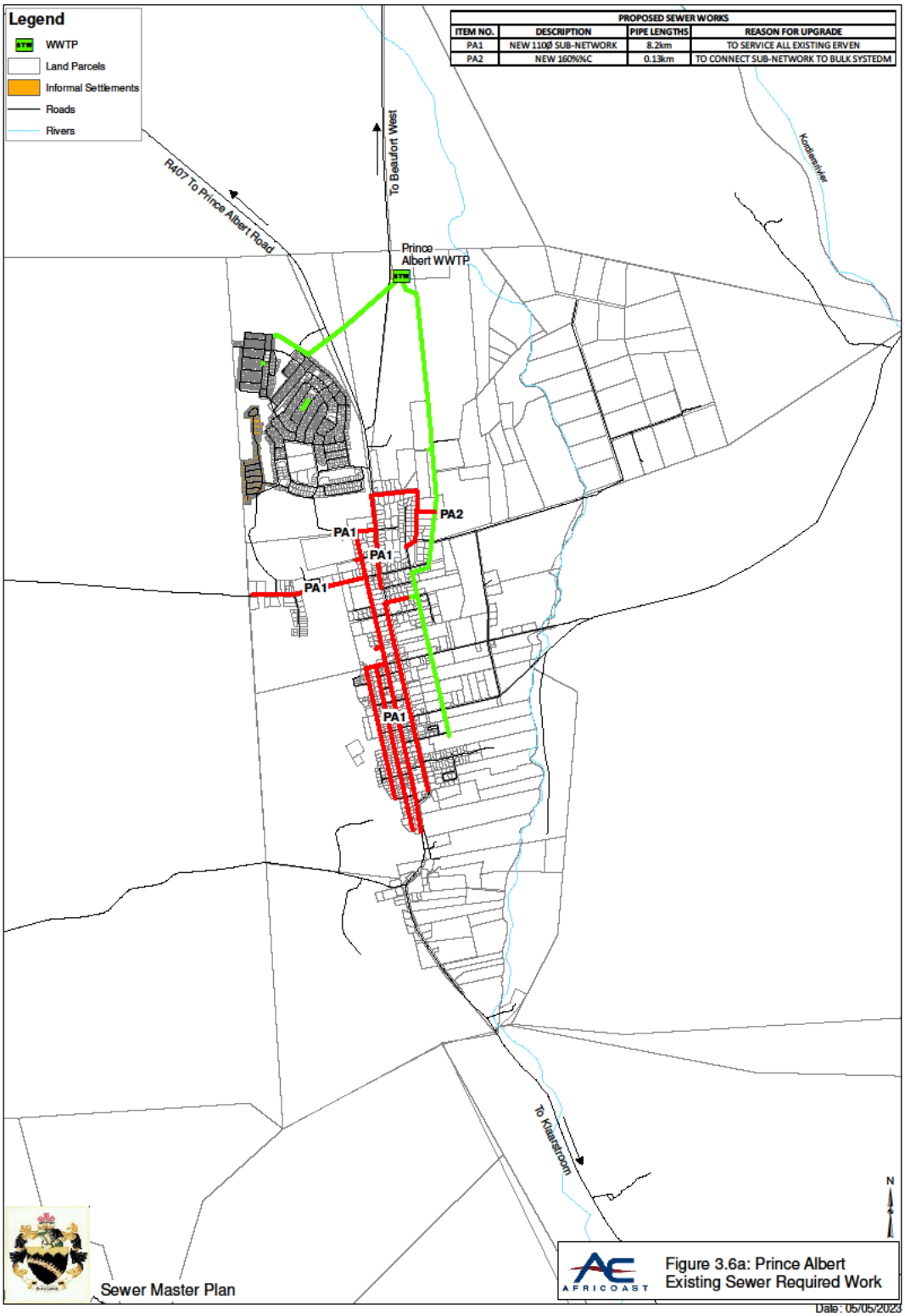

Figure 3.6b: Leeu Gamka Existing Sewer Required Work

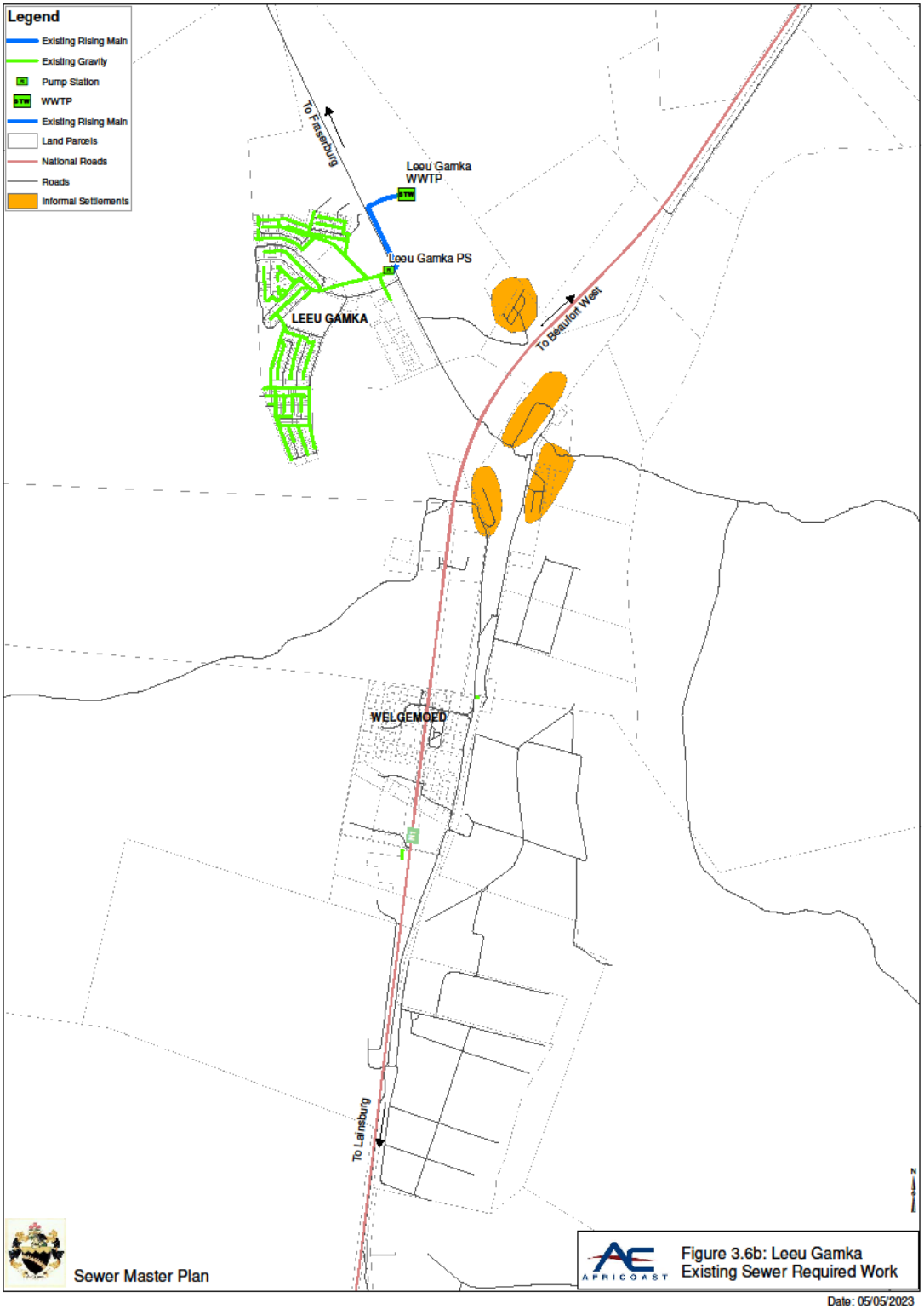

Figure 3.6c: Klaarstroom Existing Sewer Required Work

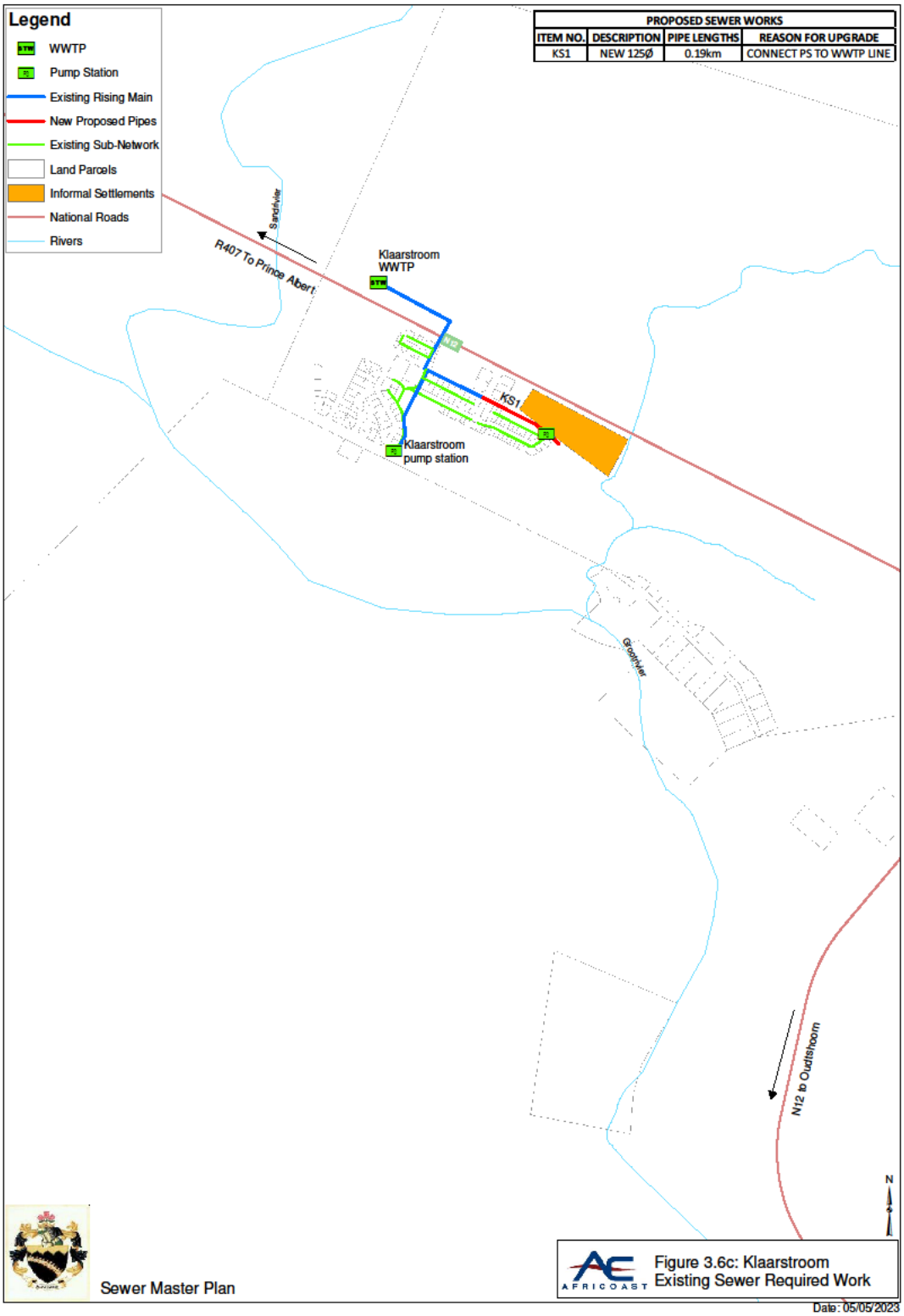

Figure 3.7a: Prince Albert Future Sewer Required Work

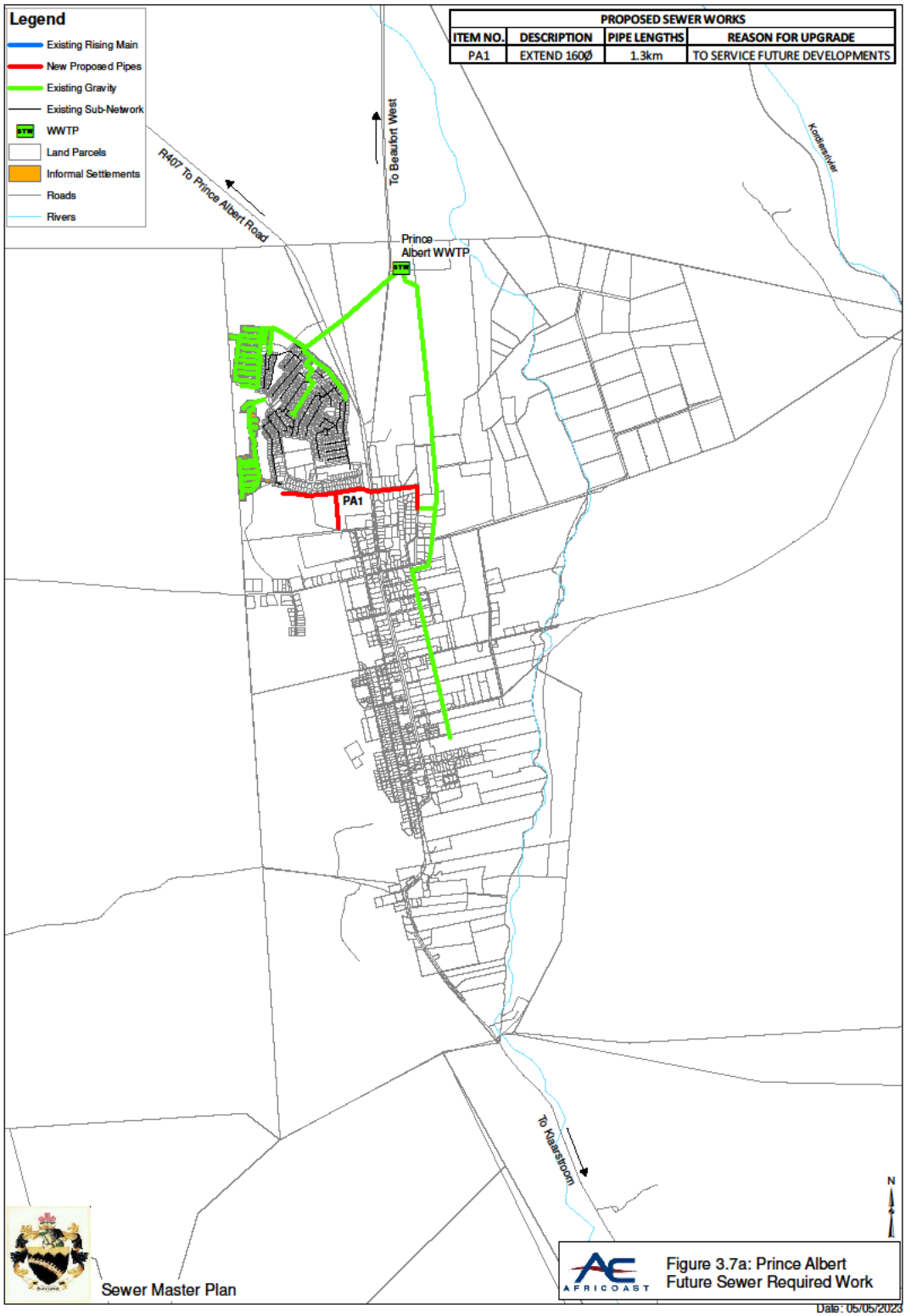

Figure 3.7b: Leeu Gamka Future Sewer Required Work

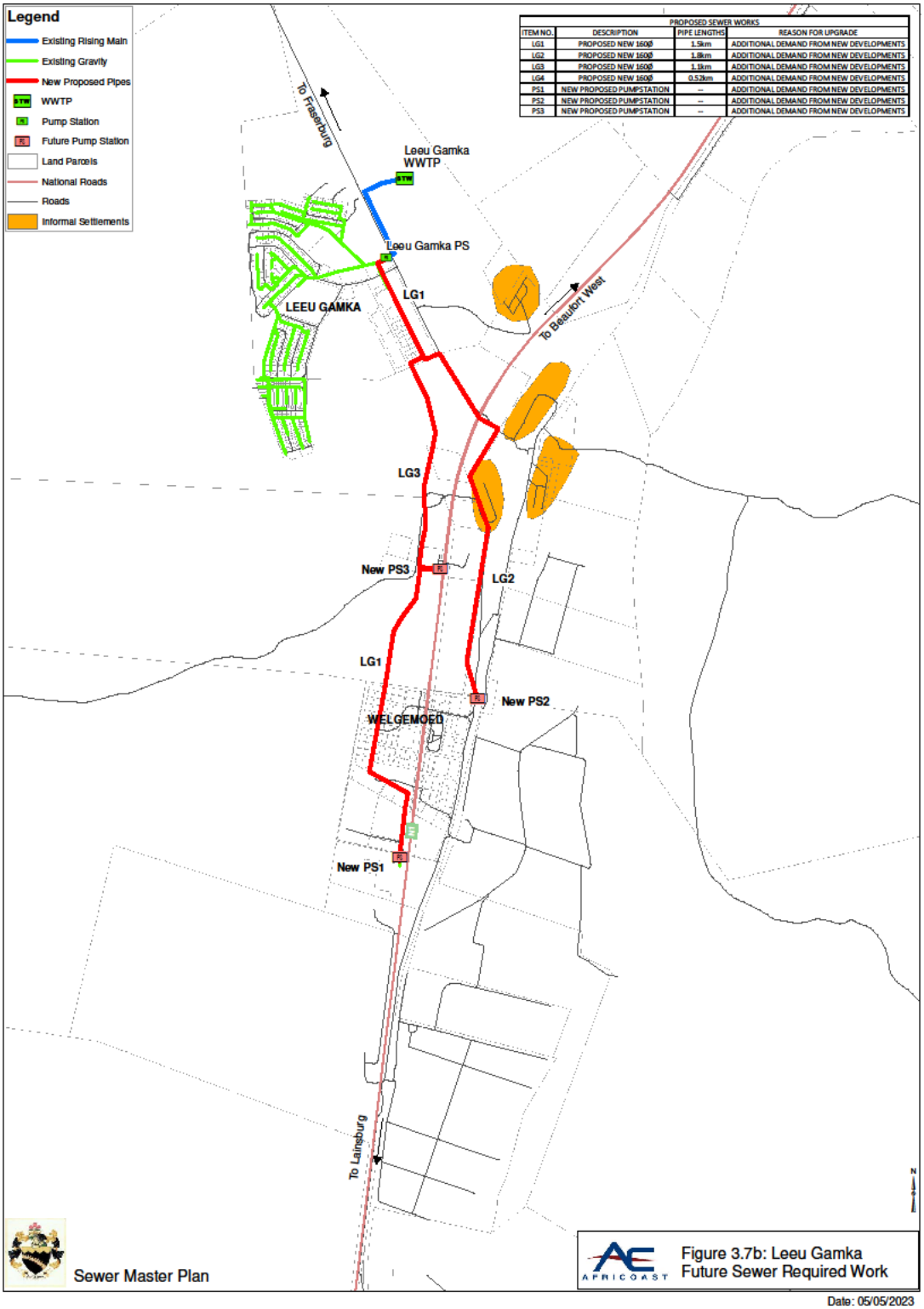

Figure 3.7c: Klaarstroom Future Sewer Required Work

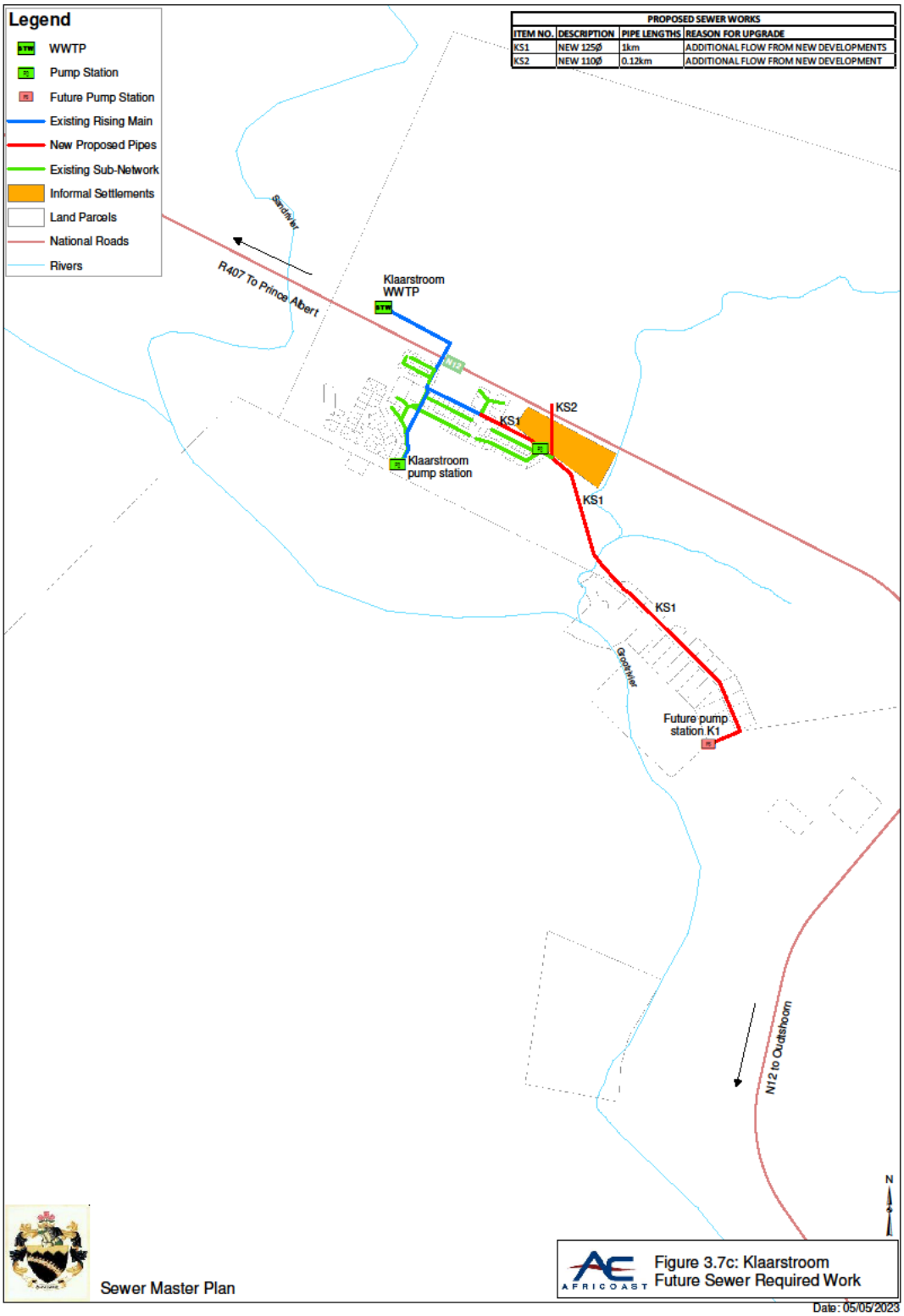

Figure 3.8a: Prince Albert Future Sewer Drainage Areas

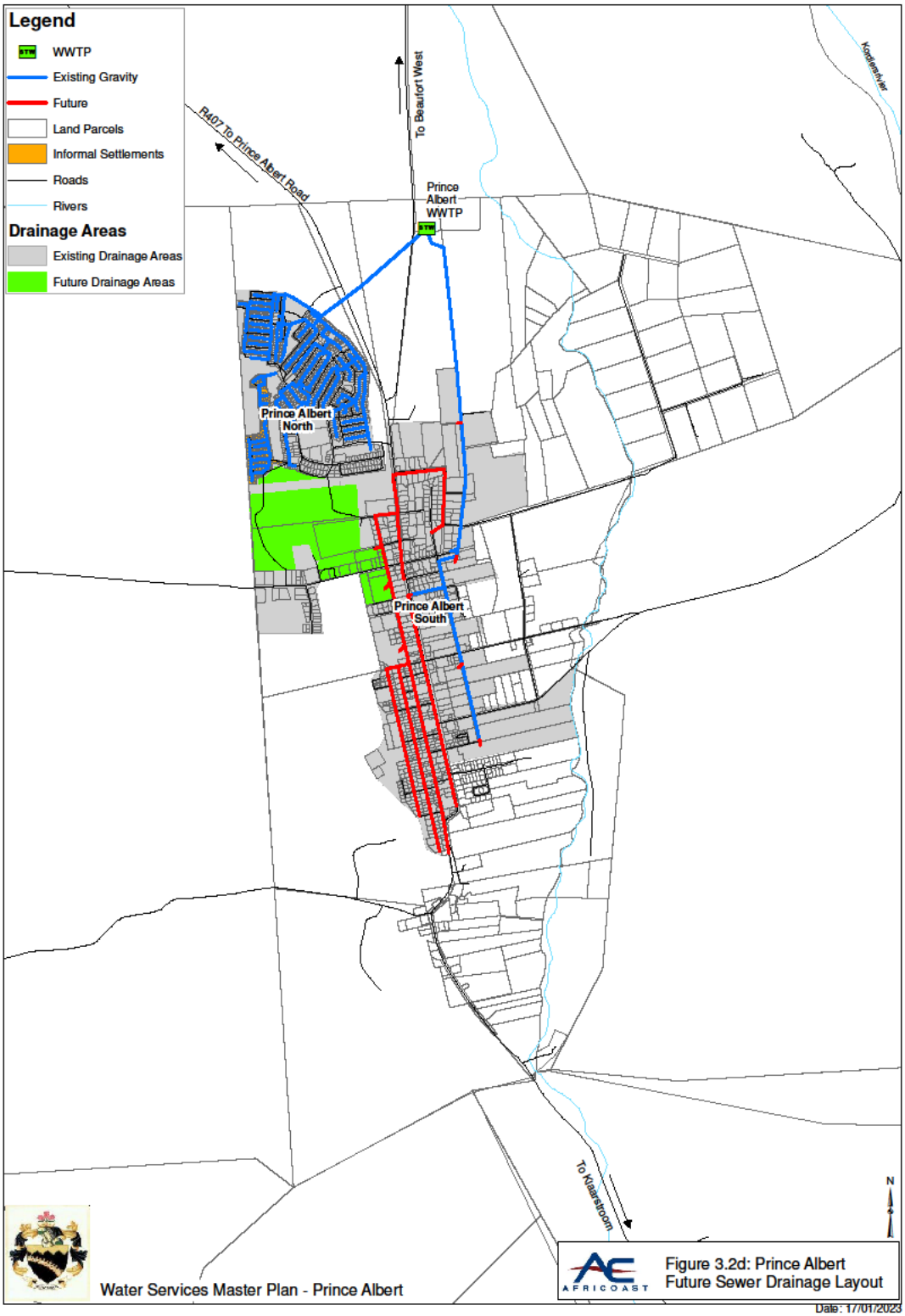

Figure 3.8b: Leeu Gamka Future Sewer Drainage Areas

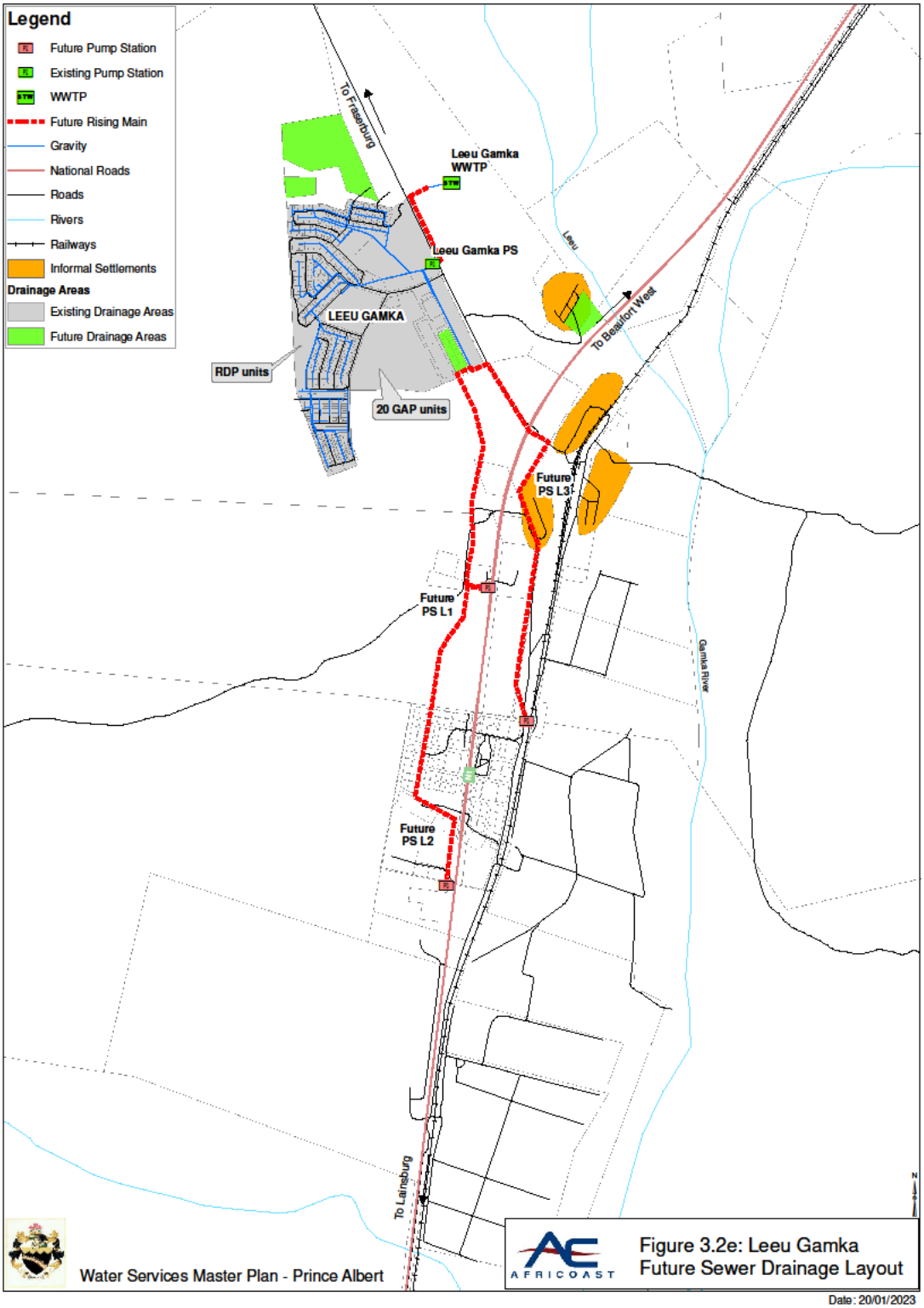

Figure 3.8c: Prince Albert Future Sewer Drainage Areas