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UMNGENI-UTHUKELA WATER INFRASTRUCTURE MASTER PLAN 2026

2026/2027 – 2056/2057

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Preface

This Infrastructure Master Plan 2026 describes:

- uMngeni-uThukela Water's infrastructure plans for the financial period 2026/2027 – 2056/2057, and
- Infrastructure master plans for other areas outside of uMngeni-uThukela Water's Operating Area but within KwaZulu-Natal.

It is a comprehensive technical report that provides information on current infrastructure and on future infrastructure development plans. This report replaces the last comprehensive Infrastructure Master Plan that was compiled in 2025.

The report is divided into **ten** volumes as per the organogram below.

Volume 1 includes the following sections and a description of each is provided below:

- **Section 2** describes the most recent changes and trends within the primary environmental dictates that influence development plans within the province.
- **Section 3** relates only to the uMngeni-uThukela Water Operational Area and provides a review of historic water sales against past projections, as well as uMngeni-uThukela Water's most recent water demand projections, compiled at the end of 2025.
- **Section 4** describes Water Demand Management initiatives that are being undertaken by the utility and the status of Water Demand Management Issues in KwaZulu-Natal.
- **Section 5**, which also relates to uMngeni-uThukela Water's Operational Area, contains a high-level review of the energy consumption used to produce the water volumes analysed in Section 3.
- **Section 6** provides an overview of the water resource regions and systems supplied within these regions.

The next eight volumes describe the current water resource situation and water supply infrastructure of the various systems in KwaZulu-Natal, including:

- | | | |
|-------------------|-------------------|--|
| • Volume 2 | Section 7 | uMngeni System. |
| • Volume 3 | Section 8 | uMkhomazi System |
| | Section 9 | uMzimkhulu System |
| | Section 10 | Mzintlava System |
| • Volume 4 | Section 11 | South Coast System |
| • Volume 5 | Section 12 | North Coast System |
| • Volume 6 | Section 13 | Upper uThukela System |
| • Volume 7 | Section 14 | Buffalo System |
| • Volume 8 | Section 15 | Middle uThukela System |
| | Section 16 | Mhlathuze System |
| • Volume 9 | Section 17 | Umfolozu System |
| | Section 18 | uMkhuze / uPhongolo / Lake Sibiyi System |

Volume 10, Section 19 describes the wastewater works currently operated by uMngeni-uThukela Water (shown in pale brown in the adjacent figure) and provides plans for development of additional wastewater treatment facilities. The status of wastewater treatment in WSA's that are not supplied by uMngeni-uThukela Water are also described in this section.

It is important to note that information presented in this report is in a summarised form and it is recommended that the reader refer to relevant planning reports if more detail is sought. Since the primary focus of this Infrastructure Master Plan is on bulk supply networks, the water resource infrastructure development plans are not discussed at length. The Department of Water and Sanitation (DWS), as the responsible authority, has undertaken the regional water resource development investigations. All these investigations have been conducted in close collaboration with uMngeni-uThukela Water and other major stakeholders to ensure that integrated planning occurs. Details on these projects can be obtained directly from DWS, Directorate: Options Analysis (East).

The Infrastructure Master Plan is a dynamic and evolving document. Outputs from current planning studies, and comments received on this document will therefore be considered in the preparation of the next update.

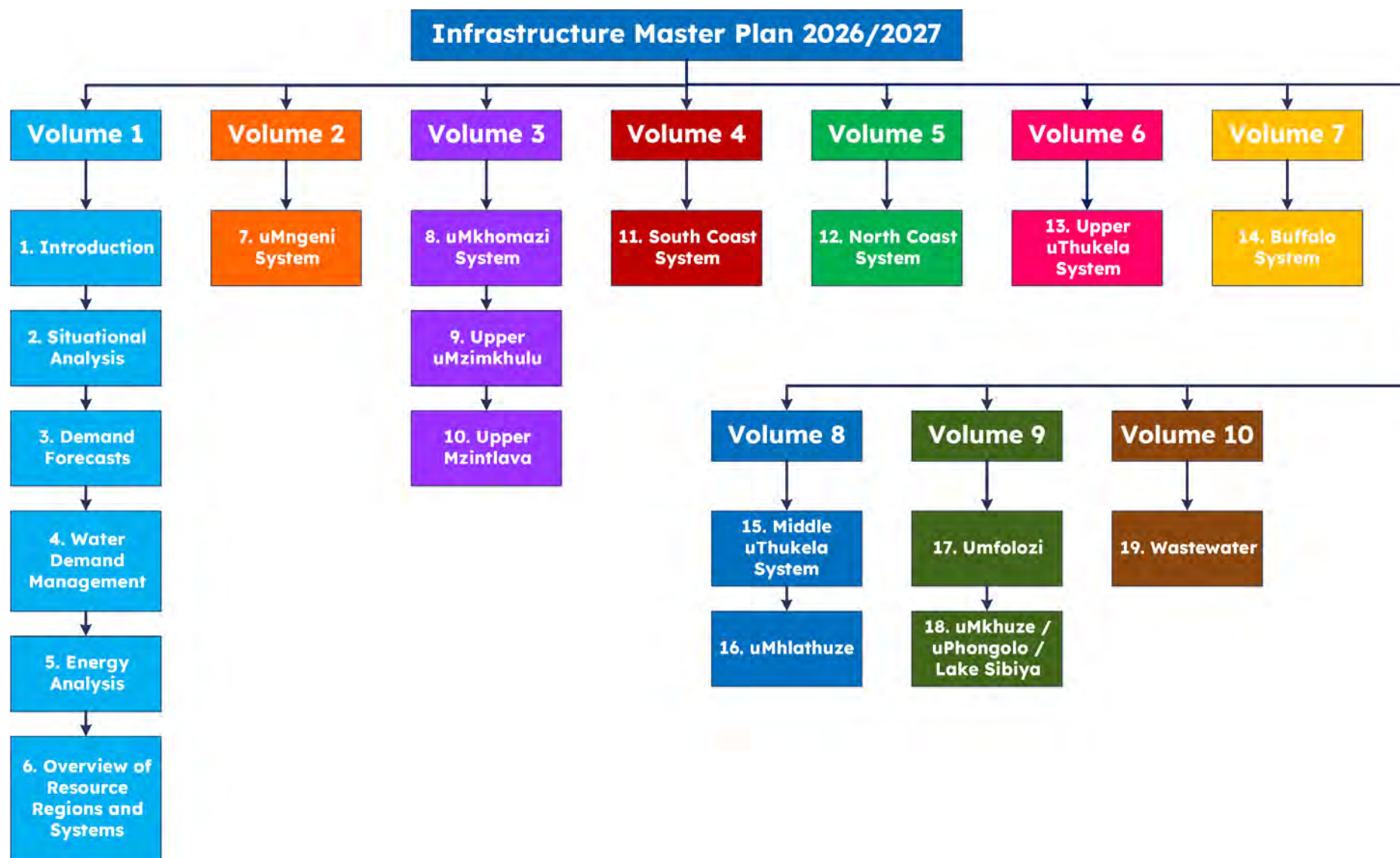


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List of Acronyms

AADD	Annual Average Daily Demand
AC	Asbestos Cement
ADWF	Average Dry Weather Flow
API	Antecedent Precipitation Index
AVGF	Autonomous Valveless Gravity Filter
BID	Background Information Document
BPT	Break Pressure Tank
BWL	Bottom Water Level
BWSP	Bulk Water Services Provider
BWSS	Bulk Water Supply Scheme
CAPEX	Capital Expenditure
CMA	Catchment Management Agency
CoGTA	Department of Co-operative Governance and Traditional Affairs
CWSS	Community Water Supply and Sanitation project
DAEA	Department of Agriculture and Environmental Affairs
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DM	District Municipality
DRDLR	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
DWAF	Department of Water Affairs and Forestry
EFR	Estuarine Flow Requirements
EIA	Environmental Impact Assessment
EKZN Wildlife	Ezemvelo KZN Wildlife
EMP	Environmental Management Plan
EWS	eThekweni Water Services
EXCO	Executive Committee
FC	Fibre Cement
FL	Floor level
FSL	Full Supply level
GCM	General Circulation Model
GDP	Gross Domestic Product
GDPR	Gross Domestic Product of Region
GVA	Gross Value Added

HDI	Human Development Index
IDP	Integrated Development Plan
IFR	In-stream Flow Requirements
IMP	Infrastructure Master Plan
IRP	Integrated Resource Plan
ISP	Internal Strategic Perspective
IWRM	Integrated Water Resources Management
KZN	KwaZulu-Natal
LM	Local Municipality
LUMS	Land Use Management System
MA	Moving Average
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MBR	Membrane Bioreactor
MMTS	Mooi-uMngeni Transfer Scheme
MMTS-1	Mooi-uMngeni Transfer Scheme Phase 1
MMTS-2	Mooi-uMngeni Transfer Scheme Phase 2
mPVC	Modified Polyvinyl Chloride
MTEF	Medium-Term Expenditure Framework
MTSF	Medium-Term Strategic Framework
MWP	Mkomazi Water Project
MWP-1	Mkomazi Water Project Phase 1
NCP-1	North Coast Pipeline I
NCP-2	North Coast Pipeline II
NCSS	North Coast Supply System
NGS	Natal Group Sandstone
NPV	Net Present Value
NRW	Non-Revenue Water
NSDP	National Spatial Development Perspective
NWSP	National Water Sector Plan
OPEX	Operating Expenditure
p.a.	Per annum
PES	Present Ecological Status
PEST	Political, Economical, Sociological and Technological
PGDS	Provincial Growth and Development Strategy
PPDC	Provincial Planning and Development Commission (KZN's)

PSEDS	Provincial Spatial Economic Development Strategy
PWSP	Provincial Water Sector Plan
RDP	Reconstruction and Development Programme
RO	Reverse Osmosis
ROD	Record of Decision
RQO	Resource Quality Objective
SCA	South Coast Augmentation
SCP	South Coast Pipeline
SCP-1	South Coast Pipeline Phase 1
SCP-2a	South Coast Pipeline Phase 2a
SCP-2b	South Coast Pipeline Phase 2b
SDF	Spatial Development Framework
SHR	St Helen's Rock (near Port Shepstone)
STEEPLE	Social/demographic, Technological, Economic, Environmental (Natural), Political, Legal and Ethical
SWRO	Seawater Reverse Osmosis
TEC	Target Ecological Category
TWL	Top Water Level
uPVC	Unplasticised Polyvinyl Chloride
UUW	uMngeni-uThukela Water
WA	Western Aqueduct
WC	Water Conservation
WDM	Water Demand Management
WMA	Water Management Area
WRC	Water Research Commission
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSNIS	Water Services National Information System
WSP	Water Services Provider
WTP	Water Treatment Plant
WWW	Wastewater Works

Spellings of toponyms have been obtained from the South African Geographical Names Council (SAGNC) which operates under the national Department of Sport, Arts and Culture (DSAC). The SAGNC provides the official spelling of place names and the spellings, together with the relevant gazette numbers, can be accessed at <http://www.dac.gov.za/content/toponymic-guidelines-map-and-other-editors>.

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7. uMngeni System

7.1 Synopsis of uMngeni System

The Durban-Pietermaritzburg Region's (the primary economic hub of KZN) main source of potable water is the uMngeni System (**Figure 7.1& Figure 7.2**). It comprises of five storage dams, four of which are located on the uMngeni River. The fifth dam and a weir are located on the Mooi River and augment raw water supply to the resources on the uMngeni River via the Mooi/Mngeni Transfer scheme (MMTS 1&2). Together they form the Mooi/uMngeni Water Resource Region which is an integrated water resource with a bulk potable water distribution system made up of two major sub-systems, viz.

- The Upper uMngeni System (also referred to as the Inland System **Figure 7.3**) serving the uMgungundlovu District Municipality, Msunduzi Municipality, Ilembe Municipality and eThekweni Municipality's Outer West area, and
- The Lower uMngeni System (**Figure 7.5**) serving the coastal areas and hinterland of the eThekweni Municipality. This sub-system also serves the northern coastal areas of Ugu District Municipality via the South Coast Augmentation Pipeline and the South Coast Pipeline.

The water resources of the two sub-systems are highly inter-dependant (**Figure 7.3**). The respective bulk distribution systems are inter-connected by uMngeni-uThukela Water's infrastructure and eThekweni Metropolitan Municipality's Western Aqueduct.

Figure 7.3 and **Figure 7.4** show the Upper uMngeni System and **Figure 7.5** and **Figure 7.6**, the Lower uMngeni System.

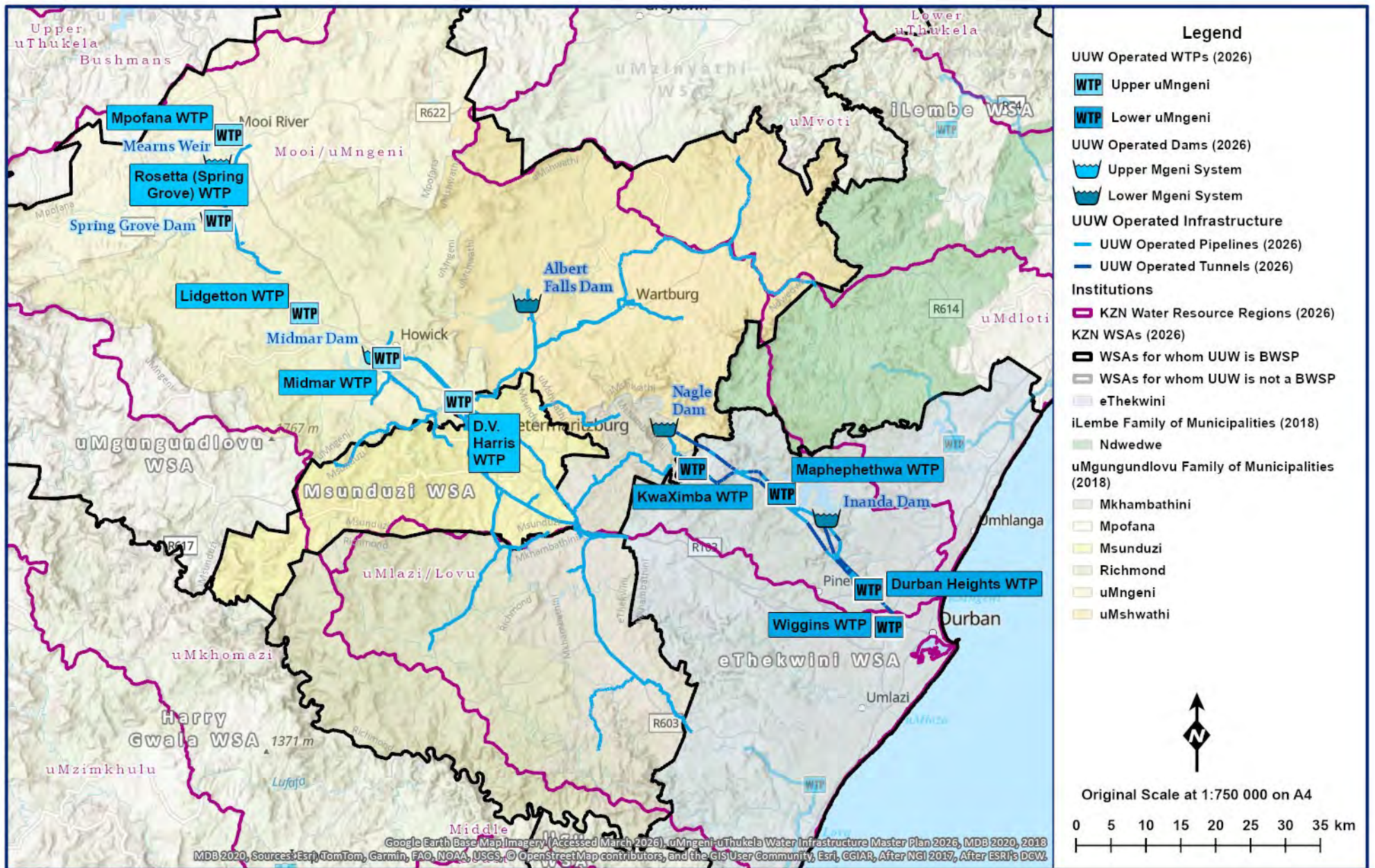


Figure 7.1 General layout of the uMngeni System

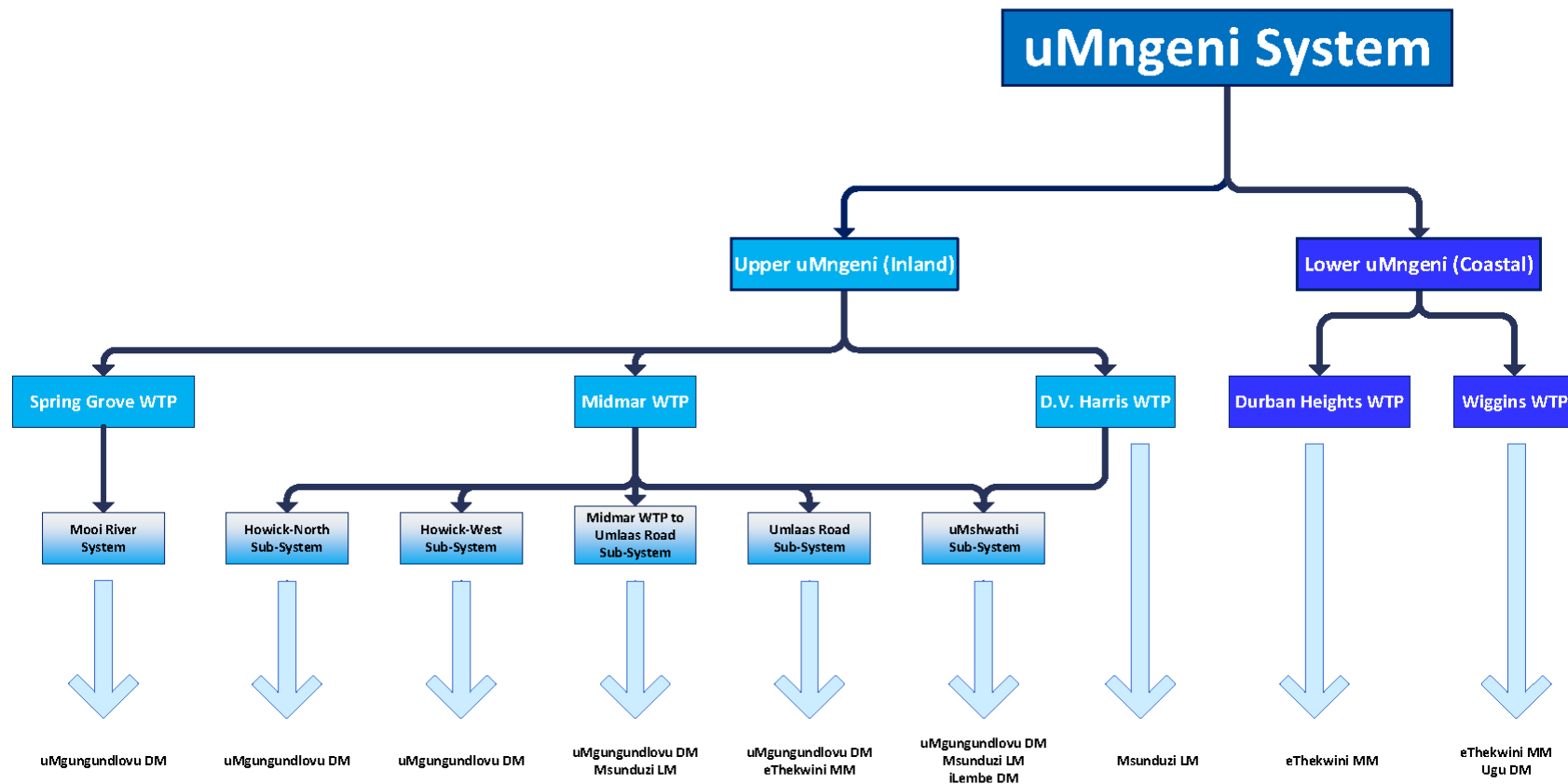


Figure 7.2 Network chart of the uMngeni System.

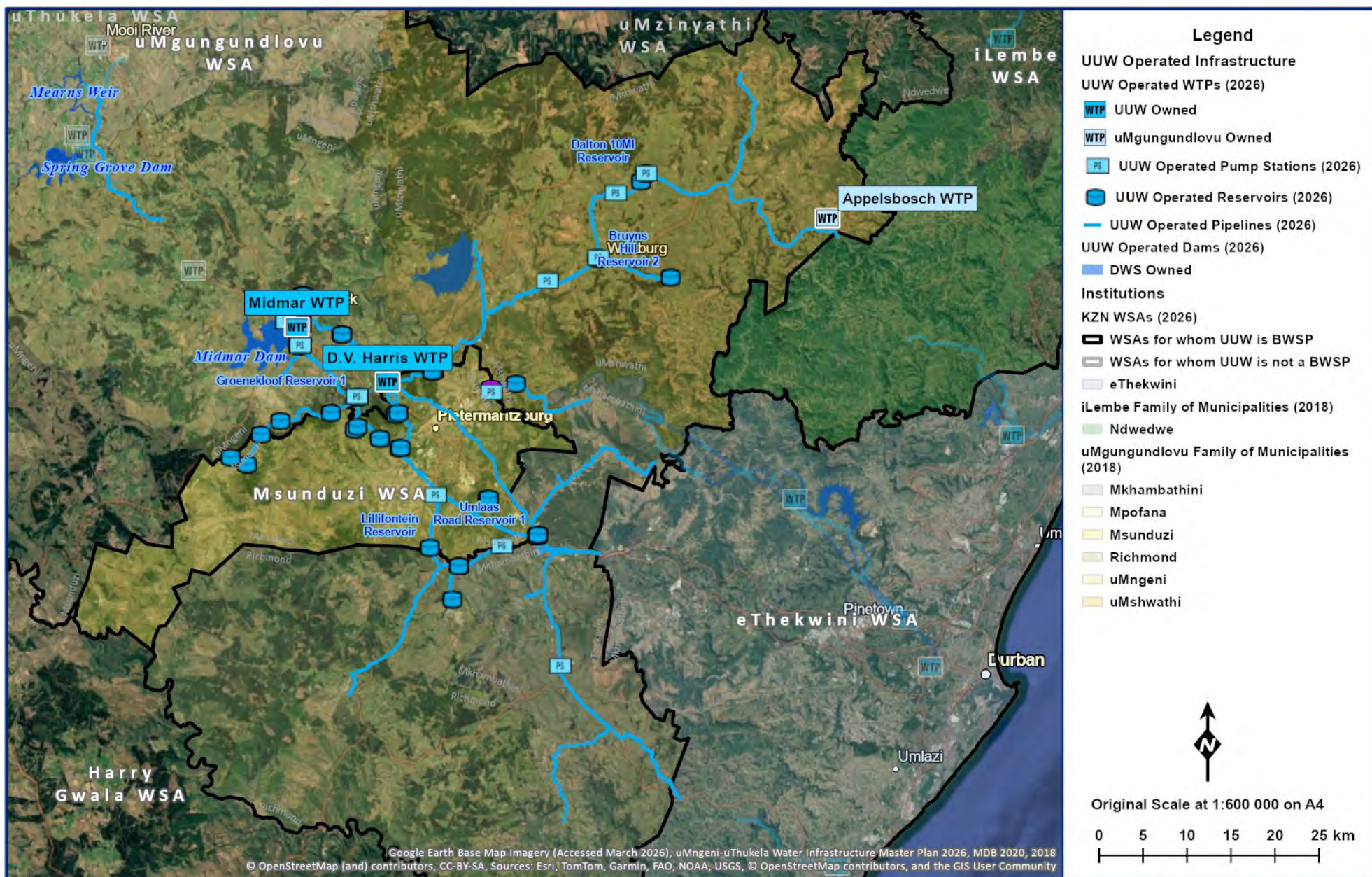


Figure 7.3 General layout of the Upper uMngeni System

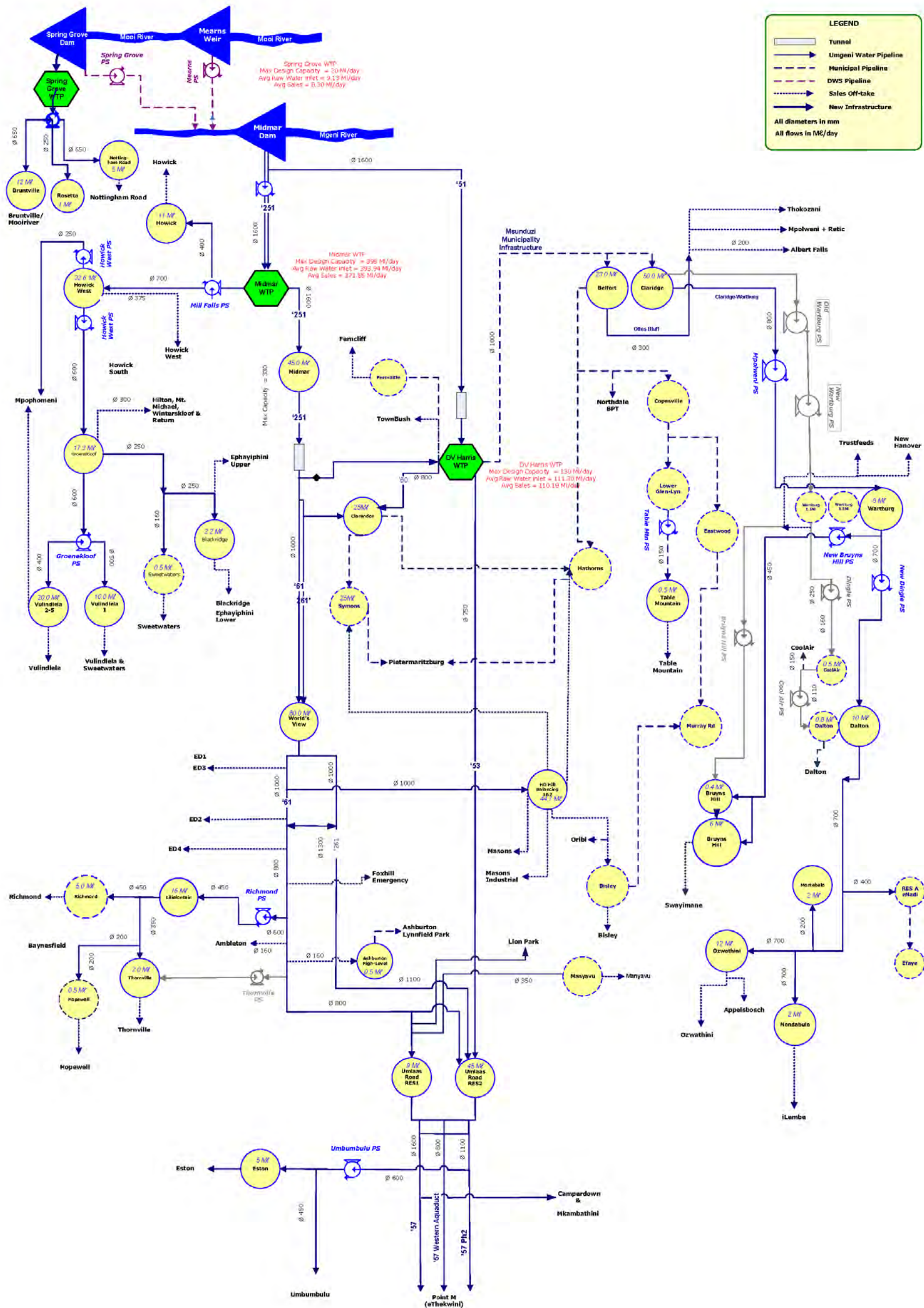


Figure 7.4 Schematic of the Upper uMgeni System.

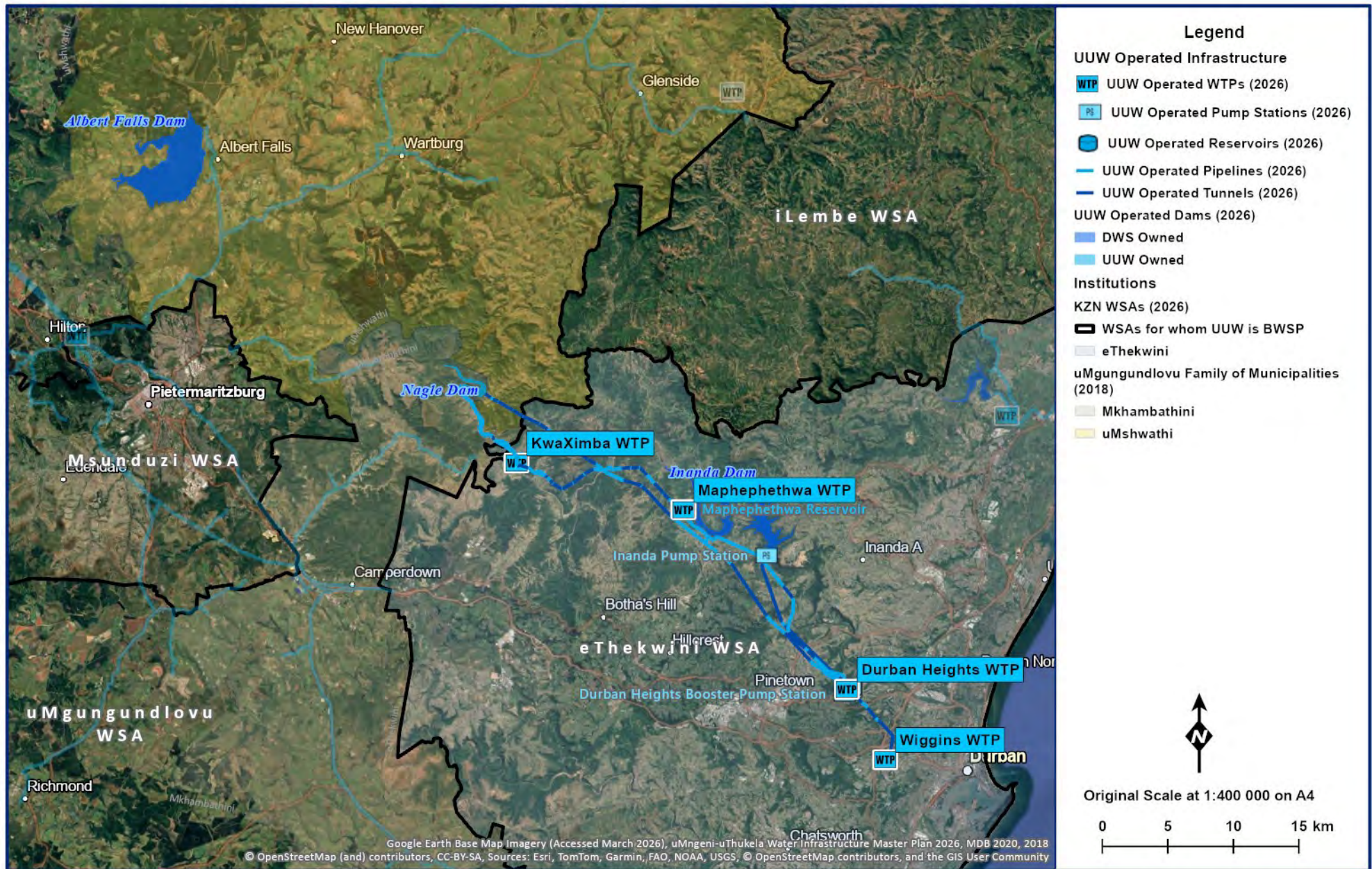


Figure 7.5 General layout of the Lower uMngeni System

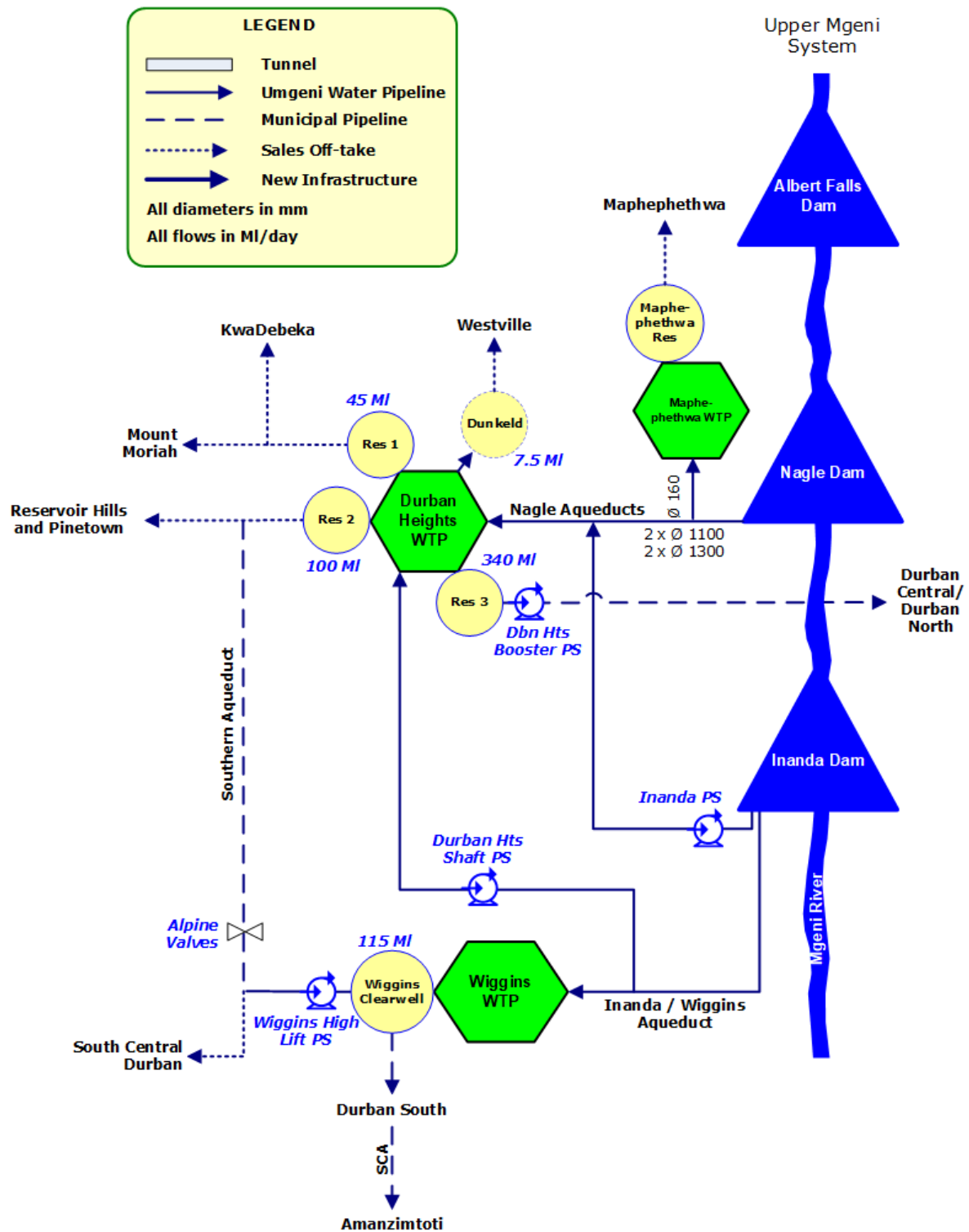


Figure 7.6 Schematic of the Lower uMgeni System.

7.2 Water Resources of the uMngeni System

7.2.1 Description of the uMngeni System Water Resource Region

a) Mooi/uMngeni Water Resource Region

i) Overview

The Mooi/uMngeni region (**Figure 7.7**) comprises of the two tertiary catchments of U20 (uMngeni River) and V20 (Mooi River). Water is stored in the Mooi River Catchment via the Spring Grove Dam and Mearns Weir for transfer into the uMngeni System to augment supply. While the focus on the Mooi River is on the upper reaches and the associated water transfer to the uMngeni, downstream parts of the Mooi River catchment are also of interest to uMngeni-uThukela Water as they influence releases of water from the Mearns Weir, which in turn impacts on water available for transfer to the uMngeni System.

The major urban centres of Durban and Pietermaritzburg are situated within the uMngeni catchment. There are a number of other urban and peri-urban centres within this region including Mooi River, Rosetta, Nottingham Road, Howick, Wartburg, Cato Ridge, and the greater surrounds of both Durban and Pietermaritzburg. The urban centres from Howick towards the coast receive their water from the uMngeni System.

The uMngeni River has been fully developed with the construction of four major dams, *viz.* Nagle (1950), Midmar (1965), Albert Falls (1976) and Inanda (1988). Water resources infrastructure on the Mooi River include the Spring Grove Dam, constructed in 2013, and the Mearns Weir, which was initially constructed in 1983 and raised in 2003. Both the Mooi and uMngeni catchments are no longer open to streamflow reduction activities such as afforestation, expansion of irrigated agriculture or the construction of storage dams, i.e. they are 'closed' catchments. The predominant land use in the Mooi catchment is commercial agriculture, which includes large-scale irrigation of pastures and summer cash crops, with an estimated water requirement of 51 million m³/annum (Umngeni Water, 2020). The other large water use is transfers to the uMngeni catchment.

In 1983, during a period of severe drought, the Mearns Emergency Transfer Scheme was constructed by DWS to enable water to be transferred from the Mooi River into the uMngeni catchment. The scheme consisted of a 3 m high weir and a pump station at Mearns on the Mooi River, a 13.3 km long, 1 400 mm diameter steel rising main to a break pressure tank situated at Nottingham Road and a 8.3 km long, 900 mm diameter steel gravity main to an outfall structure on the Mpofana River. The emergency scheme was operated for a short period until the drought broke and was then mothballed until 1993, when uMngeni-uThukela Water re-commissioned it for a short period during a drought cycle. Thereafter, the Mearns Emergency Transfer Scheme was operated as and when required until the commissioning of the Mooi-uMngeni Transfer Scheme Phase 1 (MMTS-1) in 2003.

The MMTS-1 ensured that a maximum flow of 3.2 m³/s could be transferred from the Mooi River into the uMngeni catchment on a more sustained basis. Raw water is pumped from a larger Mearns Weir on the Mooi River via the transfer pipeline to an outfall on the Mpofana River. From the Mpofana River, water flows into the Lions River and then into the uMngeni River upstream of Midmar Dam.

Phase 2 of the Mooi-uMngeni Transfer Scheme (MMTS-2), which incorporates Spring Grove Dam on the Mooi River and a transfer scheme to pump 4.5 m³/s was completed in 2016. The MMTS-2 has the flexibility of pumping 4.5 m³/s on a continuous basis from Spring Grove Dam or 3.2 m³/s from the Mearns Weir. Operation of this scheme depends on the water level in each of these water resources as well as the need for water at Midmar and Albert Falls Dams.

The construction of Spring Grove Dam increased the yield of the system, although the demand now exceeds the required 99% assurance of supply. The resulting deficit could extend for some time if the management of water resources and water losses, during the current deficit period, is not controlled. Approximately 280 Mℓ/day of water has been supplied during the year 2025, over and above the system yield of just under 1 100 Mℓ/day at a 1 in 100 year assurance level. During 2025, approximately 92 Mℓ/day was supplied over and above the water use licence for the system. Supply in the system is expected at a 1:100 year level of assurance although the licence is issued at the level of a 1:20 year. The total supply in 2025 was the equivalent of the quantity that could be delivered between a 1:5 and 1:10 year drought.

Although the current system storage as of March 2026 is considered acceptable and represents no risk of non-supply during the current 2025/26 year, there is a risk of non-supply in the longer term owing to demand growth and system losses. Water demand management data has shown that, of the total water purchases, less than 50% is deemed revenue water in this system. The system losses in the distribution network have escalated to concerning levels in the recent times, leading to the current situation. DWS first issued a Notice of Intent to issue a Directive in July 2023 to UUW, to comply with the abstraction licence. Since then, implementation was repeatedly delayed through requests for deferments and extensions, largely linked to municipal readiness and procurement constraints. DWS have issued a letter dated 21 January 2026, wherein an amended Plan of Action to comply with the abstraction licence by the end of June 2026 was accepted. DWS requested additional information from eThekweni Metro and Msunduzi Municipality at the beginning of 2026 to provide assurance that required water savings will be realised timeously. UUW continues to take steps, together with WSAs, to reduce abstraction volumes from the uMngeni System by reducing demand at the customer level. Water Service Authorities have to address water demand management, failing which water supply will have to be reduced at the UUW water treatment plants. Some of the water service authorities have made some progress on the water loss reduction initiatives and some have not.

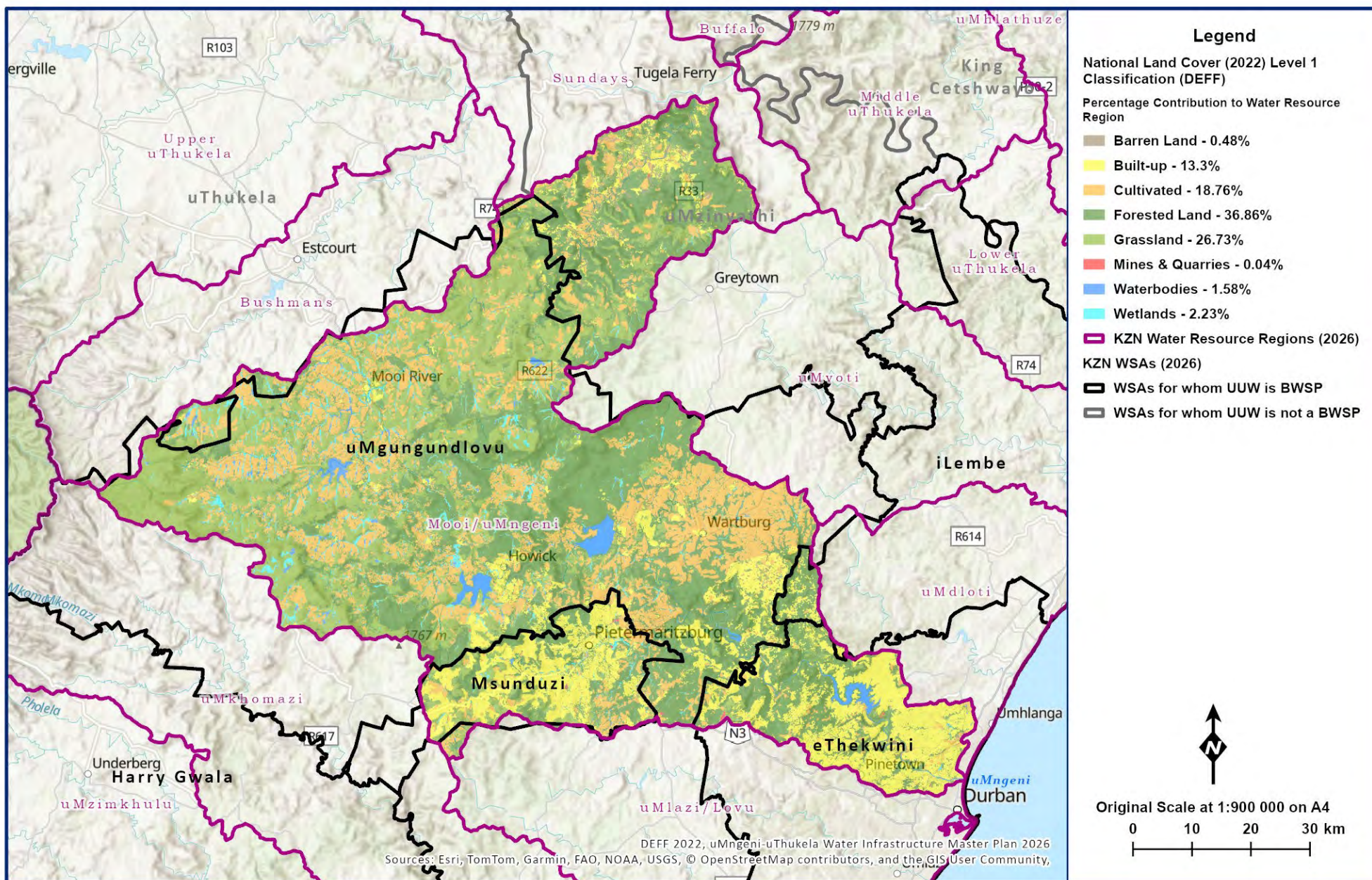


Figure 7.7 General layout of the Mooi/uMngeni Region.

ii) Surface Water

The hydrological statistics of the catchments in the Mooi-uMngeni Region are summarised in **Table 7.1**.

Table 7.1 Hydrological characteristics of the Mooi/uMngeni Water Resource Region (UUW, 2019).

Region	River (Catchment)	Area (km ²)	Annual Average			
			Evaporation (mm)	Rainfall (mm)	Natural Runoff (million m ³)	Natural Runoff (mm)
Mooi/uMngeni	Mooi River (V20) up to Mearns	1,637	1,342	800	306.1	187
	uMngeni River (U20)	4,439	1,214	932	685.8	155

iii) Groundwater

The Mooi/uMngeni Region occurs in the KwaZulu-Natal Coastal Foreland and North-western Middleveld Groundwater Regions (Section 2). This Groundwater Region is characterised by intergranular and fracture rock aquifers with extremely low to medium development potential. The underlying geology is mostly arenaceous rocks of the Ecca Formation.

Hydrogeological Units

The hydrogeologically relevant lithologies recognised in the Mooi/uMngeni region comprise sandstone, tillite and mudstone/shale supporting fractured groundwater regimes and dolerite intrusions and granite/gneiss supporting fractured and weathered groundwater regimes.

Geohydrology

The overall median yield (0.33 ℓ/s) of boreholes tapping the Natal Group Sandstone (NGS) identifies this lithology as one of the more productive hydrogeological units in the uMngeni catchment. The highest percentage of boreholes (8%) yielding greater than 4.5 ℓ/s can be found in this lithology.

The mudstone/shale of the Ecca Group occurs almost entirely inland at the head of uMngeni River and is the dominant lithology around Pietermaritzburg and Howick. Boreholes tapping these lithologies have median yields of 0.4 ℓ/s.

The tillite of the Dwyka Formation in the uMngeni catchment supports an overall median yield of 0.14 ℓ/s and a relatively high percentage (40%) of dry boreholes.

The granite/gneisses of the Natal Metamorphic Province (NMP) flank uMngeni River and are concentrated around Nagle and Inanda dams. This lithological unit supports a median yield of 0.18 ℓ/s .

An analysis of baseflow-derived stream run-off values per quaternary catchment in the uMngeni catchment suggests that groundwater recharge from rainfall varies in the range 3% to 7% of the mean annual precipitation.

In the Mooi catchment, natural groundwater discharge occurs in the form of springs, seeps and in isolated cases, uncapped artesian boreholes. The wetlands and dams in the headwaters of the Mooi River are supported by perennial groundwater seeps associated with the dolerite sill intrusions in the mudstone/shale lithologies. Springs rising in the sandstone and granite/gneiss lithologies relate to structural features (faults and fracture zones, lineaments). An analysis of baseflow-derived stream run-off values per quaternary catchment suggests that groundwater recharge from rainfall varies in the range 3% to 7% of the mean annual precipitation, similar to that found in the uMngeni catchment.

Groundwater Potential

The greatest widespread demand on the groundwater resources in the Mooi-uMngeni Region is represented by its use as a source of potable water for communities in the rural areas and, to a lesser extent, households in the farming areas. Other demands of a more concentrated nature are represented by its use to supplement rainfall and traditional surface water supplies for irrigation.

The sandstone of the Natal Group represents the most productive groundwater-bearing lithology, followed by mudstone/shale lithologies, the granite/gneiss lithologies and the tillite sediments of the Dwyka Tillite Formation.

A good to fair correlation exists between boreholes supporting yields in the moderate (greater than 0.5 ℓ/s to less than 3.0 ℓ/s) and high (greater than 3.0 ℓ/s) classification ranges and structural features represented by faults and remotely sensed lineaments (**Figure 7.8**).

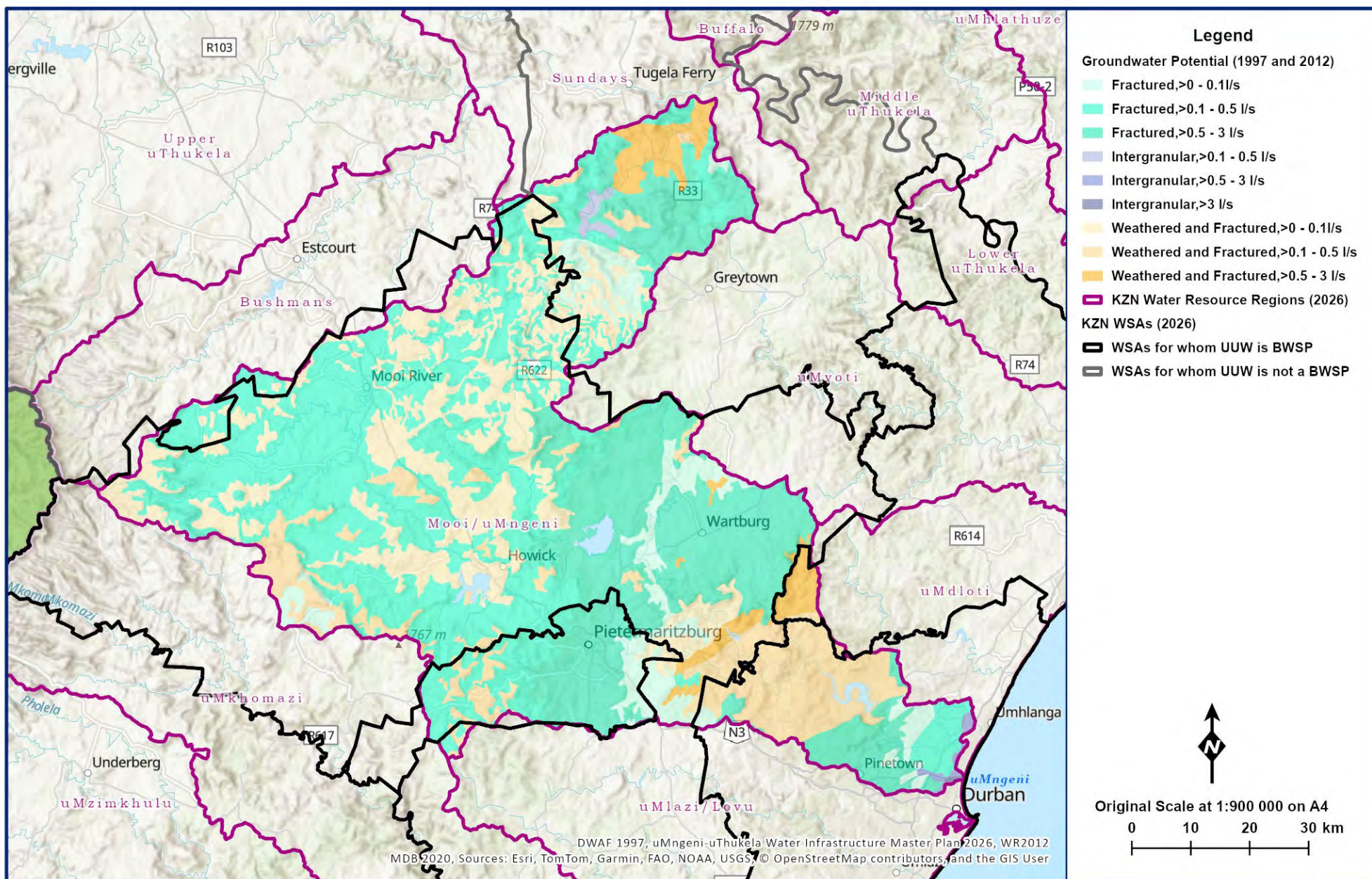


Figure 7.8 Groundwater potential in the Mooi/uMngeni Region.

iv) Water Quality

Surface Water

The algal response and nutrient loadings for Midmar Dam are shown in **Figure 7.9**. An increase in the amount of nutrients mobilized by runoff was noted in 2022 congruent with a greater rainfall amount and inflow volumes. This resulted in a peak in nutrients and suspended solids (25 922 tonnes/annum) loadings being recorded at Midmar Dam inflow. The high suspended solids load resulted in elevated turbidity results in Midmar Dam. A consistent decline was recorded from 2023 to 2024, however, an increase was noted in 2025. An increase in the inflow volume recorded in 2025 has resulted in an upward trend on the suspended solids and organic nutrients concentration.

The absence of flow measuring on Mthinzima River negates nutrients and suspended solids loads quantification. Sewage pollution is an on-going challenge impacting Mthinzima River. The presence of a wetland is playing a critical role in improving the water quality state of this input to Midmar Dam. The assimilative capacity of Midmar Dam has also played a major role in limiting the related water quality challenges. However, the cumulative impact of this sustained sewage pollution has contributed to the water quality challenges and aquatic weed growth recorded at Midmar dam. Midmar Dam is plagued by *Egeria densa* growth challenges, predominantly on the Mthinzima River inflow side of the impoundment. Numerous interventions, headlined by biocontrol release, have been implemented to manage the growth of *Egeria densa*. However, addressing the sewage contamination challenges will play a key role in suppressing infestation at the dam. The construction of the new Mpophomeni WWTW plant that is currently going through commissioning will play a key role in the management of sewage, thus decreasing the inputs into Midmar Dam.

The algal response and nutrient loadings for Spring Grove Dam are shown in **Figure 7.10**. An increase is reflected by the nutrients (phosphorus and total inorganic nitrogen) and suspended solids loadings. A peak in total inorganic nitrogen (20.42 tonnes) and suspended solids (361.45 tonnes) was recorded for 2025 with a notable increase in algal response. The increasing algal counts, coupled with persistent nutrient and sediment inflows, reflect a gradual rise in eutrophication risk within Spring Grove Dam. This highlights the need for targeted catchment management interventions, including improved agricultural runoff control, and continuous nutrient monitoring to mitigate potential algal bloom development.

The algal response and nutrient loadings for Mearns Weir are shown in **Figure 7.11**. The algal response in the Mearns Main Basin Integrated was flat when comparing 2024 and 2025. In 2025, 75% of algal observations were distributed around 1,155 cells/mL, a slight decrease from 1,171 cells/mL recorded in 2024, suggesting limited year-on-year variation. The maximum algal count in 2025 reached 19,047 cells/mL lower than 22,263 cells/mL observed in 2024.

An increase is reflected by the nutrient (phosphorus and total inorganic nitrogen) and suspended solids loadings recorded in 2025, particularly at the Little Mooi River inflow to

Mearns Dam. The recorded peak is associated with catchment inputs from intensive farming (including numerous piggeries and dairies). The Little Mooi catchment area is heavily utilised for both extensive and intensive commercial agriculture.

The algal response and nutrient loadings for Nagle Dam are shown in **Figure 7.12**. Nutrient enrichment from the Albert Falls and Nagle catchments has resulted in ongoing algal blooms in the Albert Falls and Nagle Dams since August 2024. This bloom was initially exacerbated by low water levels and limited water available for flushing in the dams in 2024. Algal count remained elevated through the first half of 2025, and a further notable increase was recorded from mid-July 2025 in both the Albert Falls and Nagle Dams, as well as associated Durban Heights and other raw waters.

Challenges associated with wastewater and agricultural inputs and resultant eutrophication of water resources were highlighted as high priority residual risks in recent Water Safety Plans. The very high nutrient loads entering the uMngeni system dams in 2022 and 2023, while mitigated with a well-flushed uMngeni system, were associated with predicted future increases in eutrophication and algal responses. 2024 nutrient loadings were low due to lower inflow volumes, but 2025 loadings are of significant concern and indicate increased nutrient concentrations and loadings.

The algal response and nutrient loadings for Inanda Dam are shown in **Figure 7.13**. An increasing trend in nutrient (phosphorus and total inorganic nitrogen) loadings into the dam was noted when comparing 2025 to 2024. High suspended solids (5185 – 158917 tonnes/annum) were recorded between 2018 and 2023, due to high inflow volumes and catchment run-off. Total phosphorus loads ranged from 45.7 – 224 tonnes/annum over the past five years, with a peak in 2021. Contributing factors to this increase include sewer issues and other catchment inputs from the Msunduzi Municipality. In addition, agricultural activities in the greater uMngeni catchment contribute to the increase in total inorganic nitrogen (combination of ammonia, nitrate and nitrite), which end up washing into the river and eventually ending up at Inanda Dam.

Algal counts and trophic status generally correlate with nutrient loading concentrations. Aligned to the trend in nutrient loading, the algal response in Inanda Dam has increased over the past three years. However, ongoing high nutrient loads entering Inanda Dam, while currently mitigated by a well-flushed uMngeni System, are associated with predicted potential future increases in eutrophication and algal responses and anticipated further deteriorating raw water quality when water levels decrease. The trophic status in the dam varies between hypertrophic (upper dam) and eutrophic in mid dam and main basin. The nuisance value of algal productivity increased to significant in the main basin from 2023 due to the storm flows washing the algae towards this area.

Groundwater

The ambient water quality of groundwater, in the Mooi/uMngeni Region, is generally excellent. 83% of recorded field observations of electrical conductivity parameters do not exceed a value of 450 mg/ℓ (70 mS/m). It appears that the least saline groundwater is associated with dolerite intrusions (median value of 11 mS/m) and the most saline with the tillite lithology (median value of 56 mS/m).

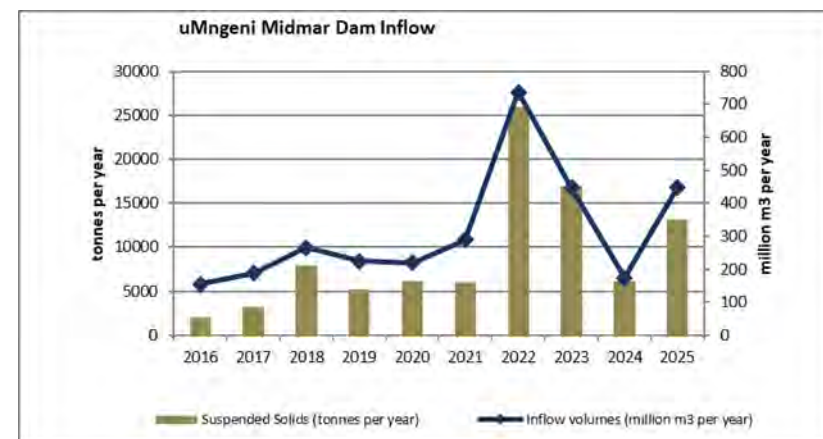
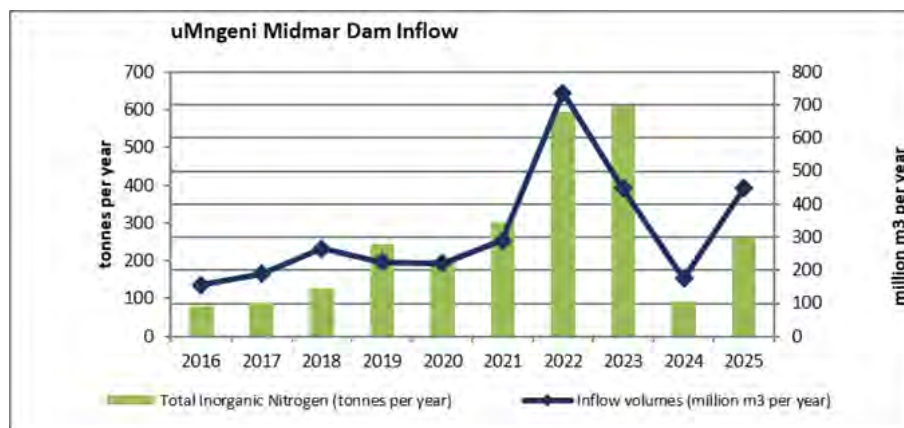
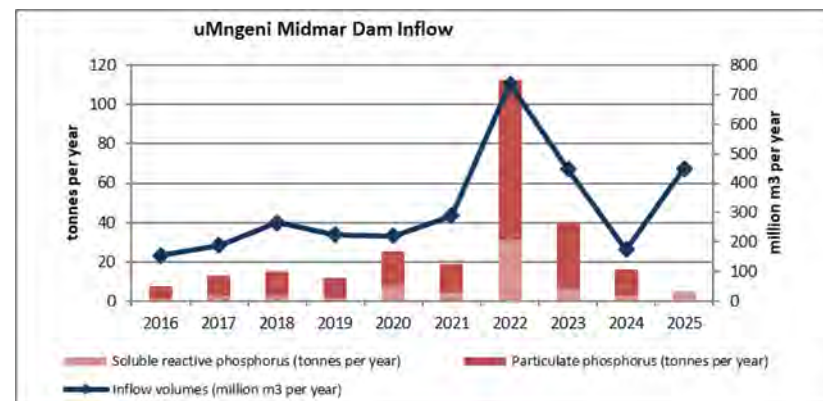
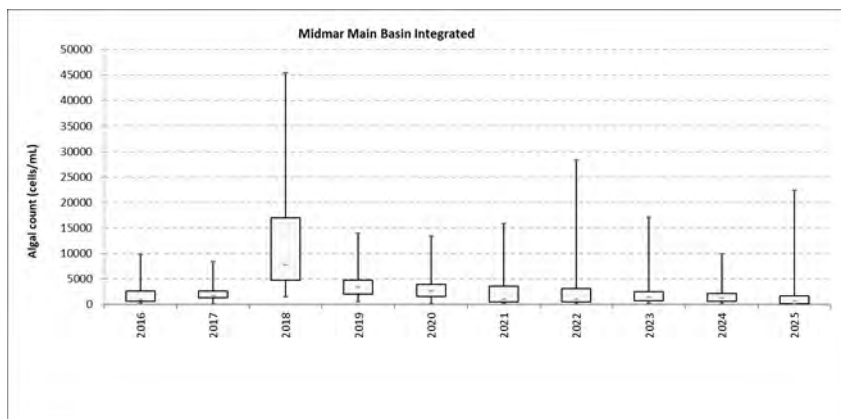


Figure 7.9 Algal response and nutrient loadings for Midmar Dam.

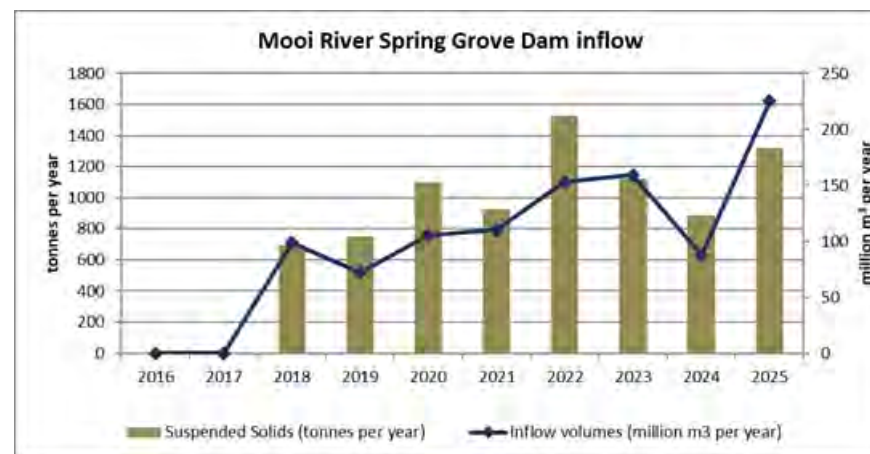
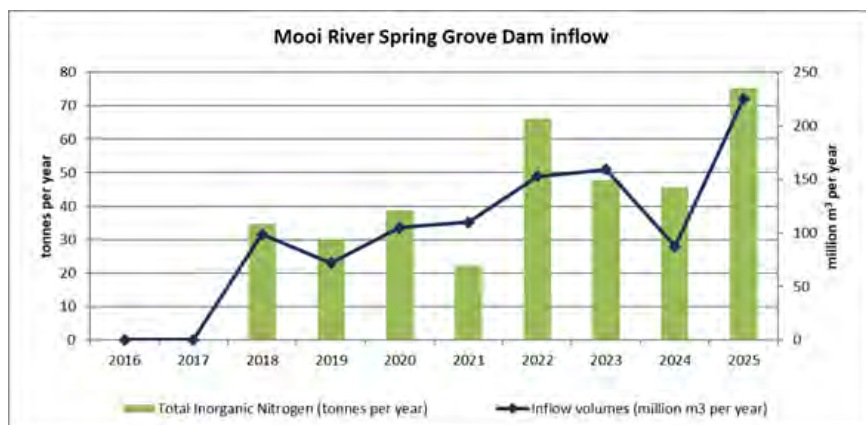
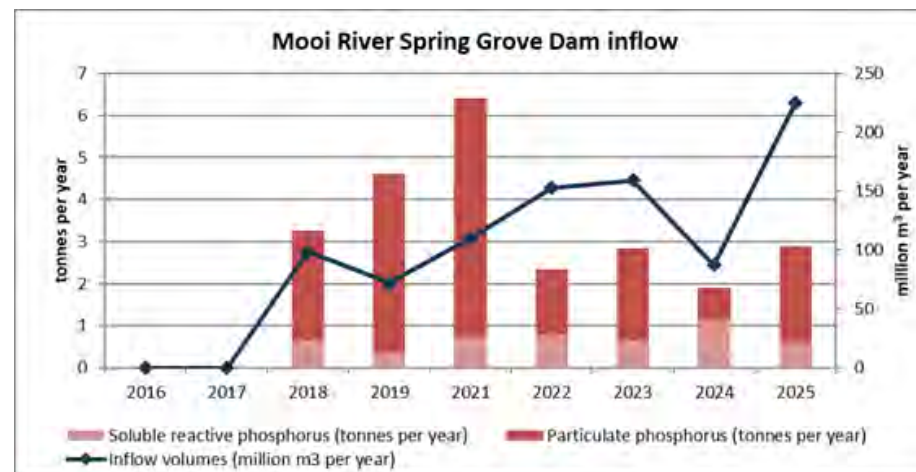
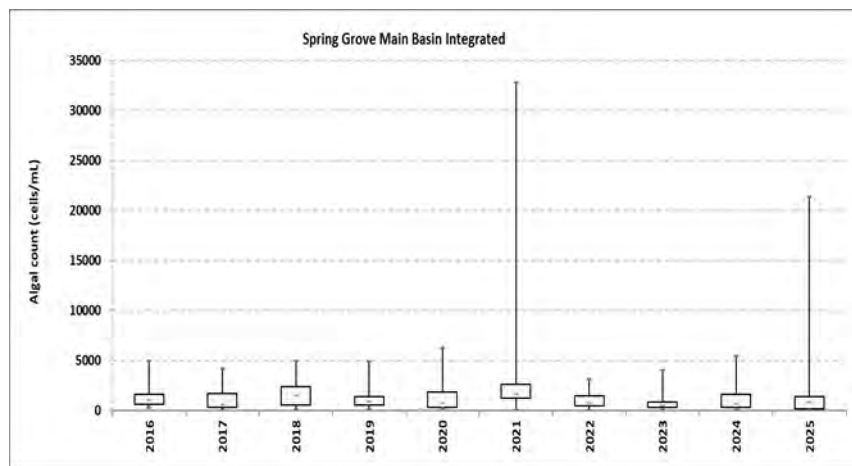


Figure 7.10 Algal response and nutrient loadings for Spring Grove Dam.

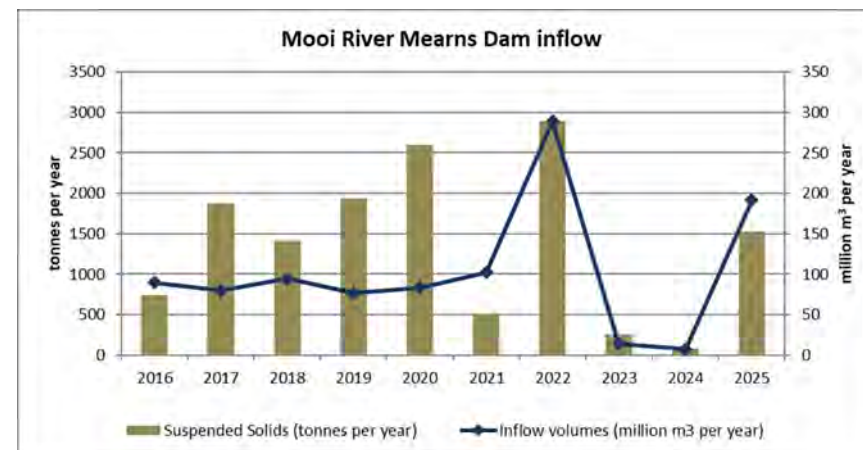
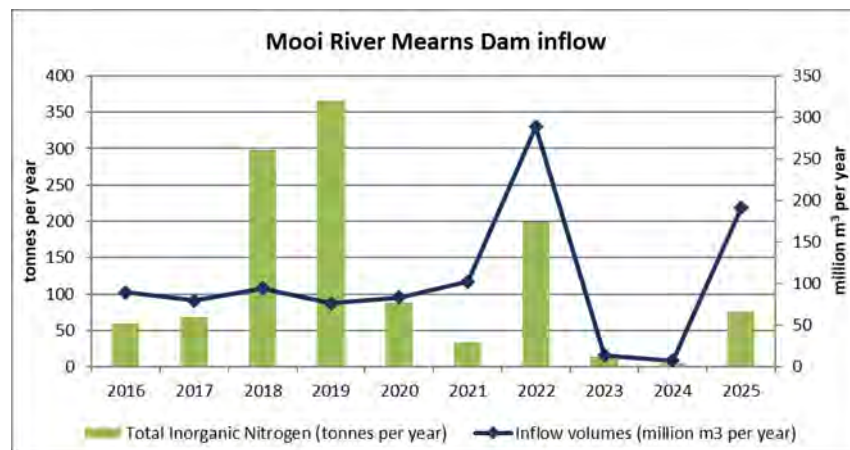
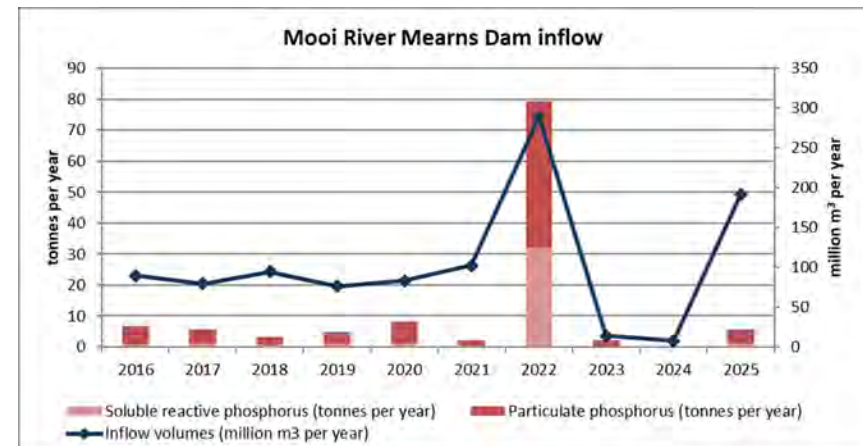
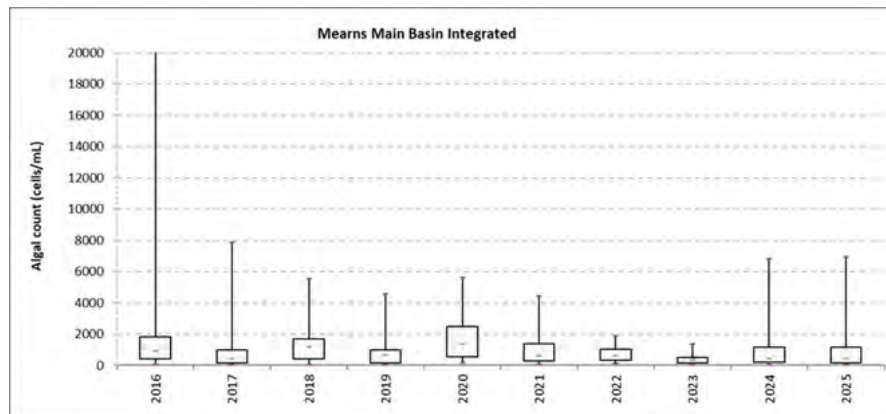


Figure 7.11 Algal response and nutrient loadings for Mearns.

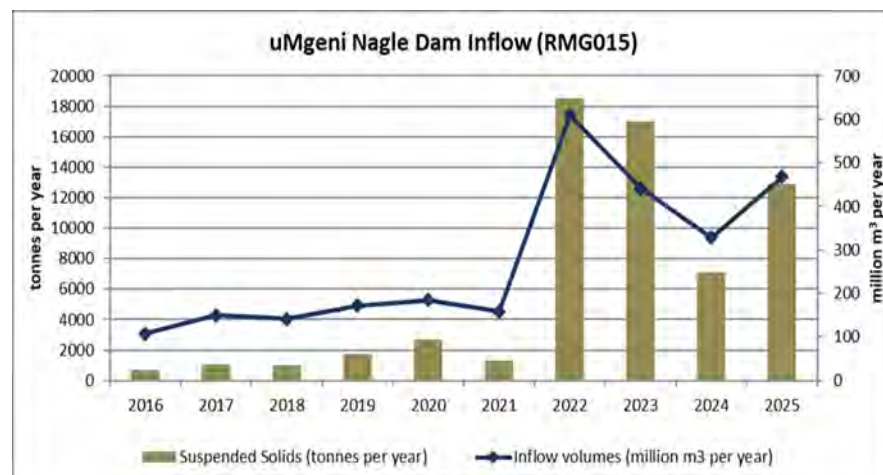
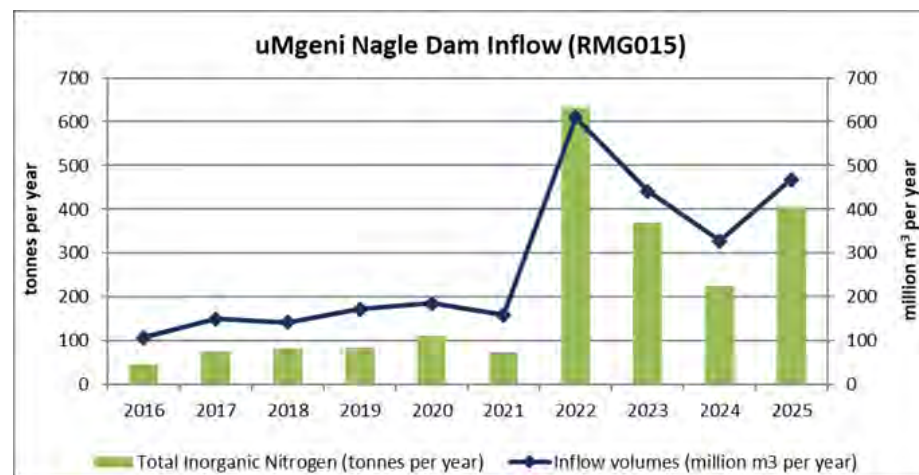
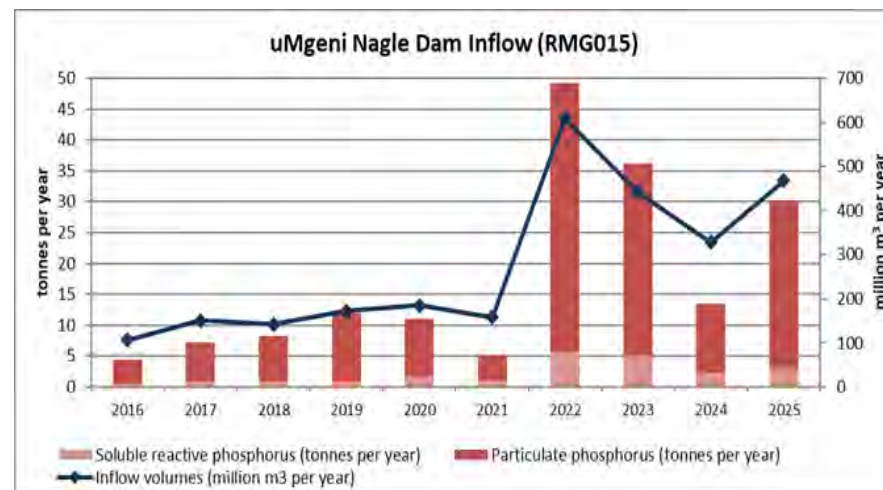
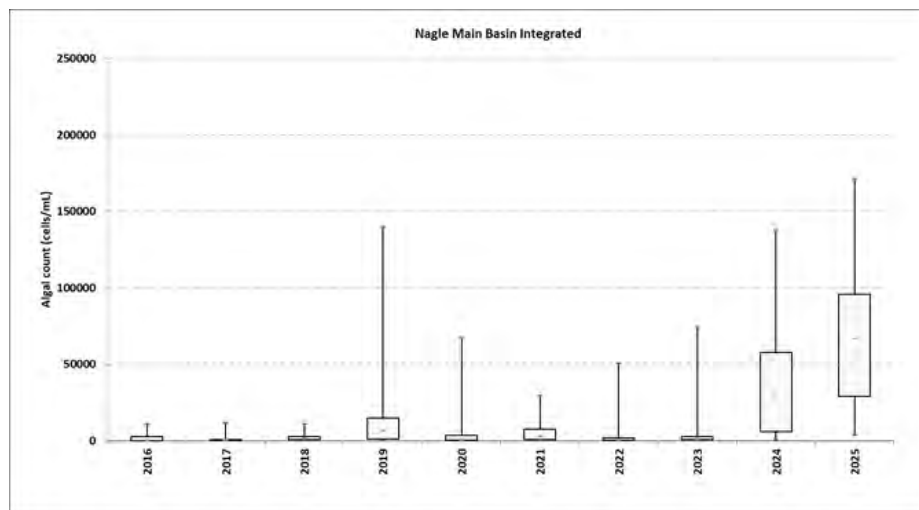


Figure 7.12 Algal response and nutrient loadings for Nagle Dam.

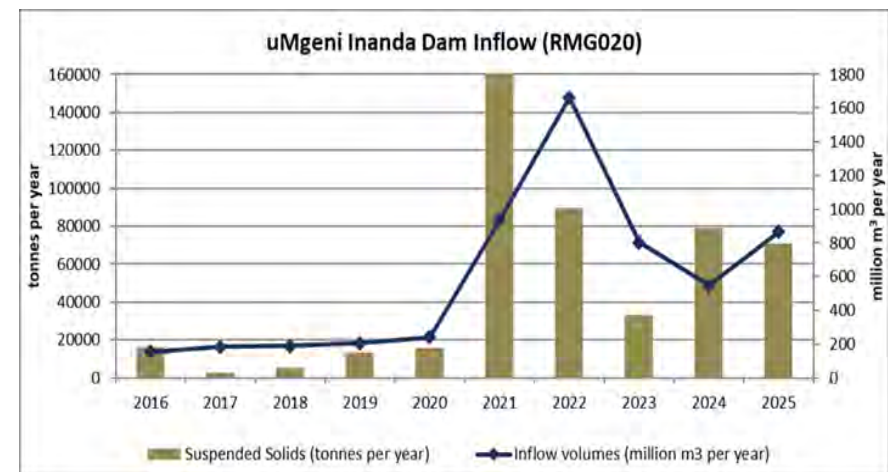
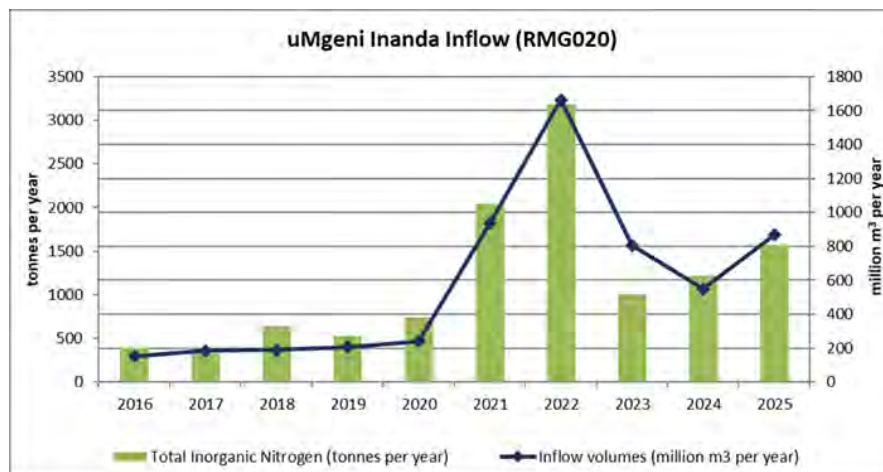
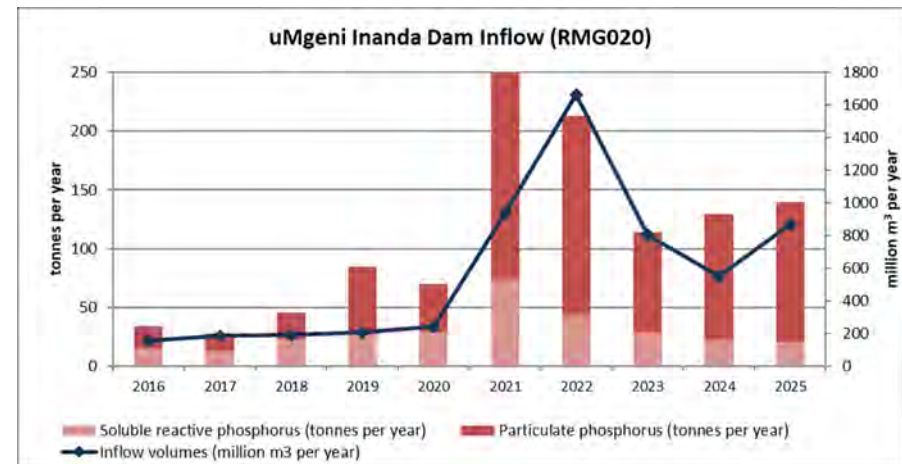
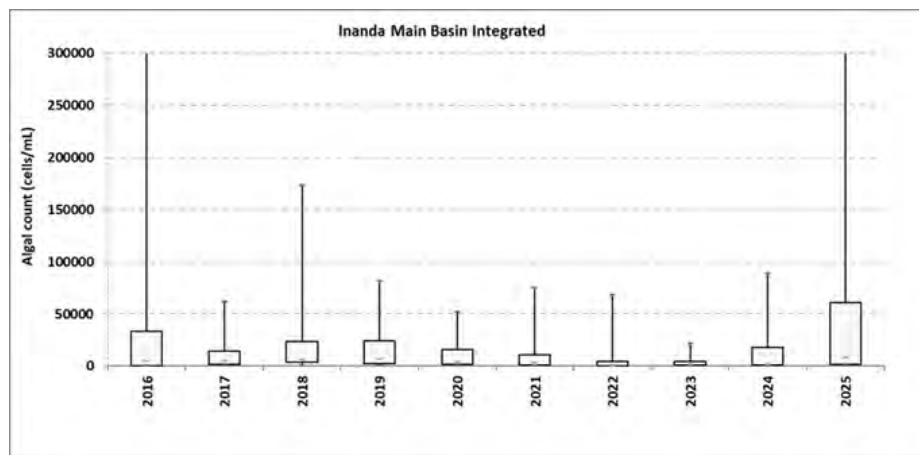


Figure 7.13 Algal response and nutrient loadings for Inanda Dam.

b) uMkhomazi Water Resource Region

i) Overview

The uMkhomazi River has its source at an elevation of approximately 3 000 m above sea level in the Drakensberg Mountains. The river flows in a south-easterly direction and enters the Indian Ocean near the town of uMkomaas about 40 km south of Durban. Several large tributaries, including the Loteni, Nzinga, Mkomazane, Elands and iXobho rivers flow into the uMkhomazi. The region includes the small towns of Bulwer, Impendle, Ixopo, uMkhomazi, Craigieburn and Magabheni which have small water requirements.

The Department of Water and Sanitation Reconciliation Strategy Study (DWA, 2010) confirmed that the uMkhomazi Water Project Phase 1, which includes the transfer of water from Smithfield Dam on the uMkhomazi River to the uMngeni System (**Section 7.5.2 (a)**), would be the most feasible for augmenting the water resources of the uMngeni System (**Figure 7.14**). Both eThekweni and Pietermaritzburg are the economic hub of KwaZulu-Natal, and need reliable, efficient and sustainable long-term water supplies from such a scheme. Phase 2 of uMkhomazi Water Project would be implemented later and when required. This second phase would be comprised of the construction of a large dam at Impendle further upstream on the uMkhomazi River to release water to the downstream Smithfield Dam. From a hydrological perspective, the uMkhomazi River Catchment comprises the tertiary catchment U10, as shown in **Figure 7.15**. The uMkhomazi River Catchment has a catchment area of 4 387 km². There is an estimated total of almost 1 000 small dams in the catchment with a combined storage of over 30 million m³ (DWS, 2015).

The catchment is currently undeveloped, with the main land use activities being commercial forestry and irrigation in the central areas around the towns of Bulwer, Richmond, Ixopo and Impendle. There is a large industrial abstraction for Sappi Saiccor near the coastal town of Umkomaas. Other water users include small towns and rural settlements, stock watering, dry-land sugarcane and invasive alien plants. The catchment is the third largest river in KwaZulu-Natal in terms of mean annual runoff (MAR).

ii) Surface Water

Based on the rainfall data analysis undertaken, it was concluded that the spatial distribution of rainfall gauging stations in the uMkhomazi River catchment is of great concern. The hydrological characteristics for this region are summarised in **Table 7.2** and **Table 7.3**. This catchment has an annual natural runoff of 1 078 million m³, 67% of which is generated upstream of the proposed Smithfield Dam site. The current net water use within the uMkhomazi River catchment is approximately 159 million m³/annum (15% of the total natural MAR), and it is estimated that this may grow to 192 million m³/annum by 2050 (DWS, 2015).

Table 7.2 Hydrological characteristics of uMkhomazi River catchment (DWS 2015).

Quaternary Catchment	Incremental Area (km ²)	MAP (mm)	MAE (mm)	Incremental Natural MAR		
				(Million m ³ /annum)	(mm/annum)	(% MAP)
U10A	418	1287	1,300	209.52	501	39
U10B	392	1176	1,300	164.49	420	36
U10C	267	1091	1,300	96.70	362	33
U10D	337	999	1,300	98.22	291	29
U10E	327	1034	1,300	100.92	309	30
U10F	379	963	1,300	67.08	177	18
U10G	353	981	1,250	70.12	199	20
U10H	458	924	1,200	82.66	180	20
U10J	505	878	1,200	77.99	154	18
U10K	364	793	1,200	40.42	111	14
U10L	307	758	1,200	29.56	96	13
U10M	280	858	1,200	40.06	143	17
Total	4387	981	1,252	1077.74	246	25

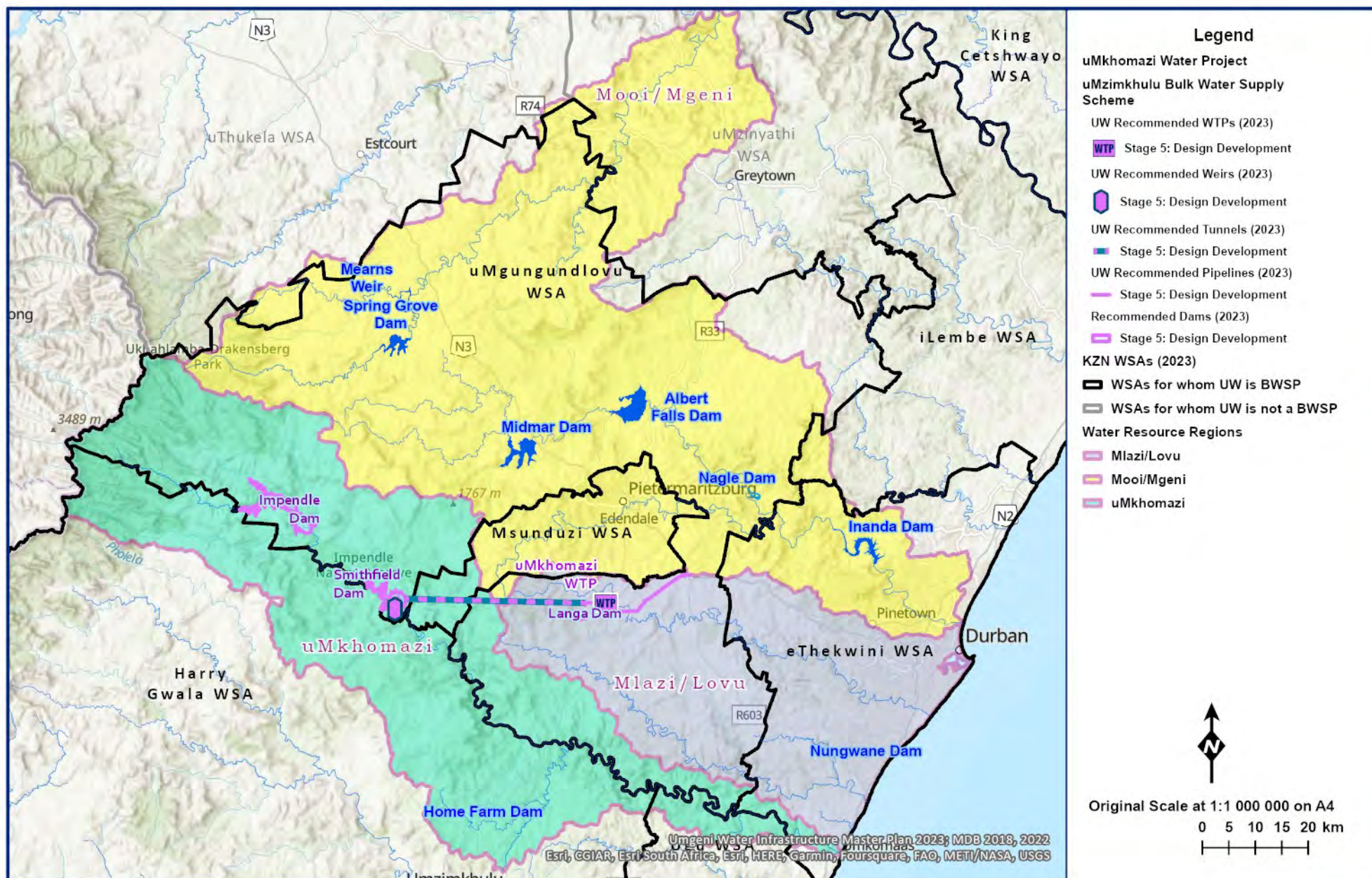


Figure 7.14 Locality map of the uMkhomazi, uMlazi and uMgeni river catchments.

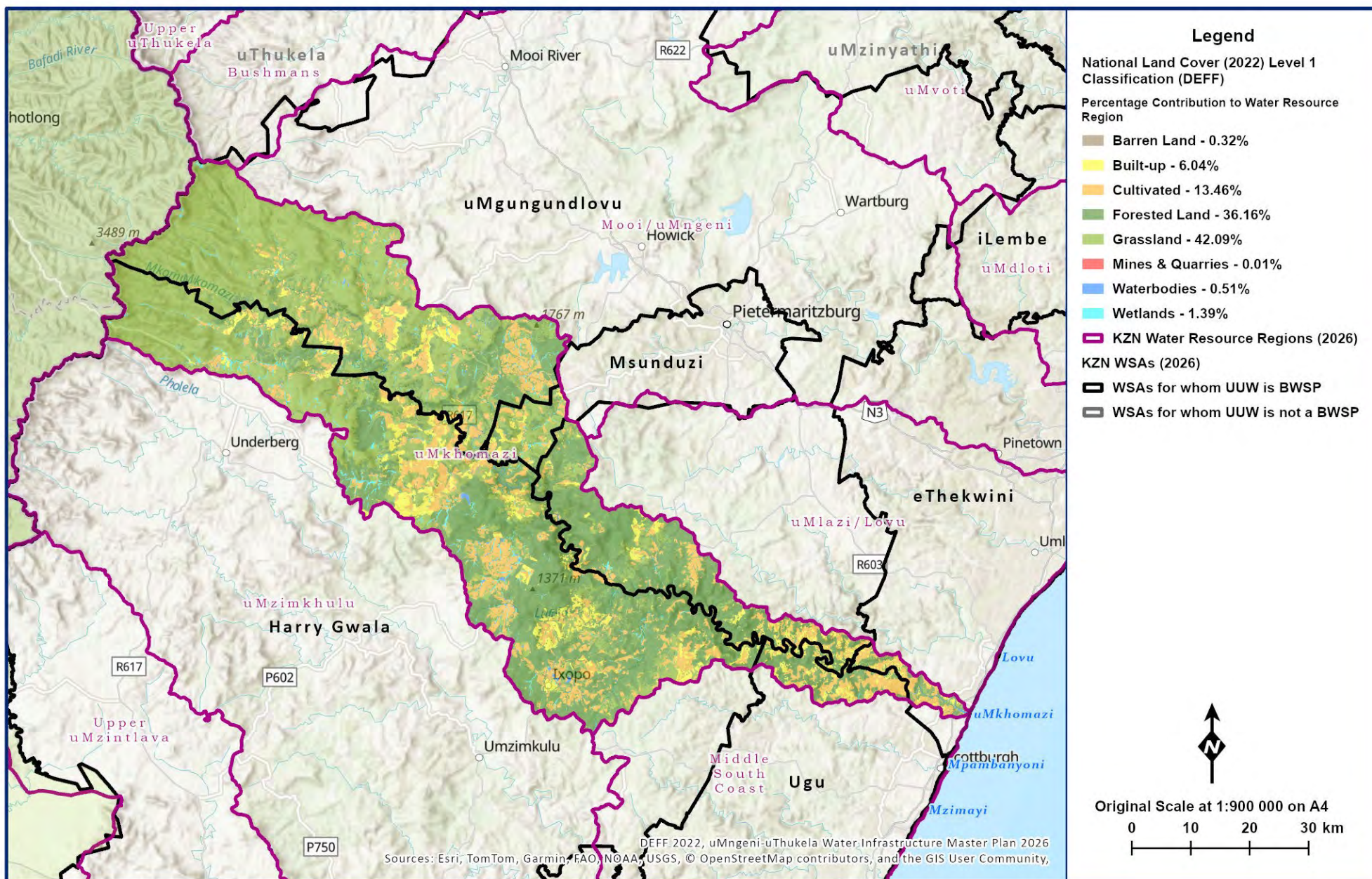


Figure 7.15 General layout of the uMkhomazi Region.

Table 7.3 Hydrological characteristics of the uMkhomazi Region (uMngeni-uThukela Water 2002 and DWA 2013).

Region	River (Catchment)	Incremental Area (km ²)	Annual Average			
			MAE (mm)	Rainfall (mm)	Natural Runoff (million m ³)	Natural Runoff (mm)
Mkhomazi	Impendle	1,422	1,300	1,138	567.9	399.4
	Smithfield	632	1,300	1,017	163.2	258.2
	Ngwadini	2,242	1,200	875	324.5	144.7
	Mkhomazi Estuary	91	1,200	855	11.3	124.2
	Luhane	46.3	1,361	980	7.5*	161.9

* Present day MAR

iii) Groundwater

The uMkhomazi Region occurs in the KwaZulu-Natal Coastal Foreland and Northwestern Middleveld Groundwater Regions (**Section 2**). As such this Groundwater Region is characterised by a combination of intergranular and fractured arenaceous rocks.

Hydrogeological Units

The hydrogeologically relevant lithologies recognised in the uMkhomazi Region comprise sandstone, tillite and mudstone/shale supporting fractured groundwater regimes and dolerite intrusions and granite/gneiss supporting fractured and weathered groundwater regimes.

Geohydrology

The Dwyka Tillite formation has the smallest coverage in comparison to the other lithological units in the catchment (**Figure 7.16**). It occurs just south of Richmond where it lies exposed in the river banks of uMkhomazi. The Eccu Group is represented by the mudstones/shale of the Pietermaritzburg, Vryheid and Volksrust Formation. The foothills of the Drakensberg Mountains at the head of uMkhomazi River and the central areas of the catchment are dominated by these lithologies. These lithologies support marginal to poor borehole yields (0.1 – 0.5 ℓ/s). However, the presence of extensive intrusive dolerite in the form of sheets and dykes has greatly enhanced the potential of the mudstones to store and yield groundwater.

Groundwater Potential

Primary groundwater supplies using boreholes fitted with hand pumps, wind pumps or submersibles are obtainable in most of the lithological units. The exceptions are the Dwyka formation (tillites) or massive granites. In these areas groundwater supply could be obtained within an adjacent fault valley where the potential for high yielding boreholes is much enhanced (**Figure 7.16**).

The sandstone of the Natal Group represents the most productive groundwater-bearing lithology, followed by mudstone/shale lithologies, the granite/gneiss lithologies and the tillite sediments of the Dwyka Tillite Formation.

Boreholes favourably located in the Natal Group Sandstone (NGS) provide good yields. Yields of 3 ℓ/s (greater than 10 000 ℓ/hr) are not uncommon where large scale fracturing/faulting provide conduits for groundwater movement

Boreholes located in metamorphic lithologies (gneisses) indicate yield characteristics in the range 0.1 to 0.5 ℓ/s , with a median value of 0.3 ℓ/s .

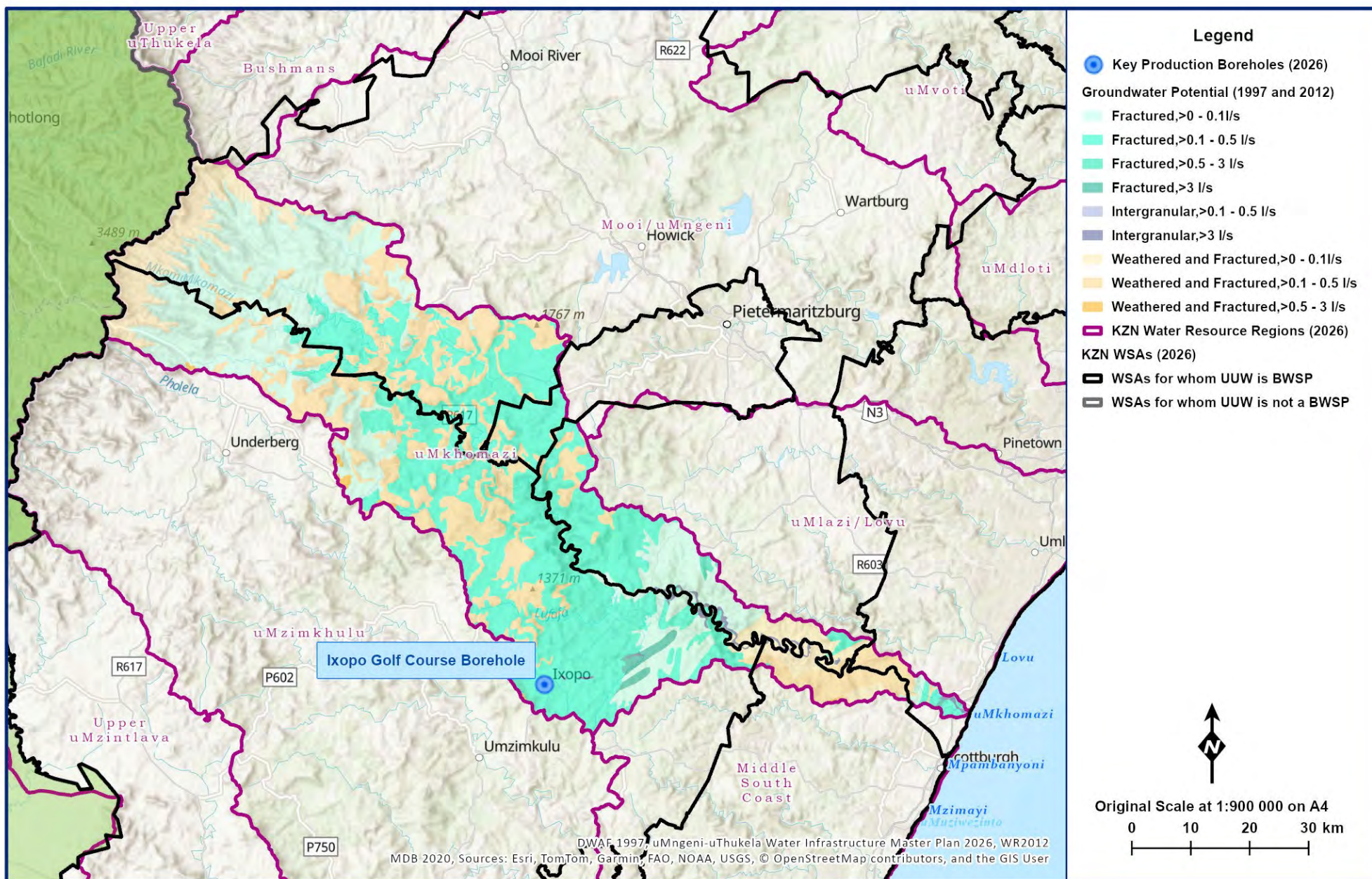


Figure 7.16 Groundwater potential in the uMkhomazi Region.

iv) Water Quality

Algal response is observed at Home Farm Dam and is shown in the graph below (**Figure 7.17**). The Home Farm Dam has been affected by nutrient inputs from sewage and agricultural pollution. The on-going pollution has resulted in eutrophication of the impoundment, leading to aquatic plant and algae growth. The aquatic weeds growth has created major challenges for the treatment plant by clogging the raw water pump, as well as water quality deterioration due to decomposition. **Figure 7.17** reflects a major increase in the algal count recorded in 2025. This indicates that there has been an increase in the nutrient enrichment.

The calculations for nutrient and suspended solids and loads are presently not feasible and are not done for this system. The absence of flow measuring devices upstream of Home Farm Dam negates quantification of the nutrient loads.

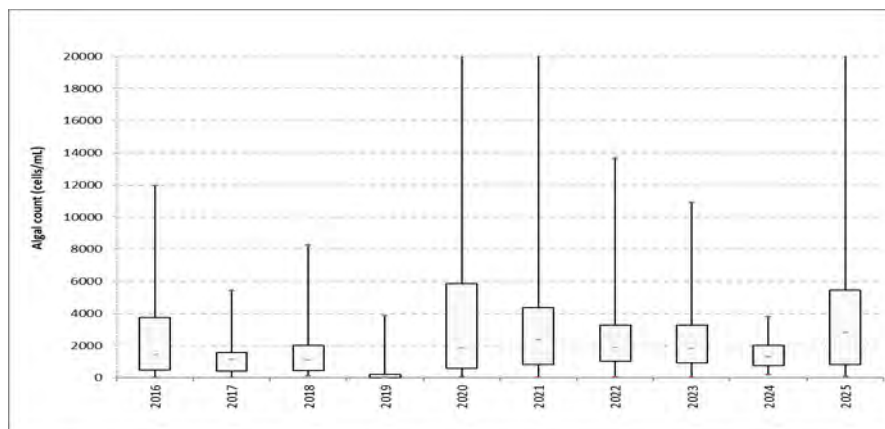


Figure 7.17 Algal response for Home Farm Dam.

7.2.2 Reserve

a) Mooi/uMngeni Water Resource Region

The quantity component of the Ecological Reserve for the uMngeni catchment has not yet been determined. The DWS (2016) study only determined the ecological classes in terms of present and target ecological classes. However, estimates of the Ecological Reserve indicate that the Ecological Reserve will have a large impact on the availability of water in the catchment. Considering that the catchment is already stressed, the determination and implementation of the Ecological Reserve will require careful consideration.

Estimates of environmental flow requirements represented as compensation flows released from the main dams in the uMngeni System are indicated in **Table 7.4**. As with the IFRs, the estuarine flow requirement (EFR) of the uMngeni River also has not been determined in a comprehensive manner.

Table 7.4 Summary of environmental (compensation) flow requirements.

Description	Simulated Compensation Flow	
	(m ³ /s)	(million m ³ /annum)
Midmar Compensation	0.900	28.40
Albert Falls Compensation	0.710	22.41
Inanda Compensation	1.500	47.34
uMngeni EFR	1.426	45.00

Present Ecological State (PES) represents how the ecological condition of a river has been modified from its natural conditions. The measure is based on water quality variables, biotic indicators and habitat information that has been collected. Results are classified on a 6-point scale, from Category A (Largely Natural) to Category F (Critically Modified). Target ecological category (TEC) represents improvements that must be done on the ecological condition of the river based on flow or non-flow related issues.

The PES of various rivers in the Mooi/uMngeni Region is detailed in the report (DWS 2016). The target ecological categories (TEC) of various rivers in the Mooi/uMngeni Region are in DWS, 2016. Various river nodes in the Greater Mooi/uMngeni Region require improvements as a result of non-flow-related/anthropogenic issues. If the REC is attainable then it has been included in the catchment configuration.

As part of the KZN Water Reconciliation Study (DWA 2011) to assess the impacts of re-utilising treated wastewater, a rapid reserve determination for the uMngeni River estuary was undertaken. The present ecological status of the estuary was found to be a Class E which indicates that it is highly degraded. The study shows that the estuary importance score is 82

which means that it is a highly important estuary. The study recommends that the ecological status of the uMngeni estuary should be improved to at least a category D.

The classes of water resources and resource quality objectives for the catchments of Mvoti to Mzimkhulu were published in the government gazette in 2017. Apart from the uMngeni System, other river systems classified included Mvoti, uMkhomazi, Umzimkhulu and Mtanvuna. This classification resulted from the findings of DWS (2016) study, and for uMngeni River these are as follows:

- The current present ecological state is recommended for the main uMngeni River.
- The uMngeni River between Midmar and Albert Falls has a Present Ecological Class of C and Recommended Ecological Class of C.
- The uMngeni River between Nagle and Inanda has a Present Ecological Class of C/D and a Recommended Ecological Class of C/D.
- uMngeni River Estuary has a Present Ecological Status of E and a Recommended Ecological Class of D.

The uMngeni River classification bears testimony to water quality deterioration downstream from Midmar Dam onwards. The deterioration is mainly linked to an increase in nutrients, linked to agricultural activities, particularly dairies, piggeries, etc. There is also increased pollution from growing settlements in the region. The water quality in the Msunduzi River downstream of Henley Dam is seriously affected by sewer infrastructure problems, including ingress of rainwater into the sewer system, which results in surcharges, overloading Darvill Waste Water Treatment Works. The estuary is under moderate flow modification, high pollution, high habitat loss and low fishing pressure.

A detailed assessment of the Ecological Reserve for the entire uThukela catchment was undertaken in 2004, and this included the Mooi River catchment. This assessment indicated an over allocation of water, particularly on the Little Mooi River. In order to ensure that the correct Reserve flows are maintained in the Little Mooi River, an approximate 50% curtailment of the existing registered irrigation and afforestation is required. Additionally, all existing farm dams will be required to release their rightful share of the Reserve. Currently none of these dams are contributing to the Reserve. Hence a compulsory licensing process will need to be completed by DWS before the Reserve can be fully implemented in the Mooi catchment.

The necessary river outlets have been included into the design of Spring Grove Dam to ensure that it will be able to release the required volumes of water needed for the Reserve.

b) Mkhomazi Water Resource Region

No comprehensive assessment, using the accepted standardised methodology, has been undertaken of the ecological Reserve of uMkhomazi River to date. A Reserve determination was undertaken in the late 1990's as part of the pre-feasibility investigations into a transfer

scheme from uMkhomazi to uMngeni catchment. The DWS (2016) study found that the present ecological state of the uMkhomazi River is in a B class in the upper reaches and a C class in the lower reaches. These ecological classes are also recommended for the proposed uMkhomazi-uMngeni Transfer Scheme, also known as the uMkhomazi Water Project (Section 7.5.2 (a)). It was estimated that 350 million m³/a (32%) of the catchment runoff should be earmarked for ecological water requirements to sustain the system's riverine health at a desirable level should the uMWP be implemented (DWS, 2015).

Taking into account the current conditions of the estuary with a present ecological class of a C, the reversibility of the current impacts and the ecological importance and the conservation requirements of the uMkhomazi Estuary, the current recommendation is for an ecological Class B category.

The present ecological state (PES) of various rivers in the uMkhomazi Region is detailed in the DWS report (DWS, 2016). The targeted ecological categories (TEC) of various rivers in the uMkhomazi Region are in the report. Various nodes require improvements as a result of non-flow-related/anthropogenic issues. If the REC is attainable then it has been included in the catchment configuration.

7.2.3 Existing Infrastructure and Yields

a) Mooi/uMngeni Water Resource Region

There are four major dams on the uMngeni River, namely Midmar (**Figure 7.18**), Albert Falls (**Figure 7.19**), Nagle (**Figure 7.20**) and Inanda (**Figure 7.21**) Dams. These dams are all used as part of the water supply system. The characteristics of these dams are summarised in **Table 7.5**, **Table 7.6**, **Table 7.7**, and **Table 7.8** respectively. The silt surveys for dams in the Mooi/uMngeni System should be undertaken every 15 years.

As part of the Mooi/uMngeni Transfer Scheme, water is pumped from either Spring Grove Dam or Mearns Weir located in the Mooi River catchment. A total volume of 92 million cubic metres was pumped from Mooi River into Midmar Dam between July 2024 and June 2025. The characteristics of Mearns Weir and Spring Grove Dam (**Figure 7.22** and **Figure 7.23**) are summarised in **Table 7.9**, and **Table 7.10**.

Henley Dam (**Figure 7.24** and **Table 7.11**), situated on the Msunduzi River, a tributary of uMngeni River is no longer used for water supply purposes. All significant dams within the Mooi/uMngeni Region are listed in **Table 7.19**.

Raw water is supplied from Midmar Dam under gravity to DV Harris WTP, and under pumping (8 m lift) to Midmar WTP. Water is released from Albert Falls Dam to Nagle Dam from where it is supplied under gravity to Durban Heights WTP. Raw water is supplied from Inanda Dam under gravity to Wiggins WTP. It is possible to pump water from Inanda Dam to Durban Heights WTP utilising two different pump sets, *viz.* the 'Shaft' pumps, comprising three pumps capable of delivering a maximum of 140 Mℓ/day with one standby and the 'Inanda' pumps, comprising two pumps capable of delivering a maximum of 120 Mℓ/day. Pumping from Inanda Pump Station has not been possible for some time: the station is currently undergoing refurbishments with the contract scheduled to conclude in September 2026. A total volume of 45 million cubic metres was pumped from Inanda Dam into Durban Heights WTP via Shaft Pumps between July 2024 and June 2025.

Under normal conditions, it is possible to pump a total of 260Mℓ/day from Inanda Dam to Durban Heights WTP. A fourth Shaft Pump, delivering 40Mℓ/day can increase the total pumping capacity to approximately 280Mℓ/day, although this could impact scheduled maintenance and operational flexibility. Hence, the maximum delivery is limited to 240Mℓ/d.

Other than Mearns Weir and Spring Grove Dam, there is one additional major dam in the catchment, i.e. Craigieburn Dam on the Mnyamvubu River, which is a tributary of the Mooi River. Craigieburn Dam is owned and operated by DWS. It has a capacity of 23.5 million m³ and mainly supplies water to approximately 2000 ha of predominantly citrus farming irrigation downstream of the dam and along the Mooi River at Mudén. There is also an intention to supply water from this dam to Greytown for treatment and potable distribution. Bulk Conveyance between CraigieBurn Dam is partly completed and about 4.2 km of the

delivery pipeline from the CraigieBurn Pumpstation remains incomplete. There is an abundance of farm dams in the Mooi catchment, especially in the upper reaches.

The yield information of the existing water resources infrastructure was revised in 2019 based on a re-evaluation of the hydrology of both Mooi and uMngeni catchments and is presented in **Table 7.13**.

- The yield results from UUW (2019) were based on improved calibration of rainfall-runoff modelling. Changes in yield values, when compared against previous studies, are a result of additional rainfall and runoff data, as well as revised land-use data. Good calibrations improved the confidence in the hydrology records and also resolved some imbalance issues noted in the previous models used to simulate the uMngeni System.
- A key recommendation of the study was that available yield volumes, determined for the dams in the Mooi-uMngeni System, should be reduced by raw water conveyance losses when compared with the potable water requirements of the system. The Midmar System showed minimal raw water losses whilst the Nagle System showed losses of up to 8% and the Inanda System a 5% loss for raw water conveyance.
- When these raw water conveyance losses are applied to the yields, the resultant yields approximate the original values and have hence not been changed on the supply systems.



Figure 7.18 Midmar Dam.

Table 7.5 Characteristics of Midmar Dam (DWS 2003; 2016a).

Catchment Details	
Incremental Catchment Area:	926 km ²
Total Catchment Area:	926 km ²
Mean Annual Precipitation:	1 011 mm
Mean Annual Runoff:	209.4 million m ³
Annual Evaporation:	1 300 mm
Raised Dam Characteristics	
Gauge Plate Zero:	1 021.7 mASL
Full Supply Level:	1 047.5 mASL
Spillway Height:	25.8 m
Net Full Supply Capacity:	235.414 million m ³
Dead Storage:	0.0 million m ³
Total Capacity:	235.414 million m ³
Surface Area of Dam at Full Supply Level:	17.93 km ²
Original Measured Dam Capacity	177.347 million m ³ (October 1963)
Second Measured Dam Capacity	177.113 million m ³ (October 1983)
Third Measured Dam Capacity	235.414 million m ³ (January 2003)
Dam Type:	Concrete gravity with earth embankments
Crest Length:	Spillway Section: 139.6 m Non-Spillway Section: 1 283.4 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	3 500 m ³ /s
Date of Completion:	1963
Date of Area Capacity Survey:	2003 – Year when the wall was raised
Date of next Area Capacity Survey:	2026



Figure 7.19 Albert Falls Dam.

Table 7.6 Characteristics of Albert Falls Dam (DWS 1993; 2016b).

Catchment Details	
Incremental Catchment Area:	728 km ²
Total Catchment Area:	1 654 km ²
Mean Annual Precipitation:	1 005 mm
Mean Annual Runoff:	131.1 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	634.3 mASL
Full Supply Level:	655.9 mASL
Spillway Height:	21.6 m
Net Full Supply Capacity:	289.133 million m ³ (March 1993)
Dead Storage:	0.975 million m ³
Total Capacity:	290.108 million m ³
Surface Area of Dam at Full Supply Level:	23.5 km ²
Original Measured Dam Capacity	289.4620 million m ³ (June 1974)
Second Measured Dam Capacity	289.167 million m ³ (March 1983)
Third Measured Dam Capacity	289.133 million m ³ (March 1993)
Dam Type:	Concrete with earth embankments
Crest Length:	Spillway Section: 100 m Non-Spillway Section: 1 930 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	3 447 m ³ /s
Date of Completion:	1976
Date of Area Capacity Survey:	2008
Date of next Area Capacity Survey:	2028



Figure 7.20 Nagle Dam.

Table 7.7 Characteristics of Nagle Dam (DWS 2004; uMngeni-uThukela Water 2015).

Catchment Details	
Incremental Catchment Area:	885 km ²
Total Catchment Area:	2 539 km ²
Mean Annual Precipitation:	940 mm
Mean Annual Runoff:	139.7 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	379.71 mASL
Full Supply Level:	403.81 mASL
Spillway Height:	24.1 m
Net Full Supply Capacity:	23.237 million m ³ (November 1987)
Dead Storage:	1.366 million m ³
Total Capacity:	24.6 million m ³
Surface Area of Dam at Full Supply Level:	1.56 km ²
Original Measured Dam Capacity	23.237 million m ³ (October 1963)
Second Measured Dam Capacity	23.237 million m ³ (November 1987)
Dam Type:	Concrete gravity dam
Crest Length:	Spillway Section: 121 m Non-Spillway Section: 272 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	4334 m ³ /s
Date of Completion:	1948
Date of Area Capacity Survey:	1987
Date of next Area Capacity Survey:	2026



Figure 7.21 Inanda Dam.

Table 7.8 Characteristics of Inanda Dam (DWS 1990).

Catchment Details	
Incremental Catchment Area:	618 km ²
Total Catchment Area:	4 082 km ²
Mean Annual Precipitation:	870 mm
Mean Annual Runoff:	60.1 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	115.8 mASL
Full Supply Level:	147.0 mASL
Spillway Height:	31.2 m
Net Full Supply Capacity:	241.685 million m ³ (April 2009)
Dead Storage:	9.964 million m ³
Total Capacity:	251.649 million m ³
Surface Area of Dam at Full Supply Level:	14.63 km ²
Original Measured Dam Capacity	258.677 million m ³ (October 1988)
Second Measured Dam Capacity	251.649 million m ³ (October 1990)
Dam Type:	Concrete with earth embankments
Crest Length:	Spillway Section: 140 m Non-Spillway Section: 468 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	4 000 m ³ /s
Date of Completion:	1989
Date of Area Capacity Survey:	2009
Date of next Area Capacity Survey:	2027



Figure 7.22 Mearns Weir.

Table 7.9 Characteristics of Mearns Weir (DWS, 2003).

Catchment Details	
Incremental catchment area	242 km ²
Total catchment area	887 km ²
Mean annual precipitation	857 mm
Mean annual runoff	44.12 million m ³
Annual evaporation	1 350 mm
Weir Characteristics	
Gauge plate zero	1375.11 mASL
Full supply level	1382 mASL
Spillway Height:	6.89 m
Original & Current Net full supply capacity	5.116 million m ³ (October 2003)
Dead storage	0.0 million m ³
Total capacity	5.116 million m ³
Surface area of weir at full supply level	2.375 km ²
Weir type	Concrete
Material content of a weir wall	Concrete
Crest length	165m
Type of spillway	Uncontrolled
Capacity of spillway	1 970 m ³ /s
Date of Completion:	2003*
Date of Area Capacity Survey:	2003
Date of next Area Capacity Survey:	2026 (In-progress)

*Construction of the initial weir completed in 1983



Figure 7.23 Spring Grove Dam.

Table 7.10 Characteristics of Spring Grove Dam (DWS 2013; Uuw 2013).

Catchment Details	
Incremental Catchment Area:	339 km ²
Total Catchment Area:	339 km ²
Mean Annual Precipitation:	1007 mm
Mean Annual Runoff:	131 million m ³
Annual Evaporation:	1 350 mm
Dam Characteristics	
Gauge Plate Zero:	1407.1 mASL
Full Supply Level:	1433.5 mASL
Spillway Height:	26.4 m
Original & Current Net Full Supply Capacity:	139.5 million m ³ (November 2013)
Total Capacity:	139.5 million m ³
Surface Area of Dam at Full Supply Level:	10.2 km ²
Dam Type:	Concrete with earth embankment
Crest Length:	Spillway Section: 70 m Non-Spillway Section: 231 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	1970 m ³ /s
Date of Completion:	2013
Date of Area Capacity Survey:	2013
Date of next Area Capacity Survey:	2028



Figure 7.24 Henley Dam.

Table 7.11 Characteristics of Henley Dam (uMngeni-uThukela Water 2017).

Catchment Details	
Incremental Catchment Area:	219 km ²
Total Catchment Area:	219 km ²
Mean Annual Precipitation:	940 mm
Mean Annual Runoff:	42.1 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	900 mASL
Full Supply Level:	923.3 mASL
Spillway Height:	23.3 m
Net Full Supply Capacity:	1.02 million m ³ (January 2019)
Dead Storage:	0.0 million m ³
Total Capacity:	1.02 million m ³
Surface Area of Dam at Full Supply Level:	0.3 km ²
Original Measured Dam Capacity	2.72 million m ³ (1942)
Second Measured Dam Capacity	5.87 million m ³ (1960)
Third Measured Dam Capacity	5.51 million m ³ (June 1983)
Fourth Measured Dam Capacity	5.41 million m ³ (November 1987)
Fifth Measured Dam Capacity	1.5 million m ³ (October 1993)
Sixth Measured Dam Capacity	1.02 million m ³ (January 2019)
Dam Type:	Concrete with earth embankment

Crest Length:	Spillway Section: N/A Non-Spillway Section: N/A
Type of Spillway:	Uncontrolled
Capacity of Spillway:	N/A
Date of Completion:	1942
Date of Area Capacity Survey:	2019
Date of next Area Capacity Survey:	2026

Table 7.12 Existing Dams in the Mooi/uMngeni Region

Impoundment	River	Capacity (million m ³)	Purpose
Spring Grove Dam	Mooi	139.5	Domestic
Craigie Burn Dam	Mnyamvubu	23.5	Irrigation
Mearns Weir	Mooi	5.1	Domestic
Midmar Dam	uMngeni	235.4	Domestic
Albert Falls Dam	uMngeni	289.1	Domestic
Nagle Dam	uMngeni	23.2	Domestic
Inanda Dam	uMngeni	241.7	Domestic

Table 7.13 Yield Information for the existing water resource infrastructure in the Mooi/uMngeni Region including transfers from the MMTS.

Phase	Position in system	Historic Firm Yield	Stochastic Yield (1 in 20 years risk of failure)		Stochastic Yield (1 in 50 years risk of failure)		Stochastic Yield (1 in 100 years' risk of failure)	
		million m ³ /annum	million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day
MMTS	Midmar Dam	167	217	594	195.0	534.0	183.0	501.4
	Nagle Dam	277	379	1038	348.0	953.4	333	912.3
	Inanda Dam	416	470	1288	446.0	1221.9	434	1189.0

Note: Yields indicated above are obtained from the UuW Report **MGENI-MOOI SYSTEM HYDROLOGY UPDATE STUDY, 2020**. Note that these yield figures represent volumes of water that can be abstracted from the dams and they do not consider the losses of water that occurs within the raw water bulk infrastructure.

Groundwater is mainly utilised in the uMngeni catchment by private landowners as the majority of towns are supplied by reticulated surface water. Groundwater is utilised to supplement irrigation and for stock watering. The exception is the Nottingham Road and Rosetta areas which are supplied by production boreholes. Very high yielding boreholes (140 kℓ/hr) have been drilled in the area. The contact zones between the shale's, sandstone and the intrusive dolerite dykes are the water bearing features in the areas. There are no faults or other structural features to target. In the Howick area groundwater is abstracted and bottled for commercial purposes. Although not accurately known it has been reported that the formal settlement of Mfolweni currently obtains their domestic water supply (in the order of 2 000 kℓ/day) from boreholes.

7.2.4 Operating Rules

a) Mooi/uMngeni Water Resource Region

The uMngeni and Mooi River systems are relatively complex in terms of their operation. In addition to the four dams, the uMngeni River System is augmented from the Mooi River System using the MMTS. The dams on the uMngeni River supply water directly to demand centres via various routes, allowing for flexibility in terms of the operation of the system (refer to description in the previous section and to the system schematic (**Figure 7.25**)).

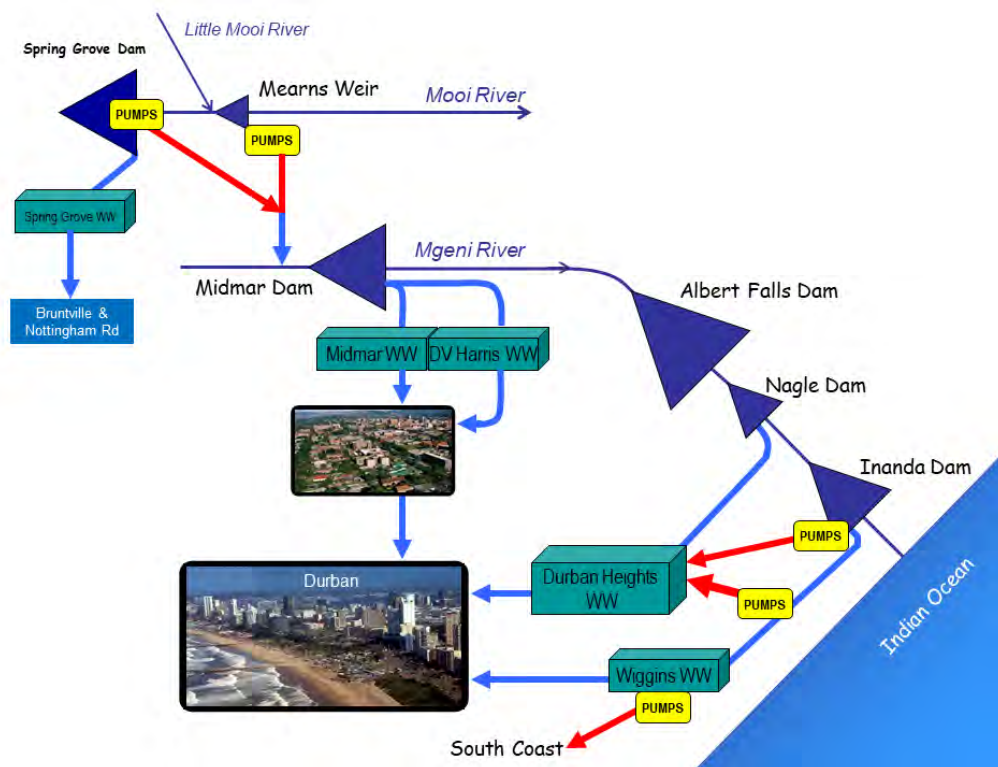


Figure 7.25 Schematic of the uMngeni System.

The area of Verulam, to the north of Durban, can be supplied from either the uMngeni System or from the Mdloti System (**Section 12**). The source of water to this area is determined through operational requirements and the water resource availability in the systems. There is also a linkage from the uMngeni System through to the Upper and Middle South Coast Regions. Water from the uMngeni System is utilised to supplement the supply from the local sources to this area (**Section 11**).

In years when the system storage is full or near full the uMngeni System demands are supplied under gravity (i.e. not utilising the pumps at Spring Grove Dam, Mearns Weir and Inanda Dam). However, if there is a risk of the system being depleted or if demands exceed the yield of the system a revised operating rule is implemented. In this instance, the cost of pumping

becomes a secondary consideration. This revised operating rule targets the maximum utilisation of the resource, through pumping at any time of the year, as long as there is excess water to pump from the donor catchment and is defined as follows:

- If Spring Grove Dam is below full supply level and Mearns Weir is above 50% of full supply capacity, then pumping through the MMTS is undertaken from Mearns Weir. This minimises the risk of water flowing over Mearns Weir and less water is lost from the Mooi System in this way. Pumping can also be augmented from the Spring Grove Pump Station to increase the volume pumped to a full $4.5\text{m}^3/\text{s}$.
- Pumping of greater than $4.5\text{m}^3/\text{s}$ is not recommended as this can result in an environmental impact on the receiving streams.
- If Spring Grove Dam is full or likely to spill then pumping through the MMTS is undertaken from the Spring Grove Pump Station which has a lower operating cost.
- Pumping through the MMTS is maximised until Midmar Dam and Albert Falls Dam reach full or near full supply capacity.
- Pumping from Mooi River is stopped when the uMngeni System is full or approaches full supply capacity with good rains predicted.
- Water is released from Albert Falls Dam to Nagle Dam from where water flows under gravity to the Durban Heights WTP.
- If Nagle Dam is spilling, then water is supplied to Durban Heights under gravity only and no pumping from Inanda Dam is undertaken;
- When Nagle or Albert Falls Dams are below full supply capacity, and are unlikely to reach full supply capacity in the season, then the supply of water to the Durban Heights WTP is maximised through pumping from Inanda Dam with augmentation, under gravity, from Nagle Dam. In this instance, all the Inanda Dam pumps ($120\text{ M}\ell/\text{day}$), including the Shaft pumps ($140\text{ M}\ell/\text{day}$), are operated to maximise the supply from Inanda Dam and prevent spills as far as possible; and
- Allow for possible down-time on all pumping routes in the system to account for scheduled maintenance and unplanned operational interruptions (e.g. as a result of power failures).

The option to use rainfall forecasts to predict dam levels, and therefore optimise pumping requirements, is available. The use of forecasting periods of high and low rainfall periods helps to refine the pumping operating rule and determine periods when pumping could be decreased so as to minimise unnecessary energy usage.

b) Mkhomazi Water Resource Region

The current water resources of the uMngeni System are insufficient to meet the long-term water demands of the system (DWS, 2015). The DWS Reconciliation Strategy Study (DWS, 2017) indicates that a development on the uMkhomazi River, the third-largest river in KwaZulu-Natal in terms of mean annual runoff (MAR), to transfer water to the existing

uMngeni System, is the most feasible option for supporting the uMngeni System. The economy of KZN will be constrained without this augmentation scheme.

The proposed uMkhomazi Water Project comprises the following components (DWS, 2015):

- A 251 million m³ dam at Smithfield on the uMkhomazi River;
- A 32 km tunnel between the Smithfield Dam and Baynesfield in the uMlaza Catchment;
- The option of a new 15.7 million m³ Langa Balancing Dam at Baynesfield has been excluded; this means that the 600 Mℓ/day water treatment plant will not operate when the uMkhomazi tunnels are taken out of service for maintenance and inspection work; and
- A gravity potable water pipeline to link this system to uMngeni-uThukela Water's 57' Pipeline. The Smithfield Dam storage capacity of 226 million provides a 1:100 yield of 600 Mℓ/day and this should accommodate the increase in demand in the uMngeni System for 30 to 40 years. Once the yield of the Smithfield Dam is fully utilised then an additional dam could be constructed on the uMkhomazi River at Impendle and, with an additional tunnel at Smithfield Dam, the yield of the system would then increase by an additional 600 Mℓ/day allowing for the long-term growth of the system. The uMkhomazi Water Project is described in **Section 7.5.2 (a)**.

7.3 Supply Systems

7.3.1 Overview

The Upper uMngeni System serves urban, peri-urban and rural settlements within the uMgungundlovu, Msunduzi, iLembe and eThekweni (Outer West) municipal areas (Error! Reference source not found.). The system extends from Howick / Mpophomeni / Vulindlela in the west, to Wartburg / New Hanover / Dalton / Ozwatini in the east, to Cato Ridge / Mpumulanga in the South and to Eston / Umbumbulu in the South West. The Mooi River System covers Bruntville and Mooi River to the north, Vaalekop, Rosetta, Nottingham Road, Balgowan, Lidgetton, Lions River to the south.

With the recent commissioning of eThekweni Metro Municipality's Western Aqueduct, the system has now been further extended to the Ntuzuma / Inanda / KwaMashu Supply systems. The system derives its water resource from the Upper uMngeni River, fed from Midmar Dam, with augmentation from the Mooi-uMngeni Transfer Scheme (MMTS) (**Section 7.2.3 (a)**). Water is treated at two Water Treatment Plants (WTP's), namely the Midmar WTP located in Howick and the D.V. Harris WTP located in Pietermaritzburg.

The Upper uMngeni sub system is a highly integrated system and therefore to describe it adequately it has been divided into Sub-systems, which have been further divided into links. This is illustrated **Table 7.14.Error! Reference source not found.**

Table 7.14 Upper uMngeni System

System	Water Treatment Plant	Link
Spring Grove node	Spring Grove	- Spring Grove WTP to Bruntville Reservoir - Spring Grove WTP to Rosetta Reservoir - Spring Grove WTP to Nottingham Road Reservoir
Howick-North node	Midmar	Mill Falls Pump Station to Howick-North Reservoir
Howick-West node	Midmar	- Mill Falls Pump Station to Howick-West Reservoir - Howick-West Reservoir to Mphophomeni Supply area - Howick-West Reservoir to Groenekloof Reservoir - Groenekloof Reservoir Supply Area
Midmar WTP to Umlaas Road Reservoir node	Midmar	'251 Pipeline: Midmar WTP to D.V. Harris Off-Take '53 Pipeline: D.V. Harris WTP to Umlaas Road Reservoir '61 Pipeline: D.V. Harris WTP to World's View Reservoir '61 Pipeline: World's View Reservoir to ED4 '61 Pipeline: ED4 to Umlaas Road Reservoir - Ashburton Supply - Richmond Pipeline - Thornville/Hopewell Supply
Umlaas Road Reservoir node	Midmar & D.V. Harris	'57 Pipeline - Eston / Umbumbulu Pipeline - Lion Park / Manyavu Pipeline
uMshwathi BWSS node	D.V. Harris	- Msunduzi Supply '69 Pipeline (Claridge Reservoir to Wartburg Reservoir) - Wartburg Reservoir to Bruyns Hill Reservoir - Wartburg Reservoir to Dalton Reservoir - Dalton Reservoir to Ozwathini Reservoir

7.3.2 Upper uMngeni System - Spring Grove Water Treatment Plant

The Spring Grove WTP, **Table 7.15**, commissioned in June 2023, abstracts water from Spring Grove Dam as part of the Mpofana BWSS to supply the village of Rosetta, Mooi River, Bruntville and Nottingham Road in Mpofana Municipality. The commissioning of this plant allowed for the decommissioning of the old Rosetta WTP. The WTP began producing an average of 5.6 Mℓ/day after the Bruntville pipeline was commissioned in June 2024. It has a current utilisation of 9.0 Mℓ/day.

The WTP has a current design capacity of 20 Mℓ/day, upgradable to 60 Mℓ/day in the future.

Table 7.15 Characteristics of the new Spring Grove WTP.

WTP Name:	Spring Grove WTP
System:	Mpofana Bulk Water Supply System
Maximum Design Capacity:	20 Mℓ/day
Current Utilisation:	9.0 Mℓ/day
Raw Water Storage Capacity:	139 million m ³
Raw Water Supply Capacity:	20 Mℓ/day
Pre-Oxidation Type:	Pre-chlorination
Primary Water Pre-Treatment Chemical:	SUDFLOC 3456
Total Coagulant Dosing Capacity:	2.5 ppm
Rapid Mixing Method:	Hydraulic jump
Clarifier Type:	Pulsators
Number of Clarifiers:	3
Total Area of all Clarifiers:	140 m ²
Total Capacity of Clarifiers:	3.2 m ³ /hr
Filter Type:	Rapid gravity Filters
Number of Filters:	4
Filter Floor Type	Concrete with perforated nozzle
Total Filtration Area of all Filters	194 m ²
Total Filtration Design Capacity of all Filters:	20 Mℓ/day
Total Capacity of Backwash Water Tanks:	184 m ³
Total Capacity of Sludge Treatment Plant:	3 Mℓ/day
Capacity of Used Washwater System:	200 m ³ x 2
Primary Post Disinfection Type:	Chlorine
Disinfection Dosing Capacity:	3.6 ppm x 3
Disinfectant Storage Capacity:	4000 ℓ
Total Treated Water Storage Capacity:	5 Mℓ



Figure 7.26 Spring Grove WTP (Google Earth)

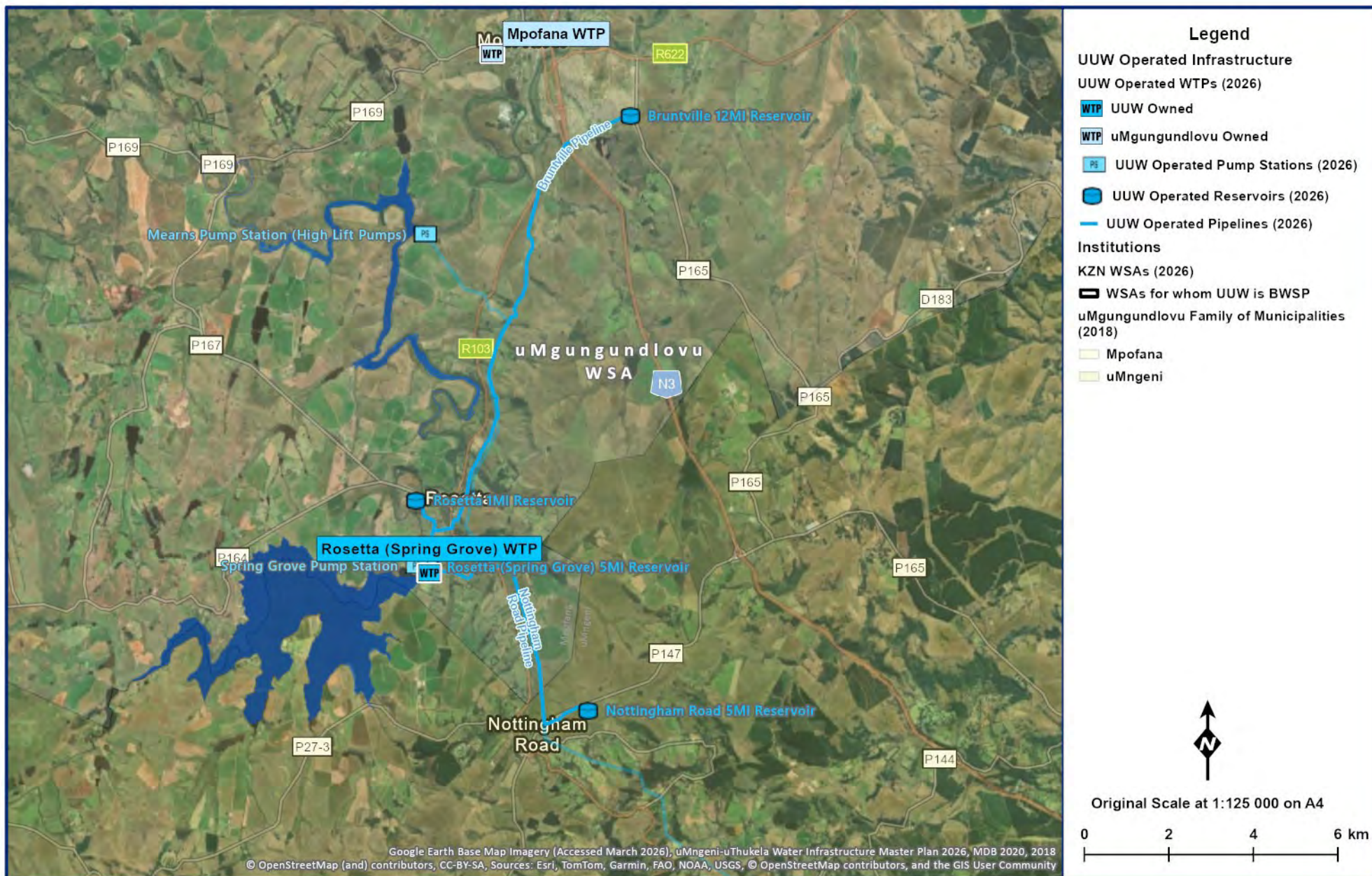


Figure 7.27 Spring Grove WTP supply system.

Table 7.16 Pump details: Spring Grove Supply-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Mooi River	Spring Grove	Bruntville Pump No 1	✓		KSB Omega 200-520 (VSD)	Spring Grove WTW	Bruntville Reservoir	107.07	95.05	15.77
Mooi River	Spring Grove	Bruntville Pump No 2		✓	KSB Omega 200-520 (VSD)	Spring Grove WTW	Bruntville Reservoir	107.07	95.05	15.77
Mooi River	Spring Grove	Bruntville Pump No 3	✓		KSB Omega 200-520 (VSD)	Spring Grove WTW	Bruntville Reservoir	107.07	95.05	15.77
Mooi River	Spring Grove	Nottingham Road No 1		✓	KSB Omega 250-800 (VSD)	Spring Grove WTW	Nottingham Road Reservoir	158.77	145	19.99
Mooi River	Spring Grove	Nottingham Road No 2	✓		KSB Omega 250-800 (VSD)	Spring Grove WTW	Nottingham Road Reservoir	158.77	145	19.99
Mooi River	Spring Grove	Nottingham Road No 3		✓	KSB Omega 250-800 (VSD)	Spring Grove WTW	Nottingham Road Reservoir	158.77	145	19.99

Table 7.17 Reservoir details: Spring Grove Supply-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Mooi River	Bruntville	Bruntville 12 Mℓ	12	Distribution	1494,51	1488,00
Mooi River	Nottingham Road	Nottingham Road	5	Distribution	1527,00	1524,20
Mooi River	Rosetta	Rosetta	1.0	Distribution	TBD	TBD

Table 7.18 Pipeline details: Spring Grove Supply-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Mooi River	Bruntville Pipeline	Spring Grove Pump Station	Bruntville Reservoir	13.4	650	Steel	36*	4
Mooi River	Nottingham Road Pipeline	Spring Grove Pump Station	Nottingham Road Reservoir	7.3	650	Steel	36*	5
Mooi River	Rosetta Pipeline	Bruntville Pipeline	New Rosetta 1 Mℓ Reservoir	0.95	250	Steel	6.36	4

*Based on 1.5 m/s

a) Spring Grove Node

The Spring Grove System is shown in **Figure 7.26**.

i) Spring Grove WTP to Bruntville Reservoir

Water is pumped from the Spring Grove pump station, through a 650 mm diameter steel pipeline to a 12 Mℓ reservoir in Bruntville. The construction of this reservoir and pipeline was completed in June 2023.

ii) Spring Grove WTP to Nottingham Reservoir

Water is pumped from the Spring Grove pump station, through a 650 mm diameter steel pipeline to a 5 Mℓ reservoir in Nottingham. The construction of this reservoir and pipeline was completed in June 2023.

iii) Spring Grove WTP to Rosetta Road Reservoir

Water is pumped to the Rosetta Reservoir from the Spring Grove pump station utilising the Bruntville reservoir pumps. This reservoir is fed through a 250 mm diameter off-take from the 650mm diameter rising main going to Bruntville Reservoir.

7.3.3 Upper uMngeni System – Midmar WTW

The Midmar WTP (**Figure 7.28, Table 7.19**), which was commissioned in 1996, draws raw water from Midmar Dam. Water from the dam is supplied under pumping via the '251 Pipeline (**Table 7.20**). The '251 raw water pipeline consists of two sections– two gravity pipelines feed water from the dam to a raw water pump station, and two rising mains from the pump station to the WTP. The new raw water pipeline was implemented as a risk mitigation measure to ensure the sustainability of supply should any one of the mains be out of service. Four pump sets are currently installed in the raw water pump station (3 duty + 1 standby) (**Table 7.21**). The details for the WTP clearwells are shown in

Table 7.22.



Figure 7.28 Midmar Water Treatment Plant after the upgrade.

In 2018, the Midmar WTP capacity was upgraded from 250 Mℓ/day to 395 Mℓ/day. The WTP supplies water to Howick and Mpophomeni, most of the south-western and southern suburbs of Pietermaritzburg, Greater Edendale, Vulindlela, Thornville, Hopewell, Richmond and the Umlaas Road node via the '61 and '261 Pipelines. It also serves eThekweni Municipality's Outer West area (comprising Cato Ridge, Georgedale, Camperdown, Gillitts, and Hillcrest), as well as consumers on the Lion Park and Eston-Umbumbulu pipelines from the Umlaas Road node. The supply area has also now been extended to eThekweni Metropolitan Municipality's Western Aqueduct, which supplies areas as far east as Inanda, Ntuzuma and KwaMashu.

The primary source of water for the Umlaas Road Reservoir node is the Midmar WTP, although this is supported by a potential maximum of 35 Mℓ/day from the D.V. Harris WTP via the '53 Pipeline. This, not only reduces the operational risk of having a single pipeline supplying Umlaas Road, but also allows uMngeni-uThukela Water to transfer some of the demand off the '61 Pipeline system, especially during high demand periods and planned outages.

Table 7.19 Characteristics of the Midmar WTP.

WTP Name:	Midmar
System:	Upper uMngeni System
Maximum Design Capacity:	395 Mℓ/day
Current Utilisation:	385.25 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	395 Mℓ/day @ velocity of 1.3 m/s
Pre-Oxidation Type:	Pre-chlorination
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	35 l/hr (according to Operating Manual)
Rapid Mixing Method:	Static Mixer
Clarifier Type:	Pulsator Clarifier
Number of Clarifiers:	5
Total Area of all Clarifiers:	3380 m ²
Total Capacity of Clarifiers:	500 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	18
Filter Floor Type	Plate Design
Total Filtration Area of all Filters	2520 m ²
Total Filtration Design Capacity of all Filters:	395 Mℓ/day
Total Capacity of Backwash Water Tanks:	2100 m ³
Total Capacity of Sludge Treatment Plant:	360 - 900 m ³ /hr (rating on thin sludge pumps)
Capacity of Used Washwater System:	10 Mℓ/day
Primary Post Disinfection Type:	Chloramination
Disinfection Dosing Capacity:	15 kg/hr
Disinfectant Storage Capacity:	8 x 1 ton full chlorine cylinders + 20 ton of ammonia delivered
Total Treated Water Storage Capacity:	7 Mℓ

Table 7.20 Pipeline details: '251 Pipeline.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'251 Pipeline	Midmar Raw Water Pump Station	Midmar WTP	3.30	1600	Steel	347.91	38
Upper uMngeni	'251 Pipeline	Midmar Dam	Midmar Raw Water Pump Station	0.40	1600	Steel	347.91	69
Upper uMngeni	'251 Pipeline	Midmar Dam	Midmar Raw Water Pump Station	0.40	1600	Steel	347.91	29
Upper uMngeni	'251 Pipeline	Midmar Raw Water Pump Station	Midmar WTP	3.30	1600	Steel	347.91	29
Upper uMngeni	'251 Pipeline	Midmar WTP	Midmar Reservoir	6.50	1600	Steel	347.91	29
Upper uMngeni	'251 Pipeline	Midmar Reservoir	D.V. Harris WTP	8.06	1600	Steel	347.91	29

* Based on a velocity of 2 m/s

Table 7.21 Pump station details: Midmar Raw Water Pump Station.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Midmar Raw Water	Pump No 1	✓		Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131
Upper uMngeni	Midmar Raw Water	Pump No 2	✓		Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131
Upper uMngeni	Midmar Raw Water	Pump No 3	✓		Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131
Upper uMngeni	Midmar Raw Water	Pump No 4		✓	Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131

Table 7.22 Clearwell details: Midmar WTP.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Midmar WTP	Midmar Clearwells	7	Bulk	979.00	974.0*

*Assumed value

a) Howick-North Sub-System

The Howick-North Sub-System is shown in **Figure 7.29**.

i) Mill Falls Pump Station to Howick-North Reservoir Complex

The Howick-North Reservoir Complex consists of four reservoirs having varying top water levels (**Table 7.23**). Water treated at Midmar WTP is pumped from the Mill Falls Pump Station (**Table 7.24**) through a 400 mm diameter steel pipeline (**Table 7.25**) to Reservoir 3 (4.5 Mℓ/day) and via a 300mm diameter pipeline to the new Reservoir 4 (6.5 Mℓ/day). Howick Reservoir 2 (0.9 Mℓ/day) has been decommissioned.

Howick Reservoir 1 (1.2 Mℓ/day) is not currently operational, but future use is expected when a request is received from uMgungundlovu District Municipality to supply water to the high lying areas. The existing 300 mm diameter pipeline from Reservoir 1 to Reservoir 3 has been abandoned.

The old supply pipeline (Greendale pipeline) is no longer in use, but has been left in place as an emergency rising main. Alternatively, it could be used in future, as a back-feed reticulation line by uMgungundlovu District Municipality (**Table 7.25**).

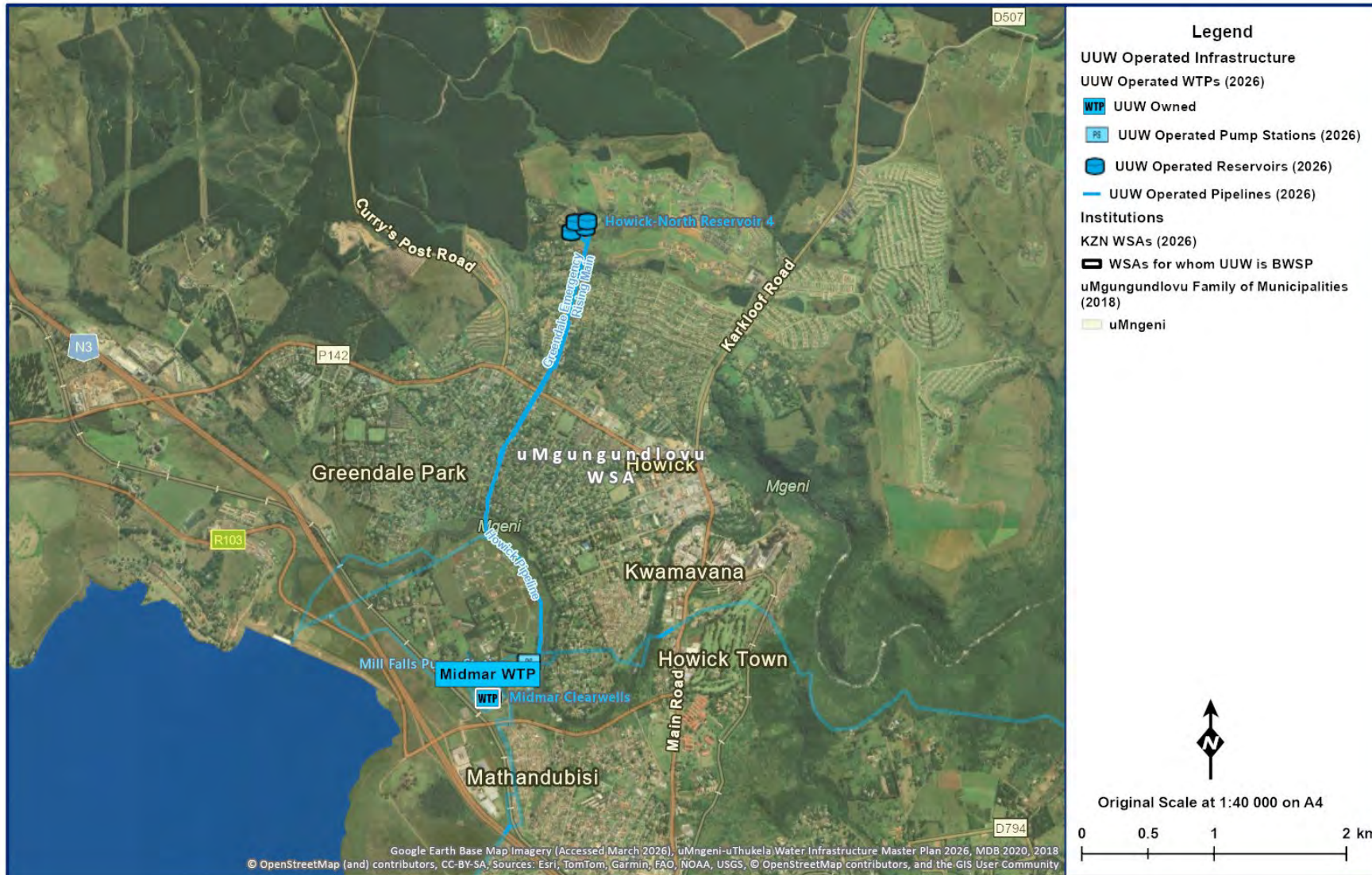


Figure 7.29 General Layout of the Howick-North Sub-System.

Table 7.23 Reservoir details of the Howick-North Sub-System

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Howick-North	Howick-North Reservoir 1 (Not currently in service)	1.2	Terminal	1113.98	1111.30
Upper uMngeni	Howick-North	Howick-North Reservoir 2 (Decommissioned)	0.9	Terminal	1104.81	1102.06
Upper uMngeni	Howick-North	Howick-North Reservoir 3	4.5	Terminal	1105.66	1098.04
Upper uMngeni	Howick-North	Howick-North Reservoir 4	6.5	Terminal	1105.66	1098.04

Table 7.24 Pump details: Howick-North Sub-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Mill Falls	Howick Pump No 1		✓	KSB:WKLn 125-3	Midmar WTP	Howick Reservoir	75	99.0	4.5
Upper uMngeni	Mill Falls	Howick Pump No 2		✓	KSB:WKLn 125-3	Midmar WTP	Howick Reservoir	75	99.0	4.5
Upper uMngeni	Mill Falls	Howick Pump No 3	✓		KSB:ETA 150-50	Midmar WTP	Howick Reservoir	75	77.4	6.9

Table 7.25 Pipeline details: Howick-North Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	Howick Pipeline	Mill Falls Pump Station	Howick Reservoir	2.5	400	Steel	16.30	29
Upper uMngeni	Howick Pipeline	Mill Falls Pump Station	Howick Reservoir	2.5	300	AC	9.20	29

* Based on a velocity of 1.5 m/s

b) Howick-West Sub-System

The Howick-West Sub-System is shown in **Figure 7.31**

i) Mill Falls Pump Station to Howick-West Reservoir

Water from the Mill Falls Pump Station (**Table 7.26**) is also pumped to the Howick-West Reservoir Complex (**Table 7.27**) through a 700 mm diameter steel pipeline (**Table 7.28**). The original 375 mm diameter asbestos cement pipe from Midmar WTP to Howick-West Reservoir is now utilised as a back-feed pipeline (**Table 7.28**). This back-feed pipeline supplies potable water to Merrivale, a low-cost housing scheme at Howick West, online consumers and the Midmar WTP.

ii) Howick-West Reservoir to Groenekloof Reservoir

The Howick-West Reservoir Complex consists of two 8.25 Mℓ reservoirs and one 16 Mℓ reservoir (**Table 7.27**). These reservoirs provide storage for the residential communities in Howick-West and Mpophomeni and serves as balancing reservoirs within the bulk supply system. The additional 16Mℓ Reservoir has been commissioned to ensure adequate storage to meet the current and projected demand of the supply area.

Water is pumped from the Howick-West Pump Station (**Table 7.26**), situated at the Howick-West Reservoir Complex, to the Groenekloof Reservoir through a 600 mm diameter pipeline ('67 Pipeline) (**Table 7.28**).

iii) Howick-West to Mpophomeni Reservoir Supply Area

From the Howick-West Pump Station, water is also pumped to the Mpophomeni Reservoir through a 5.8 km long, 250 mm diameter AC pipeline (**Table 7.28**).

iv) Groenekloof Reservoir Supply Area

The Groenekloof Reservoir Complex (**Table 7.27**) consists of three reservoirs with a combined capacity of 17.27 Mℓ.

The Groenekloof Reservoir Complex has a 300 mm diameter back-feed pipeline (old '67 Pipeline) (**Table 7.28**) that supplies consumers in Hilton and Cedara. This Complex also supplies the Vulindlela reservoirs and Blackridge Reservoir.

A 600 mm diameter pipeline from Groenekloof Reservoir feeds the Groenekloof Pump Station (**Table 7.28**). The pump station has high-lift pumps that supply Vulindlela Reservoirs 2 - 5 and low-lift pumps that supply Vulindlela Reservoir 1 (**Table 7.26**). The Vulindlela reservoirs supply the Vulindlela area through a network consisting of reservoirs and reticulation pipelines.

Groenekloof Reservoir also supplies Blackridge Reservoir (**Table 7.27**), through a 250 mm diameter pipeline ('56 Pipeline) (**Table 7.28**). There is a 160 mm diameter off-take along this pipeline supplying Sweetwaters Reservoir (**Table 7.27 and Table 7.28**).

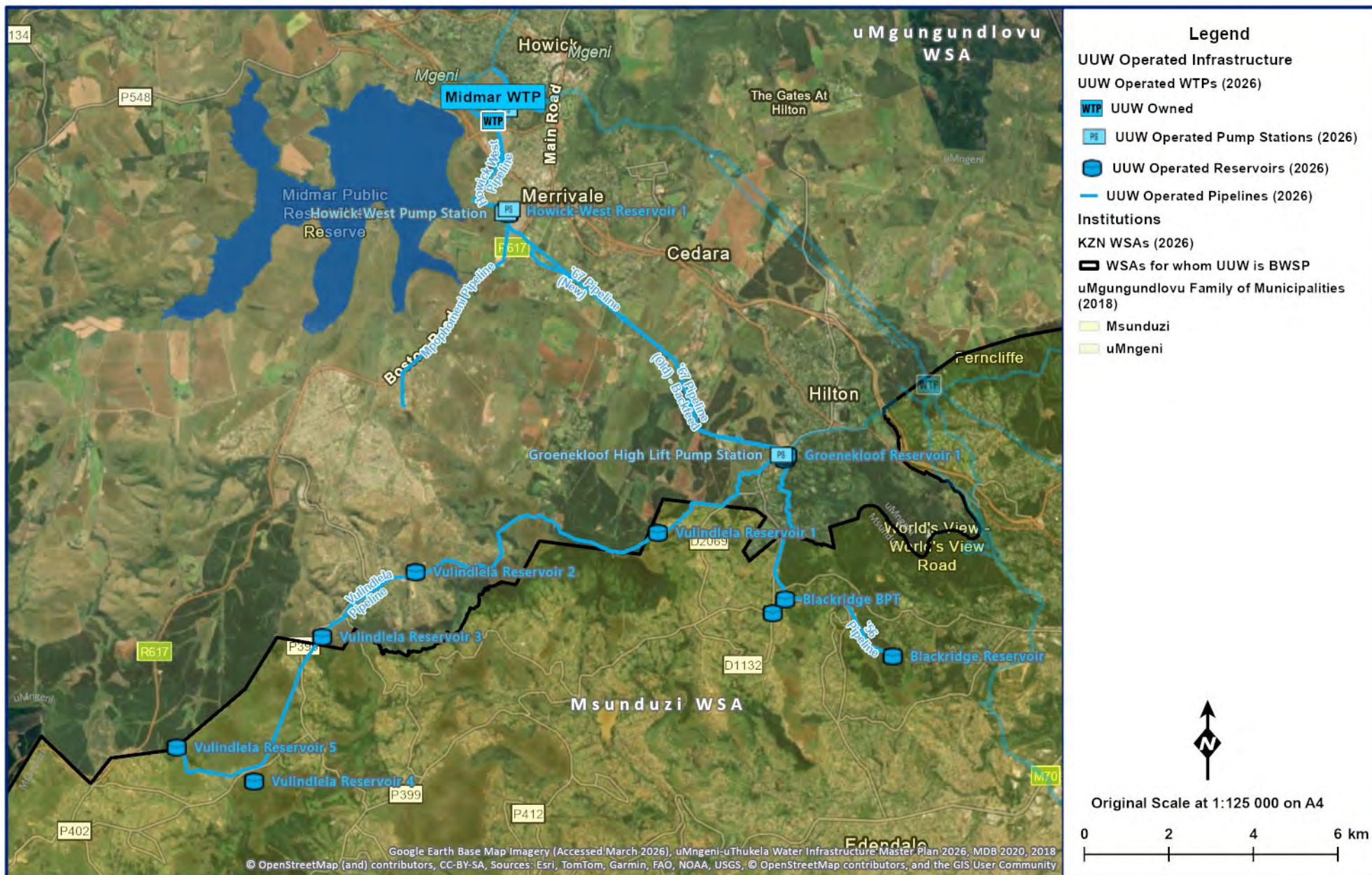


Figure 7.31 General Layout of the Howick-West Sub-System.

Table 7.26 Pump details: Howick-West Sub-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Mill Falls	Howick-West Pump No 1	✓		KSB	Midmar WTP	Howick-West	86	107	25.1
Upper uMngeni	Mill Falls	Howick-West Pump No 2		✓	KSB	Midmar WTP	Howick-West	86	107	25.1
Upper uMngeni	Howick-West	Mpophomeni Pump No 1	✓		KSB:WKLn 150/3	Howick-West Reservoir	Mpophomeni Reservoir	56	120	6.1
Upper uMngeni	Howick-West	Mpophomeni Pump No 2		✓	KSB:WKLn 150/3	Howick-West Reservoir	Mpophomeni Reservoir	56	120	6.1
Upper uMngeni	Howick-West	Groenekloof No 1	✓		KSB:ROL 250-620	Howick-West Reservoir	Groenekloof Reservoir	87	130	18.0
Upper uMngeni	Howick-West	Groenekloof No 2		✓	KSB:ROL 250-620	Howick-West Reservoir	Groenekloof Reservoir	87	130	18.0
Upper uMngeni	Groenekloof	Low Lift Pump No 1	✓		Amalgamated Power Eng:DSM 150-46	Groenekloof Reservoir	Vulindlela Reservoir 1	103	120	7.1
Upper uMngeni	Groenekloof	Low Lift Pump No 2	✓		Amalgamated Power Eng:Omega 150-605	Groenekloof Reservoir	Vulindlela Reservoir 1	103	120	7.1
Upper uMngeni	Groenekloof	Low Lift Pump No 3		✓	Amalgamated Power Eng:DSM 150-46	Groenekloof Reservoir	Vulindlela Reservoir 1	103	120	7.1
Upper uMngeni	Groenekloof	High Lift Pump No 1	✓		Amalgamated Power Eng:RKB Size 200-37	Groenekloof Reservoir	Vulindlela Reservoirs 2 - 5	226	351	11
Upper uMngeni	Groenekloof	High Lift Pump No 2	✓		Amalgamated Power Eng:RKB Size 200-37	Groenekloof Reservoir	Vulindlela Reservoirs 2 - 5	226	351	11
Upper uMngeni	Groenekloof	High Lift Pump No 3		✓	Amalgamated Power Eng:WL 200/7	Groenekloof Reservoir	Vulindlela Reservoirs 2 - 5	226	351	11

Table 7.27 Reservoir details: Howick-West Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Howick-West	Howick-West Reservoir 1	8.3	Distribution	1125.1	1118.1
Upper uMngeni	Howick-West	Howick-West Reservoir 2	8.3	Distribution	1125.1	1118.1
Upper uMngeni	Howick-West	Howick-West Reservoir 3	16	Distribution	1125.1	1118.1
Upper uMngeni	Blackridge	Blackridge Reservoir	2.2	Terminal	1006.0	1004.0*
Upper uMngeni	Sweetwaters**	Sweetwaters Reservoir	0.5	Terminal	1107.0	1103.0
Upper uMngeni	Vulindlela	Vulindlela Reservoir 1	10.0	Distribution	1313.9	1307.9
Upper uMngeni	Vulindlela	Vulindlela Reservoir 2	10.0	Distribution	1410.0	1404.0
Upper uMngeni	Vulindlela	Vulindlela Reservoir 3	0.6	Distribution	1403.9	1399.7
Upper uMngeni	Vulindlela	Vulindlela Reservoir 4	0.2	Distribution	1425.8	1422.5
Upper uMngeni	Vulindlela	Vulindlela Reservoir 5	9.2	Distribution	1494.0	1488.0
Upper uMngeni	Hilton	Groenekloof Reservoir 1	2.3	Distribution	1210.6	1205.1
Upper uMngeni	Hilton	Groenekloof Reservoir 2	5.0	Distribution	1210.6	1205.4
Upper uMngeni	Hilton	Groenekloof Reservoir 3	10.0	Distribution	1210.6	1205.1

* Estimated

** Reservoir owned and operated by Msunduzi Municipality

Table 7.28 Pipeline details: Howick-West Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Upper uMngeni	Howick West Pipeline	Mill Falls Pump Station	Howick-West Reservoir	3.30	700	Steel	66.6	46
Upper uMngeni	Howick West Pipeline (Backfeed)	Howick-West Reservoir	Midmar WTP (Backfeed)	3.40	375	AC	19.0	46
Upper uMngeni	Mpophomeni Pipeline	Howick-West Pump Station	Mpophomeni Reservoir	5.80	250	AC	8.5	46
Upper uMngeni	'67 Pipeline (New)	Howick-West Pump Station	Groenekloof Reservoir	9.80	600	Steel	49.0	28
Upper uMngeni	'67 Pipeline (Old) (Backfeed)	Groenekloof Reservoir	Howick-West Reservoir	9.80	300	AC	12.2	43
Upper uMngeni	Vulindlela Pipeline	Groenekloof Pump Station - Low-Lift Pump Station	Vulindlela Reservoir 1	4.25	400	Steel	21.7	29
Upper uMngeni	Vulindlela Pipeline	Groenekloof Pump Station - High-Lift Pump Station	Vulindlela Reservoir 5	27.90	500	Steel	34.0	29
Upper uMngeni	'56 Pipeline	Groenekloof Reservoir	Blackridge BPT	7.30	250	uPVC	8.5	41
Upper uMngeni	Sweetwaters Pipeline	'56 Pipeline (Upstream of Blackridge BPT)	Sweetwaters Reservoir	4.40	250	uPVC	8.5	41
Upper uMngeni	'56 Pipeline	Blackridge BPT	Blackridge Reservoir	3.30	250	uPVC	8.5	41

c) Midmar WTP to Umlaas Road Reservoir Sub-System

The Midmar WTP to Umlaas Road Reservoir Sub-System is shown in **Figure 7.32**.

i) '251 Pipeline (Midmar WTP to D.V. Harris Off-Take)

Downstream of Midmar WTP, the '251 Pipeline (**Table 7.31**) conveys potable water via the 45 Mℓ Midmar Reservoir (**Table 7.29**) to the inlet of the Midmar Tunnel (**Table 7.30**). Downstream of the tunnel, the '251 Pipeline resumes and delivers water into the '61 Pipeline (**Table 7.31**) at Ferncliffe near the D.V. Harris WTP. The '251 Pipeline ends at an off-take to the D.V. Harris WTP, and this allows for an emergency supply of potable water to the D.V. Harris WTP.

While the capacity of this pipeline is 347 Mℓ/day, the flow is restricted to 330 Mℓ/day due to the capacity of the Midmar Tunnel.

The Midmar Reservoir is situated on the '251 Pipeline, just upstream of the inlet portal of the Midmar Tunnel. As there is limited, clear water storage at Midmar WTP itself, Midmar Reservoir serves as the off-site potable water storage facility for the Midmar WTP. It also serves as a break-pressure tank for the '251 Pipeline prior to its entry into the tunnel. The reservoir was constructed in 1996 when the supply to the '61 Pipeline was transferred across from the D.V. Harris WTP to the then newly constructed Midmar WTP.

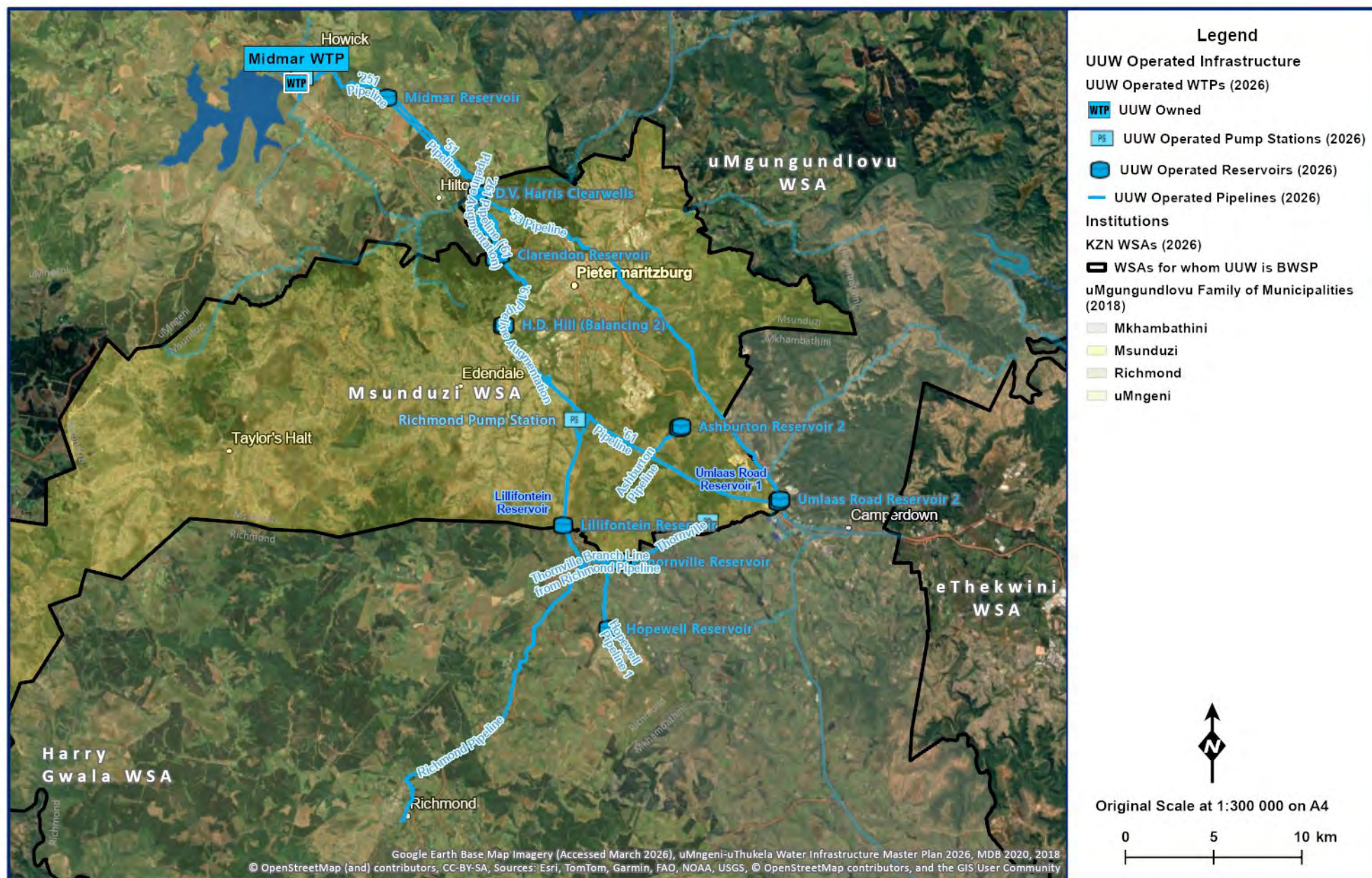


Figure 7.32 General Layout of the Midmar WTP to Umlaas Road Reservoir Sub-System.

Table 7.29 Reservoir details: Midmar WTP to Umlaas Road Reservoir Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Cedara	Midmar Reservoir	45.0	Bulk	1014.0	1001.0
Upper uMngeni	Clarendon	Clarendon Reservoir	25.0	Terminal	970.0	965.0*
Upper uMngeni	World's View	World's View Reservoir	80.0	Bulk	962.0	954.8
Upper uMngeni	Thornville	Thornville Reservoir	2.0	Terminal	954.9	949.7
Upper uMngeni	Hopewell	Hopewell Reservoir	0.5	Terminal	872.4	864.4
Upper uMngeni	Lillifontein	Lillifontein Reservoir	5	Bulk	1022.8	1014.8
Upper uMngeni	Ashburton	Ashburton High-Level Reservoir	0.5	Terminal	775.3	773.3
Upper uMngeni	Ferncliffe	D.V. Harris Clearwells	4.1	Bulk	978.9	977.1
Upper uMngeni	H.D. Hill	H.D. Hill (Balancing 1)	22.4	Distribution	869.3	862.4
Upper uMngeni	H.D. Hill	H.D. Hill (Balancing 2)	22.3	Distribution	869.3	862.4
Upper uMngeni	Cedara	St. Josephs Reservoir	0.1	Terminal	1074.2	1072.2

* Estimated

Table 7.30 Tunnel details: Upper uMngeni System.

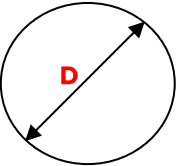
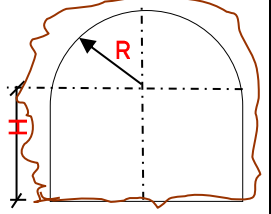
System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Upper uMngeni	Midmar Tunnel	6337	1800	1600	Concrete Lined	1996		
Upper uMngeni	Hilton Tunnel	6215	1800	1600	Concrete Lined	1959		

Table 7.31 Pipeline details: Midmar WTP to Umlaas Road Reservoir Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'251 Pipeline	Midmar WTP	Midmar Reservoir	6.50	1600	Steel	347.9	29
Upper uMngeni	'251 Pipeline	Midmar Tunnel Outlet	D.V. Harris WTP	8.06	1600	Steel	347.9	29
Upper uMngeni	'61 Pipeline	D.V. Harris WTP offtake	World's View Reservoir	6.20	1000, 900 and 800	Steel	330.0	46
Upper uMngeni	'60 Pipeline	D.V. Harris WTP offtake	World's View Reservoir	6.20	900 and 1200	Steel	330.0	12
Upper uMngeni	'61 Pipeline	World's View Reservoir	H.D. Hill	29.60	1000 and 1000	Steel	271.7	46
Upper uMngeni	'61 Pipeline	H.D. Hill	ED2 (Duplication)	8.90	1000 and 1000	Steel	271.7	23
Upper uMngeni	'61 Pipeline	ED2 (old)	Richmond P/L off-take	4.0	800	Steel	87.0	46

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'61 Pipeline	ED2 (new)	Richmond P/L off-take (Augmentation)	4	1300	Steel	229.5	14
Upper uMngeni	'61 Pipeline	Richmond P/L off-take	Umlaas Road	13.00	800	Steel	87.0	46
Upper uMngeni	'61 Pipeline	ED4	Umlaas Road	13.00	1100	Steel	133	11
Upper uMngeni	Ambleton Pipeline	Off-Take from '61 Pipeline	Ambleton Reservoir	2.00	160	Steel	3.5	33
Upper uMngeni	Ashburton Pipeline	Off-Take from '61 Pipeline	Ashburton Reservoir	2.70	160	Galvanised Mild Steel	3.5	33
Upper uMngeni	'Richmond Pipeline	Lillifontein Reservoir	Thornville Reservoir 1	4.9	350	Steel	6.2	11
Upper uMngeni	'Richmond Pipeline	Lillifontein Reservoir	Richmond Reservoir	22.6	450	Steel	7.6	11
Upper uMngeni	Hopewell Pipeline	Thornville Reservoir	Hopewell Reservoir	4.91	200	mPVC	5.4	39
Upper uMngeni	Thornville	Thornville Reservoir	De-commissioned Pump Station	7.90	160/200	Steel/AC	8.9	39
Upper uMngeni	Baynesfield	Thornville Reservoir	Baynesfield	4.95	200	AC	5.4	39
Upper uMngeni	'53 Pipeline	D.V. Harris WTP	Umlaas Road	26.60	762	Pre-Stressed Concrete	35.0	67

* Capacity based on velocity of 2 m/s

ii) 61 Pipeline: D.V. Harris to World's View Reservoir

The configuration of the pipelines between D.V. Harris WTP and World's View Reservoir is shown in **Figure 7.33**. It shows the current operating arrangement which is as follows:

- Clarendon Reservoir is fed from D V Harris WTP through the '60 pipeline; and
- World's View Reservoir is fed from Midmar WTP through the '61 pipeline - a 1000 mm diameter and the newer 900/1200 mm diameter pipeline.

When the demand downstream of World's View Reservoir reaches 245 Mℓ/day, the 800 mm diameter '60 pipeline will have to be utilised to augment the supply from Midmar WTP into World's View Reservoir. This will mean that Clarendon Reservoir will then have to be fed from Midmar WTP. Clarendon Reservoir supplies the Msunduzi Municipalities Symons and Hathorns Reservoirs, and these feed the majority of Pietermaritzburg central town and surrounds.

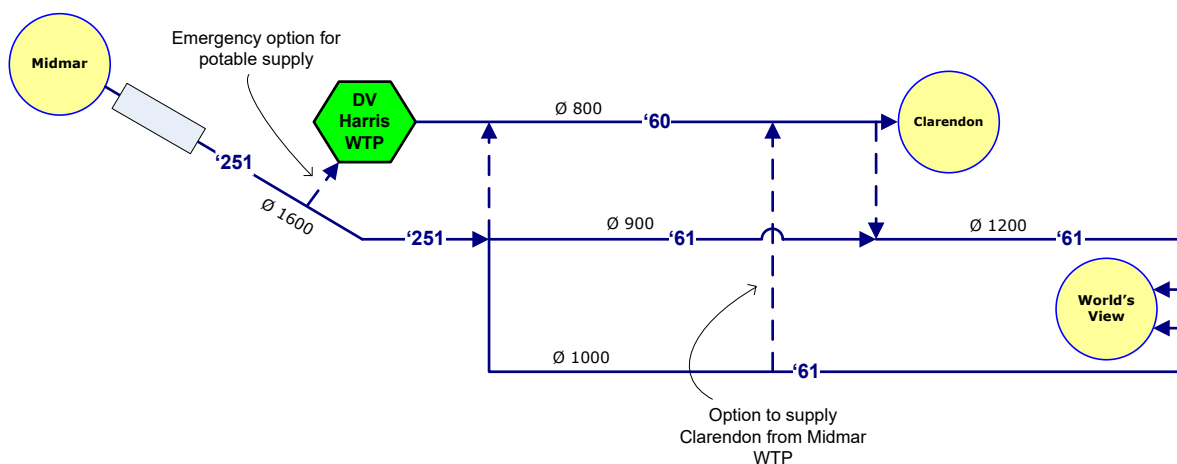


Figure 7.33 D.V. Harris WTP and World's View Reservoir pipeline configuration.

iii) '61 Pipeline: World's View Reservoir to ED2

Dual 1 000 mm diameter gravity pipelines provide water from World's View Reservoir to the ED2 offtake (

Table 7.31) which is a sales point to The Msunduzi Municipality's Edendale area. One of these pipelines is a dedicated supply to the western portions of The Msunduzi Municipality, consisting of Edendale (ED1 and ED2 (ED3-closed)). The two pipelines connect via a cross connection at ED2.

The H.D. Hill Balancing Reservoir supplies Bisley Reservoir (mainly Pietermaritzburg's western suburbs); with supply zones from Masons, Masons Industrial, Oribi and Bisley.

iv) '61 Pipeline: ED2 to Umlaas Road Reservoir

Two pipelines, an 800 mm and 1 300 mm diameter pipeline from ED2 to the Richmond Offtake and an 800 mm and 1 100 mm pipeline from ED4 to Umlaas Road, supply water from ED2 to Umlaas Road Reservoir. There are off-takes on-route for Edendale (ED4), Richmond, Foxhill Emergency, Ashburton Reservoir and the now decommissioned Thornville/Hopewell Supply (**Table 7.32** and **Table 7.31**). The Foxhill Emergency supply zone demands have increased significantly.

v) Ashburton Supply

An off-take from the '61 Pipeline supplies the Ashburton High-Level Reservoir (**Table 7.29**) through a 160mm diameter galvanised mild steel pipeline (**Table 7.31**). The reservoir feeds directly into the Msunduzi Municipality's Ashburton Lower Reservoir. The supply zone off this reservoir is the Ashburton and Lynnfield Park areas.

vi) Richmond/Thornville/Hopewell Supply

A 600 mm diameter off-take from the '61 Pipeline supplies the 16 Mℓ Lillifontein Reservoir via the Richmond Pump Station. The Thornville Reservoir (**Table 7.29**) is supplied under gravity through a 350 mm diameter pipeline (**Table 7.31**). The reservoir serves the Thornville and Baynesfield area. An off-take on the pipeline to Baynesfield supplies water to the Hopewell Reservoir (**Table 7.29**) which serves as reticulation storage for the Hopewell community.

The rising main from the '61 Pipeline to Thornville is used as a back-feed gravity main, after the commissioning of the Richmond Pipeline, to supply users along that line (i.e. supply from the Thornville Reservoir to the Thornville Pump Station). The Thornville pump station has been decommissioned.

Richmond is supplied under gravity via a 450 mm diameter steel pipeline from Lilliefontein Reservoir to the Richmond Reservoir Complex. Potable water is then distributed from the existing Richmond Reservoir Complex to the Richmond reticulation network.

vii) '53 Pipeline: D. V. Harris WTP to Umlaas Road Reservoir

The '53 Pipeline is a pre-stressed concrete pipeline that was commissioned in 1968 (**Table 7.31**). It was initially constructed to supply raw water from Midmar Dam to the Umlaas Road WTP. The pipeline was decommissioned in 2002 and the Umlaas Road Reservoir then only received potable water from the Midmar WTP via the '61 Pipeline. The '53 Pipeline was re-commissioned in 2006 as a potable pipeline from the D.V. Harris WTP to augment the supply to the Umlaas Road Reservoirs (9 Mℓ and 45 Mℓ).

Table 7.32 Pump details: Thornville/Hopewell Supply.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Thornville (Decommissioned)	Thornville Pump No 1	✓		KSB:WKLn 65/4Na	'61 Pipeline	Thornville Reservoir	100.0	112.0	1.5
Upper uMngeni	Thornville (Decommissioned)	Thornville Pump No 2	✓		KSB:WKLn 65/4Na	'61 Pipeline	Thornville Reservoir	100.0	112.0	1.5
Upper uMngeni	Thornville (Decommissioned)	Thornville Pump No 3	✓		KSB:WKLn 65/4 Na	'61 Pipeline	Thornville Reservoir	100.0	112.0	1.5
Upper uMngeni	Richmond	Richmond Pump No 1	✓		KSB Omega 300-860A	'61 Pipeline	Richmond Reservoir	50-140	65-165	*23-44
Upper uMngeni	Richmond	Richmond Pump No 2	✓		KSB Omega 300-860A	'61 Pipeline	Richmond Reservoir	50-140	65-165	*23-44

* Initial to ultimate capacity

d) Umlaas Road Reservoir Sub-System

The Umlaas Road Reservoir Sub-System is shown in **Figure 7.34**. The Umlaas Road Reservoir Complex consists of a 9 Mℓ reservoir and a 45 Mℓ reservoir (**Table 7.33**), which are interlinked. The reservoir complex has two off-takes. The '57 Pipeline (**Table 7.34**) supplies potable water to the Eston and Umbumbulu supply zones as well as the Camperdown and Mkhambathini areas. The Manyavu supply zones as well as the Lion Park Pipeline are currently fed directly from the '61 Pipeline to ensure adequate pressure along the newly commissioned pipeline.

i) '57 Pipeline

The '57, '157 and '257 Pipelines (800, 1000 and 1600 mm diameter respectively) run from Umlaas Road Reservoir to Point M, the sales point to eThekweni Municipality (**Table 7.34**).

ii) Eston/Umbumbulu Pipeline

Downstream of Umlaas Road Reservoir, Eston/Umbumbulu Pipeline draws water from the 1000 mm diameter '57 Pipeline. It feeds eThekweni Municipality's Umbumbulu Reservoir. The recently commissioned Umbumbulu pump station serves as a pressure booster on this line. En-route, there is an off-take to the Eston Reservoirs (**Table 7.34**). Further off-takes from this pipeline feed into the Greater Eston Bulk Water Supply Scheme and the Mid Illovu/Ukhalo System.

iii) Lion Park / Manyavu Pipeline/Mkhambathini

There are off-takes along the route of the 800 mm diameter '57 Pipeline for Mkhambathini Municipality (**Table 7.34**). The supply to eThekweni Municipality has been decommissioned. A 150 mm diameter AC pipeline and a newly constructed 350 mm diameter steel pipeline, off-take from the '61 Pipeline, supplies individual consumers along the Lion Park Road. This pipeline was extended in 2011 to feed the rural area of Manyavu (**Table 7.34**).

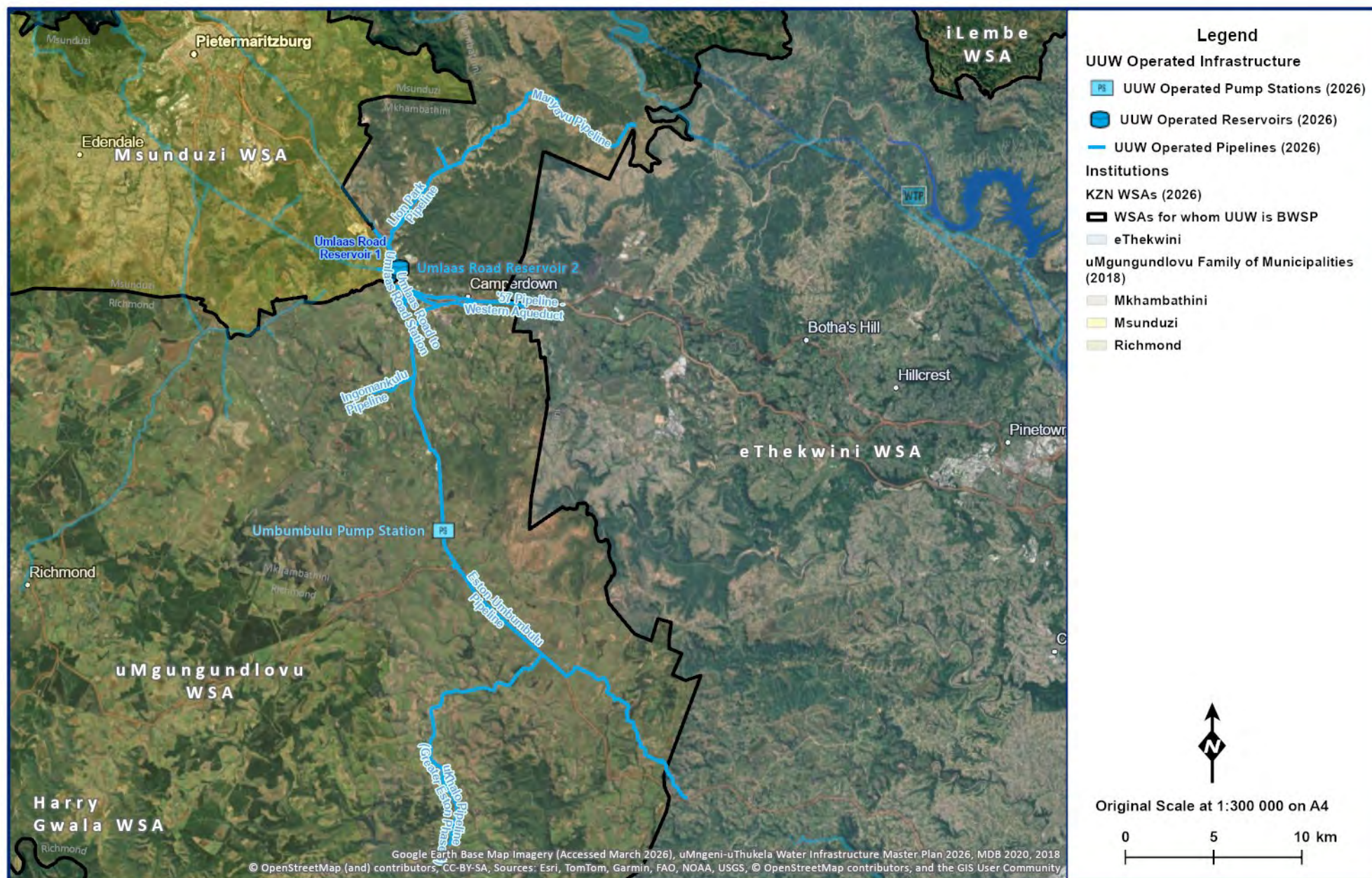


Figure 7.34 General Layout of the Umlaas Road Reservoir Sub-System.

Table 7.33 Reservoir details: Umlaas Road Reservoir Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Umlaas Road Node	Umlaas Road Reservoir 1	9.10	Distribution	844.0	837.9
Upper uMngeni	Umlaas Road Node	Umlaas Road Reservoir 2	45.00	Distribution	844.0	836.8
Upper uMngeni	Eston Reservoir 1	Eston Reservoir 1	2.50	Terminal	791.0	786.7
Upper uMngeni	Eston Reservoir 2	Eston Reservoir 2	2.50	Terminal	791.0	786.7

Table 7.34 Pipeline details: Umlaas Road Reservoir Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'57 Pipeline	Umlaas Road	Cato Ridge Bifurcation	8.60	800	Steel	87.08	53
Upper uMngeni	'257 Pipeline	Umlaas Road (Phase 3)	Cato Ridge Bifurcation	8.50	1000	Steel	135.90	30
Upper uMngeni	'357 Pipeline	Umlaas Road	Point M	8.10	1600	Steel	347.00	16
Upper uMngeni	Eston-Umbumbulu Pipeline	'57 Pipeline (Phase 3)	Eston Reservoir	16.10	600	Steel	48.93	29
Upper uMngeni	Eston-Umbumbulu Pipeline	Eston Reservoir	Umbumbulu	13.10	450	Steel	27.52	21
Upper uMngeni	Lion Park Pipeline	Umlaas Road Reservoir	Lion Park	8.60	160	Steel	3.48	52
Upper uMngeni	Lion Park Pipeline	Umlaas Road Reservoir	Lion Park	8.60	350	Steel	16.6	8
Upper uMngeni	Lion Park Pipeline	Lion Park	Consumers along the '53 Pipeline	4.60	90	HDPE	1.10	22
Upper uMngeni	Manyavu Pipeline	Lion Park	Manyavu	1.00	250	uPVC	8.50	15
				2.00	160	uPVC	3.50	15
				13.00	150	Klambon	3.10	15

* Capacity based on velocity of 2 m/s

7.3.4 D.V. Harris Water Treatment Plant

Raw water from Midmar Dam is conveyed under gravity to the D.V Harris WTP (**Figure 7.35 and Table 7.35**) via the 1600 mm diameter '51 Pipeline (**Table 7.37**). On route, the raw water passes through a raw water tunnel at Hilton (**Table 7.30**).

The WTP has a design capacity of 110 Mℓ/day, but Process Services and Operations have installed Activated Carbon filters to increase the capacity to 130 Mℓ/day. There is no need to expand the plant because it is able to accommodate the maximum raw water available from Midmar Dam. The yield at a 99% assurance of supply at Midmar Dam, with MMTS 1 and MMTS 2, is 476 Mℓ/day. Midmar WTP will treat 376 Mℓ/day and the balance of 100 Mℓ/day will be treated at D.V. Harris WTP.



Figure 7.35 D.V. Harris Water Treatment Plant.

There is the option for a potable water supply from Midmar WTP through the '251 Pipeline into the clearwells of the plant (**Figure 7.33**). This serves as an emergency supply should there be planned or unplanned downtime at the plant.

From the clearwells (**Table 7.36**) at the D.V. Harris WTP, potable water is supplied to the Clarendon, Belfort and Claridge Reservoirs, which feed the northern and eastern suburbs of The Msunduzi Municipality and Greater Wartburg and Table Mountain areas for uMgungundlovu District Municipality. The WTP also supplies potable water to the Umlaas Road Reservoir via the re-commissioned '53 Pipeline (**Table 7.31**) to feed areas within uMgungundlovu District Municipality and eThekweni Municipality.

Table 7.35 Characteristics of D.V. Harris WTP.

WTP Name:	D.V. Harris WTP
System:	Upper uMngeni System
Maximum Design Capacity:	130 Mℓ/day (100 Mℓ/day Main Plant and 30 Mℓ/day Dissolved Air Flotation)
Current Utilisation:	114.23 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	229 Mℓ/day
Pre-Oxidation Type:	Prechlorination
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	12mg/ℓ
Rapid Mixing Method:	Hydraulic Jump
Clarifier Type:	Degremont Pulsators
Number of Clarifiers:	4 (Main Plant)
Total Area of all Clarifiers:	1182 m² (Main Plant)
Total Capacity of Clarifiers:	100 Mℓ/day (Main Plant)
Filter Type:	Rapid gravity Sand Filters
Number of Filters:	21 + 4 Dissolved Air Flotation
Filter Floor Type	Concrete
Total Filtration Area of all Filters	827.82 m² Main Plant
Total Filtration Design Capacity of all Filters:	115 Mℓ/day Main Plant
Total Capacity of Backwash Water Tanks:	Backwash Water comes from Clearwell 1 – 1.38 Mℓ
Total Capacity of Sludge Treatment Plant:	
Capacity of Used Washwater System:	0.4Mℓ
Primary Post Disinfection Type:	Chloramination
Disinfection Dosing Capacity:	10mg/ℓ
Disinfectant Storage Capacity:	
Total Treated Water Storage Capacity:	5.52 Mℓ (Note there is no on-site reservoir, only clearwells)

Table 7.36 Details of the D.V. Harris clearwells.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	D.V. Harris WTP	D.V. Harris Clearwells	5.52	Bulk	978.9	977.09

Table 7.37 Pipeline details: '51 Pipeline.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'51 Pipeline	Midmar Dam	D.V. Harris WTP	10.80	1 600	Concrete	229.68	66

* Based on a velocity of 2 m/s

a) uMshwathi Sub-System

The D.V. Harris WTP supplies the uMshwathi BWSS (**Figure 7.36**). This includes supply to the Wartburg and Table Mountain areas for the uMgungundlovu District Municipality. Water is sold to The Msunduzi Municipality at the WTP and is then conveyed to the Belfort and Claridge Reservoirs. At this point, the water is “bought back” from Msunduzi Municipality through two pipelines known as the Ottos Bluff buy back (which supplies the Albert Falls, Mpolweni and Thokozani areas) as well as the Claridge-Wartburg buy back (which supplies water to the Greater Wartburg area).

i) Table Mountain Supply

Another three “buy back” points further downstream of Msunduzi Municipality’s infrastructure are located below the Copesville reservoir. The first is known as the Whispers reservoir buy back (which feeds the area of Bishopstowe). The other two buy backs are located at the Lower Glen Lyn Break-Pressure Tank. One off-take is known as the Lower Glynn buy back (which also feeds the area of Bishopstowe). Another off-take from the break-pressure tank supplies the Table Mountain Pipeline (**Table 7.38**), which feeds the Table Mountain Reservoir (**Table 7.36**). From the Table Mountain Reservoir, potable water is supplied to the rural communities in Table Mountain within the uMgungundlovu District Municipality.

ii) '69 Pipeline (Claridge Reservoir to Wartburg Reservoir)

uMngeni-uThukela Water’s Wartburg Pipeline, also known as the ‘69 Pipeline, supplies potable water to the Albert Falls, Wartburg, Cool Air, New Hanover, Dalton and Swayimane areas (**Table 7.38**).

Water is currently conveyed between D.V. Harris WTP and Claridge Reservoir along a 6.7 km long 1 000 mm diameter steel pipeline, which The Msunduzi Municipality owns. uMngeni-uThukela Water buys water back from The Msunduzi Municipality at Claridge Reservoir.

Potable water from the Claridge Reservoir previously flowed under gravity through the ‘69 Pipeline (**Table 7.38**) to the Old and New Wartburg Pump Stations (**Table 7.39**). There were off-takes to Albert Falls, Mpolweni as well as private connections en-route. From the pump stations, the ‘69 Pipeline continued as a rising main to the Wartburg Reservoirs (**Table 7.38**).

This configuration has changed with the completion of Phases 1, 2 and 3 of the uMshwathi Regional Bulk Water Supply Scheme (URBWSS) (**Section 7.5.2 (f)**). A new 800mm diameter pipeline has been constructed (Phase 1) in parallel to the existing 300 mm diameter pipeline from Claridge Reservoir to Wartburg. Similarly, a new pump station has been constructed to boost pressure in this line. The new pump station, named the Mpolweni Pump Station, was commissioned at the end of June 2019. The Wartburg Pump Stations were decommissioned. The existing 300 mm diameter NB steel pipeline is being used as a back feed line from Wartburg Reservoir to supply the existing consumers along this line. Similarly, the existing

300 mm diameter NB steel section from Claridge Reservoir is used to supply the existing consumers and the Albert Falls area. This section of pipeline terminates at the new 8 Mℓ reservoir in Wartburg.

iii) Wartburg Reservoir to Bruyns Hill Reservoir

The Bruyns Hill and adjacent area of Swayimane was previously supplied water via a 250 mm diameter steel pipeline from the Wartburg Reservoir. The pipeline was initially a gravity line to the old Bruyns Hill Pump Station (**Table 7.39**) and then a 250 mm diameter rising main to the Bruyns Hill Reservoir (**Table 7.38**).

The old Bruyns Hill pump station was decommissioned after the new Bruyns Hill pump station at Wartburg Reservoir and a 450 mm diameter steel rising main as well as a new 6 Mℓ Bruyns Hill reservoir were commissioned.

iv) Wartburg to Dalton

The new 8 Mℓ Wartburg Reservoir supplies the new 10 Mℓ Dalton Reservoir via the New Dingle Pump Station (**Table 7.39**). The areas of Dalton and Cool Air are supplied from the old 0.8 Mℓ Dalton reservoir. Specifically, the 110 mm diameter old rising main from Cool Air pumpstation (now de-commissioned), is used as a backfeed line from the Dalton reservoir now feeding the Cool Air area.

v) Dalton to Ozwathini

A 700 mm diameter NB steel pipeline from 10 Mℓ Dalton Reservoir conveys water to a 12 Mℓ reservoir at Ozwathini. The Dalton reservoir was completed at the end of August 2019.

The area of Cool Air is supplied via a back feed line which was the rising main to the old Cool Air pump station (now decommissioned).

There is a further 400mm diameter off-take that supplies water to the eNadi and Efaye community.

Another 200mm diameter offtake conveys water to a 1.5Mℓ reservoir and 0.5Mℓ elevated tank at Montebello Hospital. This reservoir was commissioned in February 2026 as part of Phase 4 of the Umshwathi BWSS.

The 12 Mℓ Ozwathini Reservoir supplies the Ozwathini and Appelsbosch supply zones whilst the Nondabulo reservoir supplies the iLembe Municipality.

The uMshwathi BWSS phase 4 and 5 aim to extend this system further into the uMshwathi, Ndwedwe and Maphumulo LMs. Phase 4 consists of 56km of pipelines and numerous reservoirs that will supply the Central/Southern Ndwedwe and is in the process of implementation by UUW.

Table 7.38 Pipeline details: Wartburg Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Upper uMngeni	Table Mountain Pipeline	Lower Glen Lyn BPT	Table Mountain Reservoir	14.80	150	uPVC	2.12*	67
Upper uMngeni	Wartburg Pipeline ('69 Pipeline) (Decommissioned)	Claridge Reservoir/Belfort Reservoir	Old Wartburg Break Pressure Tank and Pump Station	19.30	300	Steel		
Upper uMngeni	Wartburg Pipeline ('69 Pipeline)	Claridge Reservoir/Belfort Reservoir	Mpolweni Pump Station	19.30	800	Steel	87**	9
Upper uMngeni	Wartburg Pipeline ('69 Pipeline) (Decommissioned)	Wartburg Break Pressure Tank and Pump Station	1.5 Mℓ Wartburg Reservoir	6.80	300	Steel		
Upper uMngeni	Wartburg Pipeline ('69 Pipeline)	Mpolweni Pump Station	8 Mℓ Wartburg Reservoir	6.80	800	Steel		8
Upper uMngeni	Wartburg Pipeline (Decommissioned)	Wartburg Reservoir	Dingle Break Pressure Tank and Pump Station	9.50	250/200	FC	8.50/5.40*	35
Upper uMngeni	Wartburg Pipeline	8 Mℓ Wartburg Reservoir	New Dingle Break Pressure Tank and Pump Station	9.50	700	Steel	66	9
Upper uMngeni	Wartburg Pipeline (Decommissioned)	Dingle Break Pressure Tank and Pump Station	Cool Air Reservoir	13.90	160	FC	2.60***	35
Upper uMngeni	Wartburg Pipeline (now a back-feed line)	Cool Air Reservoir	Dalton 0.8 Mℓ Reservoir	1.30	110	uPVC	1.64*	35
Upper uMngeni	Wartburg Pipeline	New Dingle Break Pressure Tank and Pump Station	10 Mℓ Dalton Reservoir	13.90	700	Steel	66	9
Upper uMngeni	Wartburg Pipeline	10 Mℓ Dalton Reservoir	12 Mℓ Ozwathini Reservoir	20	700	Steel	66	9

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Upper uMngeni	eNadi/eFaye Pipeline	Wartburg Pipeline	Res A eNadi		400	Steel		
Upper uMngeni	Montebello Pipeline	Wartburg Pipeline	Montebello		200	Steel		
Upper uMngeni	Bruyns Hill Pipeline	Wartburg Reservoir	Bruyns Hill Pump Station	9.50	450	mPVC	8.49*	29
Upper uMngeni	Bruyns Hill Pipeline	Bruyns Hill Pump Station	Bruyns Hill Reservoir (decommissioned in 2012)	3.69	250	uPVC	3.00***	N/A
Upper uMngeni	Bruyns Hill Pipeline	Bruyns Hill Pump Station	Bruyns Hill Reservoir	3.69	250	Steel	8.50	15
Upper uMngeni	Albert Falls Pipeline	Wartburg Pipeline	Thokozani Reservoir	10.30	200	uPVC	5.44*	23

* Based on velocity of 2 m/s ** Restricted due to insufficient head *** Restricted due to pipe class

Table 7.39 Pump details: Wartburg Sub-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Cool Air (Decommissioned)	Dalton Pump No 1	✓		KSB:ETA 40-250/5	Cool Air Reservoir	Dalton Reservoir	58.0	100.0	0.46
Upper uMngeni	Cool Air (Decommissioned)	Dalton Pump No 2		✓	KSB:ETA 40-250/5	Cool Air Reservoir	Dalton Reservoir	58.0	100.0	0.46
Upper uMngeni	New Bruyns Hill	Pump No 1	✓		KSB:WKLN 80/2	Wartburg	Bruyns Hill	43.0	184	1.63
Upper uMngeni	New Bruyns Hill	Pump No 2		✓	KSB:WKLN 80/2	Wartburg	Bruyns Hill	43.0	184	1.63
Upper uMngeni	Bruyns Hill (Decommissioned)	Pump No 1								

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Bruyns Hill (Decommissioned)	Pump No 2								
Upper uMngeni	Dingle (Decommissioned)	Pump No1	✓		KSB:WL 65/7	Wartburg	Cool-Air Reservoir	178	271	1.17
Upper uMngeni	Dingle (Decommissioned)	Pump no 2		✓	KSB:WL 65/7	Wartburg	Cool-Air Reservoir	178	271	1.17
Upper uMngeni	Table Mountain	Pump No 1	✓		KSB:ETA new 60-250	Lower Glen-Lyn	Table Mountain Reservoir	20.0	75.00	1.3
Upper uMngeni	Table Mountain	Pump No 2	✓		KSB:ETA new 50-250	Lower Glen-Lyn	Table Mountain Reservoir	20.0	75.00	1.3
Upper uMngeni	Table Mountain	Pump No 3		✓	KSB:F/A 50-250	Lower Glen-Lyn	Table Mountain Reservoir	20.0	75.00	1.3
Upper uMngeni	Old Wartburg (Decommissioned)	Pump No 1		✓	KSB:WKLn 5016 No	Wartburg Pipeline	Wartburg Reservoir	164.0	189.0	0.52
Upper uMngeni	Old Wartburg (Decommissioned)	Pump No 2		✓	KSB:WKLn 5016 No	Wartburg Pipeline	Wartburg Reservoir	164.0	189.0	0.52
Upper uMngeni	New Wartburg (Decommissioned)	Pump No 1	✓		KSB:WL -100/4	Wartburg Pipeline	Wartburg Reservoir	164.0	239.0	3.24
Upper uMngeni	New Wartburg (Decommissioned)	Pump No 2	✓		KSB:WL -100/4	Wartburg Pipeline	Wartburg Reservoir	164.0	239.0	3.24
Upper uMngeni	Mpolweni	Pump No 1	✓		Kiloskar SCT 300/77	Wartburg Pipeline	Wartburg Reservoir	23.5	123	39
Upper uMngeni	Mpolweni	Pump No 2	✓		Kiloskar SCT 300/77	Wartburg Pipeline	Wartburg Reservoir	23.5	123	39
Upper uMngeni	Mpolweni	Pump No 3		✓	Kiloskar SCT 300/77	Wartburg Pipeline	Wartburg Reservoir	23.5	123	39

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	New Dingle	Pump No 1	✓		KSB Omega 300-700B	Dalton Pipeline	Dalton Reservoir	178	271	22.89
Upper uMngeni	New Dingle	Pump No 2		✓	KSB Omega 300-700B	Dalton Pipeline	Dalton Reservoir	178	271	22.89

Table 7.40 Reservoir details: Wartburg Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Wartburg	Wartburg Reservoir 1	0.50	Distribution	963.5	958.4
Upper uMngeni	Wartburg	Wartburg Reservoir 2	1.50	Distribution	963.5	958.7
Upper uMngeni	Wartburg	Wartburg Reservoir 3	8.00	Distribution	963.5	956.2
Upper uMngeni	Belfort	Claridge Reservoir	50.00	Distribution	940.3	931.6
Upper uMngeni	Bruyns Hill	Bruyns Hill Reservoir 1	0.40	Distribution	1006.0	1002.0
Upper uMngeni	Bruyns Hill	Bruyns Hill Reservoir 2	6.00	Distribution	1006.0	1002.0
Upper uMngeni	Cool Air	Cool Air Reservoir	0.50	Distribution	1013.1	1008.3
Upper uMngeni	PMB East	Table Mountain (Int)	0.10	Distribution	909.0	907.0

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Dalton	Dalton Res 1	0.80	Distribution		1067.00
Upper uMngeni	Dalton	Dalton Res 2	10.00	Distribution	1076.41	1067.01
Upper uMngeni	Montebello	Montebello	2.00	Distribution	948	944.5*
Upper uMngeni	Ozwathini	Ozwathini	12.00	Distribution	1052.0	1045.0
Upper uMngeni	Ozwathini	Nondabula	1.10	Distribution	1053.5*	1050.0*

7.3.5 Lower uMngeni System

The Lower uMngeni System (Error! Reference source not found. and **Figure 7.6**) serves the greater eThekweni Municipal area from lower Pinetown/KwaDabeka in the west, to Phoenix/Inanda/Verulam in the north, to the Durban seaboard in the east and to Amanzimtoti/KwaMakuta in the south. It also provides water to the northern coastal areas of Ugu District Municipality. The system derives its water resources from the uMngeni River, being fed from Nagle and Inanda Dams, which are supported by Albert Falls Dam, Midmar Dam and the MMTS.

Water is treated at uMngeni-uThukela Water's Durban Heights WTP (**Table 7.41**) located in Westville, Wiggins WTP (**Table 7.47**) located in Cato Manor and Maphephethwa WTP (**Table 7.52**) located in the Inanda Dam area. uMngeni-uThukela Water sells water to eThekweni Municipality "at the fence" of these WTPs and thus does not own nor operate the bulk distribution pipelines downstream of these WTPs. However, operational and infrastructure changes within the eThekweni Municipality's system, which is served by these WTPs, have a profound influence on the WTPs operational and infrastructure requirements.

Continuous effort (uMngeni-uThukela Water in collaboration with eThekweni Municipality) has gone into optimising the overall efficiency of the distribution system to share the load better between the two large WTPs. One example of these initiatives has involved the transfer of demand from areas previously supplied from Durban Heights WTP onto Wiggins WTP. This demand transfer commenced in January 2005 and involved the transfer of 40 - 60 Mℓ/day onto Wiggins WTP.

Durban Heights WTP has a rated capacity of 615 Mℓ/day. The primary raw water source for the WTP is Nagle Dam, which has limited storage and is in turn supplied from Albert Falls Dam located upstream of Nagle Dam on the uMngeni River. Raw water is conveyed from Nagle Dam to Durban Heights WTP via two systems comprising a series of siphons and gravity tunnels. System 1, Nagle Aqueducts 1 and 2, comprises 11 tunnels (14.57 km) which are inter-connected by siphons (29.7 km) with a capacity of 260 Mℓ/day. System 2, Nagle Aqueducts 3 and 4 comprises 6 tunnels (21.3 km) which are inter-connected by siphons (15.4 km) with a capacity of 440 Mℓ/day.

Durban Heights WTP is primarily gravity-fed with raw water from Nagle Dam via Aqueducts 1 to 4 as shown in **Figure 7.37** and detailed in **Table 7.42**, **Table 7.43** and **Table 7.44**. Aqueducts 1 to 4 have a total design capacity of 700 Mℓ/day at a total head of 404 metres above sea level (mASL), which is the top water level (TWL) of Nagle Dam.

Table 7.41 Characteristics of the Durban Heights WTP.

WTP Name:	Durban Heights WTP
System:	Lower uMngeni System
Maximum Design Capacity:	615 Mℓ/day
Current Utilisation:	56575 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	710 Mℓ/day
Pre-Oxidation Type:	Pre-chlorination
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	Other
Rapid Mixing Method:	Hydraulic Jump
Clarifier Type:	Pulsator Clarifier
Number of Clarifiers:	18
Total Area of all Clarifiers:	6580 m ²
Total Capacity of Clarifiers:	611 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	100
Filter Floor Type	Plate Design
Total Filtration Area of all Filters	6227 m ²
Total Filtration Design Capacity of all Filters:	615 Mℓ/day
Total Capacity of Backwash Water Tanks:	2326 m ³
Total Capacity of Sludge Treatment Plant:	30 000 kg/day of thin sludge
Capacity of Used Washwater System:	25.2 Mℓ/day
Primary Post Disinfection Type:	Chlorine gas
Disinfection Dosing Capacity:	
Disinfectant Storage Capacity:	24 ton
Total Treated Water Storage Capacity:	506 Mℓ

Raw water can be supplemented to Durban Heights WTP via the Inanda Pump Station through a 1 100 mm diameter NB steel pipeline connecting onto Aqueduct 1 and through the Durban Heights Shaft Pump Station which pumps water from the Wiggins Aqueduct (Figure 7.37).

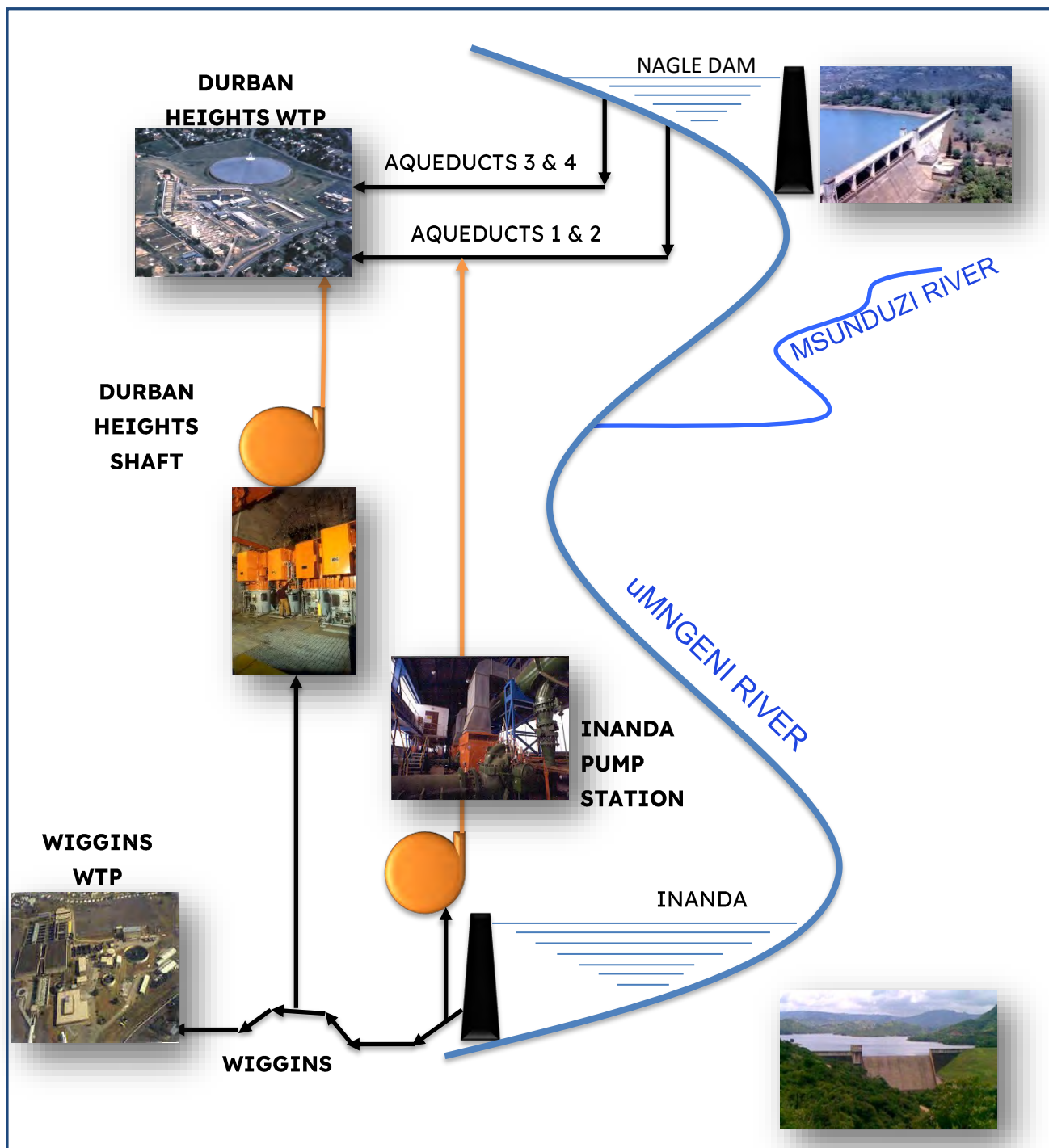


Figure 7.37 Layout of the Central Supply System.

Table 7.42 Tunnel details: Nagle Aqueduct System (Aqueduct 1 and 2).

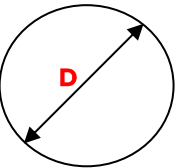
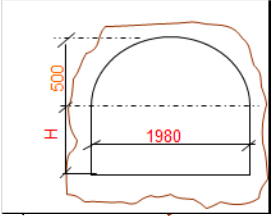
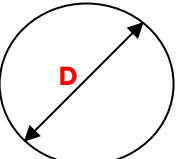
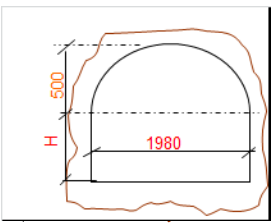
System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Lower uMngeni	Nagle Aqueduct 1 & 2 - Tunnel T1	533	1500	990	concrete lined	1949 & 1957		
	Nagle Aqueduct 1 & 2 - Tunnel T2	296	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T3	861	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T4	232	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T5	3995	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T6	2243	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T7	1682	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T8	996	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T9	1246	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T10	1751	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T11	735	1500	990	concrete lined			

Table 7.43 Tunnel details: Nagle Aqueduct System (Aqueduct 3 and 4).

System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Lower uMngeni	Nagle Aqueduct 3 & 4 - Umzwempi Tunnel T1	254	1505	1302	concrete lined - full	1967 & 1972		
		245			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Umbava Tunnel T2 Nagle Aqueduct 3 & 4 - Ngabayena Tunnel T2 Nagle Aqueduct 3 & 4 - Janokwe Tunnel T2 Nagle Aqueduct 3 & 4 - Shangase Tunnel T2 Nagle Aqueduct 3 & 4 - Ensutha Tunnel T2	1940	1505	1302	concrete lined - full			
		2866			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Mkhizwane Tunnel T3 Nagle Aqueduct 3 & 4 - Nokwenzewa Tunnel T3	562	1746	978	concrete lined - full			
		3114			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Amabedhlana Tunnel T4 Nagle Aqueduct 3 & 4 - Showe Tunnel T4	1350	1505	1302	concrete lined - full			
		3281			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Langefontein Tunnel T5	1257	1505	1302	concrete lined			
		3585			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Kraanskloof Tunnel T6	1210	1505	1302	concrete lined			
		1677			concrete lined - partial			

Note: Tunnel 3 has a different cross section shape to tunnels 1, 2, 4, 5 and 6

Table 7.44 Siphon Pipeline details: Nagle Aqueducts.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Lower uMngeni	Aqueduct 1	Nagle Dam	Durban Heights WTP	29.7	900	Steel	100	7677
Lower uMngeni	Aqueduct 2	Nagle Dam	Durban Heights WTP	29.7	1 000	PCP and Steel	160	6869
Lower uMngeni	Aqueduct 3	Nagle Dam	Durban Heights WTP	15.4	1 400	PCP	220	5859
Lower uMngeni	Aqueduct 4	Nagle Dam	Durban Heights WTP	15.4	1 400	PCP	220	5354

Table 7.45 Reservoir details: Durban Heights WTP.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Lower uMngeni	Durban Heights	Reservoir 1	45	Bulk	264.84	259
Lower uMngeni	Durban Heights	Reservoir 2	100	Bulk	272	265
Lower uMngeni	Durban Heights	Reservoir 3	343	Bulk	272	247
Lower uMngeni	Durban Heights	Dunkeld Reservoir*	9	Bulk	264.84	259

* Owned by EWS

Table 7.46 Pump details: Durban Heights WTP.

System	Pump Station Name	Number of Pumps		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
		Number of Duty Pumps	Number of Standby Pumps						
Lower uMngeni	Durban Heights Booster Pump Station	4	1	KSB Omega 200-670	Durban Heights	eThekwinini Northern Aqueduct	104	35	110
Lower uMngeni	Durban Heights Shaft Pump Station	3	1	Sulzer Bbk 620-022 4 stage	Wiggins Aqueduct	Durban Heights WTP	152	180	50
Lower uMngeni	Inanda Pump Station	3	1	Sulzer SM 303-800	Inanda Dam	Durban Heights WTP	140	200	50

Table 7.47 Characteristics of the Wiggins WTP.

WTP Name:	Wiggins WTP
System:	Lower uMngeni System
Maximum Design Capacity:	350 Mℓ/day
Current Utilisation:	334 335 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	350 Mℓ/day
Pre-Oxidation Type:	Ozone
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	Polymeric Coagulant
Rapid Mixing Method:	Hydraulic Jump
Clarifier Type:	Pulsator Clarifier
Number of Clarifiers:	4
Total Area of all Clarifiers:	3980 m ²
Total Capacity of Clarifiers:	360 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	24
Filter Floor Type	Monolithic
Total Filtration Area of all Filters	6688 m ²
Total Filtration Design Capacity of all Filters:	350.16 Mℓ/day
Total Capacity of Backwash Water Tanks:	
Total Capacity of Sludge Treatment Plant:	
Capacity of Used Washwater System:	2.78 Mℓ/day
Primary Post Disinfection Type:	Hypochlorite
Disinfection Dosing Capacity:	240 ℓ/hr
Disinfectant Storage Capacity:	
Total Treated Water Storage Capacity:	120 Mℓ

Wiggins WTP is primarily gravity-fed with raw water from Inanda Dam via the Wiggins Aqueduct (**Figure 7.37** and **Table 7.48** and **Table 7.49**). The Wiggins Aqueduct has a total design capacity of 350 Mℓ/day at a total head of 147 mASL, which is the top water level (TWL) of Inanda Dam.

Table 7.48 Tunnel details: Inanda-Wiggins Aqueduct System.

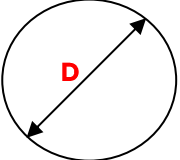
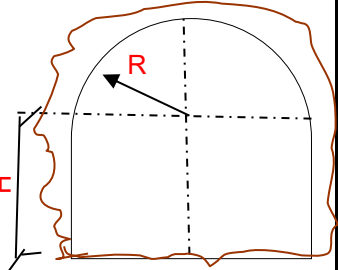
System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Lower uMngeni	Inanda Wiggins Aqueduct - Emolweni Tunnel	5320	1350	1220	steel lined	1993		
Lower uMngeni	Inanda Wiggins Aqueduct - Clermont Tunnel	5400	1350	1220	steel lined	1993		
Lower uMngeni	Inanda Wiggins Aqueduct - Reservoir Tunnel	2560	1350	925	steel lined	1984		
Lower uMngeni	Inanda Wiggins Aqueduct - University Tunnel	1040	1350	925	steel lined	1984		
Lower uMngeni	Inanda Wiggins Aqueduct - Sherwood Tunnel	3350	1350	925	steel lined	1984		

Table 7.49 Pipeline details: Inanda-Wiggins Aqueduct.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Lower uMngeni	Inanda Wiggins Aqueduct	Inanda Dam	Durban Heights WTP	11.8	2620	Steel	550	3233
Lower uMngeni	Inanda Wiggins Aqueduct	Durban Heights WTP	Wiggins WTP	5.9	2315	Steel	350	4142

Table 7.50 Reservoir details: Wiggins WTP.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Lower uMngeni	Wiggins	Reservoir 1	120	Bulk	103	96.6

Table 7.51 Pump details: Wiggins WTP.

System	Pump Station Name	Number of Pumps		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
		Number of Duty Pumps	Number of Standby Pumps						
Lower uMngeni	Wiggins High Lift Pumps (small)	2	1	APE 300-300-370 HMNA	Wiggins WTP	Ridge Reservoir/Lamont Reservoir	31	130	28
Lower uMngeni	Wiggins High Lift Pumps (big)	1	1	APE Model 6920 5-stage	Wiggins WTP	Ridge Reservoir/Lamont Reservoir	31	130	108

Table 7.52 Characteristics of the Maphephethwa WTP.

WTP Name:	Maphephethwa WTP (upgrade commissioned in December 2015)
System:	Lower uMngeni System
Maximum Design Capacity:	5 Mℓ/day
Current Utilisation:	4.1 0 Mℓ/day
Raw Water Storage Capacity:	None
Raw Water Supply Capacity:	5.3 Mℓ/day
Pre-Oxidation Type:	Chlorine
Primary Water Pre-Treatment Chemical:	Aluminium Sulphate
Total Coagulant Dosing Capacity:	250 kg/day at 50 mg/ℓ (maximum)
Rapid Mixing Method:	Flow over weirs
Clarifier Type:	Circular clarifiers with mechanical sludge scrapers
Number of Clarifiers:	2
Total Area of all Clarifiers:	226 m ²
Total Capacity of Clarifiers:	5 Mℓ/day
Filter Type:	Rapid Gravity Filters
Number of Filters:	4
Filter Floor Type	Monolithic
Total Filtration Area of all Filters	50 m ²
Total Filtration Design Capacity of all Filters:	5 Mℓ/day
Total Capacity of Backwash Water Tanks:	195 m ³
Total Capacity of Sludge Treatment Plant:	5 Mℓ/day
Capacity of Used Washwater System:	11.7 m ³ /day
Primary Post Disinfection Type:	Gaseous Chlorine
Disinfection Dosing Capacity:	1.5 kg/hr
Disinfectant Storage Capacity:	70 kg cylinders with automatic changeover
Total Treated Water Storage Capacity:	2.5 Mℓ

7.3.6 Status Quo and Limitations of the Upper uMngeni – Spring Grove Node

a) Overview

The demand off the Spring Grove node for the period December 2024 to November 2025 was approximately 8.09 Mℓ/day. The Mooi River System supplies one WSA, namely, Mpofana Local Municipality, within the UMDM jurisdiction.

b) Spring Grove Water Treatment Plant

The Spring Grove WTP started producing 5.6 Mℓ/day, when the Bruntville pipeline was commissioned in June 2024. The WTP has a current design capacity of 20 Mℓ/day, upgradable to 60 Mℓ/day in the future.

There are no recommendations for an upgrade at this stage.

The demand placed on the Spring Grove Water Treatment Plant is presented in **Figure 7.38** together with the future forecast sales. The current average WTP production is approximately 5.6 Mℓ/day.

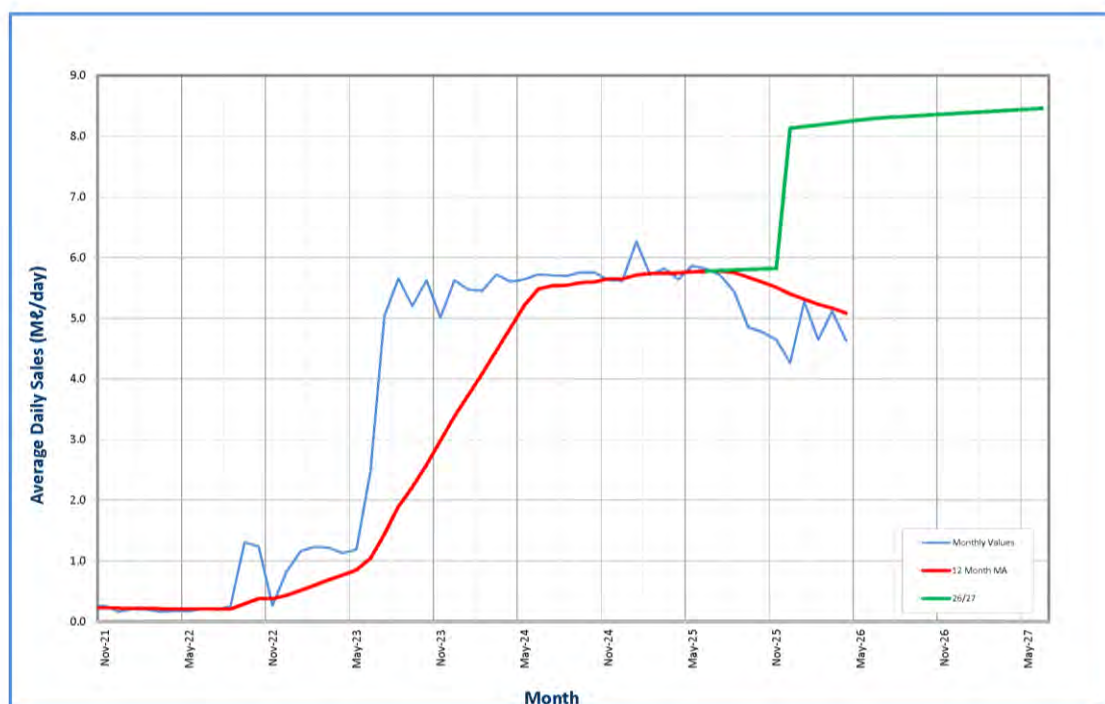


Figure 7.38 Water demand from Spring Grove WTP

The projected increase in demand is based on the growth in the Bruntville area as well as the supply from the Bruntville Reservoir to the Mooi River CBD.

An analysis of daily historical production (December 2024 to November 2025) of the Spring Grove WTP is presented in **Figure 7.39**. It shows that for 0.55% of the time the WTP was being operated above the optimal operating capacity (16 Ml/day) and 0% above its design capacity (20 Ml/day).

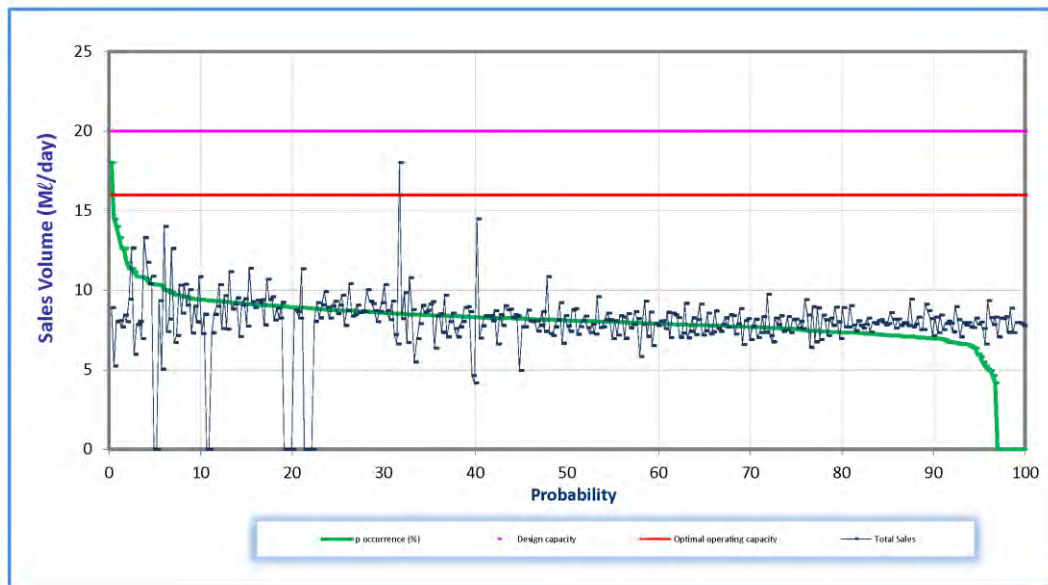


Figure 7.39 Analysis of historical production at Spring Grove WTP (November 2024 to October 2025).

7.3.7 Status Quo and Limitations of the uMngeni System

a) Overview

The demand off the Upper uMngeni System for the period December 2024 to November 2025 is approximately 476.75 Ml/day. **Figure 7.40** illustrates the distribution of this demand between the three WSAs.

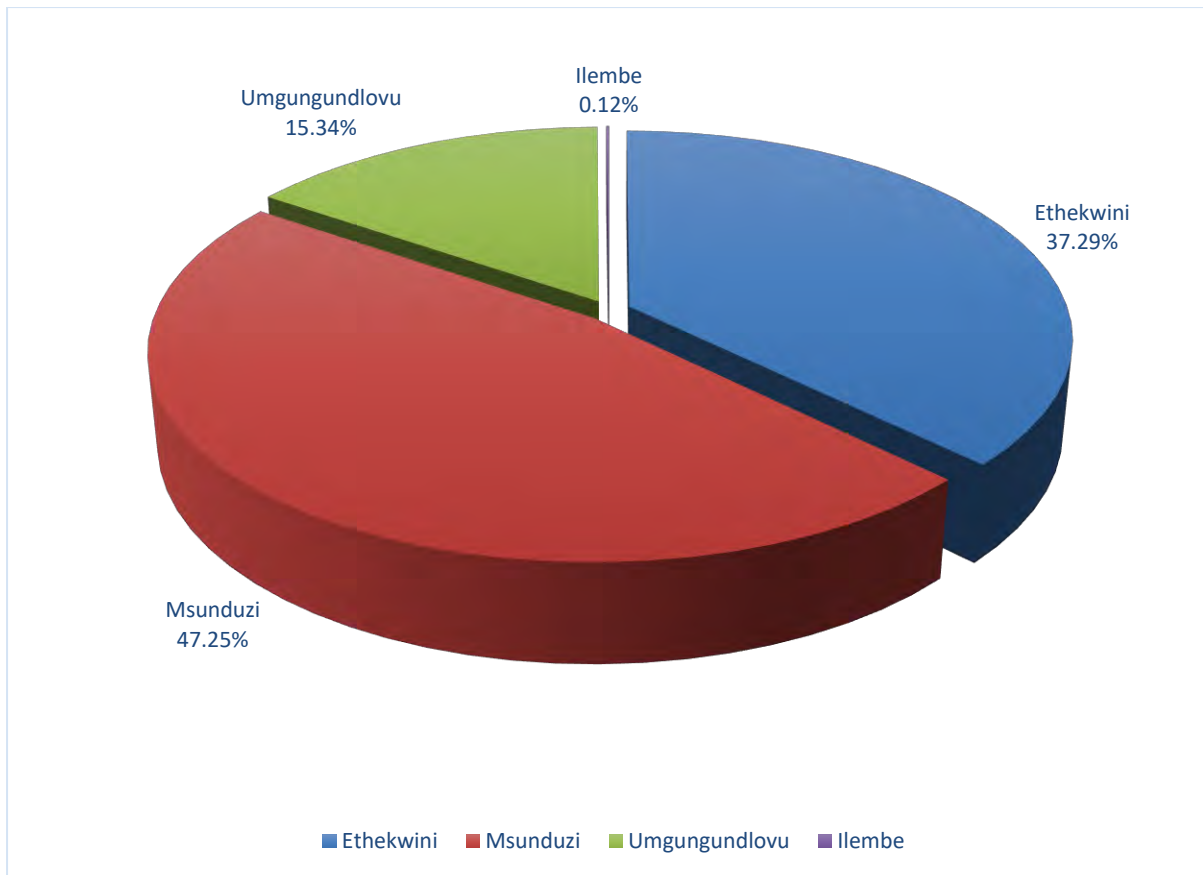


Figure 7.40 Distribution of Demands in Upper uMngeni per WSAs (October 2023).

Over recent years, eThekweni Municipality has made an effort into optimising the operation of its distribution systems that are served by the Lower uMngeni System. Amongst other things, this has led to them implementing new infrastructure in order to undertake a load shifting exercise.

eThekweni Municipality's Western Aqueduct project, which was fully commissioned in 2020, represents the most significant of these load-shifting operations. The intention is for those areas, currently being served under pumping from the Lower uMngeni System (viz. from Durban Heights WTP), to be transferred onto the Upper uMngeni System, and served under gravity from Midmar WTP via the Western Aqueduct (WA). These areas include Greater Inanda, KwaDabeka, Mt Moriah and Pinetown South. Further to this, eThekweni Municipality plans to link the WA into their Northern Aqueduct thereby extending this supply to the municipality's northern areas as far as the Dube TradePort Development Zone. Whilst this measure will free up additional capacity within the Lower uMngeni System, which can then be redirected elsewhere within eThekweni Municipality, it does place considerable additional load on much of UMngeni-uThukela Water's infrastructure in the Upper uMngeni System. This includes the '57, '61 and '251 Pipeline systems, Midmar WTP, and ultimately on the water resources available from Midmar Dam (**Section 7.2.3 (a)**). The augmentation of the '57 Pipeline (completed in 2011) and the '61 pipeline (commissioned in 2014) were undertaken in

order to provide sufficient capacity in this portion of the supply network to meet the required demands of the WA.

With the completion of the second phase of the MMTS (**Section 7.2.3 (a)**), and the catchment hydrology update undertaken in 2019, the 99% assured yield of the uMngeni System, at Midmar Dam, has increased from 322.5 Mℓ/day (173.8 million m³/annum) to 501.4 Mℓ/day (183.0 million m³/annum) excluding raw water conveyance losses. However, even an increased yield at Midmar Dam will be insufficient to support the proposed full Western Aqueduct load shift for any significant period, and further water resource developments will be required to serve the increasing demand of eThekweni Municipality. However, additional water resource developments within the Mooi-uMngeni System are not considered beneficial as this catchment is now considered fully utilised. An alternative water resource option that is currently being investigated is the uMkhomazi Water Project (uMWP) (**Section 7.5.2 (a)**) which would transfer raw water from the uMkhomazi River to a WTP near Baynesfield, with potable water then being supplied to the Umlaas Road area to feed into the '57 Pipeline and subsequently into the WA. The earliest that it is envisaged that the scheme could be completed and operational is 2035.

Midmar Dam's yield has now been maximised following the completion of phase 2 of the MMTS. It is prudent that all future bulk distribution infrastructure upgrades within the Upper uMngeni System (Midmar WTP - Umlaas Road) be limited to the water resources capacity that Midmar Dam can support (bearing in mind that Midmar Dam must also contribute to the water resource requirements downstream of it).

An assessment was undertaken in 2014 to determine the "load shift potential from the Lower uMngeni System to the Upper uMngeni System" (**Section 7.2.2 (e)**). EWS have requested that uMngeni-uThukela Water provide additional water to Umbumbulu to satisfy future demand growth. EWS agreed that this additional demand would decrease the availability of water at Point 'M'.

As mentioned in **Section 7.2.2 (e)**, only 330 Mℓ/day is available through the '61 System after the tunnel. Significant infrastructure costs would have to be incurred to overcome this hydraulic constraint, and taking into account, the water resource constraint mentioned above, this upgrade is not considered practical.

Hence, the water available to meet demands downstream of Umlaas Road Reservoir is limited until the uMWP is commissioned. Further to this, the available water for eThekweni Municipality will decrease over time as the demands upstream of the Umlaas Road Reservoir increase. The full WA load shift requirement will not be accommodated by the Upper uMngeni System until the uMWP is commissioned.

b) Midmar Water Treatment Plant

The demand placed on the Midmar Water Treatment Plant, over the past few years, is presented in **Figure 7.41**. Forecast sales are shown on the same figure. The current average WTP production is approximately 393.94 Mℓ/day.

The steep increase in supply is due to Msunduzi Municipality's demand along the '61 Pipeline Supply System exceeding the projected demand. It is further strained due to an increase in supply to eThekweni Municipality's demand to point M. eThekweni Municipality commissioned the Western Aqueduct and have requested that uMngeni-uThukela Water supply the maximum of 200 Mℓ/day during commissioning and thereafter supply the demand as projected.

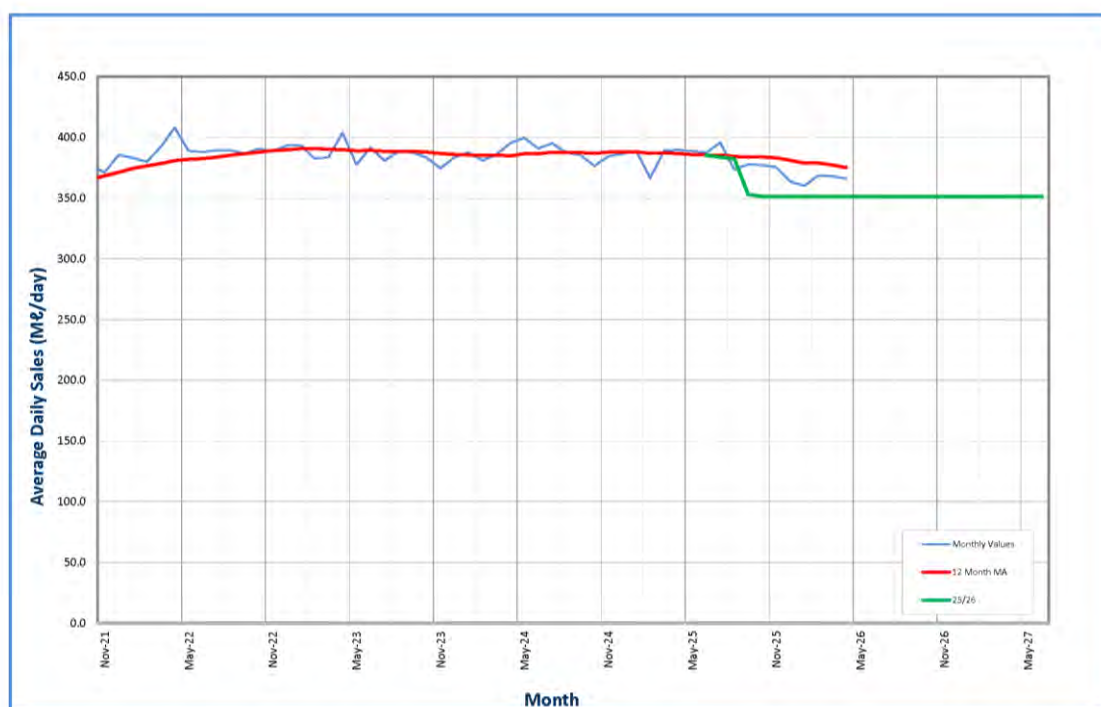


Figure 7.41 Water demand from Midmar WTP.

An analysis of daily historical production (December 2024 to November 2025) of the Midmar WTP is presented in **Figure 7.42**. It shows that for 99.73% of the time the WTP was being operated above the optimal operating capacity and 1.37% above its design capacity. This is an increase from the 97.82% above the optimal operating capacity of the previous reporting period. The result of this is that WSA's are going to be prohibited from implementing any new developments because UUW will not have the infrastructure capacity to meet the projected demand. The Department of Water and Sanitation (DWS) have issued a directive to UUW to observe the abstraction license agreement along the uMngeni System. Discussions with UMDM, Msunduzi Municipality and eThekweni Metropolitan Municipality on demand

projections, have proposed and agreed to reduce demand over the next four years if abstraction licence conditions are to be met.

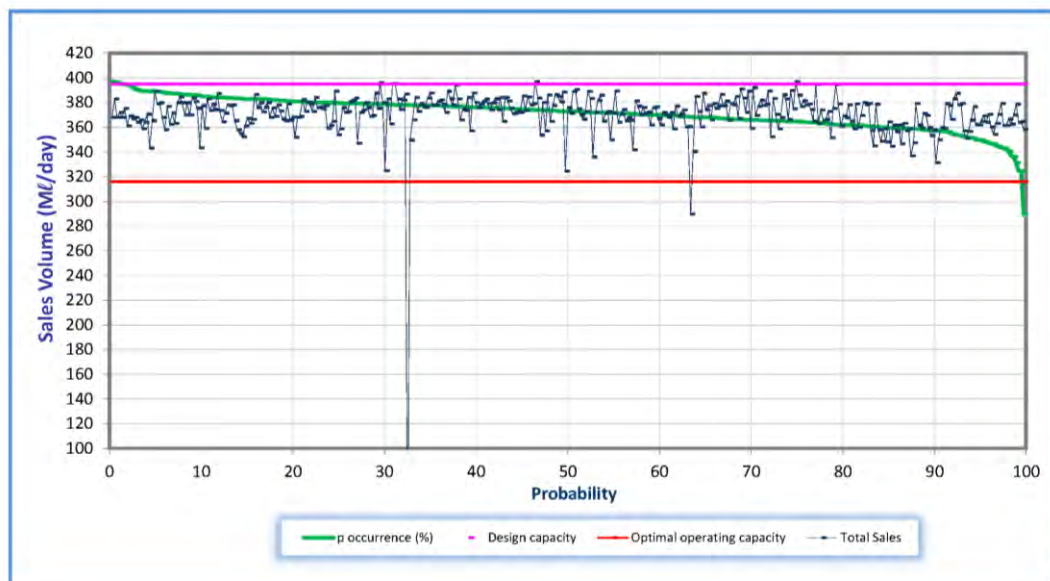


Figure 7.42 Analysis of historical production at Midmar WTP (December 2024 to November 2025).

c) Howick-North Sub-System

i) Mill Falls Pump Station to Howick-North Reservoirs

The Howick North Reservoir Complex (6.6 Mℓ) functions as a terminal reservoir under the current operating conditions. With the current average demand at 4.81Mℓ/day, the reservoir does not have enough storage to meet its 48-hour storage requirement. A new reservoir, at a higher level, is proposed, to supply future developments. This reservoir, which needs to be constructed by uMgungundlovu District Municipality, will be supplied from the Howick-North Reservoir Complex. The Howick-North Reservoir Complex will thereafter become a distribution reservoir.

The pumps at Mill Falls and the pipeline to the reservoir were recently upgraded and hence there is sufficient capacity, when the additional resource becomes available from the uMkhomazi Water Project, in this infrastructure for the near future.

d) Howick-West Sub-System

i) Mill Falls Pump Station to Howick-West Reservoir

The pump station and pipeline to Howick-West Reservoir have adequate capacity to serve the short to medium-term demands of Howick-West, Mpophomeni and Groenekloof demands. A review of this system will have to be undertaken for the long-term demand when the upgraded Vulindlela phases 1 and 2 is commissioned.

ii) Howick-West Reservoir to Groenekloof Reservoir

The Howick-West Reservoir Complex (32 Mℓ) serves as a distribution reservoir with bulk supply lines to Groenekloof and Mpophomeni Reservoirs, and with direct supply into the Howick-West reticulation network. The current demand on this reservoir is approximately 48.35 Mℓ/day.

Water is pumped from the Howick-West Reservoir to Mpophomeni Reservoir (an uMgungundlovu District Municipality reservoir). Off-takes from this pumping main have the effect of continuously changing the system curve, which affects the duty point of the pumps.

iii) Groenekloof Reservoir Supply

The 17.3 Mℓ Groenekloof Reservoir serves as a balancing reservoir for Vulindlela, Sweetwaters and Blackridge. The current demand out of Groenekloof Reservoir is 31.56 Mℓ/day. The high lift pumps to Vulindlela Reservoirs 2-5 have a capacity of approximately 22 Mℓ/day, which meets the current demand of 14.72 Mℓ/day. Phase 1 of the Vulindlela BWSS was implemented in 2026 however the new pumpstation at Res 2 was not commissioned due to lack of power supply. Phase 2 is anticipated to be completed by the end of 2028. This will result in the decommissioning of the Vulindlela High-Lift pumps at Groenekloof, with water supply then coming directly from Howick West reservoir to Reservoir 2. The storage requirements at Groenekloof will be re-assessed.

iv) Blackridge Reservoir Supply

The current demand from the Blackridge Reservoir is approximately 5.97 Mℓ/day, including Ephayaphini. The capacity of the reservoir is 2.2 Mℓ. The reservoir functions as a terminal reservoir that should ideally have 48 hours of storage (7.0Mℓ). This is a reticulation requirement and the responsibility for the upgrade, therefore lies with the Municipality.

e) Midmar WTP to Umlaas Road Sub-System

i) '251 Pipeline: Midmar WTP to D.V. Harris Off-Take

Due to limiting head conditions in the upper portion of the '251 Pipeline, the maximum flow obtainable through this pipeline is 330 Mℓ/day. Augmentation of all pipeline elements downstream of the '251 Pipeline should therefore be based on a maximum available flow of 330 Mℓ/day.

ii) Clarendon Reservoir

The current demand from Clarendon Reservoir is approximately 26.66 Mℓ/day. The capacity of the reservoir is 25 Mℓ. The reservoir function is a terminal reservoir, which should have 48 hours of storage. The Clarendon reservoir should therefore be upgraded to minimise risk. This is a reticulation requirement and the responsibility to provide this storage requirement lies with the Municipality. The Msunduzi Municipalities' operational philosophy places the supply zones from Symons and Hathorns on Clarendon Reservoir.

iii) '61 Pipeline: D.V. Harris to World's View Reservoir

This section of pipeline has been augmented to accommodate the maximum flow of 330 Mℓ/day. The Worlds View reservoir has two 40 Mℓ compartments and the current throughput is approximately 318.39 Mℓ/day.

iv) '61 Pipeline: World's View Reservoir to ED2

This dedicated pipeline serving The Msunduzi Municipality has sufficient capacity to satisfy the growing annual average daily demand (AADD). For a peak flow of 1.3 x AADD the pipeline could reach its capacity by 2030. However, with the proposed interlinking of the two '61 pipelines and the anticipated relief from the '61 Pipeline of the WA demand, once the uMWP is commissioned, the current pipeline capacity is considered adequate.

v) '61 Pipeline: ED2 to Umlaas Road Reservoir

The Msunduzi Municipality plans to formalise the low-income housing in the Shenstone/Ambleton area. These developments will be supplied with potable water from the ED4 off-take. It is expected that the increase in demand at this point will be in the region of 1.5% annually over the next 5 years.

The Richmond off-take to Lilliefontein remains a problematic section of pipeline with illegal connections resulting in lost revenue for UuW.

A 1300 mm diameter pipeline was constructed, from ED2 to the Richmond off-take in 2012 to augment the 800 mm diameter pipeline. This will ensure adequate capacity for growth in demand towards 2030 when the uMWP is commissioned.

vi) ED4 to Umlaas Road

The dual 61' Pipelines from ED4 to Umlaas Road have sufficient capacity to supply the current and future needs of the Umlaas Road Demand Zone. The demand at this zone will decrease once the uMWP is commissioned.

vii) Ashburton Supply

The average flow in this pipeline is currently 1.54 Mℓ/day. This system has sufficient capacity for the short and medium term.

viii) Thornville / Hopewell Supply

The average demand through this pipeline is currently 3.24 Mℓ/day. Thornville Reservoir is now supplied from the Richmond pipeline via the Lilliefontein Reservoir. The Thornville Pump Station was decommissioned, with the rising main now being utilised as a backfeed line for customers along this route.

ix) T Pipeline: D. V. Harris WTP to Umlaas Road Reservoir

This pipeline currently supplies approximately 24.83 Mℓ/day to Umlaas Road Reservoirs. This ageing pipeline has an operational history of frequent bursts and caution has to be taken to not exceed the current “safe load carrying capacity” of 35 Mℓ/day.

f) Umlaas Road Sub-System

The current demand at Umlaas Road Reservoir is 161.102 Mℓ/day. The reservoir serves primarily as a distribution reservoir, supplying reservoirs in Mkhambathini Municipality and eThekweni Municipality.

i) '57 Pipeline

The existing 800 mm diameter pipeline serves a minimal demand in Camperdown. The combined capacity of the 1000mm diameter and the new 1600 mm diameter pipeline is 485 Mℓ/day, which is sufficient to satisfy the future demands of the WA.

ii) Eston/Umbumbulu Pipeline

The capacity of this pipeline is restricted to 18.67 Mℓ/day due to the ground level profile along the pipeline route. The flow is restricted to ensure that the hydraulic grade line is at least 20 m above a high point at Stoney Ridge. The current flow in this pipeline is 13.57 Mℓ/day. uMgungundlovu District Municipality supplies the Greater Eston area with potable water from this pipeline.

EWS have requested that uMngeni-uThukela Water provide additional water to Umbumbulu to satisfy future demand growth in the area. This demand growth due to planned and unplanned commercial and residential developments in Umbumbulu as well as a load shed of a portion of Adams Mission onto the Umbumbulu Reservoir. This means that the capacity of this pipeline is insufficient to meet the current demands. uMngeni-uThukela Water has implemented the Umbumbulu Booster Pump Station as a short-term solution to meet the rapid growth in demand and a pipeline augmentation in the medium to long term.

iii) Lion Park / Manyavu Pipeline

The current demand on this pipeline is approximately 4.32 Mℓ/day. uMngeni-uThukela Water constructed a pipeline from an off-take on the Lion Park Pipeline to serve the Manyavu community (circa 2007). The Manyavu demand was expected to grow to about 6 Mℓ/day by 2040. uMngeni-uThukela Water has augmented the Lion Park Pipeline by constructing a new 350 mm diameter steel pipeline to ensure the sustainability of the supply to this area.

g) D.V. Harris Water Treatment Plant

The demand on the plant is made up of supply to the Msunduzi and uMshwathi Municipalities, as well as a supply to the Umlaas Road Reservoir via the '53 Pipeline. The supply through the '53 Pipeline varies between 25 to 35 Mℓ/day depending on the operational requirements at Umlaas Road Reservoir. While Clarendon can be supplied from the Midmar WTP, the current operating rule is to supply Clarendon Reservoir from D.V. Harris WTP to maximise the availability on the '251 pipeline to serve the Umlaas Road Sub-System.

Due to the configuration of the '61 Pipelines between D. V. Harris WTP and Clarendon Reservoir (**Figure 7.33**), it is expected that Clarendon Reservoir will have to be fed from Midmar WTP on a continuous basis going forward. The demand on the plant will be reduced if the '53 Pipeline is decommissioned when the uMWP is commissioned towards the year 2035. There will thus be no need to upgrade D.V. Harris WTP in the short to medium term.

The demand placed on the plant over the past few years is presented in **Figure 7.43**. Projected sales over the next year are also shown in the same figure. The current production at the plant is approximately 111.3 Mℓ/day.

uMshwathi BWSS phases 1, 2 and 3 have now been fully commissioned. The expected demand increased as potable water was supplied to the areas of Cool Air, Dalton, Ozwathini, eNadi, Efaye and Swayimana. Phase 4 & 5 are currently in construction and design, respectively.

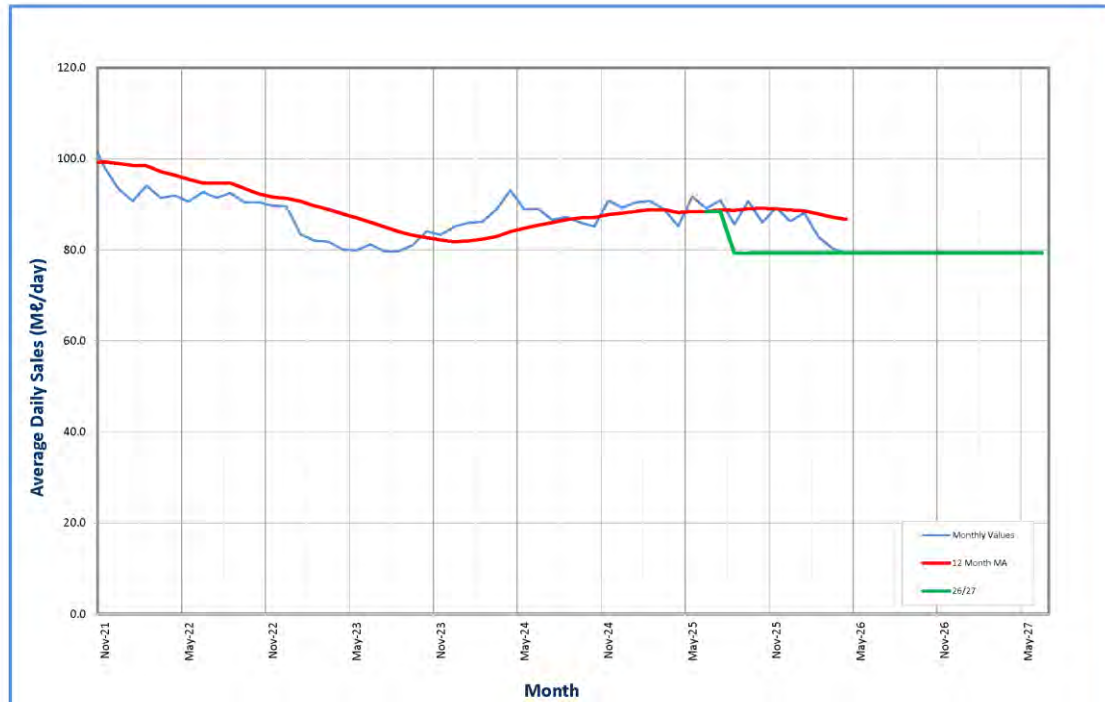


Figure 7.43 Water demand from D. V. Harris WTP.

An analysis of daily historical production (December 2024 to November 2025) of the D.V. Harris WTP is presented in **Figure 7.44**. It shows that for 93.46% of the time the WTP was being operated above the optimal operating capacity when compared to 93.7% over the previous year. The plant operated above design capacity for 3.0% of the time compared to 2.7% in the previous year. This is an alarming trend for both WTP's and discussions with the WSA's are ongoing to reduce the Non-Revenue Water component as this is the biggest contributor to the growing demand off the WTP's. The Department of Water and Sanitation (DWS) have issued a pre-directive to UUW to observe the abstraction license agreement along the uMngeni System. Discussions with UMDM and Msunduzi Municipality on demand projections have proposed and agreed to reduce demand over the next two years for the abstraction licence conditions to be met.

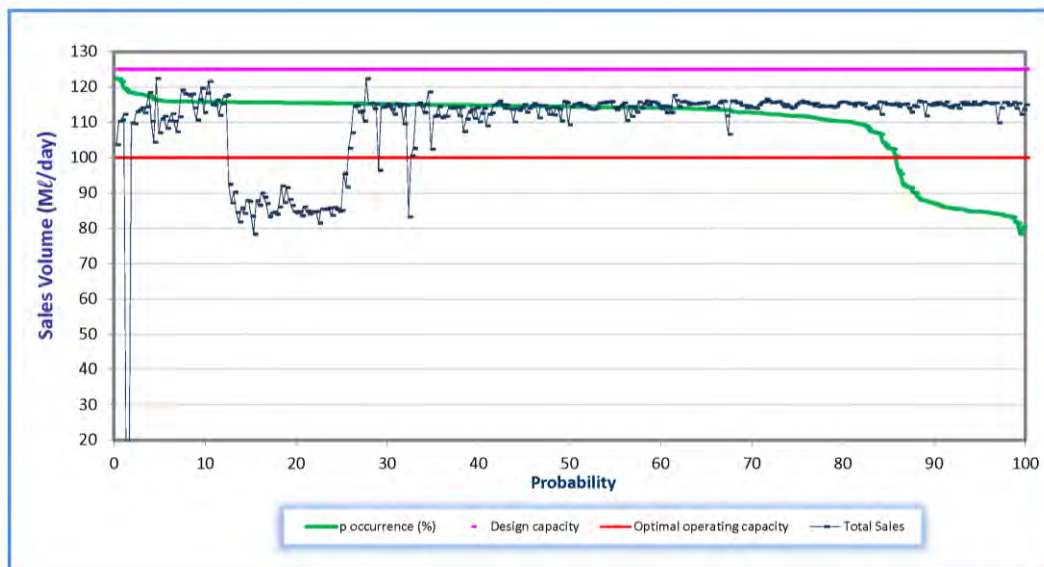


Figure 7.44 Analysis of historical production at D.V. Harris WTP (November 2023 to October 2024).

h) uMshwathi Sub- System

i) Pipeline from D V Harris WTP to Claridge Reservoir/Msunduzi Supply

The current total supply to the Msunduzi pipeline (Belfort and Claridge reservoirs) from DV Harris WTW is 61.54 Mℓ/day.

The main distribution pipeline leaving DV Harris is a 1000 mm diameter steel pipeline, approximately 6.7km in length, belonging to the Msunduzi Municipality. This pipeline transmits water from DV Harris to the Claridge and Belfort Storage Reservoirs. A bulk meter at DV Harris WTP measures the quantity of water sold to Msunduzi Municipality.

Uuw has an off take on the Belfort Reservoir outlet pipeline from where water is bought back from the Msunduzi Municipality for supply to parts of the Wartburg and Table Mountain areas.

Uuw completed the construction of the 50 Mℓ Claridge Reservoir in the year 2000. This reservoir is situated adjacent to the 23Mℓ Belfort Reservoir. With increasing demand growth on the uMshwathi and Table Mountain systems, the existing 1000 mm diameter pipeline has constraints to meet the current and projected demands.

A hydraulic analysis has shown that the maximum flow under gravity, with the available head difference of 39.74 m, is 63 Mℓ/day along the existing 1000 mm diameter pipeline. This is inadequate to meet the future demand. A demand projection has recently been undertaken and this shows that 120 Mℓ/day will be required to supply the demands of the area in 2053.

UUW, therefore, needs to augment the pipeline from DV Harris to the Claridge Reservoir to meet future demands.

ii) '69 Pipeline: Claridge Reservoir to Wartburg Reservoir

The '69 Pipeline has been upgraded to supply the uMshwathi Municipality and the western areas of iLembe District Municipality. This pipeline has been fully commissioned and the “old” pipeline has been decommissioned. The total demand through the system at present is approximately 16.26 Mℓ/day.

iii) Wartburg Reservoir to Bruyns Hill Reservoir

The Wartburg Reservoir functions primarily as a bulk reservoir for the Bruyns Hill and Cool Air Reservoirs. To function as a bulk reservoir, it should have 15 hours of the AADD supply to Cool Air and Bruyns Hill Reservoirs.

Water demands from the Swayimane area have consistently increased over the years. This growth is expected to continue with the planning of further low cost housing in the area. iLembe District Municipality has also requested a supply to its Southern Ndwedwe region from Bruyns Hill.

The new pipeline from Bruyns Hill Pump Station to Bruyns Hill Reservoir is a 450 mm diameter steel pipe. The supply from Wartburg Reservoir to Bruyns Hill Pump Station has been completed and can now support this new demand node, relieving the hydraulic constraint between Wartburg Reservoir and Bruyns Hill Pump Station. The storage capacity at Bruyns Hill Reservoir has been increased and should be adequate for the next 20 years.

iv) Wartburg Reservoir to Dalton Reservoir

The supply pipelines from Wartburg Reservoir to the 10 Mℓ Dalton are adequate for the current demand. Phases 2 and 3 of the uMshwathi BWSS are complete and commissioned.

i) Durban Heights Water Treatment Plant

Construction of the 400 Mℓ/day Western Aqueduct (WA) has now been commissioned by eThekweni Municipality (excluding Contract 5, which has been postponed to 2025). Sub-systems supplied from Durban Heights WTP and which are planned to be transferred to the WA include: Outer and Inner West, Tshelimnyama, Pinetown, Kwadabeka, Ntuzuma and Mzinyathi. Water currently available from Point M to the WA, based on the 1:100 year yield from the uMngeni system, is approximately 200 Mℓ/day until the proposed uMkhomazi Water Project (uMWP) is commissioned (**Section 7.4.2 (a)**).

eThekweni Municipality plan to transfer the demands off Durban Heights WTP and onto the Western Aqueduct. However, until the uMWP has been commissioned, Durban Heights WTP

will need to continue to supply Pinetown with 50 Mℓ/day and a minimum pumping of 30 Mℓ/day to Ntuzuma. No significant reduction in sales has occurred since the Western Aqueduct was commissioned in 2019. The estimated reduction in demand on Durban Heights was forecast to be approximately 20 Mℓ/day.

The approximate 20 Mℓ/day that was to be freed up would have been utilised to meet the increasing demands of other nodes along the extension of the Northern Aqueduct. These include the demands of new housing developments in the Verulam/Tongaat area, Grange and that of the proposed Dube TradePort. By virtue of its high elevation of 272 meters above sea level the Durban Heights WTP is able to supply a major portion of the eThekweni Municipality coastal demands via gravity. Portions of the Municipality's Outer West Area are however supplied via pumping. Treated water is sold by UUW to eThekweni Municipality "at the fence", and the Municipality is responsible for the entire distribution network. Due to supply problems primarily on their Northern Aqueduct pipeline from Durban Heights WTP, and in an effort to reduce pumping costs eThekweni Municipality constructed the 400 Mℓ/day Western Aqueduct pipeline (excluding Contract 5, as postponed to 2027). The intention was to shift some of its water supply load from the Durban Heights WTP to the Upper uMngeni System supplied from Midmar Dam, viz. the Midmar and DV Harris WTP's. The subsystems supplied from Durban Heights WTP, which are planned to be transferred to the Western Aqueduct, include Outer West, Pinetown, Tshelimnyama, kwaDabeka, Ntuzuma and Mzinyathi.

The 400 Mℓ/day Western Aqueduct was commissioned in 2019, with the understanding that the full capacity is constrained based on both the 1:100 year yield and associated infrastructure from the Upper uMngeni System; until the proposed uMkhomazi Water Project (uMWP) is commissioned (**Section 7.4.2 (a)**). The water available for the Western Aqueduct diminishes over time due to the increasing demands from the inland region upstream. The water availability data is provided in (**EWS, May 2015**)

Table 7.54 Water Availability at Point M.

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2035
Water available at Pt M				Western Aqueduct *Commissioned						Initial date uMWP	Revised date uMWP
Mℓ/day	210	209	207	206	204	203	201	200	198	197	182

****Note: Western Aqueduct full 400 Mℓ/day capacity constrained until proposed uMWP commissioned***

An analysis of historical production for the Durban Heights WTP (October 2024 to November 2025) is presented in **Figure 7.45**, and shows that for 97.8% of the time the WTP was being operated above the optimal operating capacity (80% of design capacity) and 2.5% of the time

the WTP was operated at above design capacity. The previous year Durban Heights WTP was operating above the optimal operating capacity for 95.6% of the time. Comparison of the statistical analysis year-on-year illustrates that there was an increase in times that the WTP design capacity was continues to be exceeded, as well as increase in average demand from the WTP. This may be attributed to increased sales due to the filling and commissioning of phase two (of three phases) of the new 1200 mm diameter Northern Aqueduct.

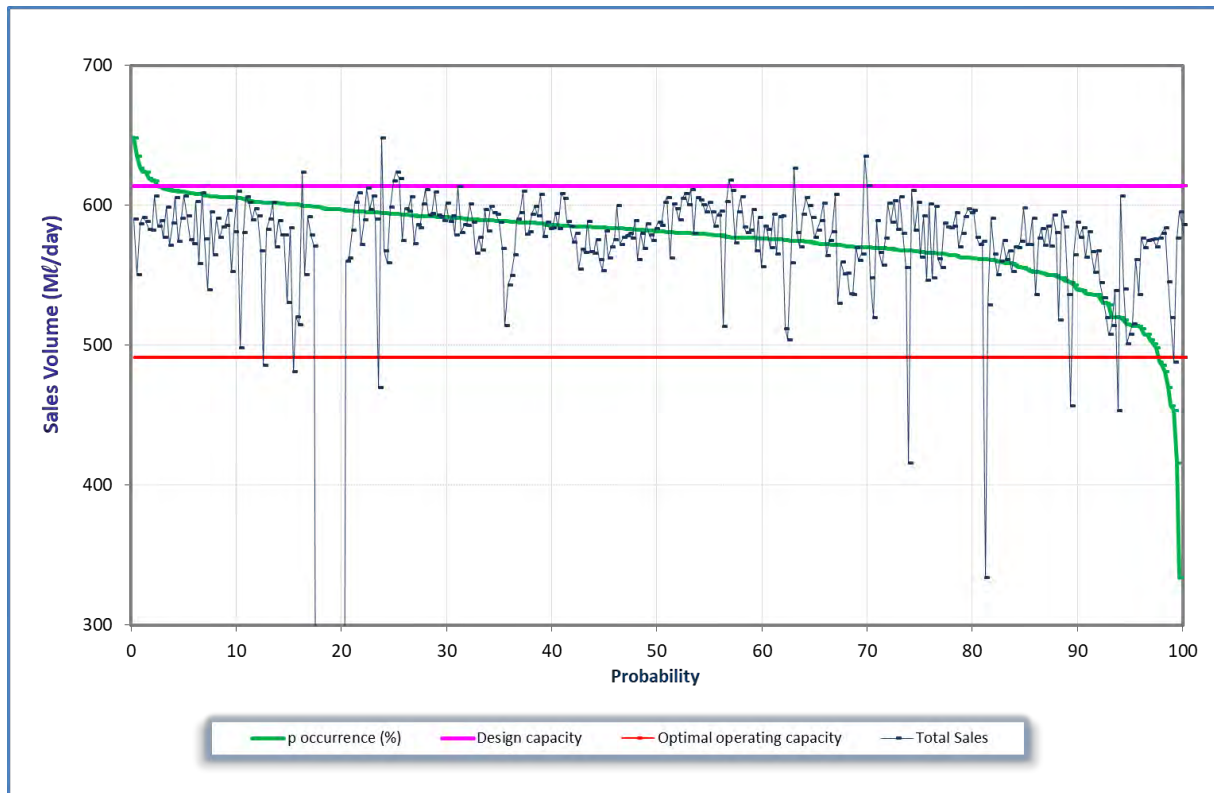


Figure 7.45 Analysis of historical production at Durban Heights WTP from December 2024 to November 2025.

Current raw water abstractions from the uMngeni System continue to exceed the Water Use Licence, which is potentially a criminal offense; in this regard a Notice of Intent to issue a Directive was received from DWS, dated 18 July 2023 for contravening the conditions of the Water Use Licence (WUL). In light of the DWS intent to issue a Directive, the proposed developments and associated demand within the EWS area of supply were discussed with the municipality during August 2025, **but not** included in the forecast sales figures. To ensure abstractions are equal to or less than the WUL amount, a decrease in sales forecast for the ensuing years were mutually agreed. A year-on-year decrease in demand of 9.1% is expected for the ensuing financial year. Thereafter a 0.3%, 0.0% and 0.0% decrease per annum was estimated over the 4 years, respectively. Note: as per the Plan of Action submitted to DWS the 9.1% decrease is reported to occur during the first four months of the 2025/26 Financial Year and “level out” over the ensuing eight months from October 2025 to June 2026. The Plan ought to give the Municipality the time needed to plan and implement WC/WDM initiatives,

which will then reduce the demand in the system. The WC/WDM initiatives explain forecast levelling off trend of the 12-month moving average as illustrated in **Figure 7.46**.

Demand for the 2024/2025 financial year was 575.0 Mℓ/day. An increase of 9.6 Mℓ/day or 1.7% was recorded over the year.

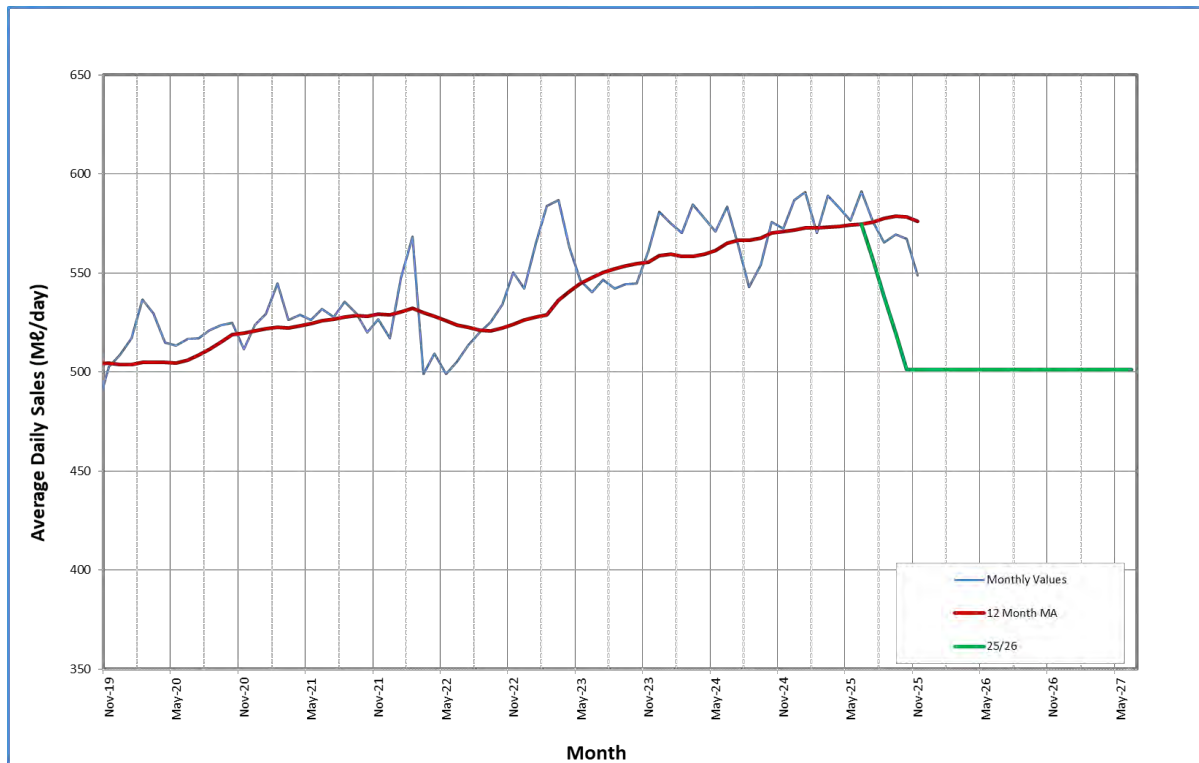


Figure 7.46 Historical demand curve for Durban Heights WTP.

j) Wiggins Water Treatment Plant

Wiggins WTP supplies the Amanzimtoti/KwaMakuta areas located in the southern portion of eThekweni Municipality. Due to water resource constraints at Nungwane Dam (**Section 11.2.3 (a)**) and the limited capacity of Amanzimtoti WTP, it is necessary to augment the supply to areas downstream of the Amanzimtoti WTP with flows from Wiggins WTP via the South Coast Augmentation (SCA) Pipeline. This will be required until such time as a new regional bulk water supply system is developed on the lower reaches of the uMkhomazi River (**Section 11.7.3 (d)**). In the interim, the Wiggins WTP sub-system should have sufficient treatment and distribution capacity to meet the short and medium-term demands of Amanzimtoti and the South Coast Pipeline (SCP).

Figure 7.47 shows the current configuration of the existing SCA pumped supply infrastructure linking the Wiggins WTP sub-system to Amanzimtoti WTP. This system has certain operational capacity constraints that still have to be rectified to ensure that the Wiggins WTP system continues as the point of supply for Amanzimtoti and the SCP in the future.

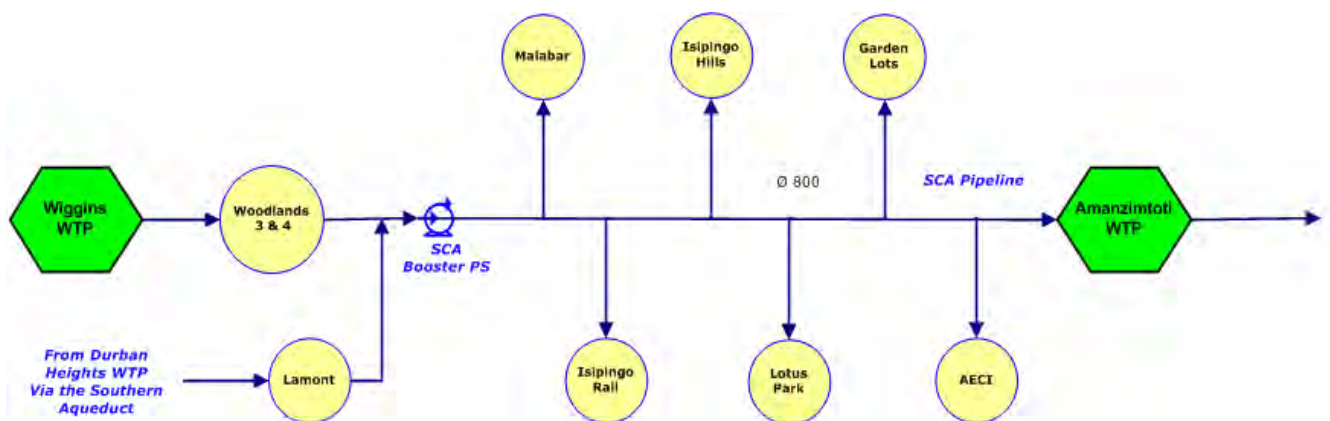


Figure 7.47 Extent of the South Coast Augmentation Scheme.

The South Coast Augmentation Booster Pump Station was commissioned in December 2013 and serves as a medium-term infrastructure development strategy to meet current and projected demands off the SCA Pipeline up to the year 2020.

An analysis of historical production at the Wiggins WTP (December 2024 to November 2025) is presented in **Figure 7.48** and shows that for 95.2% of the time the WTP was being operated above the optimal operating capacity (80% of design capacity) and 4% of the time the WTP was operated at above design capacity.

Demands from Wiggins WTP over the 2024/2025 financial year remained 'constant', the marginal increase in sales to eThekweni Municipality may be attributed to challenges in the SCA Pipeline supply to Amanzimtoti WTP, with load-shedding having an effect on the municipality water supply systems, as well as undue delays, which are beyond UuW control, in replacing the gravity aqueduct sales meter. This meter accounts for approximately two thirds of the supply volumes from the WTP. A slight increase in demand of 0.6 Mℓ/day (0.2%) when compared with the prior year demand growth (**Figure 7.51**). The previous year Wiggins WTP was operating above the optimal operating capacity for 94.9% of the time.

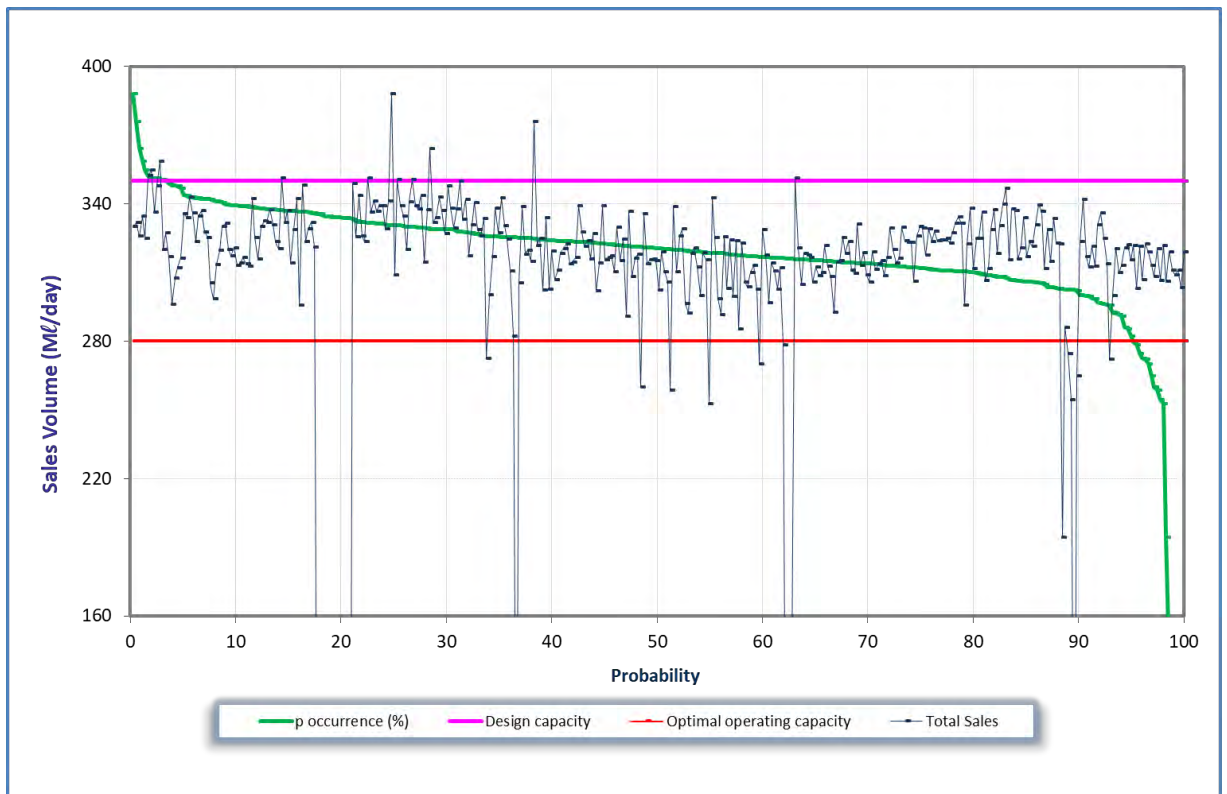


Figure 7.48 Analysis of historical production at Wiggins WTP from November December 2024 to November 2025.

The historical and projected water demand from the Wiggins WTP is presented in **Figure 7.49**.

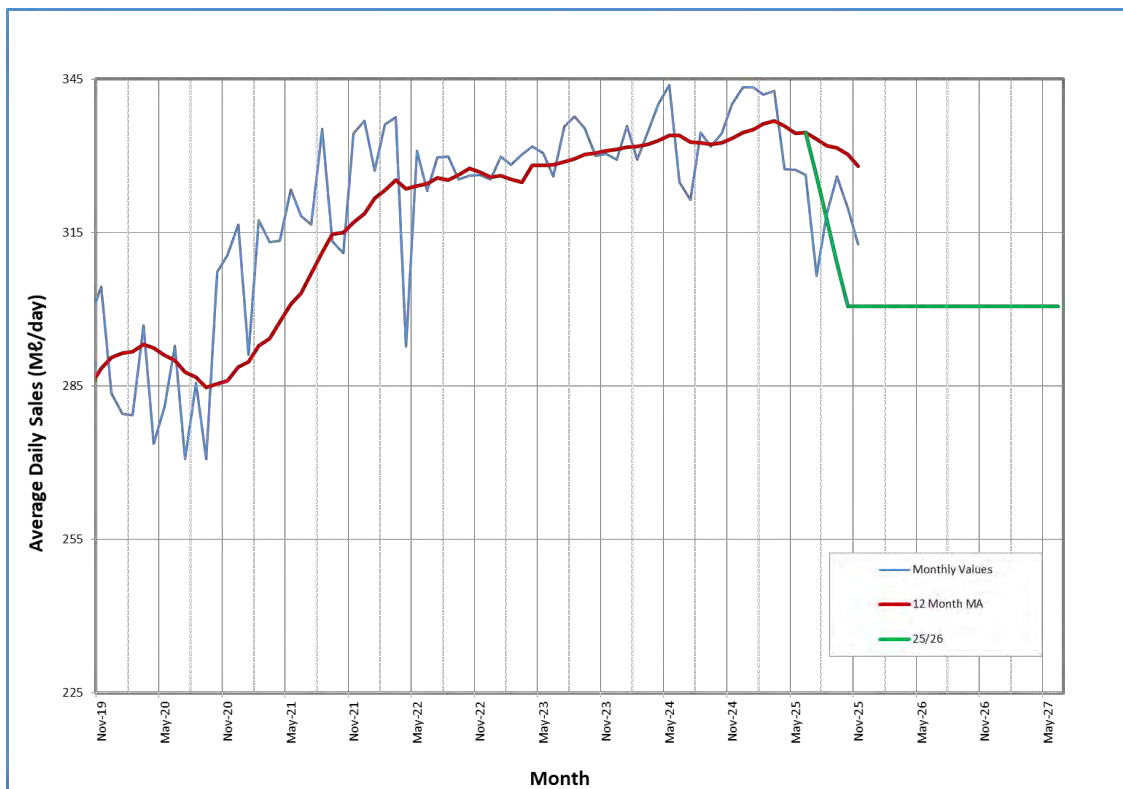


Figure 7.49 Historical demand curve for Wiggins WTP.

k) Maphephethwa Water Treatment Plant

Maphephethwa WTP (**Figure 7.51**) was originally commissioned as a rural scheme under a turnkey contract. The works is located in the Inanda Dam area and draws water off one of the Nagle Dam raw water aqueducts supplying Durban Heights WTP. The raw water is filtered through a set of four slow sand filters. The filtered water is chlorinated and supplied into a 1 Mℓ on-site storage/distribution reservoir. The original works had slow sand filters with a treatment capacity of 0.75 Mℓ/day.

The works was upgraded to a design capacity of 5 Mℓ/day in 2014. The WTP is currently operated at 0 Mℓ/day. Raw water to the works is drawn from Nagle Aqueduct No. 2, which delivers water to Durban Heights WTP, via a 160 mm internal diameter PVC pipeline. The off-take point of the Aqueduct is located 260 m from the works. The raw water supply pipeline to the WTP is fitted with a pre-chlorination unit, flow meter and a flow control valve.

An analysis of historical production at the Maphephethwa WTP (December 2024 to November 2025) is presented in **Figure 7.51**. It shows that for 36.5% of the time, the WTP was being operated above the optimal operating capacity (80% of design capacity) and 0.0% of the time the WTP was operated at above design capacity (based on the upgraded capacity of the plant).

Figure 7.52 shows that the demand on this WTP remained 'constant' during 2024/2025. The works currently produces an average of 3.8 Mℓ/day (as at the end of October 2025). It is envisaged that the demand will decrease to conform with the DWS Notice and ensure that water abstractions adhere to the WUL conditions during 2026 (**Figure 7.52**).

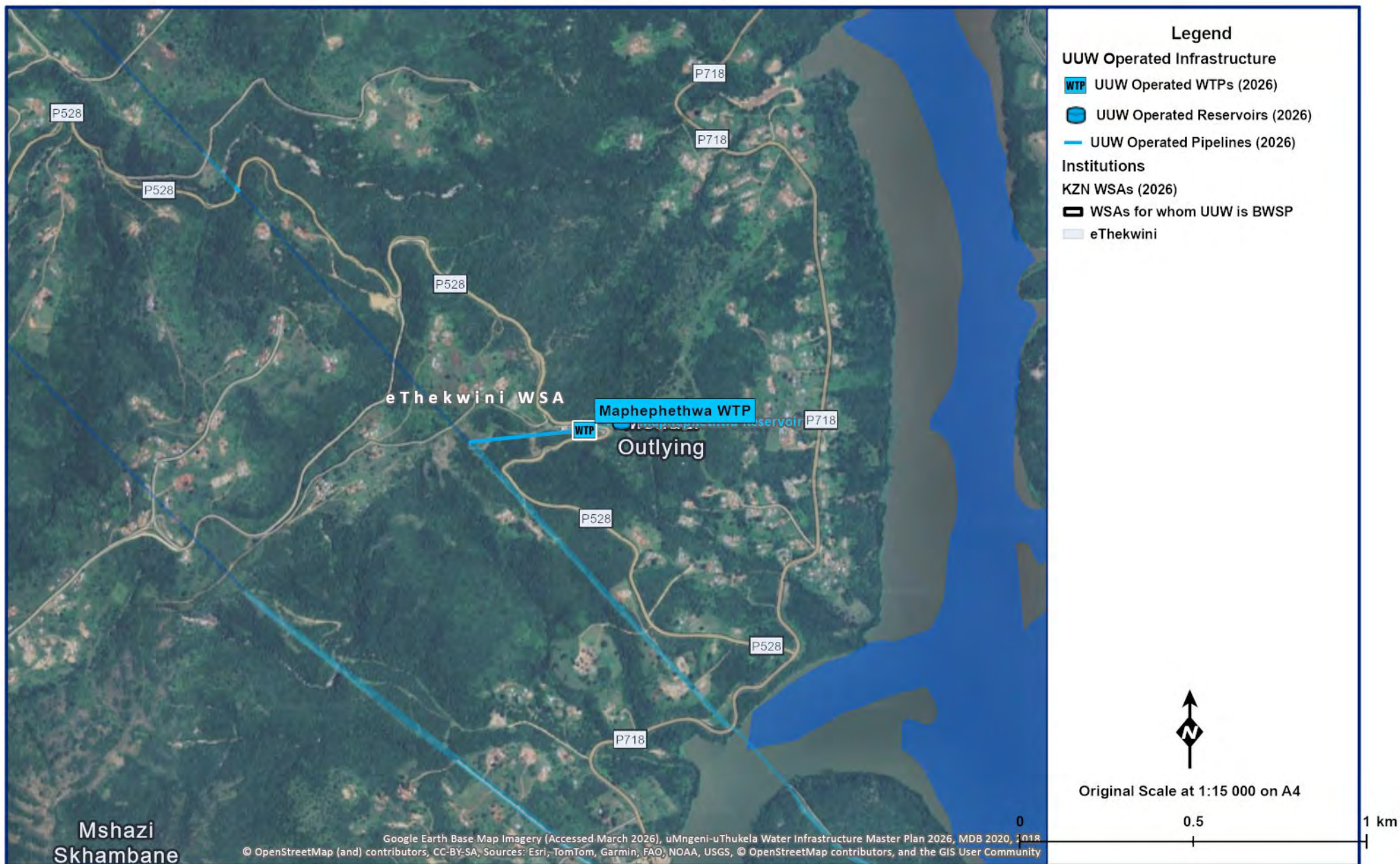


Figure 7.50 Maphephethwa Water Treatment Plant.

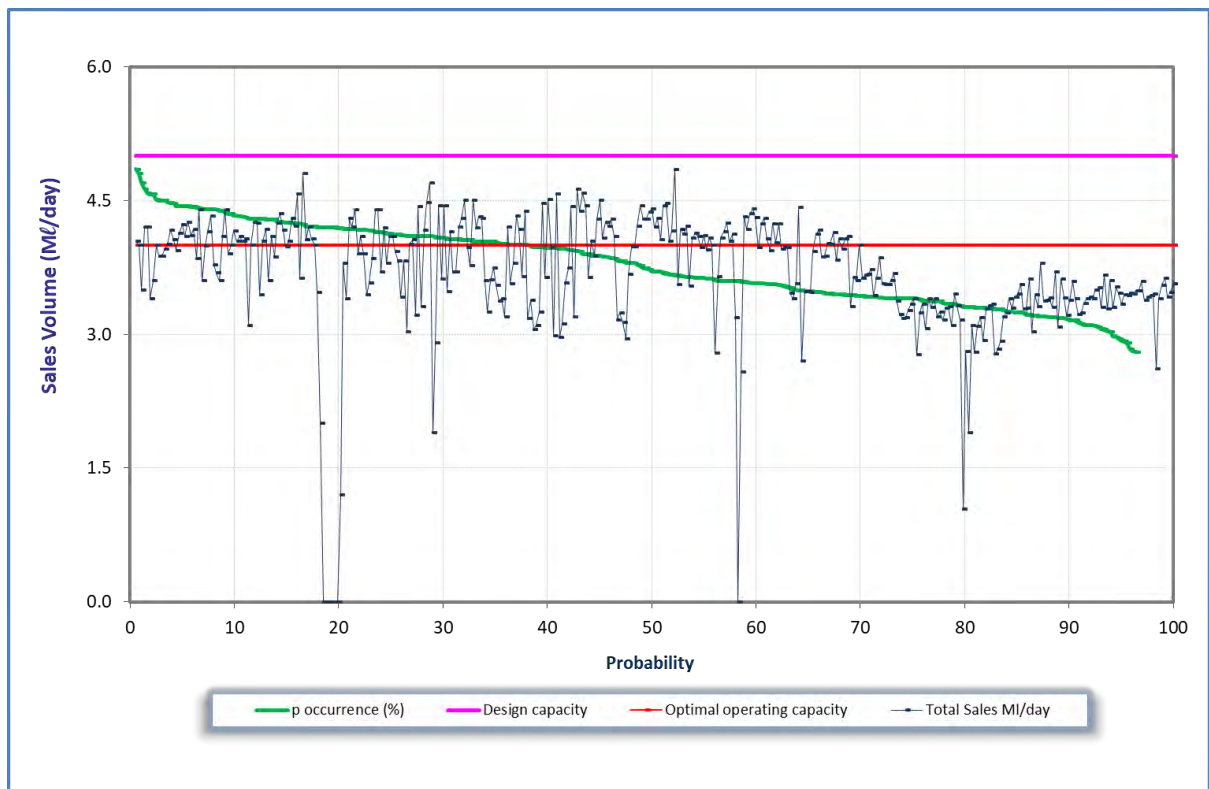


Figure 7.51 Analysis of historical production at Maphephethwa WTP from December 2024 to November 2025.

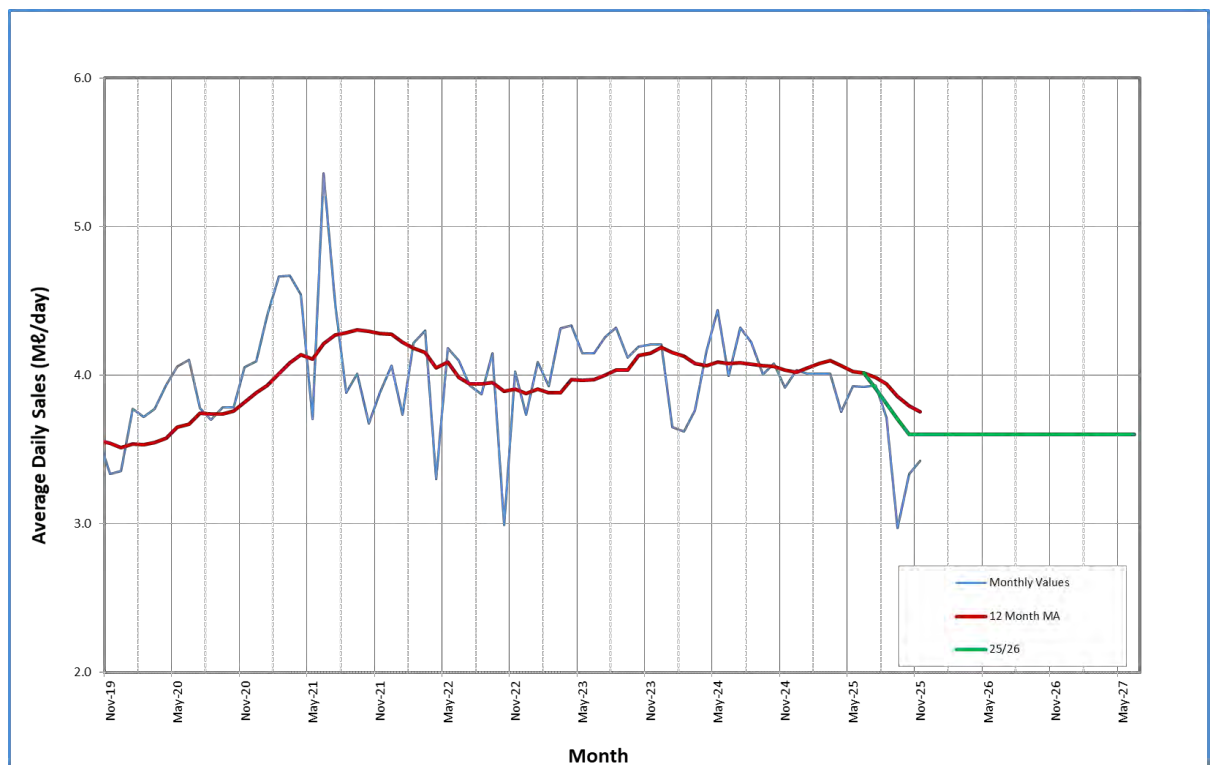


Figure 7.52 Historical demand curve and projections for Maphephethwa WTP.

7.3.8 KwaXimba Water Treatment Plant

The KwaXimba Water Treatment Plant is shown in **Figure 7.53**. At the time of this IMP, the KwaXimba WTP had not operated for 12 months and therefore there is insufficient data for the analysis. This WTP will therefore be discussed in the IMP 2027.



Figure 7.53 KwaXimba Water Treatment Plant.

7.4 Water Balance/Availability

The current uMngeni System can be considered as a “stressed” catchment and **Table 7.53** indicates yields for the levels of assurance that are below levels that EWS require.

Table 7.53 Yield Information for uMngeni System.

Stochastic Yield (1 in 5 years risk of failure)		Stochastic Yield (1 in 10 years risk of failure)		Stochastic Yield (1 in 20 years' risk of failure)	
million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day
510.0	1397.3	497.0	1361.6	470.0	1287.7

A graphical representation of the 1:100-year yield information (worst drought in 100 years) for the uMngeni System is presented in **Figure 7.54**. The graph also shows the yield of the proposed Smithfield Dam on the uMkhomazi River, which is 220 million m³/a. The projected water demand line for the uMngeni System is shown on the graph and these demands are based on 0 % growth until the next augmentation, i.e., Smithfield Dam.

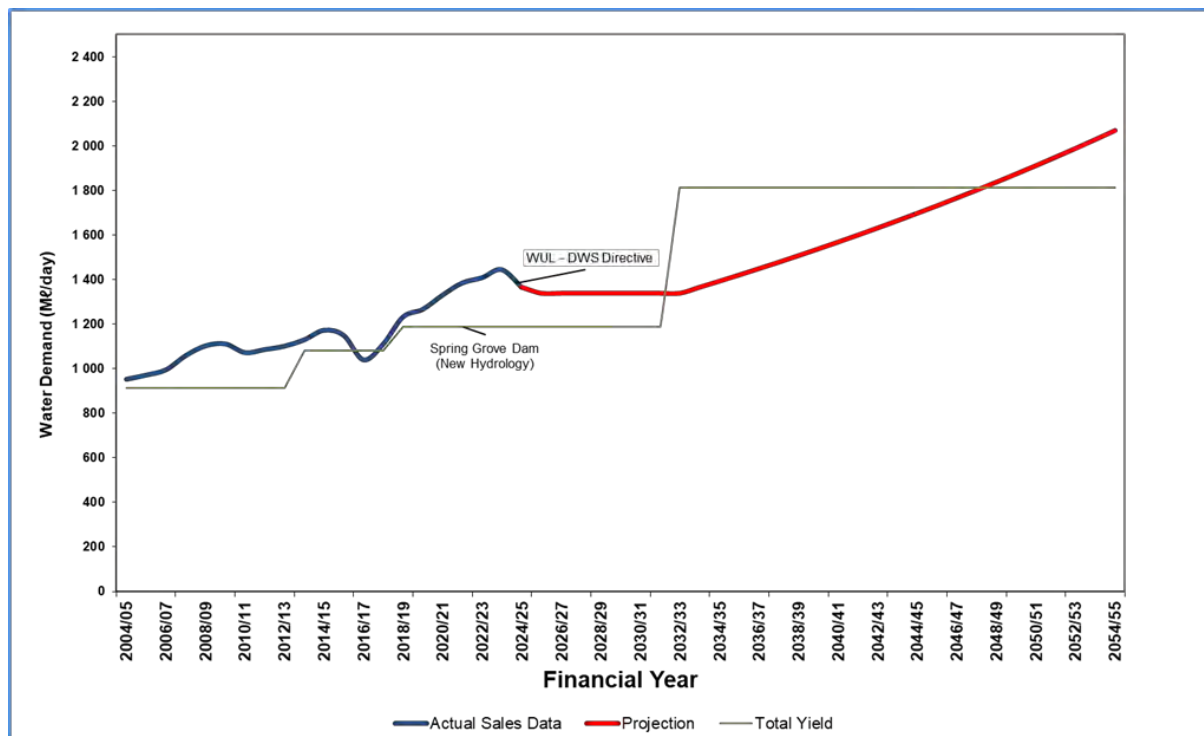


Figure 7.54 uMngeni System balance.

7.5 Recommendations for the uMngeni System

7.5.1 System Components

a) Mooi/uMngeni Water Resource Region

In evaluating the long-term water security of the uMngeni System, water resources analyses were undertaken by the DWS Reconciliation Strategy Study (DWS 2024). Analyses indicate that further augmentation of the system is required. In this regard, the option that has been approved is the uMkhomazi-uMngeni Transfer Scheme (known as the uMkhomazi Water Project; **Section 7.5.2 (a)**), although the following augmentation options are also still being investigated, the reuse of treated effluent and seawater desalination. Yields of the proposed infrastructure (uMkhomazi Water Project) are listed in **Table 7.54**. In the interim, annual operating analyses (AOAs) are conducted to determine the short-term operations and allocations of water, together with the monitoring and operationalisation of the decisions taken by uMngeni System Joint Operations Committee (JOC).

b) uMkhomazi Water Resource Region

The current water resources of the uMngeni System are insufficient to meet the long-term water demands of its own system. Past investigations have indicated that, possibly, the most suitable long-term solution would be to develop a scheme that transfers raw water from the still undeveloped uMkhomazi River to the uMngeni Catchment. Water resources development options on the uMkhomazi River (**Figure 7.55**) have been investigated with a number of potential sites and transfer options being considered. The recommended scheme, known as the uMkhomazi Water Project (uMWP) (**Section 7.5.2 (a)**) will comprise of two phases.

The first phase (uMWP-1) will consist of the once-off constructed 251 million m³, 58 m high Smithfield Dam (**Table 7.54 and Figure 7.56**) on the uMkhomazi River near Richmond from where water would gravity feed through a 32 km, 3.5 m diameter transfer tunnel. Treated water would be transferred from a 600 Mℓ/day WTP, near the outlet of the tunnel, through potable water pipelines to an appropriate delivery node within the uMngeni catchment (**Section 7.5.2 (a)**). DWS anticipates that the uMWP-1 will be implemented in and around 2030/31. The yields of the proposed water resource infrastructure (DWA, 2015) for the uMkhomazi Region are listed in **Table 7.54** and **Table 7.55**.

The second phase (uMWP-2) will comprise the construction of a large dam at Impendle further upstream on the uMkhomazi River. Once in place, water would be released from the Impendle Dam down the uMkhomazi River for abstraction and transfer at Smithfield Dam (**Table 7.54**). The Impendle Dam could be built either in two phases or as a once-off constructed scheme component. The uMWP-2 would only be implemented at a future date when needed.

The Harry Gwala District Municipality Regional Bulk Water Supply scheme (formerly known as the Greater Bulwer-Donnybrook Regional Water Supply Scheme) will supply water to the areas around the Stephen Dlamini Dam.

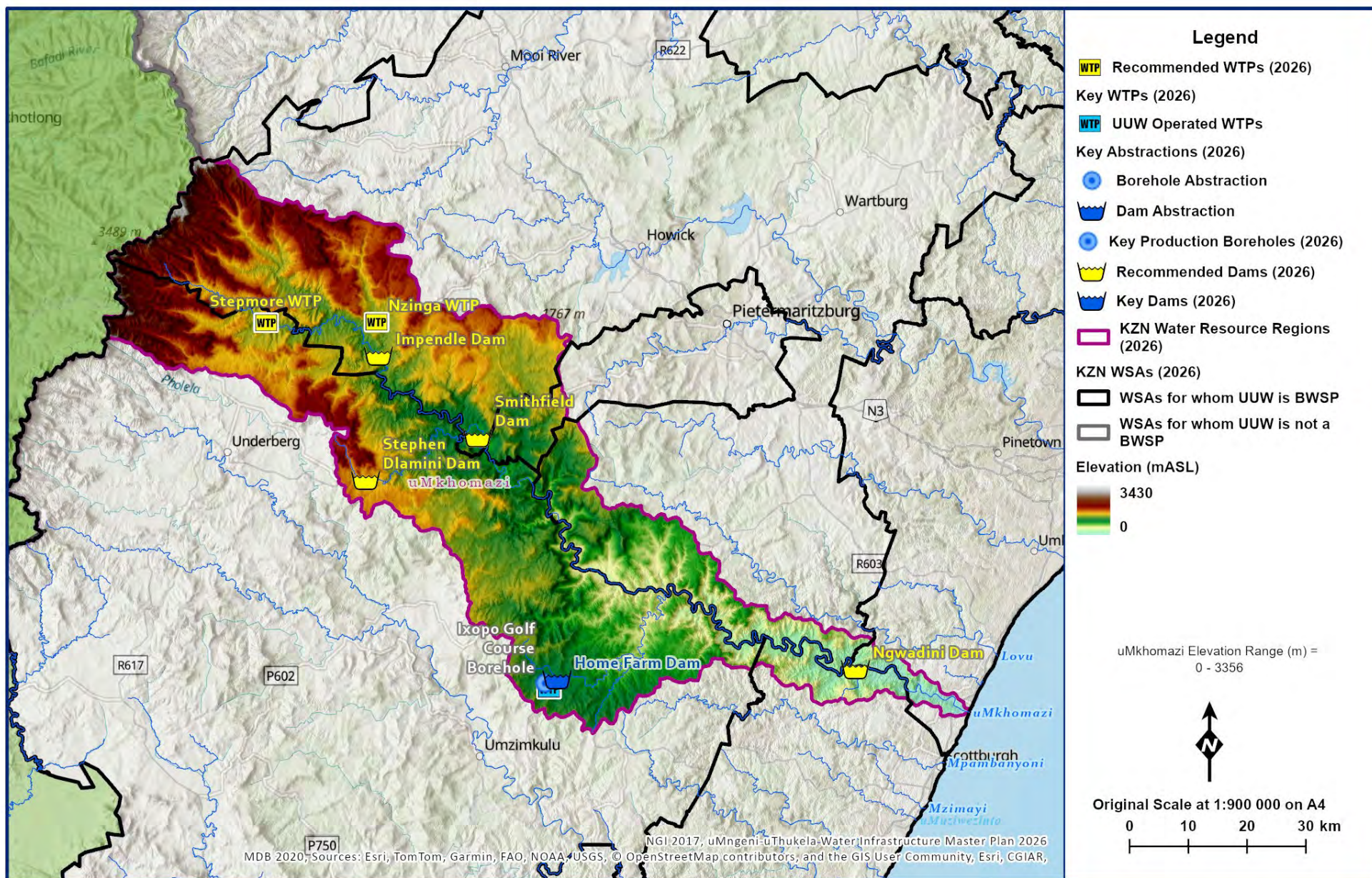


Figure 7.55 uMkhomazi Water Resource Region proposed infrastructure.



Figure 7.56 Artistic impression of Smithfield Dam.

Table 7.54 Proposed water resource infrastructure for the uMkhomazi Region.

Impoundment	River	Capacity (million m ³)	Yield (million m ³ /year)	Stochastic Yield (million m ³ /year)
			Historical	1:100
Smithfield Dam	uMkhomazi	226	172 (471 Mℓ/day)	220 (602 Mℓ/day)
Impendle Dam	uMkhomazi	270	204 (559 Mℓ/day)	228 (625 Mℓ/day)
Ngwadini Dam	uMkhomazi (Off-channel)	10	32 (88 Mℓ/day)	34 (93 Mℓ/day)
Stephen Dlamini Dam	Luhane	9.9	3.2* (8.9 Mℓ/day)	3.4* (9.3 Mℓ/day)

excl. Ecological reserve

Previous studies were reviewed regarding the Lower uMkhomazi Off-Channel Storage Dam (Ngwadini Dam) option to provide a reliable water supply to the South Coast area. The construction of Phase 1 – Ngwadini Off Channel Storage Dam is currently in progress. This phase comprises of Ngwadini Abstraction Works, Goodenough Weir and Abstraction Works, Desilting structures, Raw water storage reservoir, 1km Rising main and 7 km raw water gravity main. Phase 2 will comprise of the Water Treatment Works; Gravity Bulk Potable water main; and Command Reservoir.

The current total demand for the South Coast is 66 Mℓ/day with Ugu District Municipality's current demand being approximately 17 Mℓ/day and eThekweni Municipality's demand being approximately 49 Mℓ/day. The yield of the uMkhomazi River, with Sappi's allocation and the Reserve supplied, is 93 Mℓ/day. Raw water from the Ngwadini Off Channel Storage Dam will be transferred via a bulk pipeline to a new Water Treatment Plant, a storage reservoir and finally to the South Coast Pipeline (SCP).

DWA (2013) undertook a detailed hydrological assessment on the uMkhomazi and Upper uMlaza River Catchments with the purpose of updating and extend the simulations for the area. The results from the hydrology assessment were used in a number of yield assessment scenarios to determine the impact of releasing water from Smithfield Dam to augment Ngwadini Dam. The scenarios and impacts on yield are shown in **Table 7.55**.

Table 7.55 Yields for proposed water resource infrastructure for uMkhomazi Region (DWA 2013).

Scenario	Time Slice	Support Releases (Smithfield to Ngwadini)	Ngwadini Dam Yield/Target (1:100)		Smithfield Dam Yield (1:100)	
			Mℓ/day	Million m ³ /annum	Mℓ/day	Million m ³ /annum
Ngwadini Dam	2012	None	93	34	-	-
Ngwadini & Smithfield	2050	None	66	24	602	220
Ngwadini & Smithfield	2050	Yes	70	26	600	219
Ngwadini & Smithfield	2050	Yes	95	35	586	214
Ngwadini & Smithfield	2050	Yes	150	55	537	196

c) Overview of Recommendations for the Upper uMngeni System

- **Figure 7.57, Figure 7.58, Figure 7.59, Figure 7.60 and Figure 7.61** illustrate schematically the Upper uMngeni System in its current configuration and how it will need to be upgraded over the next 30 years to accommodate the future growth in water demands. This Section should be read in conjunction with these Figures. Construction of Phase 1 of the uMkhomazi Water Project; and Decommissioning of the '53 Pipeline.

Other infrastructure upgrades and additions that will be required over the next 30 years include:

- Increase the capacity of the Mills Falls to Howick West Supply System
- Augmentation of the Vulindlela BWSS;
- Whilst the Clarendon and Blackridge Reservoirs should be upgraded, it is recommended that this requirement be transferred to The Msunduzi Municipality as the additional 48-hour emergency storage requirement is a WSA responsibility.

- Augmentation of the Umbumbulu System, construction of a new pump station and pipeline.

d) Midmar Water Treatment Plant

The Western Aqueduct was commissioned in 2020/2021. The Midmar WTP had been upgraded from its treatment capacity of 250 Mℓ/day to 375 Mℓ/day in 2018 to accommodate the new demand on the Western Aqueduct. Midmar WTP and D.V. Harris WTP, combined, can now supply 525 Mℓ/day of potable water. This is slightly above the 99% assured yield of Midmar Dam of 501.4 Mℓ/day (183.0 million m³/annum) (excluding raw water conveyance losses) when supported by the MMTS.

e) Howick-North Sub-System

The Howick Reservoir Complex will have to supply newly developed areas to the north of Howick. This high-level reservoir serves as a distribution reservoir that should have 48 hours of storage. The total storage is currently 6.6 Mℓ/day following the addition of a 6.5 Mℓ reservoir in October 2014 and the total current demand is 4.6 Mℓ/day.

f) Howick-West Sub-System

i) Mills Falls to Howick - West Reservoir

The rapid growth in demand of the Vulindlela Supply System impacts on the capacity of the upstream supply systems, especially the Mills Falls to Howick West Supply System. This system must be augmented to meet the 20-year demand of 81 Mℓ/day, starting in 2028.

ii) Howick - West Reservoir to Groenekloof Reservoir

Storage at Howick-West Reservoir was increased by 16 Mℓ to bring the total storage to 32.5 Mℓ (**Section 7.5.2 (d)**). This would then adequately serve as a distribution reservoir until 2030. A new 400 mm diameter pipeline, dedicated to serve the Mpophomeni area, will be required by UMDM once the new Khayalisha housing development is constructed. The existing 250 mm diameter pipeline will then become a backfeed from the Mpophomeni Reservoir.

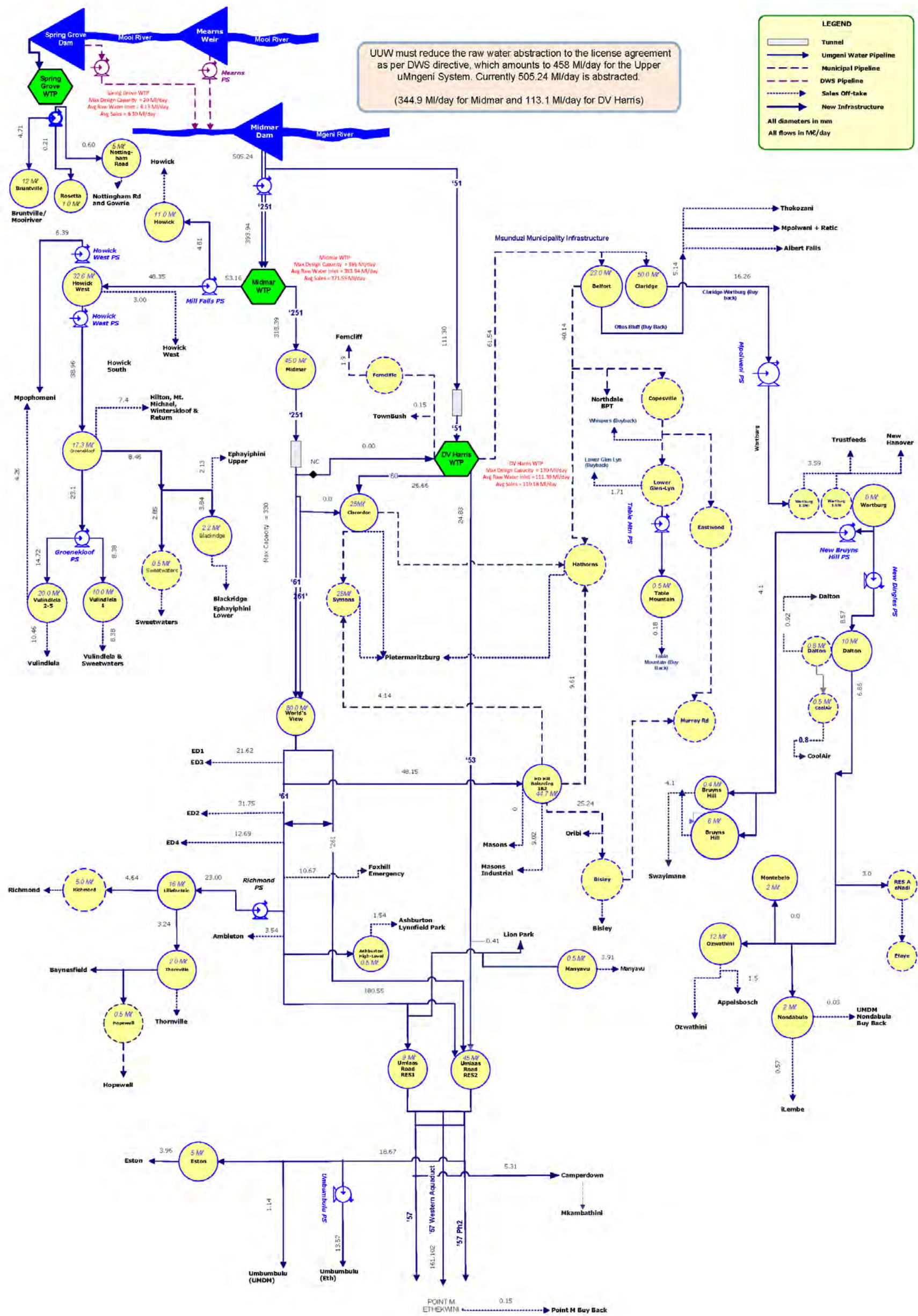


Figure 7.57 Demand on the Upper uMgeni System as at February 2026

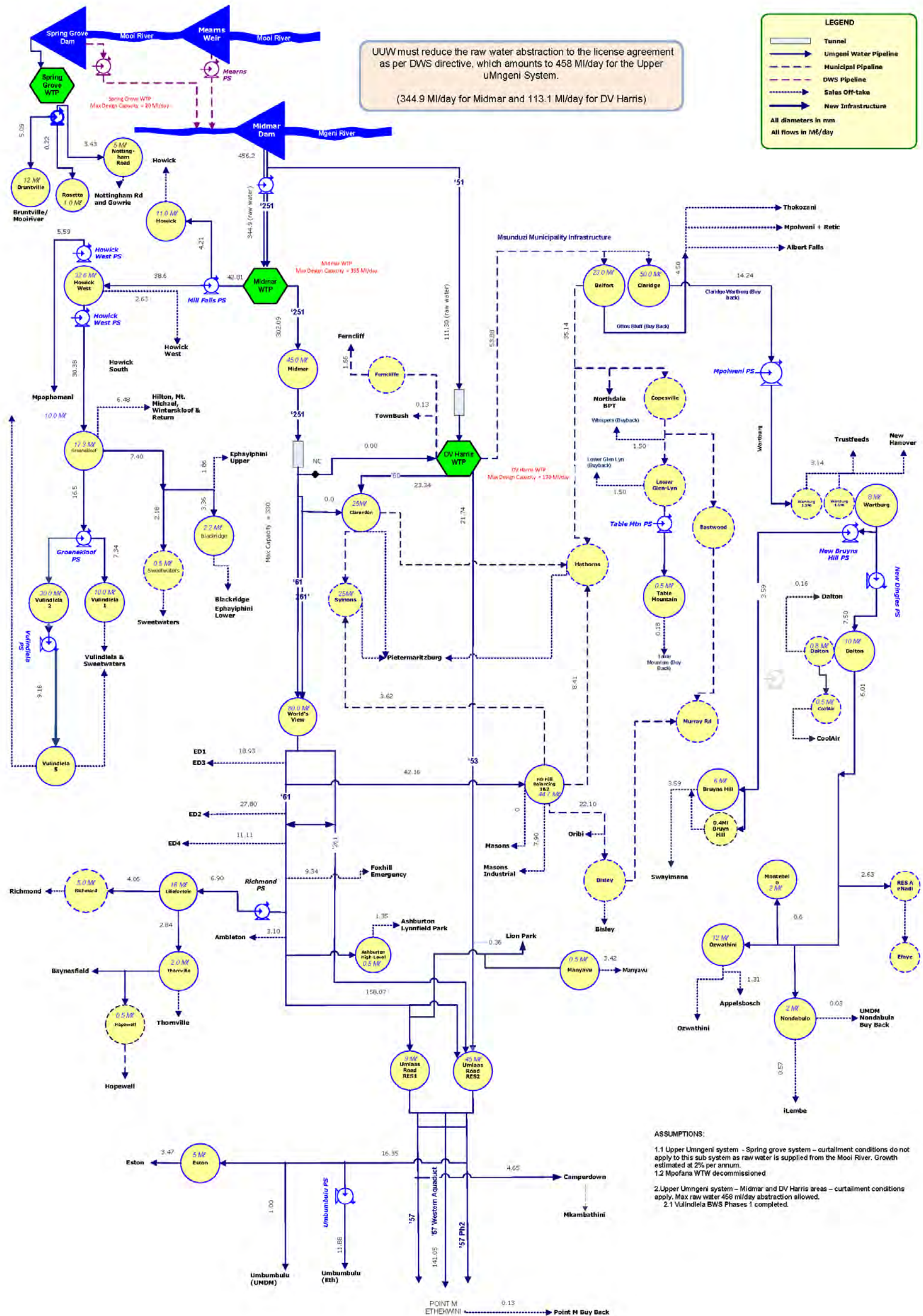


Figure 7.58 Five year demand projection for the Upper uMngeni System.

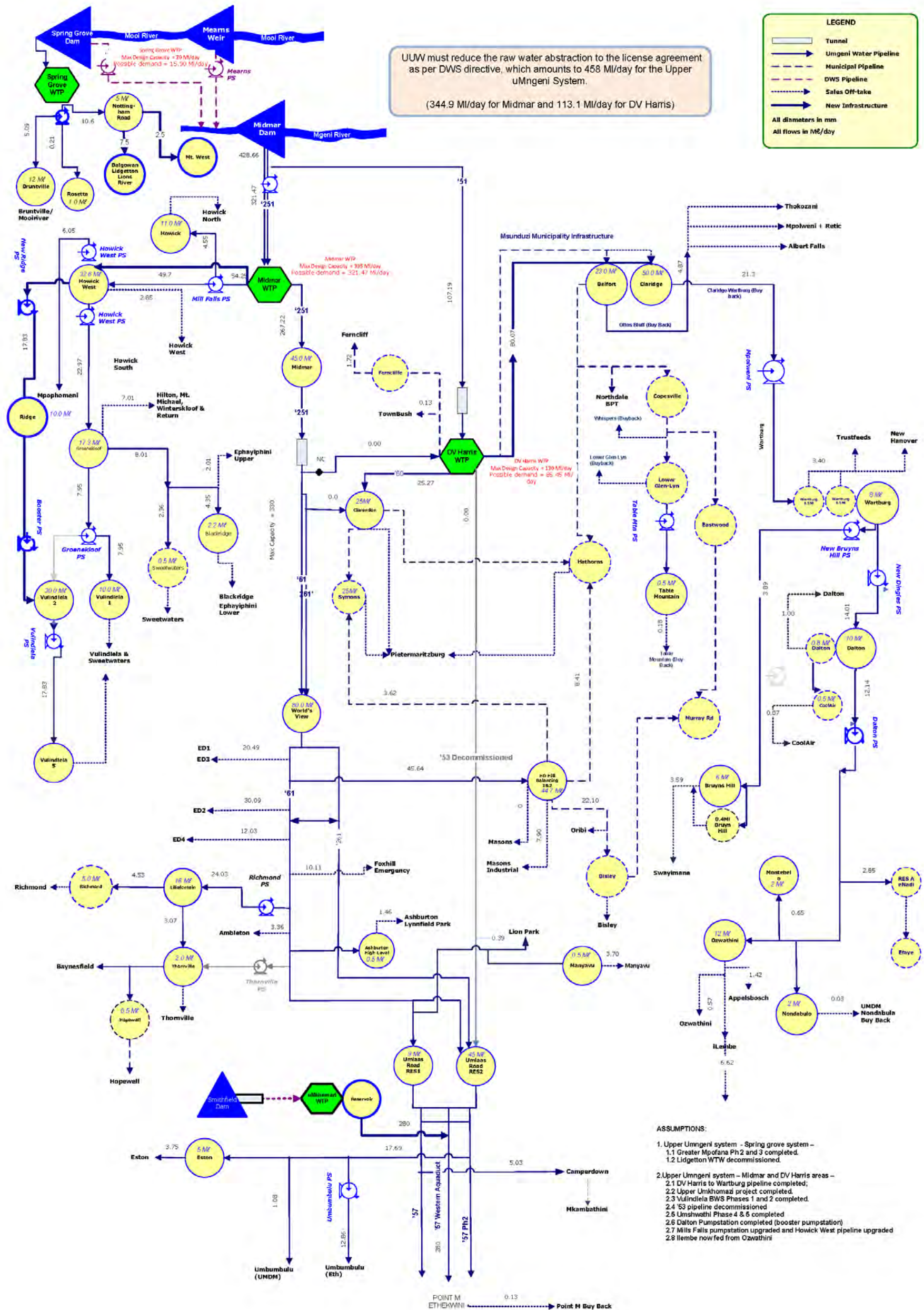


Figure 7.59 Ten day demand projection for the Upper uMgeni System.

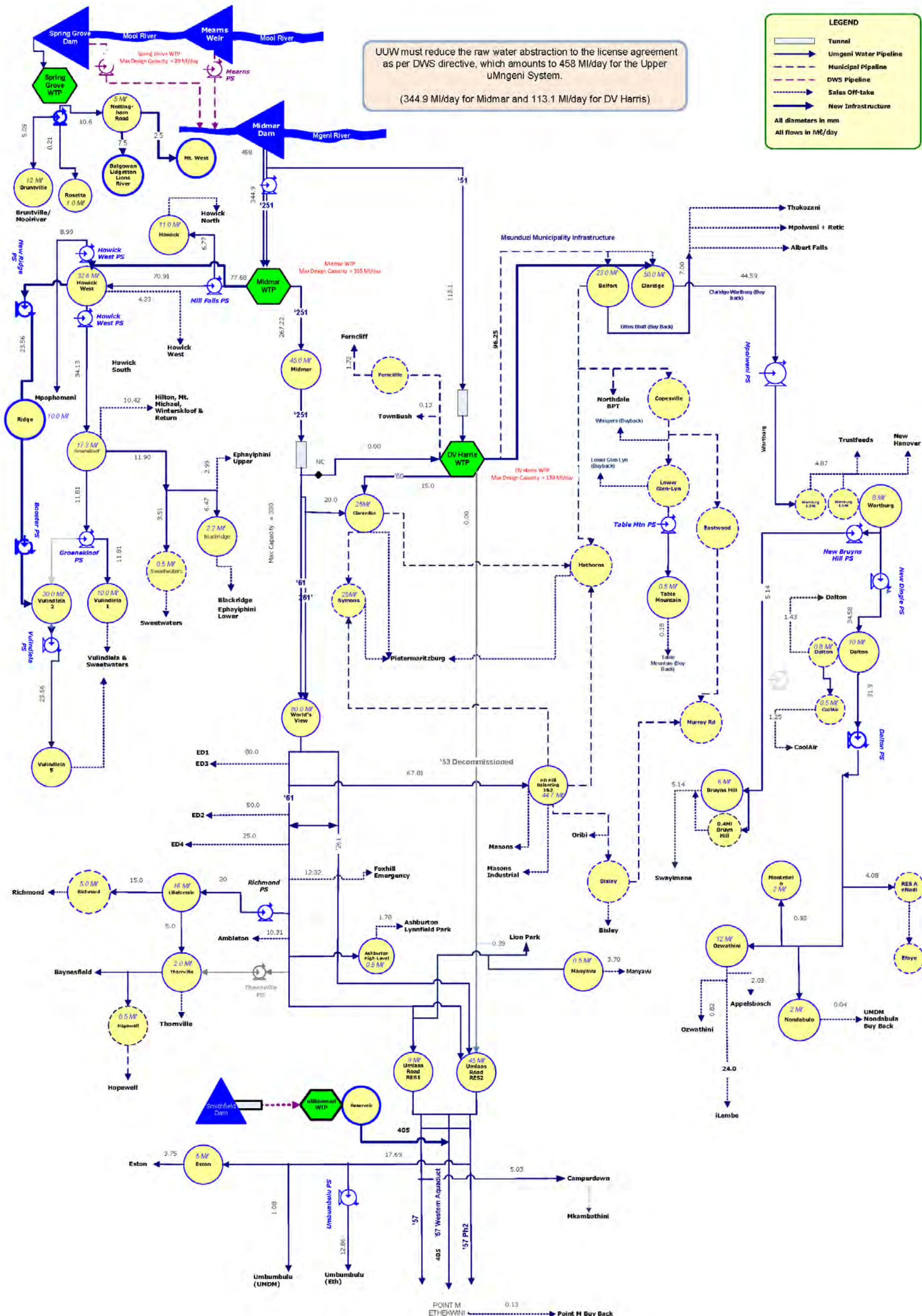


Figure 7.61 Thirty year demand projection for the Upper uMngeni System.

iii) Vulindlela BWSS

The current demand on the Vulindlela BWSS is approximately 22.2 Mℓ/day and the projected demand is 63.1 Mℓ/day in 2050.

The existing capacity of the system is capable of serving the current demand; although, future growth will exceed the system capacity.

Extensive hydraulic analyses were conducted to optimise the hydraulic efficiency of the Vulindlela BWSS. The results of the hydraulic analyses indicated that the following infrastructure requirements, some of which have been completed in the first phase of construction:

Phase 1 : Overall 98% complete; anticipated final completion date is September 2025

- Construction of a new 20 Mℓ Reservoir and all ancillary works – 100% complete;
- A new 2.4 km of DN600 epoxy lined pipeline from Reservoir 4 to Reservoir 5 to replace the existing DN300 rising main - 100% complete;
- Conversion of the existing DN200 rising main to gravity main from Reservoir 5 to Reservoir 4 - 100% complete;
- A new DN200 steel gravity bulk pipeline from Reservoir 4 to Reservoir 3, tying into the existing branch pipelines supplying Reservoirs 4 and 3 respectively - 100% complete.
- Construct a new Pump Station at Reservoir 2 - 70% complete;
- Installation of an adequate new power supply to the new Reservoir 2 pump station – 0 % complete; due to Eskom payment delays being addressed
- Modification of inlet & outlet pipework at Reservoir 2 and Reservoir 5, as well as the tie in details for the new connections required at reservoirs 3 and 4 - 100% complete.
- Completion Certificate has been issued to the contractor for phase 1 contract with major incomplete scope. The majority of the incomplete scope was due to no electrical provision to ensure conformance to the GCC2015 contract whereby commissioning could not be conducted. The outstanding scope of phase 1, is being interrogated and added to the phase 2 contract.

Phase 2 :

- The design and Bill of Materials is currently being finalised. Phase 2 anticipated to commence construction in 2027.

g) Midmar WTP to Umlaas Road Sub-System

i) '61 Pipeline: World's View Reservoir to ED4

This section of infrastructure allows for the maximum of 330 Mℓ/day that the tunnels can deliver. No further infrastructure is required.

ii) Thornville/Hopewell Supply

Thornville Reservoir can be supplied from both the Richmond pipeline and the existing Thornville Pump Station. The rising main from the '61 Pipeline to Thornville, operated as a

back-feed gravity main when the Richmond BWSS was commissioned in 2015, supplying water to Thornville from the Richmond Pipeline.

iii) '53 Pipeline: D. V. Harris WTP to Umlaas Road Reservoir

This pipeline needs to remain operational until such time as the uMWP is commissioned. Thereafter it is recommended that it be decommissioned. In the interim, caution should be taken not to exceed the “safe load carrying capacity” of 35 Mℓ/day. The operational philosophy for the '53 pipeline, allows a maximum of 30 Mℓ/day.

h) Umlaas Road Sub-System

An analysis of the Umlaas Road Reservoir Complex showed that the augmentation to the '61 Pipeline system resulted in little or no stress on the reservoirs. This coupled with the fact that eThekweni Municipality have indicated that they have sufficient storage in their system, and that they do not wish uMngeni-uThukela Water to augment the Umlaas Road storage, means that there is no planned augmentation of storage at Umlaas Road. Additional storage will be constructed as part of the uMWP.

i) Eston/Umbumbulu Pipeline

The capacity of this pipeline is restricted to 15 Mℓ/day due to the ground level profile along the pipeline route. The flow is restricted to ensure that the hydraulic grade line is at least 20 m above a high point at Stoney Ridge. A booster pump station and a 900 mm diameter steel pipeline has been constructed to increase the flow through this pipeline to a maximum 22 Mℓ/day (**Section 8.5.2 (e)**). The projected growth in demand is envisaged to peak at 50 Mℓ/day by the year 2047. To ensure the sustainability of supply, uMngeni-uThukelaWater will initiate a feasibility study to augment the existing supply system with a new pipeline.

i) DV Harris to Claridge Pipeline

The major constraint in this system is the maximum capacity of the pipeline from DV Harris WTP to Claridge/Belfort Reservoir. A hydraulic analysis has shown that the maximum flow, under gravity, with the available head difference of 39.74 m is 63 Mℓ/day along the existing 1000 mm diameter pipeline, which is inadequate to meet the current demand. This constraint is currently having a negative effect on the supply of potable water to the Greater uMshwathi BWSS.

The delay in the implementation of this project is a result of an oversight when planning and implementing the uMshwathi BWSS, i.e. the infrastructure necessary for the supply of water to the uMshwathi BWSS is inadequate. It is anticipated that Phase 4 will be completed in December 2029. Phase 5 contracts 1 and 3 were completed in February 2026 and Contract 3 is anticipated to be completed in July 2026. When the projects in iLembe District Municipality (IDM) have been completed, there will be insufficient supply; it is acknowledged that the 2053

demand of 130ML/d will not be available but supply will improve once the over abstraction on the uMngeni System has been addressed and UWP is commissioned.

The hydraulic analysis has shown that the augmentation of the pipeline from DV Harris WTP to Claridge Reservoir is necessary to increase the flow, with the current available head, to a maximum of 130 Mℓ/day. This project is currently in the design stage.

The analysis has indicated that a new 1400 mm diameter pipeline is required to meet this maximum flow.

j) Recommendations for Lower uMngeni System

Figure 7.62 illustrates, schematically, the demands on the Lower uMngeni System in its current configuration. Future demands in this area will be supplied by the Lower uMngeni System Water Treatment Plants and through the Western Aqueduct. As such, there are no new infrastructure projects planned for this area at this time. The following project has, however, been recommended to address operational challenges:

- Replacement of the existing pump sets at the Wiggins High Lift Pump Station (HLPS). There is a short-term risk of pump failure (non-supply) as the existing pumps are not appropriate for the current application. The project, currently on hold at completion of Detailed Design Stage, will not alter the capacity of the pump station but aims to satisfy the duty envelope more efficiently from both an energy and maintenance perspective. The HLPS was originally (1996) used as an emergency back-up supply to Durban Heights but has more recently become a permanent supply. In the long term, there is a need to consider system optimisation of the municipality's distribution network considering future demands and reliance on the HLPS.

Note: the uMngeni Catchment is closed with respect to Water Use Licences and currently abstractions far exceed the authorised volumes. Hence no rationale for committing further resources to pursuing supply side interventions within the uMngeni Catchment. In the short term UUW recommends demand side interventions until the uMkhomazi Water Project is available to augment the uMngeni System. With NRW estimated to be almost 60% within eThekweni Municipality there is a significant opportunity to promptly improve water supply downstream from the WTP's via WC/WDM interventions. These interventions should help to reduce the demand on the oversubscribed Lower uMngeni System "freeing up" the existing supply to the Municipality from a corresponding decrease in water lost from the system.

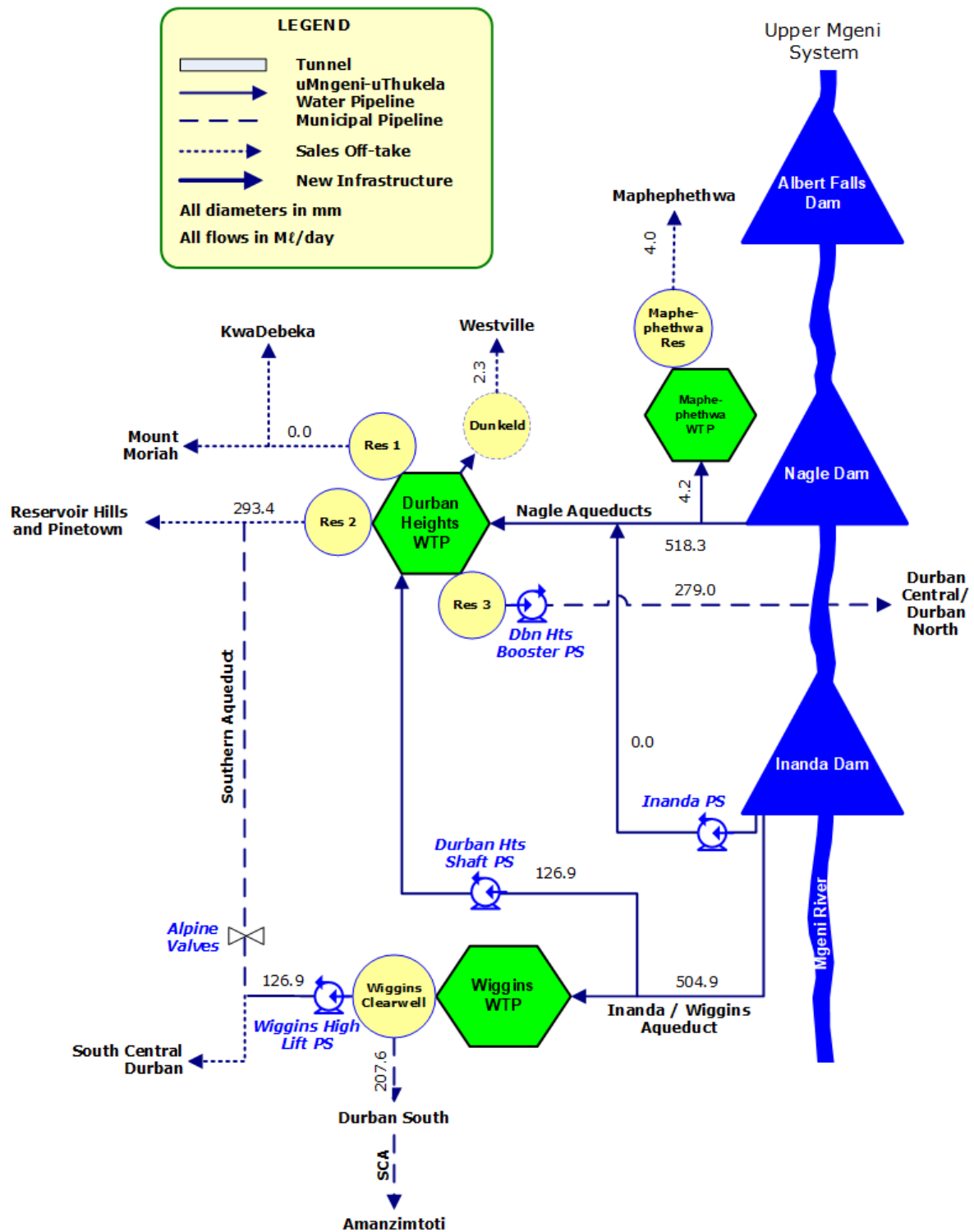


Figure 7.62 Schematic of the Lower uMngeni System.

7.5.2 Projects

a) uMkhomazi Water Project

Planning No.	114.0
Project No.	UI0530
Project Status	Design Development

i) Project Description

With the commissioning of Phase 2B of the Mooi-uMngeni Transfer Scheme (MMTS-2), the water resources available in the Mooi and uMngeni catchments, to augment the uMngeni System, are now fully utilised (Section 7.2.3 (a)). The MMTS-2 increased the safe assured yield of the uMngeni System to 434 million m³/annum

Over recent years, eThekweni Municipality has put considerable effort into optimising the operation of its distribution systems that are served by the Lower uMngeni System. Amongst other things, this has led to them implementing new infrastructure in order to undertake a significant load shifting exercise.

eThekweni Municipality's Western Aqueduct project was fully commissioned in 2020/2021, and represented the most significant of these load-shifting operations. The intention was for those areas currently being served under pumping from the Lower uMngeni System (viz. from Durban Heights WTP) to be transferred onto the Upper uMngeni System, and served under gravity from Midmar WTP via the Western Aqueduct (WA). After the implementation of MMTS-2, further water resource developments within the Mooi-uMngeni System are not considered to be beneficial due to resource limitation. Further augmentation of the uMngeni System will then be required.

Water resource development on the uMkhomazi River has been identified as the next major project to secure long-term water resources for eThekweni's Western Aqueduct supply zone. During the late 1990's, the then DWAF (now DWS) and uMngeni-uThukela Water jointly commissioned a pre-feasibility study to investigate various options for developing the uMkhomazi River's water resources, such that they could be utilised to augment those of the uMngeni River System.

A two-phased scheme was proposed, and the overall project area is shown in **Figure 7.63**. Phase 1 of the proposed uMkhomazi Water Project (uMWP-1) will involve the construction of Smithfield Dam, located along the central reaches of the uMkhomazi River midway between Lundy's Hill Bridge and Deepdale. Smithfield Dam will be the primary impoundment, whilst for Phase 2, a second dam (Impendle Dam) will be constructed upstream of the Smithfield site (just downstream of the uMkhomazi River/Nzinga River confluence).

The feasibility study for Phase 1 is complete and off-take agreements have been signed. Currently, the detailed design and construction is being procured. This scheme will be a gravity feed into the existing system and whilst it is a large expensive scheme, it is cheaper per unit of water supplied than other alternatives investigated. Phase 2 would only be implemented once the yield of Phase 1 (Smithfield Dam) has been fully utilised.

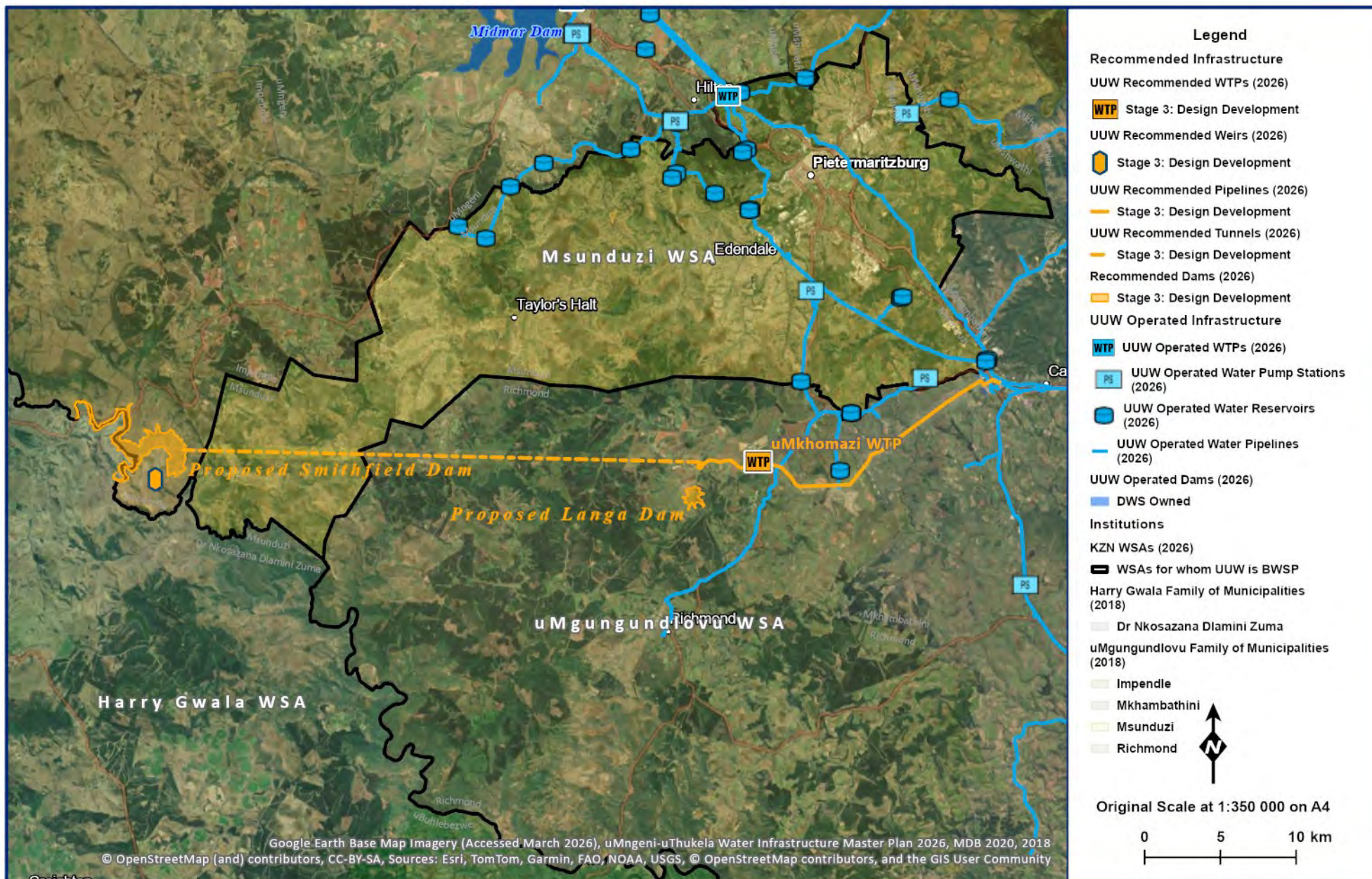


Figure 7.63 uMkhomazi Water Project.

Succinct details of the proposed potable water infrastructure are as follows:

Water treatment plant design: In order to meet the proposed phased increases in demand as well as a requirement to provide support to the uMngeni System, the capacity of the uMWP-1 WTP is proposed to be 500 Ml/day. A further 125 Ml/day phase would be required in 2044. The proposed WTP layout (**Figure 7.64**) was constrained by the requirement for gravity supply in the overall system between Smithfield Dam and the Umlaas Road tie-in, as well as a requirement to keep the WTP footprint to a minimum. The proposed plant layout combines features of accessible and compact unit process configuration, minimum lengths of interconnecting pipework, minimum volume of excavation and ease of future extension. The recommended WTP processes are pre-chlorination, coagulation/flocculation, high-rate clarifiers, rapid gravity filtration, granular activated carbon (GAC) filtration, final chlorination and sludge treatment.

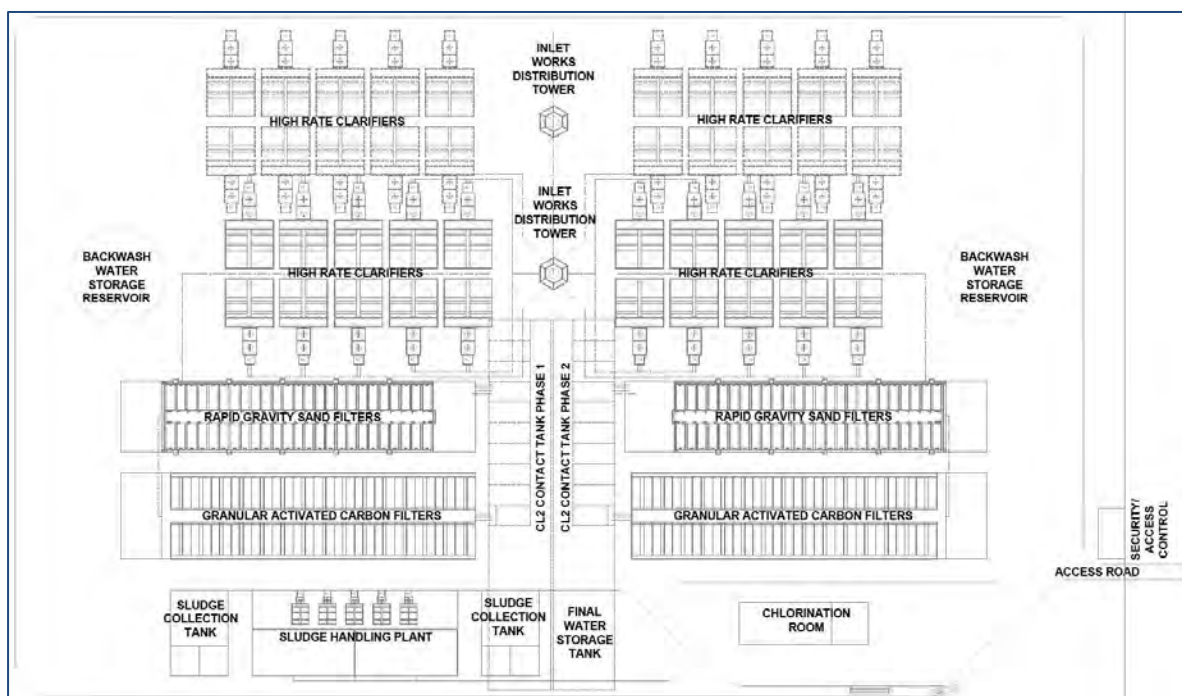


Figure 7.64 Layout of Water Treatment Plant.

Potable water reservoir: The potable water reservoir was sized to accommodate a minimum of six hours of the daily WTP capacity. Based on the WTP phasing discussed above the first 500 M_l/day WTP phase would require 125 M_l of storage, with a further 31.25 M_l/day required when the next 125 M_l/day WTP phase is constructed in 2044, i.e. a total of 156.25 M_l of storage for the uMWP-1.

The reservoir for the uMWP-1 would require a footprint of 2.2 hectares. In light of a requirement to keep the WTP footprint to a minimum, it was proposed that potable water storage be constructed beneath various WTW structures.

Potable water pipeline. The potable water pipeline (**Figure 7.65**) was designed to accommodate an average annual daily demand of 602 Mℓ/day; equivalent to the 1:100 year yield of the Smithfield. The peak design capacity was 753 Mℓ/day. Pipelines ranging from 2 820 mm diameter (15.1 km) to 2 540 mm diameter is proposed to convey the peak demand of 753 Mℓ/day.

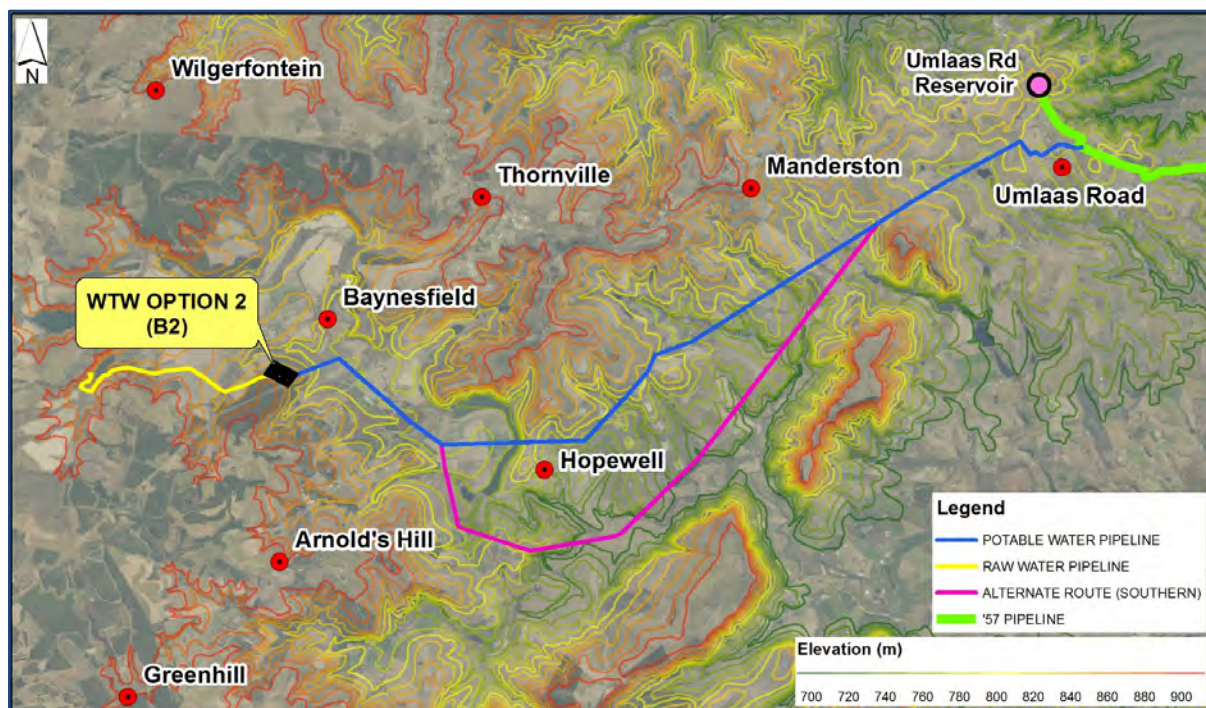


Figure 7.65 Layout of pipeline.

Key information on this project is summarised in **Table 7.56**.

Table 7.56 Project description: uMkhomazi Water Project.

Project Components	Water Resource Components (to be developed by DWS): Smithfield Dam – having a storage capacity 251 million m³ (31% of MAR), earth core rockfill dam. A Transfer Tunnel – 3.5 m bored diameter (3.0 m lined diameter), concrete-lined (where necessary), overall length of 32 km. 3km of 3 000 mm Raw Water Pipeline. Potable Water Supply Components (to be developed by uMngeni-uThukela Water): Water Treatment Plant (WTP) – to be located near Baynesfield Estate with an initial capacity of 500 Mℓ/day and allowance for further module to increase capacity to 625 Mℓ/day. 156.25 Mℓ potable water storage reservoir at WTP. Bulk Potable Water Pipelines – 2 820mm diameter (15.1 km) and 2 540 mm diameter (4.6 km) gravity mains from the WTP to '57 pipeline.
Capacity	625 Mℓ/day

ii) Institutional Arrangements

DWS will plan, develop and own the water resource and raw water infrastructure up to the WTP. The operation and management component of this infrastructure will be decided at the time of commissioning. uMngeni-uThukela Water will design, build, own, operate and maintain all water supply infrastructure from (and including) the WTP. uMngeni-uThukela Water will purchase raw water from DWS as per a revised raw water agreement and sell potable water from this system to eThekweni, the Msunduzi and uMgungundlovu municipalities, as per the existing bulk water supply agreements.

iii) Beneficiaries

The scheme will primarily serve the eThekweni Municipal area and to a lesser extent portions of uMgungundlovu District Municipality. Assuming 200 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 625 Mℓ/day may be 3 125 000 people.

iv) Implementation

The project is divided into three components:

- Module 1: Technical Feasibility Study: Raw Water (Appointment by Department of Water and Sanitation). The study was completed in 2015;
- Module 2: Environmental Impact Assessment (Joint appointment by Department of Water Affairs and uMngeni-uThukela Water). EIA was awarded;
- Module 3: Technical Feasibility Study: Potable Water (Appointment of PSP by uMngeni-uThukela Water). The study was completed in 2015.

The project should have been implemented by 2020 in order to achieve a 99% level of assurance of supply to the uMngeni System. However, the earliest probable commissioning of this scheme is 2034/35.

The estimated cost of the entire project (raw and potable components) is approximately R 33 billion at 2020 prices. This is made up of R 24.5 billion for the raw water component to be implemented by DWS and R 8 billion for the potable component to be implemented by uMngeni-uThukela Water.

b) Impendle BWSS

Planning No.	105.44
Project No.	UI0544A – CI.00240
Project Status	Detailed design

i) Project Description

The area of Impendle has unreliable sources of water and many small run-off-river abstraction and borehole schemes. This project will increase the level of assurance of supply to the community of Impendle as requested by uMgungundlovu District Municipality. The water schemes are part of the Impendle bulk water supply project for the Impendle Local Municipality.

The Impendle Municipality's topography predominantly comprises rolling hills, mountains and scattered settlements covering an area of 948 km². Due to the nature of the area's topography and extended scattered settlements, two separate bulk water supply schemes are proposed.

One bulk scheme will serve the north western part of the Municipality that includes communities from Stepmore to the Lotheni area. The second bulk scheme will provide water to the communities on the east (**Figure 7.66**).

Stepmore

The proposed source for the scheme is a new river intake to be constructed on the uMkhomazi River. Raw water from this intake will be delivered to a proposed Stepmore Water Treatment Plant (WTP), where the water will be purified. The WTP is situated on a greenfield site and will have a initial capacity of 1.6 Mℓ/day upgradable to 3.0 Mℓ/day when required. From a high-lift pump station within the WTP site, purified water will be delivered through a clear water rising main to Lotheni 1 Reservoir with a capacity of 1Mℓ. From Lotheni 1 Reservoir a gravity main will convey water to Lotheni 2 Reservoir. From the Lotheni 1 and 2 Reservoirs, distribution mains will convey the water by gravity to existing distribution networks in the areas of Stepmore, Inkangala and Lotheni.

uMngeni-uThukela Water will be responsible for the implementation of the Bulk Works from the Abstraction and Water Treatment Plant to the Lotheni 2 Reservoir. Detailed design for the Stepmore area is complete.

Nzinga

The proposed source for the scheme is a new river intake to be constructed on the uMkhomazi River. Raw water from this intake will be pumped to the proposed Nzinga Raw Water Pump Station (NRWPS) located approximately 190 metres from the intake structure. From the NRWPS, raw water will be delivered through a 325/355 mm diameter x 7.6 km long rising main to the Nzinga WTP located on the same site as the existing WTP. The pipeline is

designed to supply 275 kℓ/hr of raw water. The BWSS will be operated and maintained by uMngeni-uThukela Water. Detailed design for the Nzinga area is 25% completed.

Key information on this project is summarised in **Table 7.57**.

Table 7.57 Project information: Impendle BWSS.

Project Components:	Nzinga Waterworks • The proposed plant has a capacity of 13 Mℓ/day with an abstraction capacity of 18 Mℓ/day. • 355 mm diameter x 7.6 km long rising main. • 1 Mℓ Nzinga Reservoir. Stepmore Waterworks • The proposed plant has a capacity of 1.6 Mℓ/day upgradable to 3.0 Mℓ/day with an abstraction capacity of 4.0 Mℓ/day • 1 Mℓ Lotheni 1 Reservoir. • 650 kℓ Lotheni 2 Reservoir. • Construction of approximately 11,5 km of 100 mm diameter to 200 mm diameter uPVC and steel pipelines.
Capacity:	15 Mℓ.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain this bulk scheme and will sell potable water to the uMgungundlovu District Municipality as per the Bulk Water Supply Agreement. The uMgungundlovu District Municipality will then reticulate to the end consumers through existing and new supply infrastructure.

iii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Impendle Local Municipality with an estimated population of 37 000.

iv) Implementation

The detail design and construction monitoring of the Nzinga Project is based on a fee-based contract and at the time of tender the value of construction was estimated at R172 million. The construction duration of this project is anticipated to be six years. The total cost is estimated to be R386 million at 2021 prices.

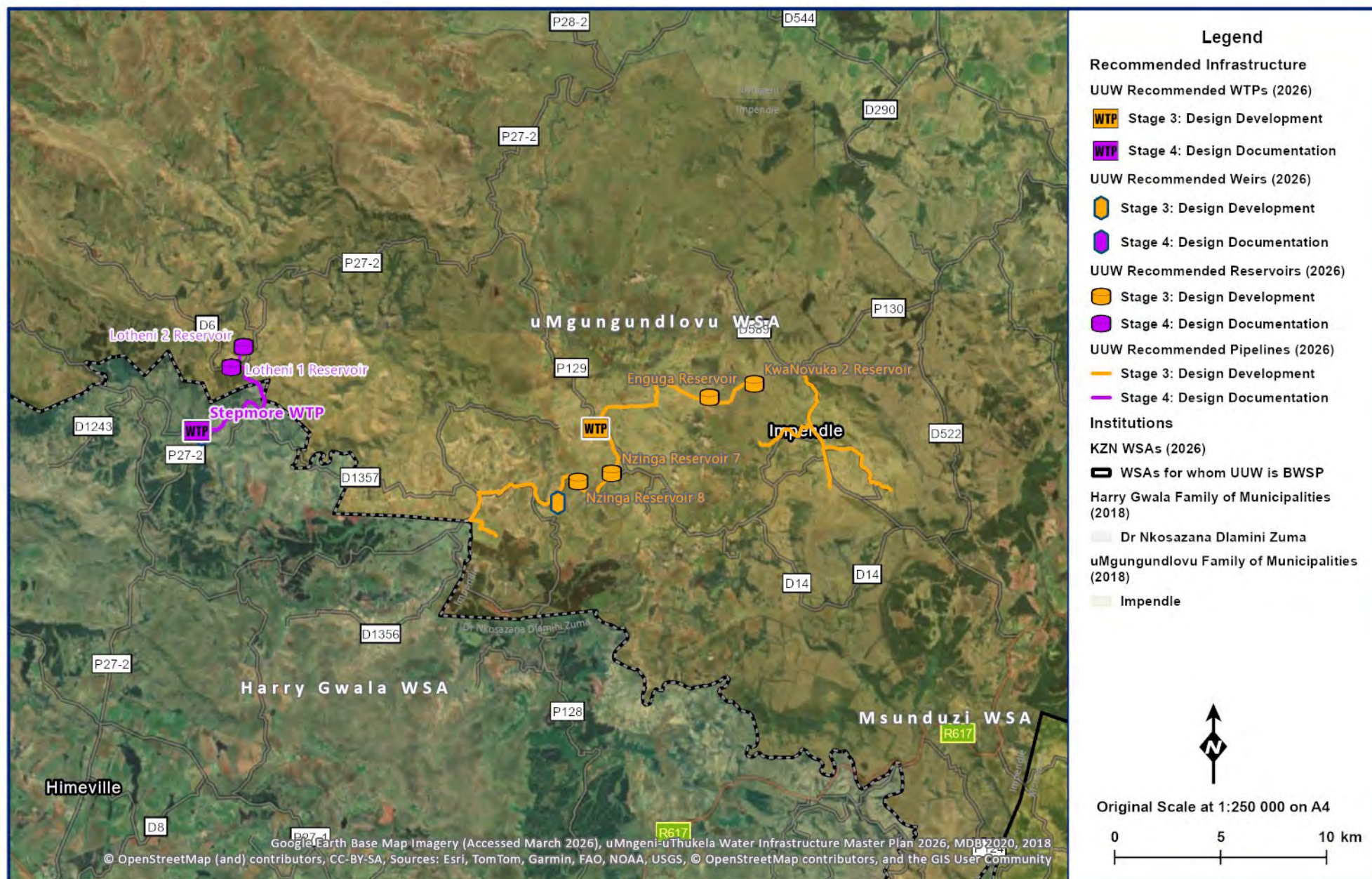


Figure 7.66 General layout of the Impendle Project Areas.

c) Greater Mpofana Bulk Water Supply Scheme

Planning No.	105.24
Project No.	CI.0001
Project Status	Phase 1: Commissioned Phase 2 – PreliminaryDesign

i) Project Description

Sustained housing development and tourism related activities are increasing the water demand at several nodes along Main Road R103 between Lions River (uMngeni Local Municipality) and Mooi River (Mpofana Local Municipality). This growth is beginning to stress local water resources and water supply infrastructure in the area. The Greater Mpofana Region (described in this report as the area from Mooi River to Lidgetton) does not have a reliable water supply. Much of the area relies on boreholes and run of river abstraction. With increasing demands, the future supply is not considered sustainable.

A regional bulk water supply scheme referred to as the Greater Mpofana Bulk Water Supply Scheme (GMBWSS) is being implemented to ensure that the area has a reliable water supply that will sustain this growth into the future.

Phase 1 of the project has been commissioned and handed over to operations and is now fully operational. This project provides a sustainable bulk water supply to the towns of Mooi River, Rosetta and Nottingham Road. (**Figure 7.67**) depicts that raw water is sourced from Spring Grove Dam on the Mooi River to the Spring Grove WTP situated adjacent to the dam. From there, potable water is pumped to two command reservoirs. The first reservoir is located at Bruntville in Mooi River. This reservoir serves the greater Mooi River area and has the potential to supply the Mudén/Rocky Drift area. The second reservoir is at Nottingham Road, which supplies Balgowan, Lidgetton, Nottingham Road, Gowrie Estates and Lions River.

Phase 2 is currently in the detailed design stage of the project and will provide a sustainable bulk water supply to the towns of Lidgetton and Lions River including the rural hinterland surrounding the abovementioned towns in KwaZulu-Natal. It entails the construction of a pipeline from the Nottingham Road reservoir to the new Balgowan reservoir and extending to Lidgetton.

Phase 3 will entail the construction of the pipeline from the Nottingham Road reservoir to a new reservoir at Mount West. This supply will require a booster pump station at the Nottingham Road reservoir.

The scheme is to be built in phases to gradually increase the supply area (**Figure 7.68**)

Key information on this project is summarised in **Table 7.58**

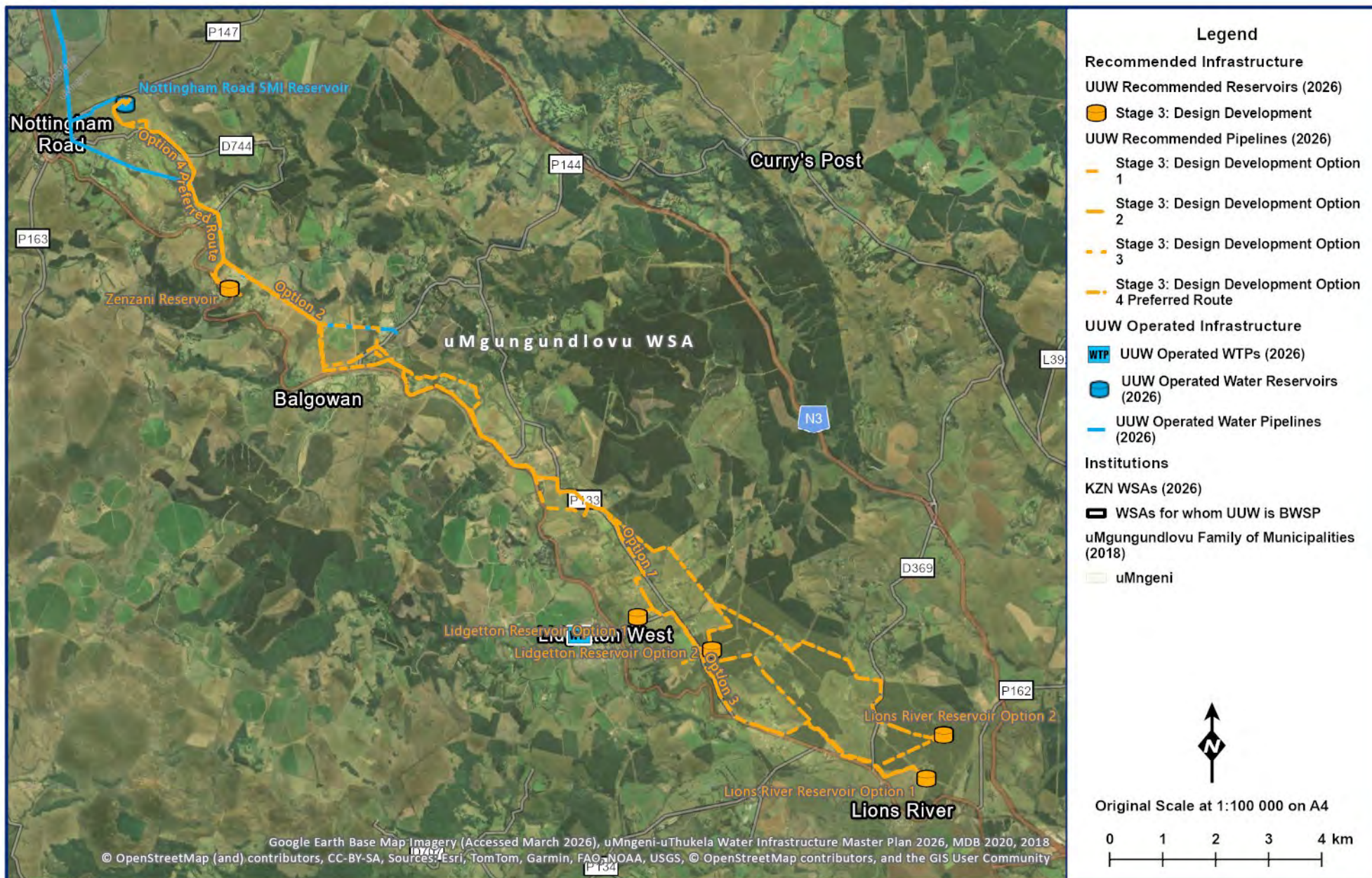


Figure 7.67 Greater Mpofana Bulk Water Supply Scheme Phase 2.

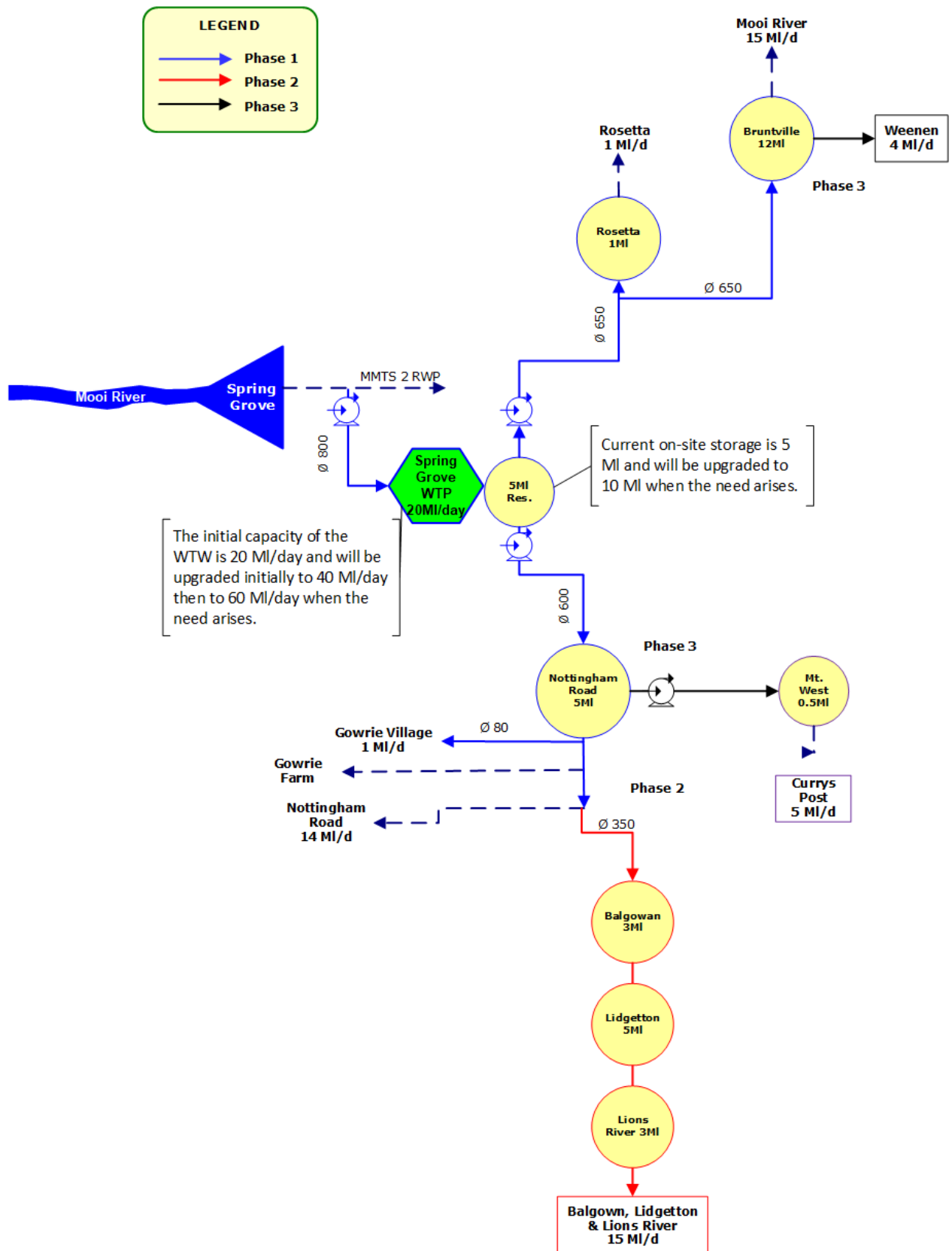


Figure 7.68 Schematic of Greater Mpofana BWSS.

Table 7.58 Project information: Greater Mpofana Bulk Water Supply Scheme.

Project Components:	Phase 1: 20 Mℓ/day Water Treatment Works, associated pump stations, 600 mm diameter pipeline to Nottingham Road and 5 Mℓ reservoir, and 650 mm diameter pipeline to Rosetta and Bruntville in Mooi River with 12 Mℓ reservoir at Bruntville. (Complete) Phase 2: Pipeline from Nottingham Road Reservoir to Balgowan and then Lidgetton and Lions River including three Reservoirs.
Capacity (WTP):	20 Mℓ/day; a further upgrade to be undertaken to 40 Mℓ/day when required and reaching an ultimate capacity of 60 Mℓ/day.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain this bulk scheme and will sell potable water to the uMgungundlovu District Municipality as per the Bulk Water Supply Agreement. The uMgungundlovu District Municipality will then reticulate to the end consumers through existing and new supply infrastructure.

iii) Beneficiaries

The scheme will serve residential and tourist establishments in the Mpofana Municipality and uMngeni Municipality within the uMgungundlovu District Municipality. It will also be a source of potable water for low-cost housing in Bruntville and Lions River in the Mpofana and uMngeni municipalities respectively. The forecasted water demand for the Greater Mpofana BWSS is shown in **Table 7.59**

Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated initial capacity was 20 Mℓ/day. The current supply to the area is 12 Mℓ/day.

Table 7.59 Water forecasts for the Greater Mpofana BWSS.

Mpofana Municipality	2013	2043
Mooi River	7.3	15.24
Weenen & Msinga	0.00	8.00
Rosetta	0.4	0.85
Mpofana Total	7.7	24.10
Mngeni Municipality	2013	2043
Nottingham Road	1.50	13.6
Mount West & Curry's Post	0.0	5.1
Balgowan & Lions River	0.0	14.8
Mngeni Total	1.5	33.5
Total Volume - Expected	9.2	57.6

iv) Implementation

The project is phased with the first phase consisting of a 20 Mℓ/day WTP at Spring Grove Dam and separate pumping mains to new reservoirs at Bruntville (12 Mℓ) and Nottingham Road (5 Mℓ). The total cost for Phase 1 was R 849 million as at November 2021. Construction has been completed and the project has been commissioned.

Phase 2 is currently at Detailed Design stage. The estimated cost for Phase 2 is R 450 million as at April 2026.

d) Umbumbulu Pipeline

Planning No.	105.a
Project No.	
Project Status	New project

i) Project Description

The capacity of the current pipeline is restricted to 15 Mℓ/day due to the ground level profile along the pipeline route. The flow is restricted to ensure that the hydraulic grade line is at least 20 m above a high point at Stoney Ridge. The current flow in this pipeline is 11 Mℓ/day. The hydraulic analysis has indicated that a new 900mm NB steel pipeline would adequately meet the future 50 Mℓ/day (2045) demand (**Figure 7.69**). This supply could be from the '57 Pipeline or could ultimately be supplied directly from the uMkhomazi Water Project Pipeline. The existing pipeline will be decommissioned once this pipeline is constructed.

Table 7.60 Project information: Umbumbulu.

Project Components:	Designed to deliver approximately 50 Mℓ/day at 2045 demand projections.
Capacity:	50 Mℓ/day ultimate.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain the pipeline and will sell potable water from this system to uMgungundlovu District Municipality and eThekweni Municipality as per existing bulk water supply agreements.

iii) Beneficiaries

The beneficiaries will be the Greater Eston region, including the Umbumbulu and the Adams Mission communities. Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 23 Mℓ/day may be 230 000 people.

iv) Implementation

The construction duration of this project is anticipated to be 5 years and can only be implemented when the uMkhomazi BWSS is implemented. The total cost is anticipated to be R 983 million as at May 2026 .

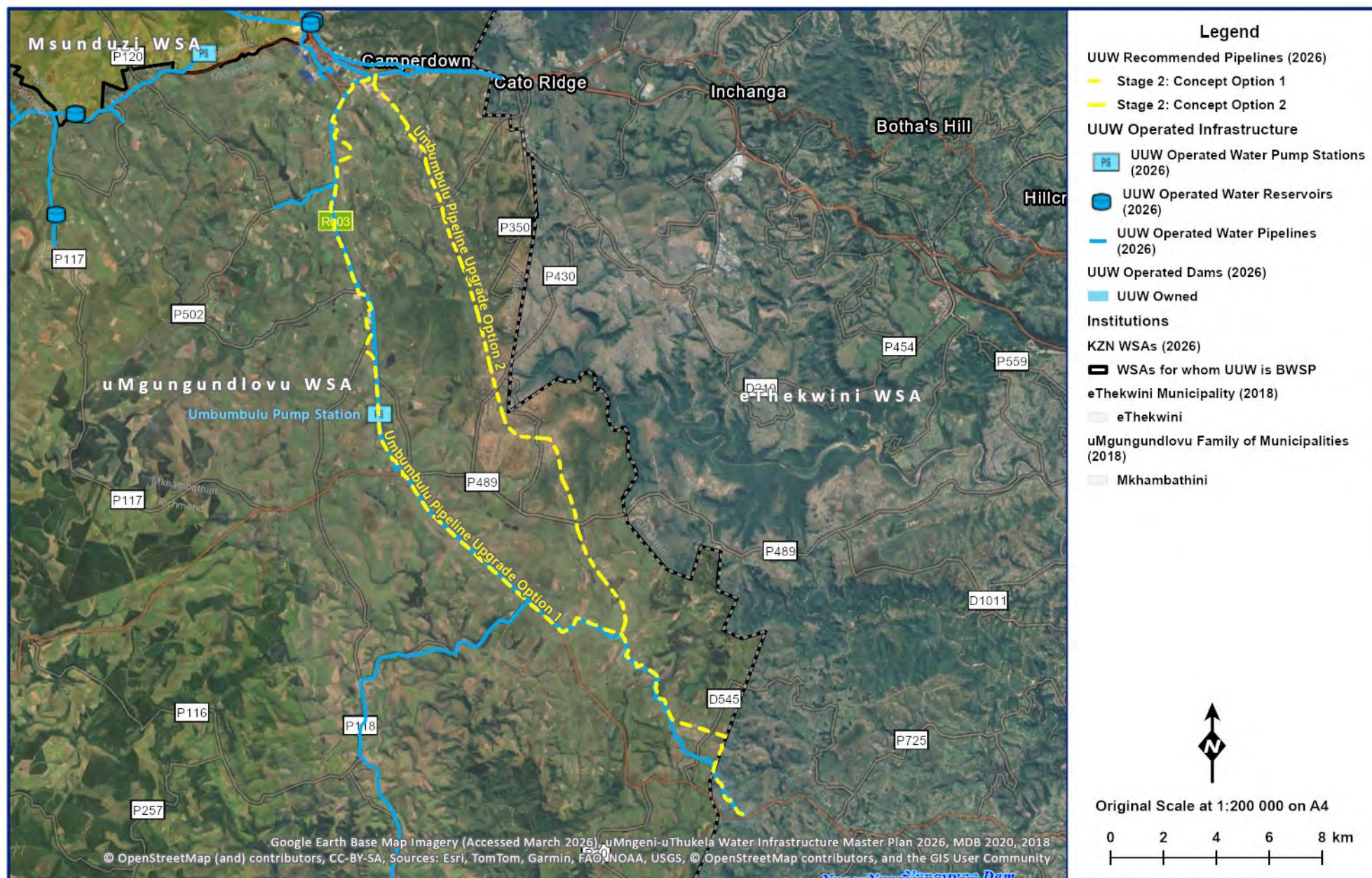


Figure 7.69 General layout of the Umbumbulu Pipeline Upgrade.

e) Vulindlela Upgrade

Planning No.	105.42
Project No.	CI.00035
Project Status	Phase 1: Partial completion Phase 2 ; Procurement

i) Project Description

The Vulindlela Bulk Water Supply Scheme (BWSS) was handed over to the Msunduzi Municipality (MM) in 2013 as part of uMngeni-uThukela Water's rationalization strategy. uMngeni-uThukela Water's responsibility ends at the sales meters downstream of the Vulindlela Pump Station. The Vulindlela area has suffered from an insufficient and interrupted water supply. The Msunduzi Local Municipality requested uMngeni-uThukela Water look at a more optimal bulk supply option for the Vulindlela BWSS to ensure an improved supply.

The Vulindlela system (**Figure 7.70**) receives potable water from the Groenekloof Reservoir Complex (TWL of 1210.6 mASL) through two pumping systems via two bulk supply systems. The high-level pumping system feeds two command reservoirs, namely, Reservoir 2 (TWL of 1410.2mASL) and Reservoir 5 (TWL of 1493.93mASL) and two additional reservoirs, Reservoir 3 and Reservoir 4. The low level pumping system only feeds command Reservoir 1. Potable water is then gravity fed from Reservoir 2 to Reservoirs 13 to 19, whilst potable water is gravity fed from Reservoir 5 to Reservoirs 6 to 12.

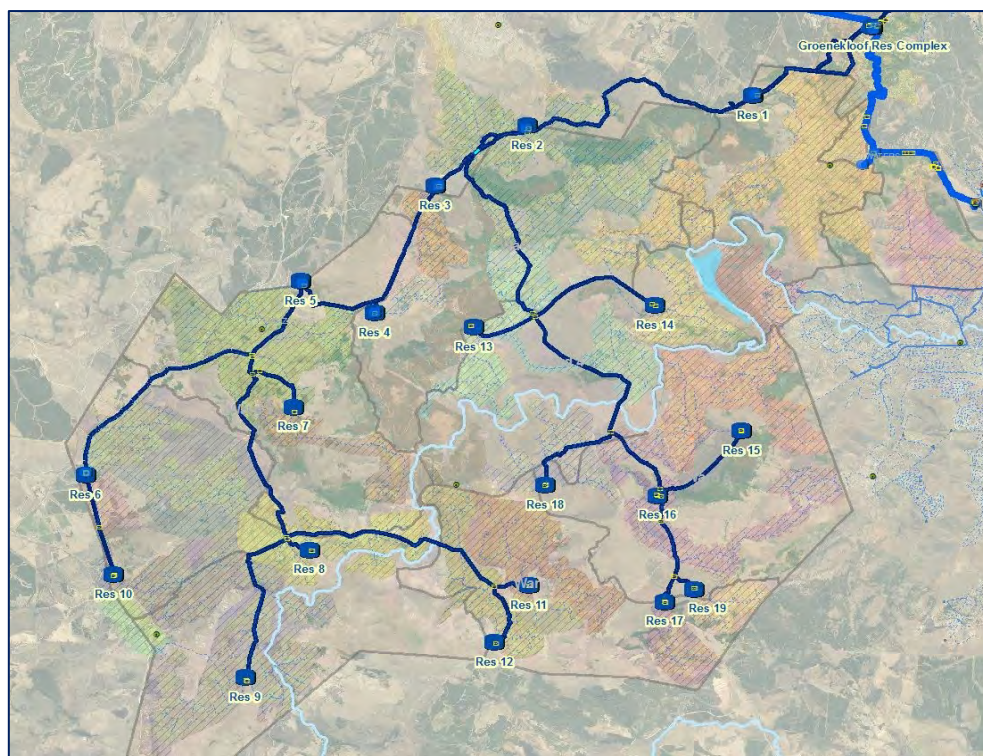


Figure 7.70 General layout of the Vulindlela System.

The Groenekloof High Lift Pump Station consists of three pumps, each with a design duty of 8.64 Mℓ/day at a generated head of 300 m. The current operating philosophy is for two pumps as duty and one as standby, thus having a total duty capacity (theoretical) of 17.28 Mℓ/day. The pumps “hunt” on their curves due to the fact that they have to pump against two different system resistance curves along the same pipeline in their supply of water to Reservoir 2 and Reservoir 5.

The Groenekloof Reservoir serves as a balancing reservoir for Vulindlela, Sweetwaters and Blackridge (**Figure 7.70**). The current demand out of Groenekloof Reservoir is 23 Mℓ/day. An alternative configuration to supply the Vulindlela Reservoir 2 from the existing Howick West Reservoir Complex has been identified and adopted. This configuration will be more efficient and eliminate the need to augment the Groenekloof supply network.

Key information on this project is summarised in **Table 7.61** and illustrated in **Figure 7.71**

Table 7.61 Project information: Vulindlela Upgrade.

Project Components:	• Construct a new pump station at Howick West Reservoir Complex to supply Vulindlela Reservoir 2 by installing 3 x 22 Mℓ/day pump sets (2 x operating and 1 x standby). • Construct an 800mm diameter pipeline of 11 km in length from Howick West Pump Station to Reservoir 2. • Construct the Pump Station at Reservoir 2 consisting of 2 x 18 Mℓ/day pump sets (1 x operating and 1 x standby). • Construct one 15 Mℓ Reservoir (25 Mℓ required in total) at Reservoir 2 site as additional storage to the existing 10 Mℓ reservoir. • Construct a back-feed pipeline of 300mm diameter with a length of 6 km, from Reservoir 5 to supply Reservoir 3 and Reservoir 4.
Capacity:	45 Mℓ/day.

ii) Institutional Arrangements

The Vulindlela BWSS will be operated and maintained by uMngeni-uThukela Water.

iii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Msunduzi Municipality and UMDM. Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 45 Mℓ/day may be 50 000 people.

iv) Implementation

The following scope has been completed under Phase 1:

- Construction of a new 20 Mℓ Reservoir and all ancillary works;
- A new 2.4 km of DN600 epoxy lined pipeline from Reservoir 4 to Reservoir 5 to replace the existing DN300 rising main;

- Conversion of the existing DN300 rising main to gravity main from Reservoir 5 to Reservoir 4;
- A new DN200 steel gravity bulk pipeline from Reservoir 4 to Reservoir 3, tying into the existing branch pipelines supplying Reservoirs 4 and 3 respectively.
- Construct a new Pump Station at Reservoir 2 – PARTIAL COMPLETION
- Modification of inlet & outlet pipework at Reservoir 2 and Reservoir 5, as well as the tie in details for the new connections required at reservoirs 3 and 4.

Phase 2 , yet to commence, will entail the following:

- Installation of an adequate new power supply to the new Reservoir 2 pump station;
- DN800 rising main from Howick West to Vulindlela Reservoir 2.
- 10Mℓ Reservoir at the midway ridge site.
- New Howick West Pump Station.
- New Mpophomeni Booster Pump Station.

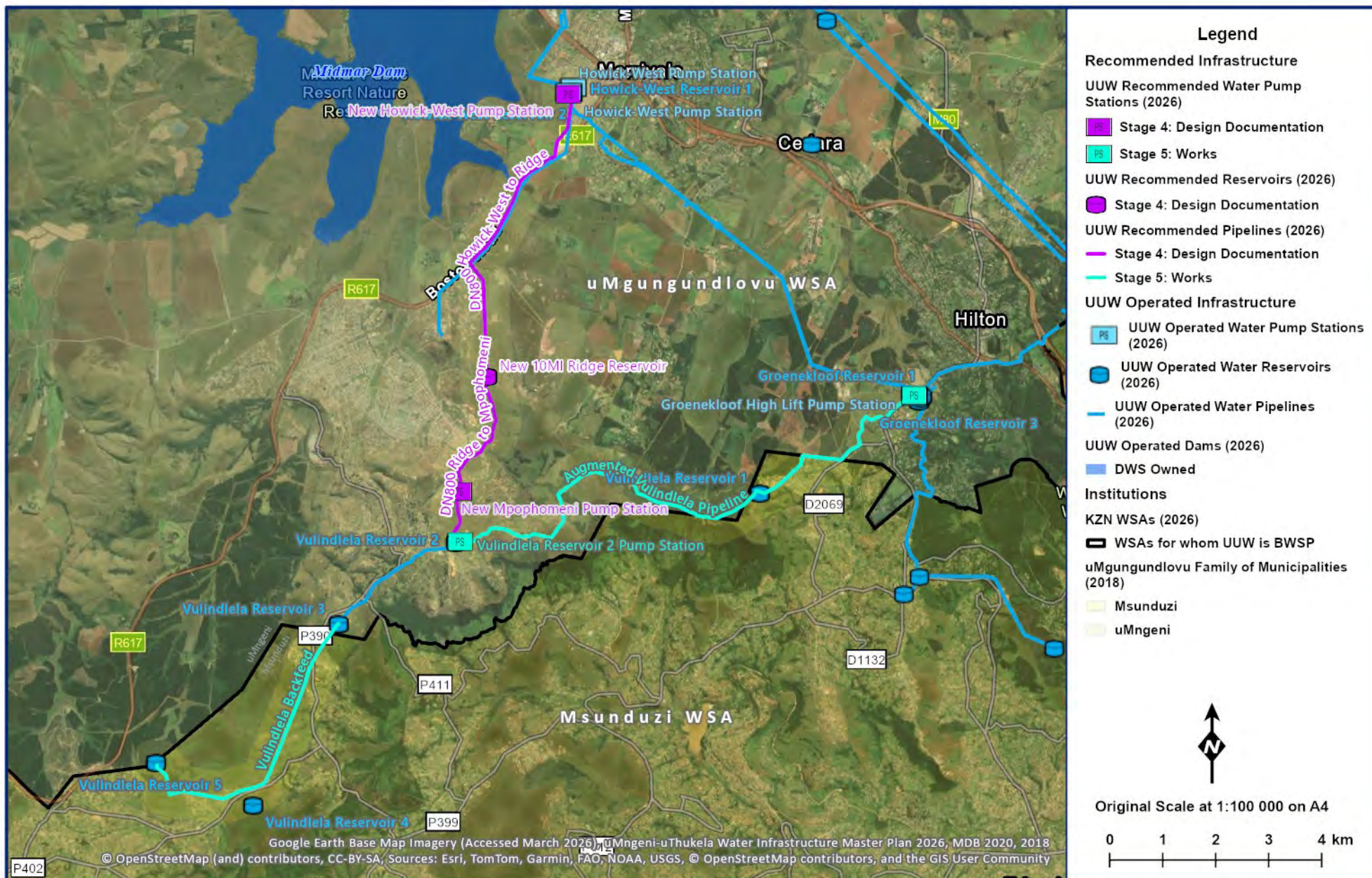


Figure 7.71 Vulindlela Upgrade.

f) Table Mountain Upgrade

Planning No.	105.41
Project No.	
Project Status	New project

i) Project Description

uMgungundlovu District Municipality requested uMngeni-uThukela Water to consider the augmentation of the existing Table Mountain supply infrastructure to meet current and future demand. The initial assessment indicated that the current infrastructure is inadequate to sustain current demand.

The hydraulic analysis indicated that significant augmentation is required to meet current and future demands. Complete upgrade of the pump station, the bulk supply pipeline and a 4 Mℓ/day reservoir is required to ensure an improved supply and greater assurance of supply over the next 20 years.

A pre-feasibility study identified two possible scenarios to augment the supply to the Greater Table Mountain area. Scenario 1 entails the upgrade of the Lower Glen Lyn Break Pressure Tank to a 2 Mℓ storage facility, replacing the existing Table Mountain pump sets with three new pump sets to meet the current and projected demand and construct a new 4 Mℓ Reservoir at Table Mountain.

Scenario 2 entails a direct feed off a proposed new 23 Mℓ Msunduzi Municipality Whispers Reservoir thus eliminating the need of augmenting the Glen Lyn Break Pressure Tank. The other components, i.e., the pump station and Table Mountain Reservoir would be as per Scenario 1.

Msunduzi Municipality in February 2017 informed uMngeni-uThukela Water that they are revising their Water Master Plan due to the changes in the demarcation of boundaries. The site for the proposed 23 MI Whispers Reservoir now falls within uMshwati Local Municipality. Msunduzi Municipality is negotiating with uMshwati Local Municipality to purchase the land for the construction of the proposed reservoir. The timing is uncertain.

uMgungundlovu District Municipality requested that uMngeni-uThukela Water meet the 3 MI/day demand over the next 5 years. uMngeni-uThukela Water together with uMgungundlovu District Municipality and Msunduzi Municipality agreed to implement some of the recommendations as per Option 1 for the upgrade of the Table Mountain Bulk Water Supply Scheme (BWSS) to meet a demand of 3.0 MI/day. This entails the construction of a 300 mm NB, 500 m long suction pipeline, the installation of 2 x 3.2 MI/day pump sets and the upgrade of the existing switchgear. The cost for the partial upgrade will be attached to the asset management maintenance budget. This project is complete. However, due to the

integrity of the rising main to the Table Mountain Intermediate Reservoir, the supply is limited to 2.8 Ml/day.

Key information on this project is summarised in **Table 7.62** and **Figure 7.72**

Table 7.62 Project information: Table Mountain Upgrade.

Project Components:	• 350 mm diameter pipeline, 4.4 km in length. • 4 Mℓ Reservoir.
Capacity:	4 Mℓ.

ii) Institutional Arrangements

The infrastructure from the buy-back meter will be owned, operated and maintained by uMngeni-uThukela Water.

iii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Greater Table Mountain area with estimated population of 13 500.

iv) Implementation

The implementation of this project is dependent on the augmentation of the Msunduzi Municipality Supply network. Msunduzi Municipality estimate that the augmentation of their water supply system will be implemented by 2027. This project is on hold until such time as a definite directive is obtained for the implementation of the Msunduzi Municipality Supply Network.

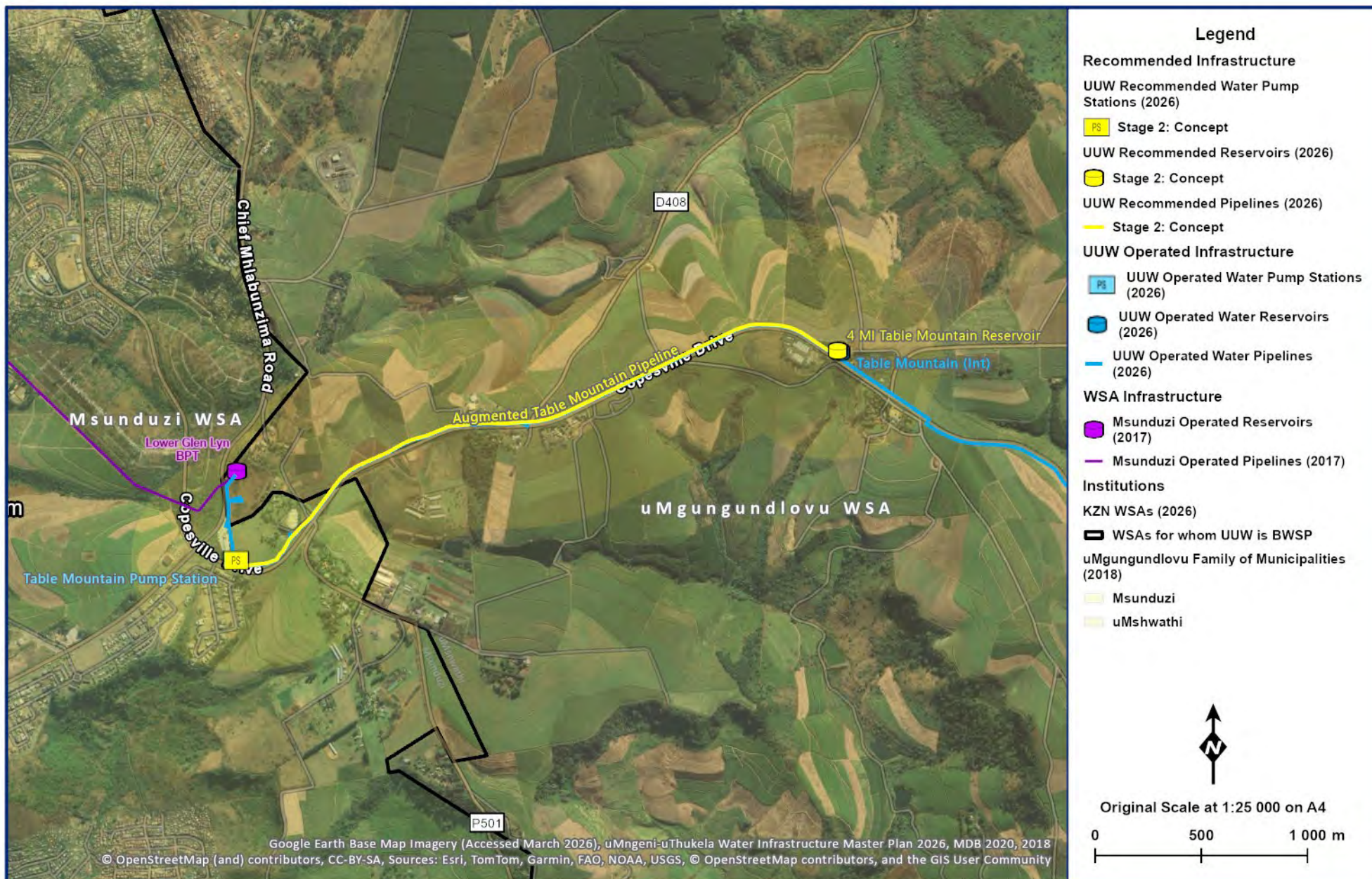


Figure 7.72 Table Mountain Upgrade.

g) Hydropower Unit at the Mpofana Outfall

Planning No.	609.2
Project No.	CI.00003
Project Status	Detailed Design

i) Project Description

A Detailed Feasibility Study (DFS) to assess the viability of a Hydropower Unit on the Mooi-uMngeni Transfer Scheme (MMTS) was initiated in 2013. A cost benefit model was developed to investigate the benefit of installing larger pipe sizes under the second phase of the MMTS in the gravity section of the pipe from the Gowrie Break Pressure Tank to the Mpofana Outfall Site (**Figure 7.73**). It was identified that a 914 mm diameter steel pipe had the highest Internal Rate of Return (IRR), and therefore is the optimal size for installation. The residual head available for power generation at the outfall site under full flow conditions for a new pipe scenario is 148 m, and under aged pipe conditions is 128 m.

The DFS has shown that a dual turbine powerhouse at the Mpofana Outfall Site, with twin turbo type turbines, each capable of discharging 2.25 m³/s at 148 m head, can produce 2.698 MW each (5.396 MW total).

Electrical transmission of the power generated will be fed back into the National Grid at the Gowrie Substation in Nottingham Road. The recoupment of costs will be offset against the power generated and billed to uMngeni-uThukela Water, for the MMTS, by Eskom.

A hydropower unit on the MMTS will recover between 19.7 and 16.8 GW.hr/annum of power, based on MMTS operation for 6 months of the year at 83% efficiency, and depending on the age of the supply pipelines.

This project has been delayed by several unsuccessful negotiations with land owners to purchase land for the substation required. UUW are seeking intervention through the uMngeni Municipality leadership before engaging the courts for expropriation.

ii) Institutional Arrangements

The new infrastructure will be owned, operated and maintained by uMngeni-uThukela Water.

iii) Beneficiaries

The MMTS Hydropower Project is economically feasible with an expected payback period of 5 years. Thereafter the project will save uMngeni-uThukela Water and hence consumers an estimated R36 million per annum at the current electricity tariff.

This saving in the operating costs can be offset in the tariff, which will benefit all consumers within uMngeni-uThukela Water's area of jurisdiction.

iv) Implementation

The total cost is estimated to be approximately R 350 million as at 2024 prices. uMngeni-uThukela Water obtained permission from the Department of Water and Sanitation for access to their infrastructure and is now at the Detailed Design phase of the hydropower unit.

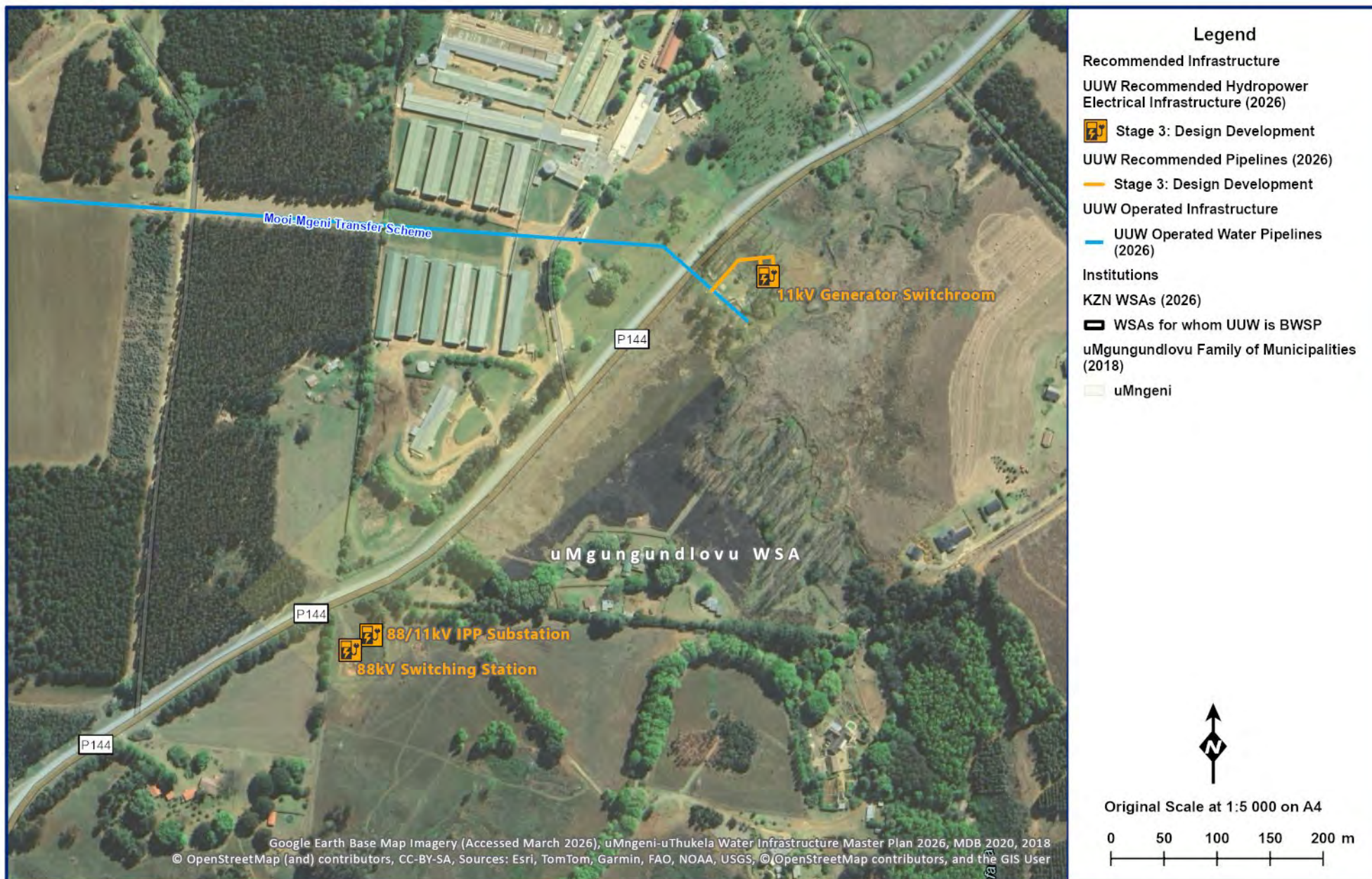


Figure 7.73 Layout of the proposed hydropower unit at the Mpofana Outfall.

h) D.V Harris to Claridge Pipeline

Planning No.	-
Project No.	CI.00448
Project Status	Turnkey

i) Project Description

The major constraint in this system is the maximum capacity of the pipeline from DV Harris WTP to Claridge/Belfort Reservoir. A hydraulic analysis has shown that the maximum flow, under gravity, with the available head difference of 39.74 m is 63 Mℓ/day along the existing 1000 mm diameter pipeline, which is inadequate to meet the current demand.

This constraint is currently having a negative effect on the supply of potable water to the Greater uMshwathi BWSS.

The delay in the implementation of this project is because of oversight when planning and implementing the uMshwathi BWSS, i.e. the infrastructure necessary for the supply of water to the uMshwathi BWSS is inadequate. The current projected date for completion is January 2029.

When the projects in iLembe District Municipality (IDM) have been completed, there will be insufficient supply; it is acknowledged that the 2053 demand of 130MI/d will not be available but supply will improve once the over abstraction on the uMngeni System has been addressed and uMkomasi Water Project commissioned.

The hydraulic analysis has shown that the augmentation of the pipeline from DV Harris WTP to Claridge Reservoir is necessary to increase the flow, with the current available head, to a maximum of 130 Mℓ/day.

The analysis has indicated that a new 1400 mm diameter pipeline is required to meet this maximum flow.

Table 7.63 Project information: DV Harris to Claridge Pipeline.

Project Components:	Designed to deliver approximately 130 Mℓ/day at 2055 demand projections.
Capacity:	130 Mℓ/day ultimate.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain the pipeline and will sell potable water from this system to uMgungundlovu District Municipality and Msunduzi Municipality as per existing bulk water supply agreements.

iii) Beneficiaries

The beneficiaries will be the Greater uMshwathi region, Msunduzi Municipality's northern region and sections of iLembe DM's areas. Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 130 Mℓ/day may be 1 300 000 people.

iv) Implementation

The construction duration of this project is anticipated to be 3 years and will be implemented by end of 2027. The total cost is anticipated to be R 450 million as at November 2024.

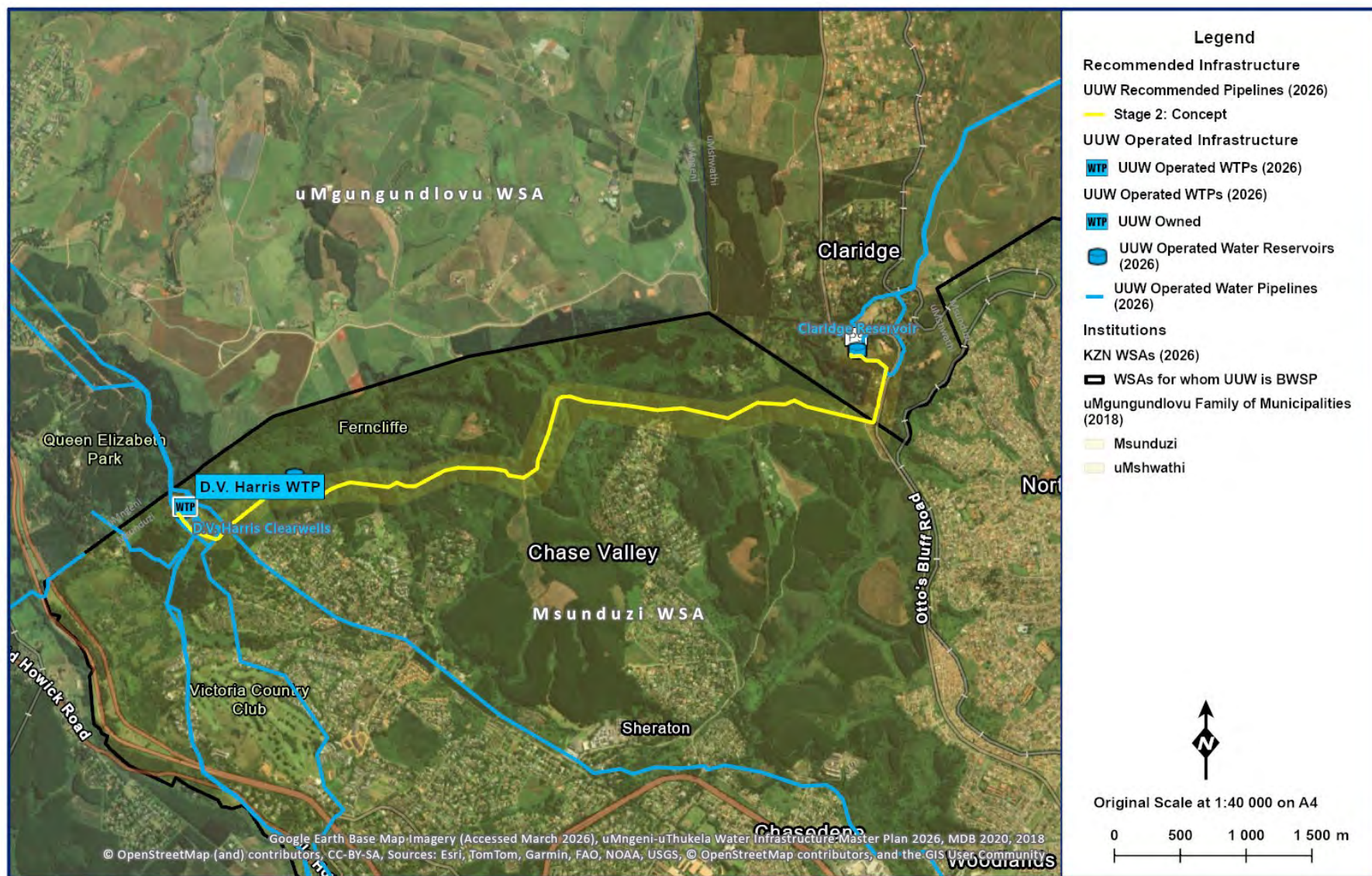


Figure 7.74 Layout of the DV Harris to Claridge Pipeline Augmentation.

7.6 Management and Operation of uMgungundlovu Water Treatment Plants (WTPs)

In 2016, uMgungundlovu District Municipality requested that uMngeni-uThukela Water manage and operate four WTPs under their jurisdiction. uMngeni-uThukela Water agreed to the request under a Memorandum of Understanding (MOU).

The four WTP's (**Figure 7.75**) are:

- Appelsbosch WTP (Decomissioned)
- Lidgetton WTP;
- Mpofana WTP; and
- Rosetta WTP; (Decommissioned)

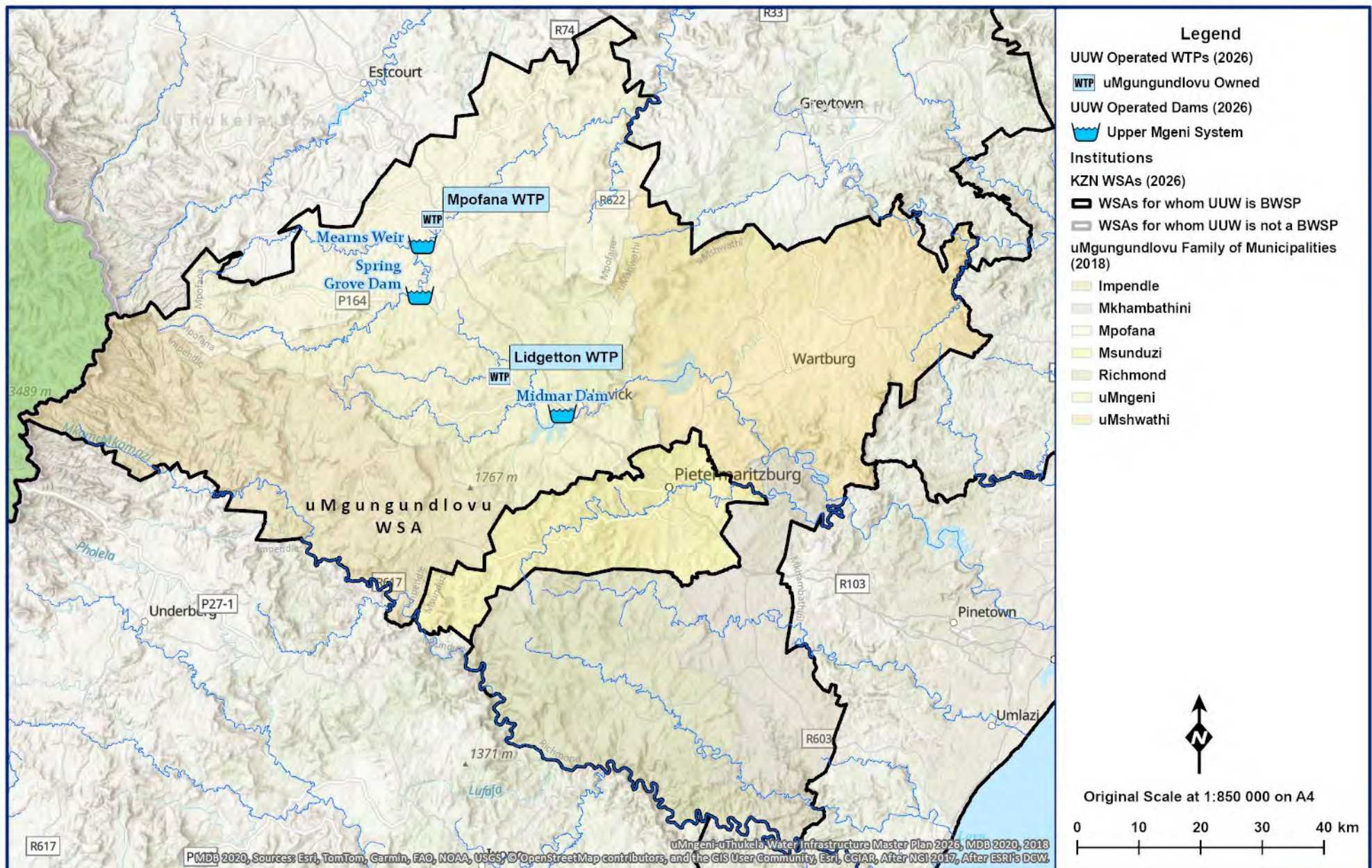


Figure 7.75 General layout of the four uMgungundlovu WTPs being operated and managed by uMngeni-uThukela Water.

7.6.1 Lidgetton WTP

The Lidgetton WTP (**Table 7.64; Figure 7.76**) is located in uMngeni Municipality and supplies the village of Lidgetton from the Lions River (**Figure 7.77**).

Plans are in place to implement the Mpofana BWSS Phase 2, which is the supply to Lidgetton from the Mpofana BWS, as there is an increase in demand in this area. In the interim, the capacity of the existing plant has been “upgraded” (**Figure 7.78**), by the addition of package clarifiers and filters as shown in **Table 7.64**.

Table 7.64 Characteristics of the Lidgetton WTP.

	Current	Package Plant 2019/2020
WTP Name:	Lidgetton WTP	Lidgetton WTP
System:	UMDM	UMDM
Maximum Design Capacity:	0.5 MLD	1 MLD
Current Utilisation:	0.448 MLD	N/A
Raw Water Storage Capacity:	-	-
Raw Water Supply Capacity:	2.3 MLD @ 22.5 m	1.2 MLD @ new system head
Pre-Oxidation Type:	N/A	N/A
Primary Water Pre-Treatment Chemical:	N/A	Polymeric Coagulant
Total Coagulant Dosing Capacity:	N/A	2 x 6 l/h
Rapid Mixing Method:	N/A	Static mixer
Clarifier Type:	N/A	Package Lamella clarifiers
Number of Clarifiers:	N/A	2
Total Area of all Clarifiers:	N/A	38 m ²
Total Capacity of Clarifiers:	N/A	2.4 MLD
Filter Type:	Slow sand filtration	Pressure filters
Number of Filters:	3	4
Filter Floor Type	-	-
Total Filtration Area of all Filters	75 m ²	14 m ²
Total Filtration Design Capacity of all Filters:	0.5 MLD	2.4 MLD
Total Capacity of Backwash Water Tanks:	N/A	To be determined
Total Capacity of Sludge Treatment Plant:	N/A	To be determined
Capacity of Used Washwater System:	N/A	To be determined
Primary Post Disinfection Type:	Calcium hypochlorite granules	Sodium hypochlorite
Disinfection Dosing Capacity:	2 x 6 l/h	2 x 6 l/h

Disinfectant Storage Capacity:	20L drums; stored in the chemical room	To be stored in 25 L drums ,in the chemical room
Total Treated Water Storage Capacity:	Onsite sump: Estimated to be 80 m3	Onsite sump: Estimated to be 80 m3



Figure 7.76 Lidgetton WTP sand wash bays with old dosing system (uMgungundlovu District Municipality 2010)

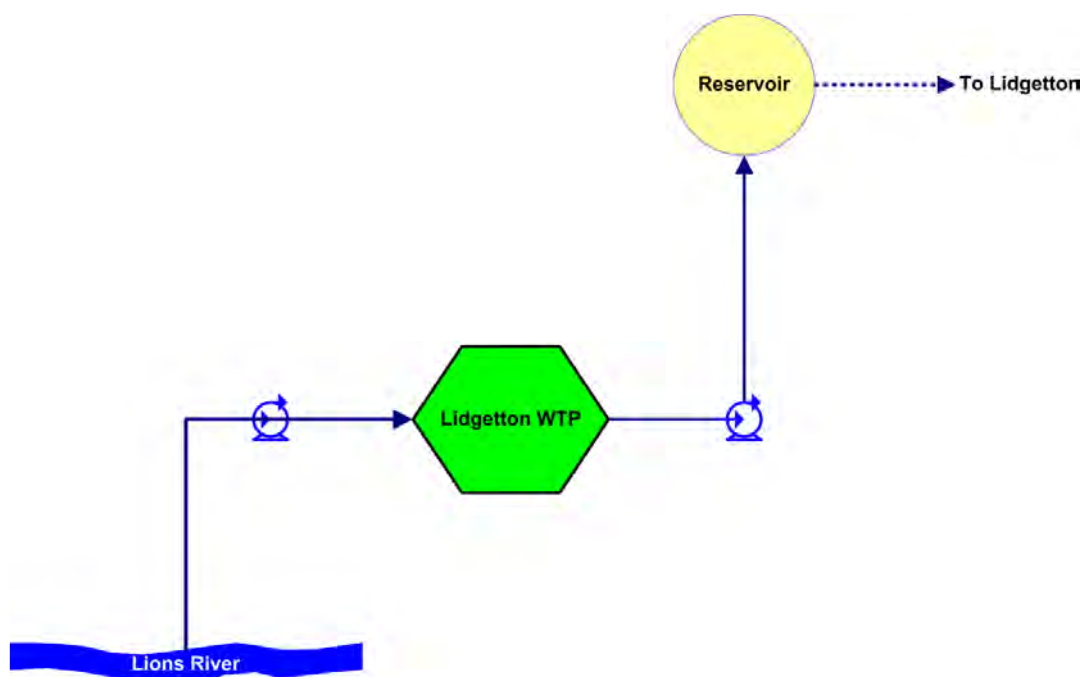


Figure 7.77 Schematic of the Lidgetton System (subject to verification).



Figure 7.78 1 MI/day being constructed at the Lidgetton System.

An analysis of daily historical production (November 2022 to October 2023) of the Lidgetton WTP is presented in **Figure 7.79**. It shows that for 28.88% of the time the WTP was being operated above the optimal operating capacity for the period as stipulated and 17.98 % above the upgraded design capacity.

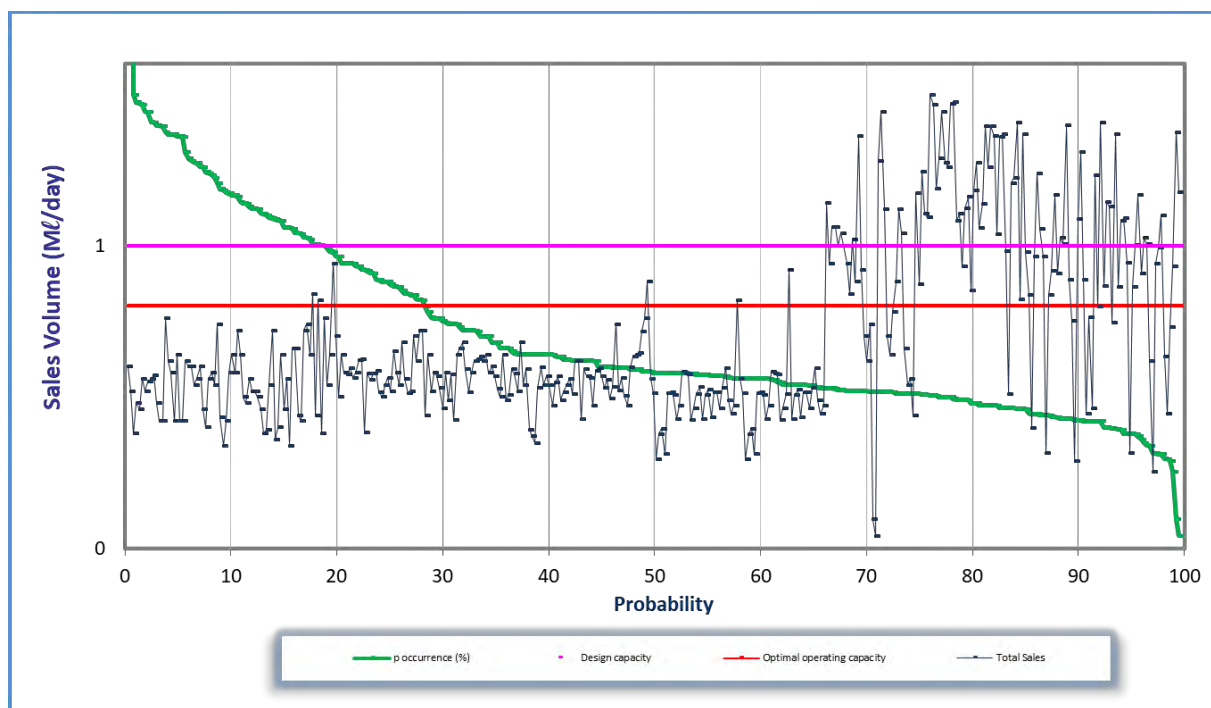
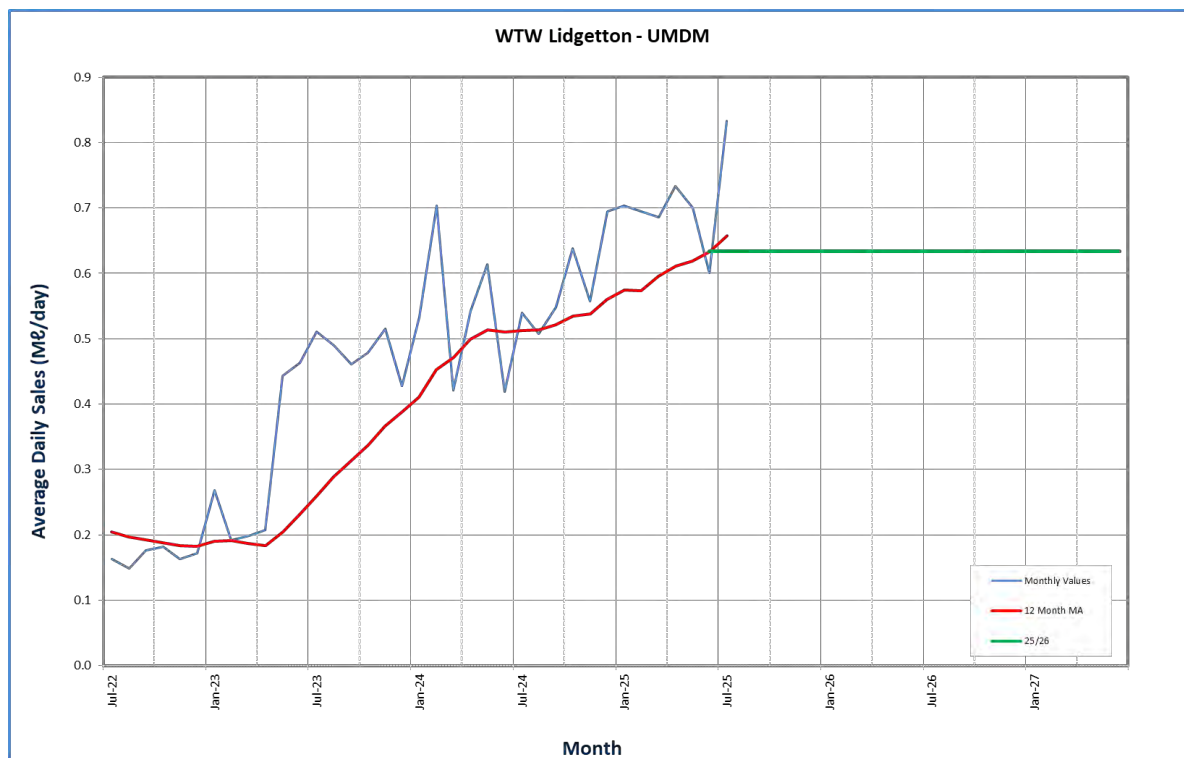


Figure 7.79 Analysis of historical production at Lidgetton WTP (November 2022 to October 2023).

The growth in demand is estimated at 1.5 % per annum over the next two years (). It is envisaged that the 1 M_l/day package plant will, thereafter, be fully operational.

Figure 7.80 Water demand from Lidgetton WTP.



This plant will be decommissioned when the Mpofana BWSS Phase 2 Supply System is implemented by the year 2027.

7.7 uMzinyathi Water Treatment Plants

7.7.1 Mudén WTP and Supply System

a) Description of the Mudén WTP and Supply System

The Mudén Water Supply Scheme is located in the lower reaches of the Mooi catchment in the Mvoti Local Municipality (**Figure 7.81**) and is operated by the uMzinyathi WSA.

The scheme is currently supplied from boreholes and abstractions from the Mooi River (**Table 7.65**). The long-term water demand for the uMzinyathi DM section of the Mudén Water Supply Scheme is estimated at 15.78 Mℓ/day. The Mooi River remains the most viable source of water for the scheme. The MAR at the abstraction point was calculated at 49.85 million m³, according to page 33 of the Mudén All Town Recon Strategy (Department of Water and Sanitation, 2011. First Stage Reconciliation Strategy for Mudén Water Supply Scheme Area - uMvoti Local Municipality).

Table 7.65 Summary of Mudén WTP Supply System existing infrastructure (DWS 2011).

Scheme Area	Source	Water Treatment Plant	Reservoir Capacity (Mℓ)
Mudén	Mooi River	Mudén WTP – 11.00 Mℓ/day, conventional plant	8
	Boreholes	Borehole – 1.58 Mℓ/day	

The raw water sources for the Mudén Supply System is 1) the Mooi River, which supplies the Mudén WTP, and 2) seven boreholes, which supply directly into reticulated networks (**Figure 7.82**). Abstraction from the Mooi River takes place at several locations, however, the ideal abstraction position for the scheme is at an existing irrigation canal in Mudén. The canal's supply is from a weir constructed on the Mooi River, located approximately 7 km from the existing Mudén WTP (**Table 7.66** and **Figure 7.83**). The irrigation canal feeds water to the existing treatment plant via gravity, from where it is distributed to the Mudén and Opathe areas. The Craigieburn Dam, which is situated between Mooi River and Greytown, augments the flow in the Mooi River as and when required.

The pump details, reservoir details and pipeline details for the Mudén Supply System are listed in **Table 7.67**, **Table 7.68** and **Table 7.69** respectively.

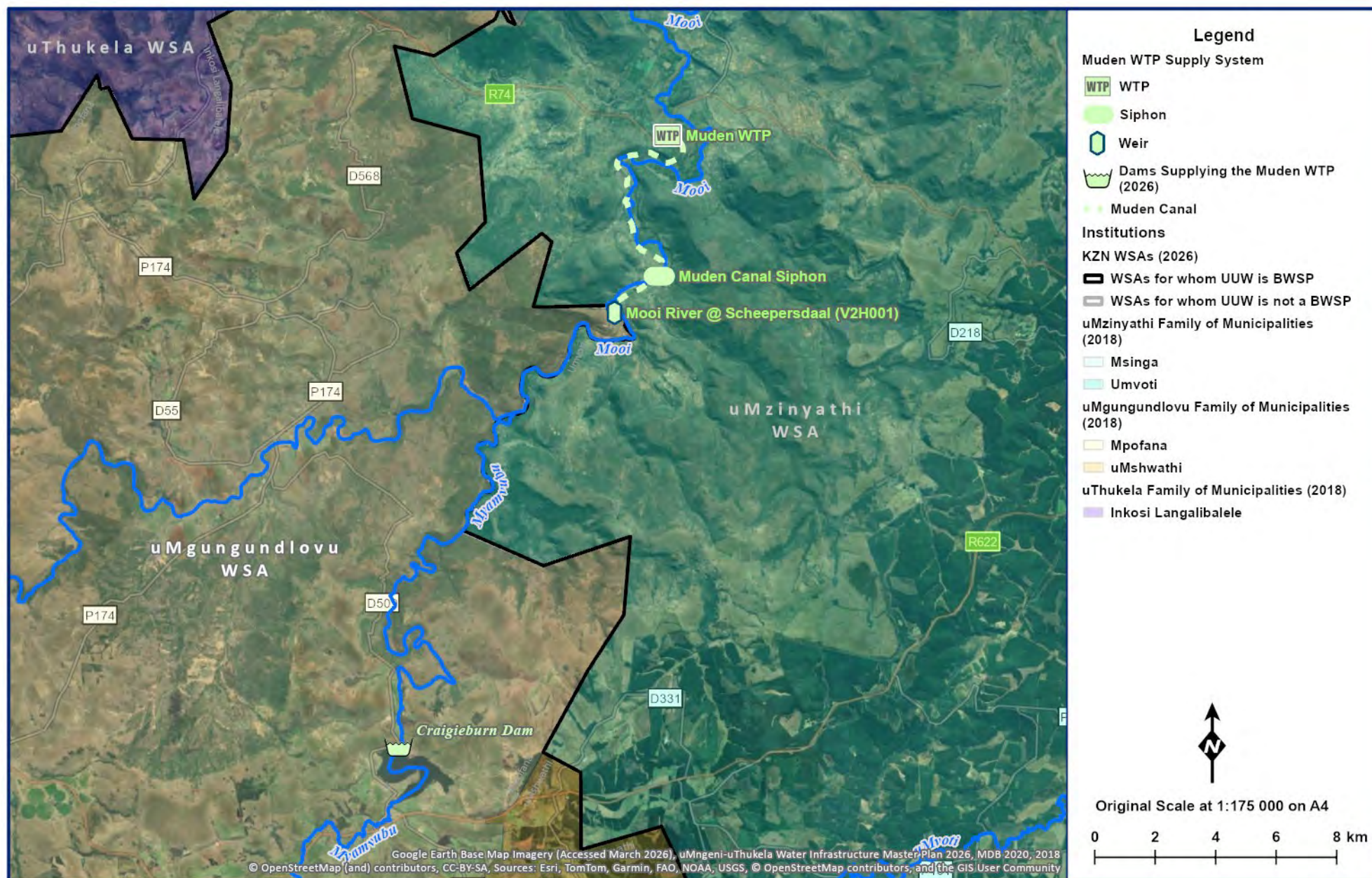


Figure 7.81 Muden WTP supply system.

The characteristics of the Mudén WTP are shown in **Table 7.66**.

Table 7.66 Characteristics of the Mudén WTP.

WTP Name:	Mudén WTP
System:	Mvoti Supply System
Maximum Design Capacity:	11 Mℓ/day (3 Mℓ/day old plant + 8 Mℓ/day new plant)
Current Utilisation:	2.798 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	3.0 Mℓ/day due to constraint of irrigation canal
Pre-Oxidation Type:	None
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	13 ℓ/hour (running at 50%)
Rapid Mixing Method:	Conventional Paddle Flash Mixer
Clarifier Type:	Dortmund manual clarifiers
Number of Clarifiers:	6 (2 old and 4 new)
Total Area of all Clarifiers:	140.4 m ² (28.08 m ² old and 112.32 m ² New)
Total Capacity of Clarifiers:	12.5 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	8 (2 Old and 6 New)
Filter Floor Type	Laterals with Nozzles
Total Filtration Area of all Filters	83.64 m ²
Total Filtration Design Capacity of all Filters:	12.5 Mℓ/day
Total Capacity of Backwash Water Tanks:	0m ³
Total Capacity of Sludge Treatment Plant:	None
Capacity of Used Washwater System:	0 Mℓ/day
Primary Post Disinfection Type:	Sodium Hypochloride
Disinfection Dosing Capacity:	13 ℓ NaOCl/hr
Disinfectant Storage Capacity:	
Total Treated Water Storage Capacity:	0.5 Mℓ

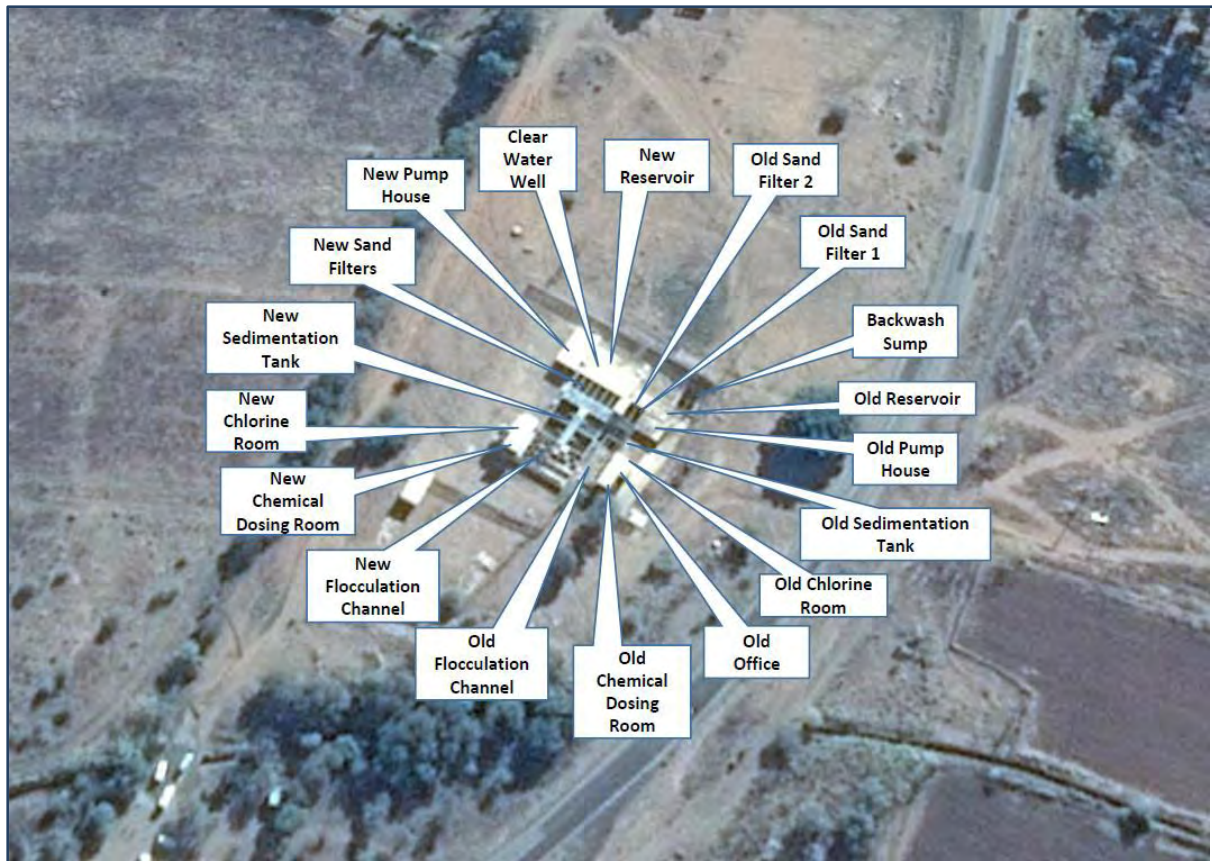


Figure 7.83 Aerial view of the Mudén WTP (Google Earth 2018).

Table 7.67 Pump details: Mudén Supply System.

System	Pump Station Name	Number of Pumps		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
		Number of Duty Pumps	Number of Standby Pumps						
Muden	PS 1	2	1	KSB WKLn 80/2	Muden WTP	Res 1	95	110	2.8
Muden	PS 2	1	1	KSB WKLn 40/6	Res 3	Res 4	124	144	0.5
Muden	PS 3	2	1	KSB NTC 65/50	Res 1	Res 2	216	250	1.7
Muden	PS 5	1	1	KSB WKLn 40/4	Res 5	Res 6	95	128	0.432
Muden	PS 7	1	1	KSB WKLn 65/10	Res 17	Res 16	51	115	0.5
Muden	PS 8	1	1	KSB WKLn 40/4	Res 6	Steel header tank	166	O/C*	O/C*

* PS 8 is out of commission as it cannot deliver the required head.

Table 7.68 Reservoir details: Mudén Supply System.

System	Reservoir Site	Reservoir Name	Capacity (M_l)	Function	TWL (aMSL)	FL (aMSL)
Muden	Muden	Res 3	0.350	Distribution	917	913
Muden	Muden	Res 4	0.100	Terminal	1041	1038
Muden	Muden	Res 5	0.250	Distribution	919	916
Muden	Muden	Res 6	0.250	Distribution	1014	1011
Muden	Muden	Res 7	0.250	Distribution	820	817
Muden	Muden	Res 8	0.450	Terminal	1104	1101
Muden	Muden	Res 1	0.250	Distribution	921	917
Muden	Muden	Res 2	0.450	Distribution	1136	1132
Muden	Muden	Res 9	0.300	Terminal	1257	1254
Muden	Muden	Res 12	0.150	Terminal	917	913
Muden	Muden	Res 13	0.150	Terminal	1135	1132
Muden	Muden	Res 14	0.150	Terminal	852	849
Muden	Muden	Res 18	0.100	Terminal	1246	1243
Muden	Muden	Res 16	0.100	Terminal	876	872
Muden	Muden	Res 17	0.150	Distribution	825	822

Table 7.69 Pipeline details: Mudén Supply System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (M _l /day)	Age (years)
Mudén	Raw water pipeline	Irrigation canal	Mudén WTP	0.3	315	uPVC	13.46*	4
Mudén	Potable pipeline water	Mudén WTP	Res 3	1.477	250	uPVC	6.36**	57#
Mudén	Potable pipeline water	Res 3	Res 4	9.6	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Mudén PS	Res 1	4.37	250	uPVC	6.36**	57#
Mudén	Potable pipeline water	Res 1	Res 2	3.05	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Res 1	Res 8	3.936	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Res 8	Res 9	2.7	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Mudén PS	Res 5	5.179	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Mudén PS	Res 7	8.2	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Res 5	Res 6	2.215	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Res 6	Steel Header Tank	4.99	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Res 7	Res 17	3.29	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Res 17	Res 16	6.55	110	uPVC	1.23**	57#

* Based on a velocity of 2 m/s

** Based on a velocity of 1.5 m/s

Age need to be verified

b) Status Quo and Limitations of the Mudén Supply System

The primary water source for the regional scheme is the Mooi River. Abstraction from the Mooi River takes place at several locations, however, the ideal abstraction position is at an existing irrigation canal in Mudén. The canal's supply is from a weir constructed on the Mooi River, located approximately 7km from the existing Mudén WTP. The irrigation canal feeds water to the existing treatment plant via gravity and from there it is distributed to the Mudén and Opathe areas. The Craigieburn Dam, which is situated between Mooi River and Greytown augments the above mentioned weir as and when required through downstream releases.

The irrigation channel is fed from the Mooi River and supplies irrigation water to the farms in the area. The design capacity of the channel is sufficient to supply irrigation and domestic water for Mudén, Ophate and Keate's Drift. The channel is, however, an earthen channel and is prone to silting and damage. The channel is cleaned of silt and plant growth on a regular basis and this has increased the capacity of the channel significantly although further rehabilitation would be required to restore the channel to full design capacity. The supply is supported by the Craigieburn Dam which has sufficient capacity according to DWS. In March 2021, there has been a dispute relating to the raw water resource, between the farmers and uMzinyathi DM, which resulted in a total supply of only 1.567 Mℓ/day. The use of the canal as the primary raw water resource does pose a significant risk to the sustainability of supply and an alternative will have to be considered.

The current water sources at Keate's Drift and Ndaya schemes are inadequate and unsustainable to meet the water demand for the area. The community of Ndaya currently obtains water supplies from streams, rivers and springs in the area for domestic purposes. In most instances these rivers and streams are located more than two kilometres from households and water quality is considered poor.

An upgrade has been planned for the Mudén WTP to extend the supply to the Keate's Drift and Ndaya areas. The extension of the supply to these areas is currently in the design/construction stage.

The pump stations and pipelines would have to deliver 5100 kℓ to Keate's Drift / Ndaya per day. The water would be delivered to a service reservoir from where it will be fed to the distribution networks and/or supply areas.

7.8 Recommendations for the uMzinyathi Water Treatment Plants

The projected total daily demand of 6.9 Mℓ/day, by 2025, for the Mudén BWSS (which includes the daily demand for Mudén and Opathe) was discussed with DWS, in order to establish whether the Craigieburn Dam would be a sustainable supplementary source and it was confirmed.

To meet current and future demand, the Mudén Bulk Water Supply Scheme has been planned and designed by Ilifa Consulting Engineers appointed by uMzinyathi DM and comprises of the following infrastructure:

- The expansion of the existing Mudén Water Treatment Plant from a capacity of 2.4 Mℓ/day to a capacity of 6.9 Mℓ/day.
- The relocation of the portable 1 Mℓ/day Water Treatment Plant, located near Keate's Drift abstraction works to Mudén to augment supply.
- The construction of approximately 150 km of bulk water pipelines ranging in diameter from 90 mm to 315 mm.
- The construction of several bulk water reservoirs totalling approximately 15 Mℓ of storage, and distribution reservoirs totalling 0.3 Mℓ of storage.
- The construction of six bulk water pump stations and two booster pump stations to carry water to the high lying areas of the project area.
- The construction of approximately 77 km of distribution water pipelines (including reticulation), ranging in diameter from 63 mm to 90 mm.
- The construction of approximately 410 standpipes to provide water to the entire project area.

In order to mitigate the constraints of the water supply to Keate's Drift, it is recommended to supply this area from Mudén WTP and the preferred option is:

- A pump station at the plant pumping directly to the service reservoir over a distance of ± 17.3 km. The advantage of this option is that only one pump station at the plant is required. The disadvantage is that the pumping head is such that expensive pipes (ductile iron vs uPVC) or larger pipes (i.e. 400 mm v 315 mm) would be required. The total pumping head at the plant is ± 95 m requiring 75 kW motors for three pumps running in parallel.
- The centre line levels vary between 815 m at the purification plant and ± 700 m at the proposed service reservoir in Keate's Drift. The proposed Keate's Drift service reservoir top water level is slightly higher than the level at the plant. The water supply from the service reservoir to Keates Drift would require a pressure reducing installation. The supply scheme capacity up to the service reservoir is 90 ℓ/s and ± 150 ℓ/s downstream of the service reservoirs.

The aim of the Mudén Bulk Water Supply Scheme is to:

- Consolidate water supply sources to achieve economies of scale.

- Provide a safe and reliable source of potable water to promote health and hygiene and reduce the incidence of waterborne diseases for a population of 59 880 (7485 households) in the project area.
- Create employment opportunities for the community for the duration of the construction programme.
- Promote community awareness in terms of general health and hygiene issues.

In summary, the project is recommended for the following reasons:

- It is a cost effective solution.
- It makes use of existing infrastructure most effectively.
- Operation and Maintenance activities at the Mudén Abstraction Works and Water Treatment Plant are already in place, and therefore pose no new challenge to the operating authority.
- There is a guaranteed assurance of supply from the Mudén irrigation canal which is supplied via the existing Craigieburn Dam.
- Eliminates the operation of multiple Water Treatment Works situated at various places within the Municipal boundaries i.e. economy of scale.

(uMzinyathi DM 2015)

7.8.1 Projects

a) Mudén BWSS

Planning No.	
Project No.	
Project Status	Detailed design and construction

i) Project Description

The current water sources at Keate's Drift and Ndaya schemes are inadequate and unsustainable to meet the water demand for the area. The community of Ndaya currently obtains water supplies from streams, rivers and springs in the area for domestic purposes. In most instances, these rivers and streams are located more than two kilometres from households and water quality is considered poor.

An upgrade has been planned for the Mudén WTP (**Figure 7.84**) to extend the supply to the Keate's Drift and Ndaya areas. The extension of the supply to these areas is currently in the Design/construction stage

Key information on this project is summarised in **Table 7.57**.

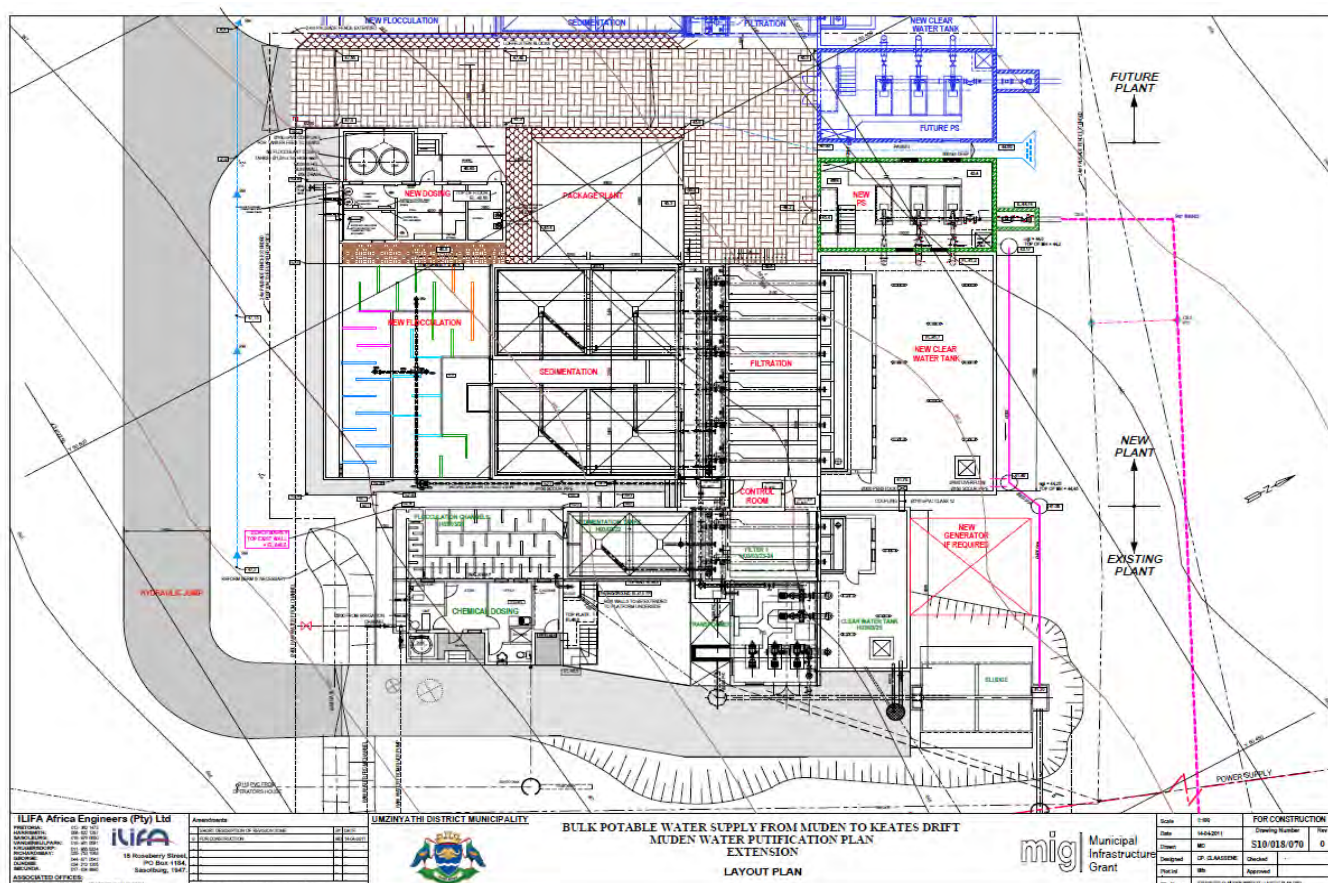


Figure 7.84 General layout of the Mudén WTP upgrade.

Table 7.70 Project information: Mudén BWSS.

Project Components:	• The expansion of the existing Mudén Water Treatment Plant from a capacity of 2.4 Ml/day to a capacity of 6.9 Ml/day (Complete) • The relocation of the portable 1 Ml/day Water Treatment Plant, located near Keates Drift abstraction works to Mudén to augment supply. • The construction of approximately 150 km of bulk water pipelines ranging in diameter from 90mm to 315mm diameter pipelines (In construction). • The construction of several bulk water reservoirs totalling approximately 15ML of storage, and distribution reservoirs totalling 0.3ML of storage. • The construction of six bulk water pumpstations and two booster pumpstations to carry water to the high lying areas of the project area. • The construction of approximately 77km of distribution water pipelines (including reticulation), ranging in diameter from 63mm to 90mm. • The construction of approximately 410 standpipes which will provide water to the entire project area. •
Capacity:	6.9 Ml/day.

ii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Mudén, Opathe, Keate's Drift and Ndaya areas with an estimated population of 59880.

iii) Implementation

The construction duration of this project is anticipated to be six years. The total cost is estimated to be R142 million at 2020 prices.

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Kevin Meier,
MANAGER: PLANNING SERVICES

Preface

This Infrastructure Master Plan 2026 describes:

- uMngeni-uThukela Water's infrastructure plans for the financial period 2026/2027 – 2056/2057, and
- Infrastructure master plans for other areas outside of uMngeni-uThukela Water's Operating Area but within KwaZulu-Natal.

It is a comprehensive technical report that provides information on current infrastructure and on future infrastructure development plans. This report replaces the last comprehensive Infrastructure Master Plan that was compiled in 2025.

The report is divided into **ten** volumes as per the organogram below.

Volume 1 includes the following sections and a description of each is provided below:

- **Section 2** describes the most recent changes and trends within the primary environmental dictates that influence development plans within the province.
- **Section 3** relates only to the uMngeni-uThukela Water Operational Area and provides a review of historic water sales against past projections, as well as uMngeni-uThukela Water's most recent water demand projections, compiled at the end of 2025.
- **Section 4** describes Water Demand Management initiatives that are being undertaken by the utility and the status of Water Demand Management Issues in KwaZulu-Natal.
- **Section 5**, which also relates to uMngeni-uThukela Water's Operational Area, contains a high-level review of the energy consumption used to produce the water volumes analysed in Section 3.
- **Section 6** provides an overview of the water resource regions and systems supplied within these regions.

The next eight volumes describe the current water resource situation and water supply infrastructure of the various systems in KwaZulu-Natal, including:

- | | | |
|-------------------|-------------------|--|
| • Volume 2 | Section 7 | uMngeni System. |
| • Volume 3 | Section 8 | uMkhomazi System |
| | Section 9 | uMzimkhulu System |
| | Section 10 | Mzintlava System |
| • Volume 4 | Section 11 | South Coast System |
| • Volume 5 | Section 12 | North Coast System |
| • Volume 6 | Section 13 | Upper uThukela System |
| • Volume 7 | Section 14 | Buffalo System |
| • Volume 8 | Section 15 | Middle uThukela System |
| | Section 16 | Mhlathuze System |
| • Volume 9 | Section 17 | Umfolozu System |
| | Section 18 | uMkhuze / uPhongolo / Lake Sibiyi System |

Volume 10, Section 19 describes the wastewater works currently operated by uMngeni-uThukela Water (shown in pale brown in the adjacent figure) and provides plans for development of additional wastewater treatment facilities. The status of wastewater treatment in WSA's that are not supplied by uMngeni-uThukela Water are also described in this section.

It is important to note that information presented in this report is in a summarised form and it is recommended that the reader refer to relevant planning reports if more detail is sought. Since the primary focus of this Infrastructure Master Plan is on bulk supply networks, the water resource infrastructure development plans are not discussed at length. The Department of Water and Sanitation (DWS), as the responsible authority, has undertaken the regional water resource development investigations. All these investigations have been conducted in close collaboration with uMngeni-uThukela Water and other major stakeholders to ensure that integrated planning occurs. Details on these projects can be obtained directly from DWS, Directorate: Options Analysis (East).

The Infrastructure Master Plan is a dynamic and evolving document. Outputs from current planning studies, and comments received on this document will therefore be considered in the preparation of the next update.

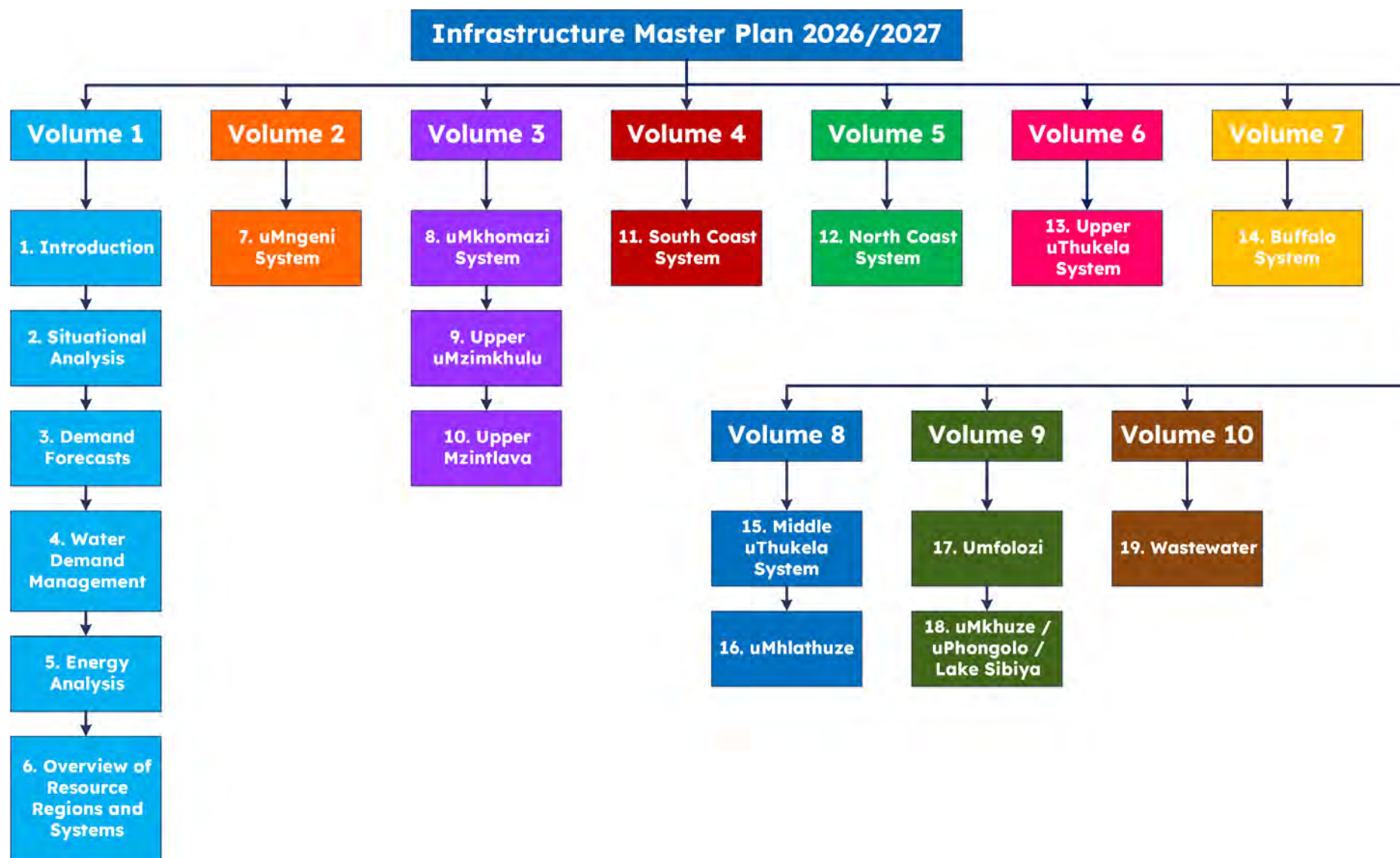


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List of Acronyms

AADD	Annual Average Daily Demand
AC	Asbestos Cement
ADWF	Average Dry Weather Flow
API	Antecedent Precipitation Index
AVGF	Autonomous Valveless Gravity Filter
BID	Background Information Document
BPT	Break Pressure Tank
BWL	Bottom Water Level
BWSP	Bulk Water Services Provider
BWSS	Bulk Water Supply Scheme
CAPEX	Capital Expenditure
CMA	Catchment Management Agency
CoGTA	Department of Co-operative Governance and Traditional Affairs
CWSS	Community Water Supply and Sanitation project
DAEA	Department of Agriculture and Environmental Affairs
DEA	Department of Environmental Affairs
DEFF	Department of Environment, Forestry and Fisheries
DM	District Municipality
DRDLR	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
DWAF	Department of Water Affairs and Forestry
EFR	Estuarine Flow Requirements
EIA	Environmental Impact Assessment
EKZN Wildlife	Ezemvelo KZN Wildlife
EMP	Environmental Management Plan
EWS	eThekweni Water Services
EXCO	Executive Committee
FC	Fibre Cement
FL	Floor level
FSL	Full Supply level
GCM	General Circulation Model
GDP	Gross Domestic Product
GDPR	Gross Domestic Product of Region
GVA	Gross Value Added

HDI	Human Development Index
IDP	Integrated Development Plan
IFR	In-stream Flow Requirements
IMP	Infrastructure Master Plan
IRP	Integrated Resource Plan
ISP	Internal Strategic Perspective
IWRM	Integrated Water Resources Management
KZN	KwaZulu-Natal
LM	Local Municipality
LUMS	Land Use Management System
MA	Moving Average
MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MBR	Membrane Bioreactor
MMTS	Mooi-uMngeni Transfer Scheme
MMTS-1	Mooi-uMngeni Transfer Scheme Phase 1
MMTS-2	Mooi-uMngeni Transfer Scheme Phase 2
mPVC	Modified Polyvinyl Chloride
MTEF	Medium-Term Expenditure Framework
MTSF	Medium-Term Strategic Framework
MWP	Mkomazi Water Project
MWP-1	Mkomazi Water Project Phase 1
NCP-1	North Coast Pipeline I
NCP-2	North Coast Pipeline II
NCSS	North Coast Supply System
NGS	Natal Group Sandstone
NPV	Net Present Value
NRW	Non-Revenue Water
NSDP	National Spatial Development Perspective
NWSP	National Water Sector Plan
OPEX	Operating Expenditure
p.a.	Per annum
PES	Present Ecological Status
PEST	Political, Economical, Sociological and Technological
PGDS	Provincial Growth and Development Strategy
PPDC	Provincial Planning and Development Commission (KZN's)

PSEDS	Provincial Spatial Economic Development Strategy
PWSP	Provincial Water Sector Plan
RDP	Reconstruction and Development Programme
RO	Reverse Osmosis
ROD	Record of Decision
RQO	Resource Quality Objective
SCA	South Coast Augmentation
SCP	South Coast Pipeline
SCP-1	South Coast Pipeline Phase 1
SCP-2a	South Coast Pipeline Phase 2a
SCP-2b	South Coast Pipeline Phase 2b
SDF	Spatial Development Framework
SHR	St Helen's Rock (near Port Shepstone)
STEEPLE	Social/demographic, Technological, Economic, Environmental (Natural), Political, Legal and Ethical
SWRO	Seawater Reverse Osmosis
TEC	Target Ecological Category
TWL	Top Water Level
uPVC	Unplasticised Polyvinyl Chloride
UUW	uMngeni-uThukela Water
WA	Western Aqueduct
WC	Water Conservation
WDM	Water Demand Management
WMA	Water Management Area
WRC	Water Research Commission
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSNIS	Water Services National Information System
WSP	Water Services Provider
WTP	Water Treatment Plant
WWW	Wastewater Works

Spellings of toponyms have been obtained from the South African Geographical Names Council (SAGNC) which operates under the national Department of Sport, Arts and Culture (DSAC). The SAGNC provides the official spelling of place names and the spellings, together with the relevant gazette numbers, can be accessed at <http://www.dac.gov.za/content/toponymic-guidelines-map-and-other-editors>.

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7. uMngeni System

7.1 Synopsis of uMngeni System

The Durban-Pietermaritzburg Region's (the primary economic hub of KZN) main source of potable water is the uMngeni System (**Figure 7.1& Figure 7.2**). It comprises of five storage dams, four of which are located on the uMngeni River. The fifth dam and a weir are located on the Mooi River and augment raw water supply to the resources on the uMngeni River via the Mooi/Mngeni Transfer scheme (MMTS 1&2). Together they form the Mooi/uMngeni Water Resource Region which is an integrated water resource with a bulk potable water distribution system made up of two major sub-systems, viz.

- The Upper uMngeni System (also referred to as the Inland System **Figure 7.3**) serving the uMgungundlovu District Municipality, Msunduzi Municipality, Ilembe Municipality and eThekweni Municipality's Outer West area, and
- The Lower uMngeni System (**Figure 7.5**) serving the coastal areas and hinterland of the eThekweni Municipality. This sub-system also serves the northern coastal areas of Ugu District Municipality via the South Coast Augmentation Pipeline and the South Coast Pipeline.

The water resources of the two sub-systems are highly inter-dependant (**Figure 7.3**). The respective bulk distribution systems are inter-connected by uMngeni-uThukela Water's infrastructure and eThekweni Metropolitan Municipality's Western Aqueduct.

Figure 7.3 and **Figure 7.4** show the Upper uMngeni System and **Figure 7.5** and **Figure 7.6**, the Lower uMngeni System.

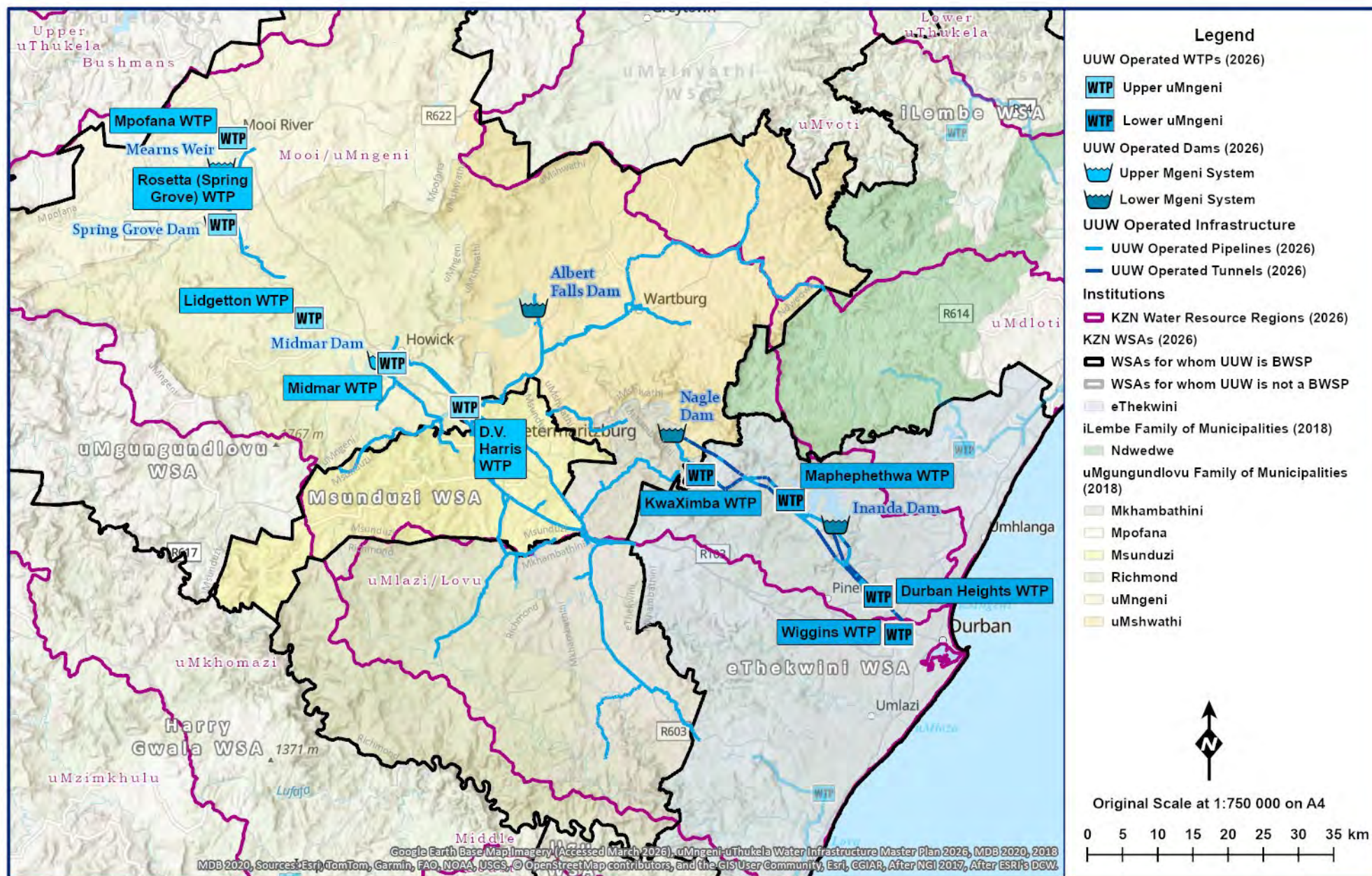


Figure 7.1 General layout of the uMngeni System

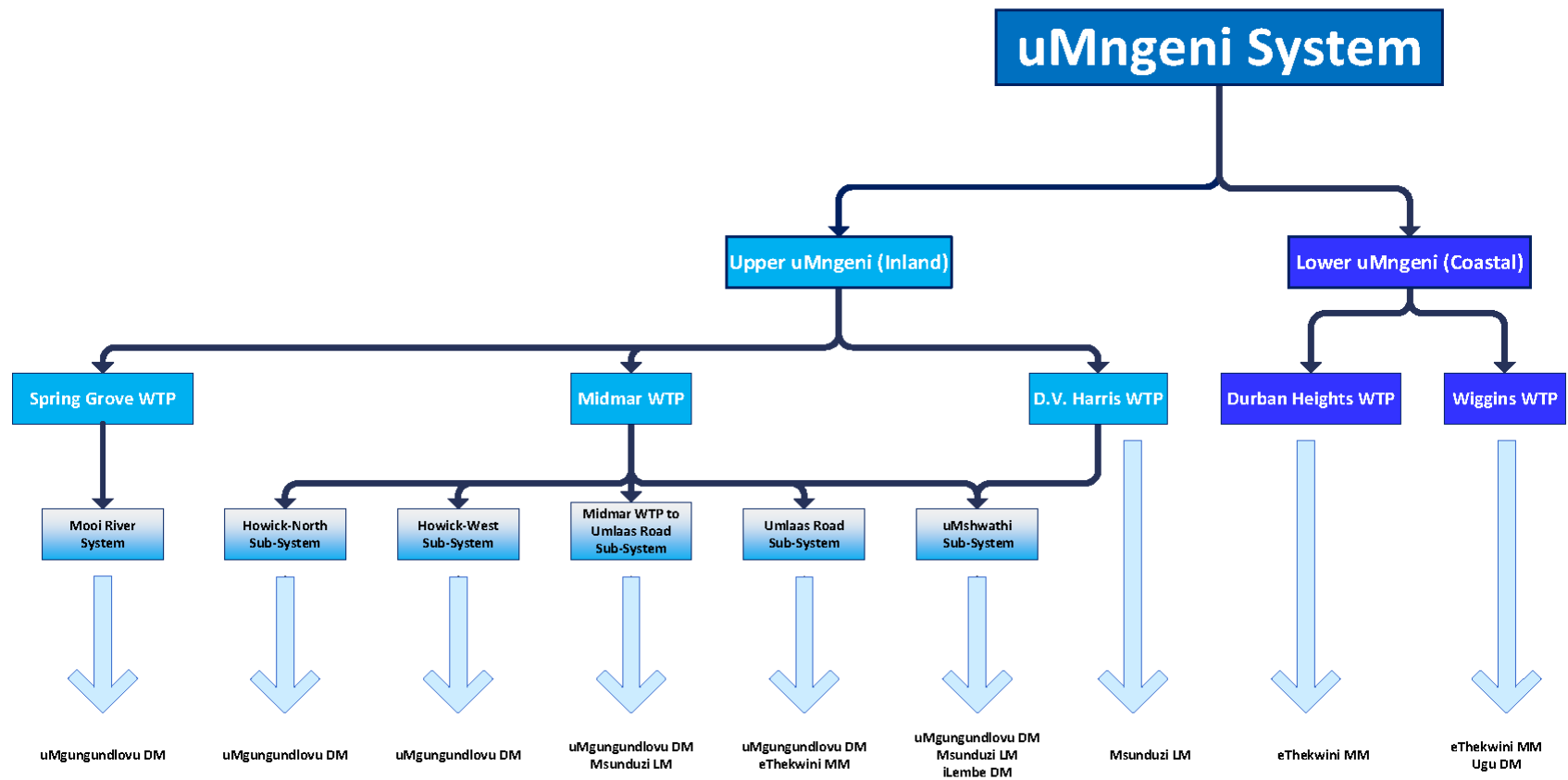


Figure 7.2 Network chart of the uMngeni System.

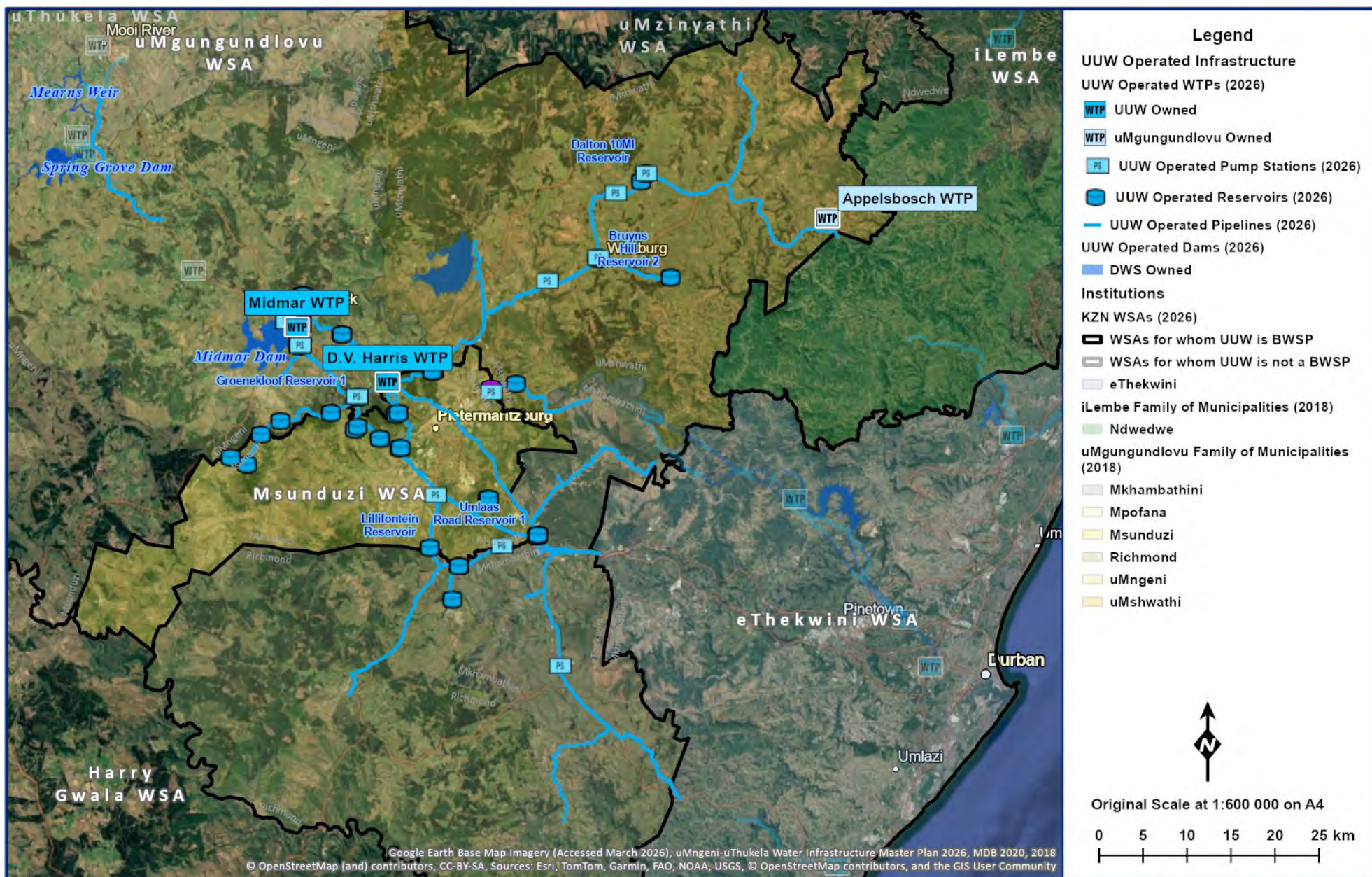


Figure 7.3 General layout of the Upper uMngeni System

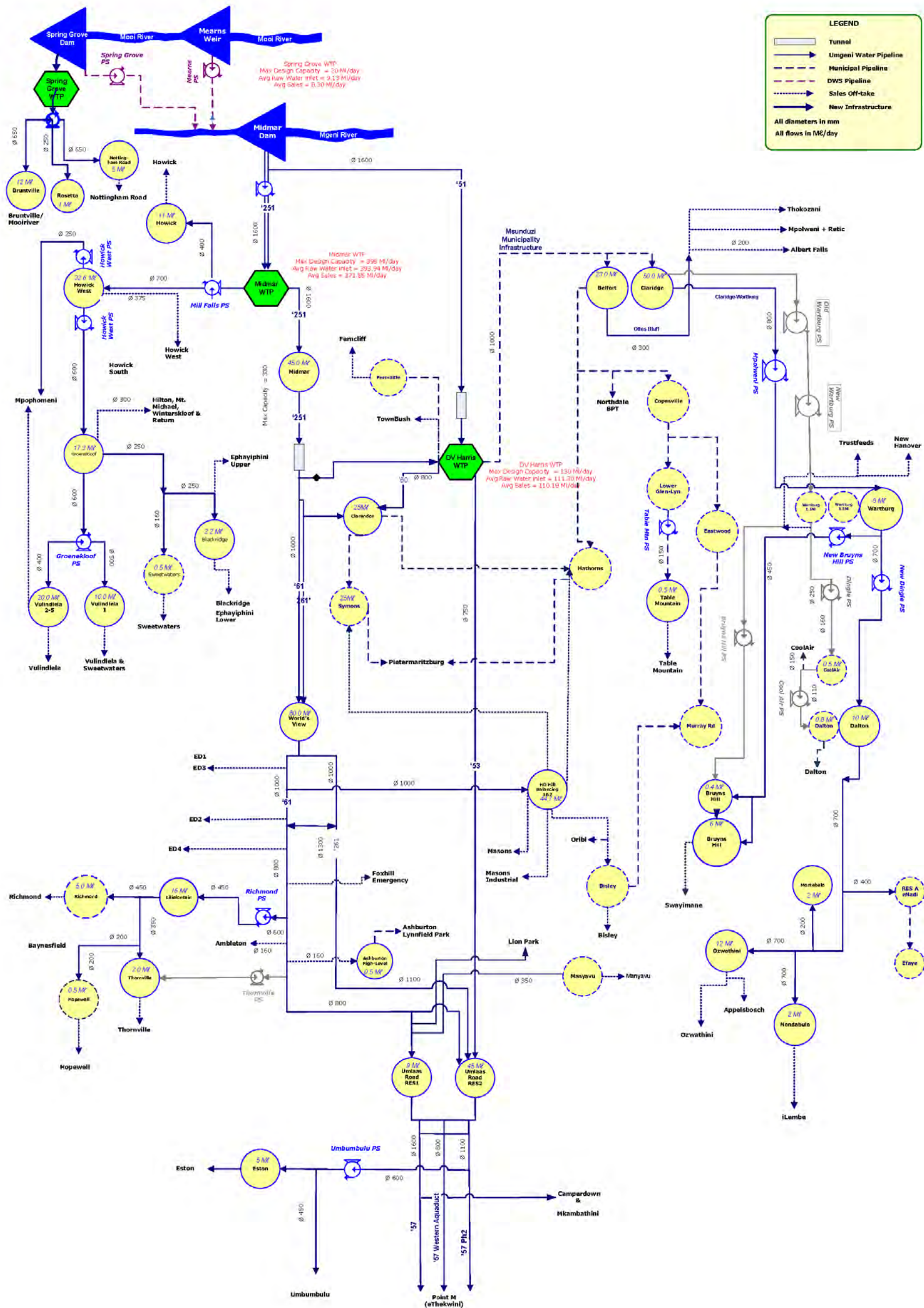


Figure 7.4 Schematic of the Upper uMgeni System.

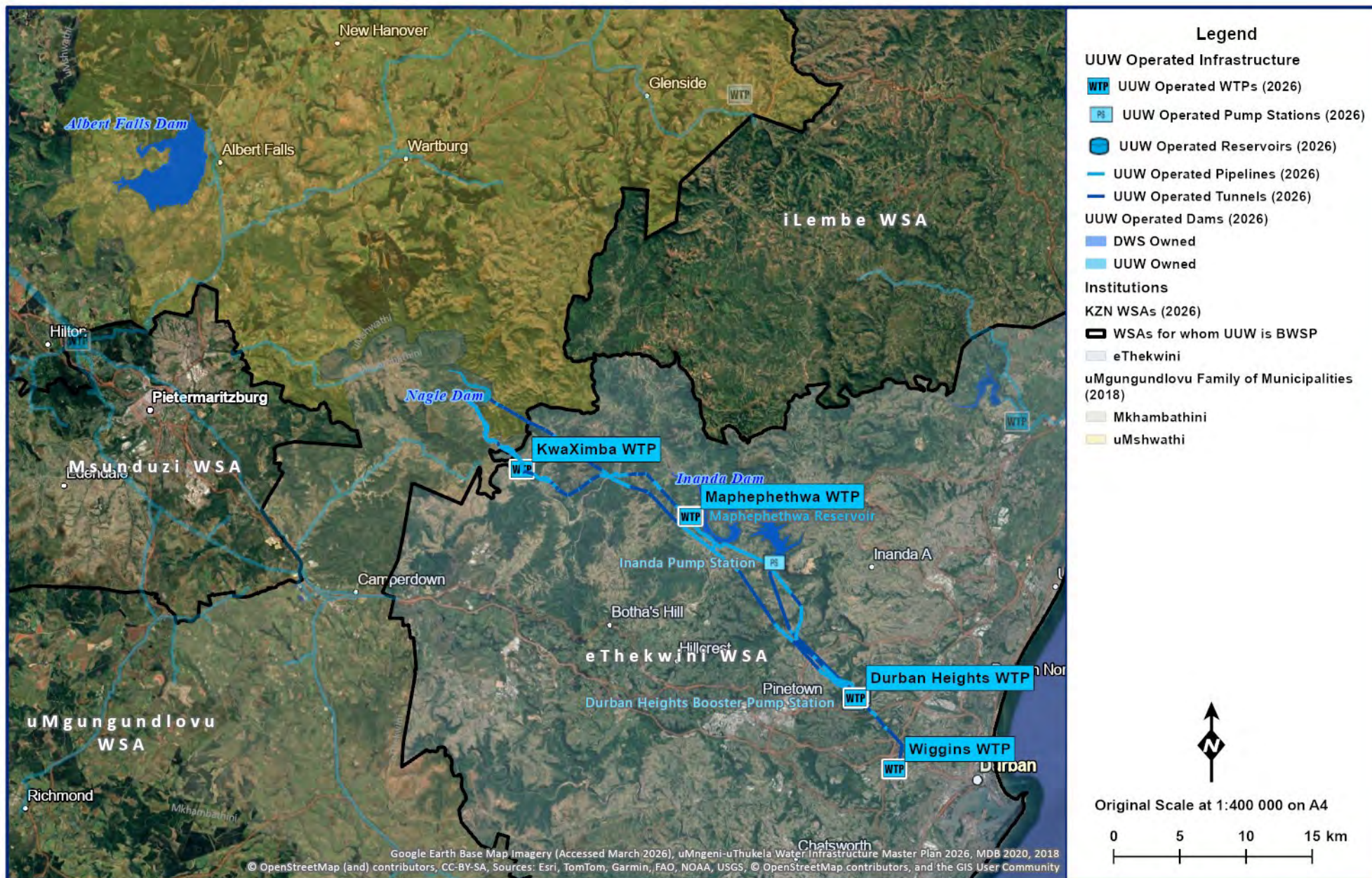


Figure 7.5 General layout of the Lower uMngeni System

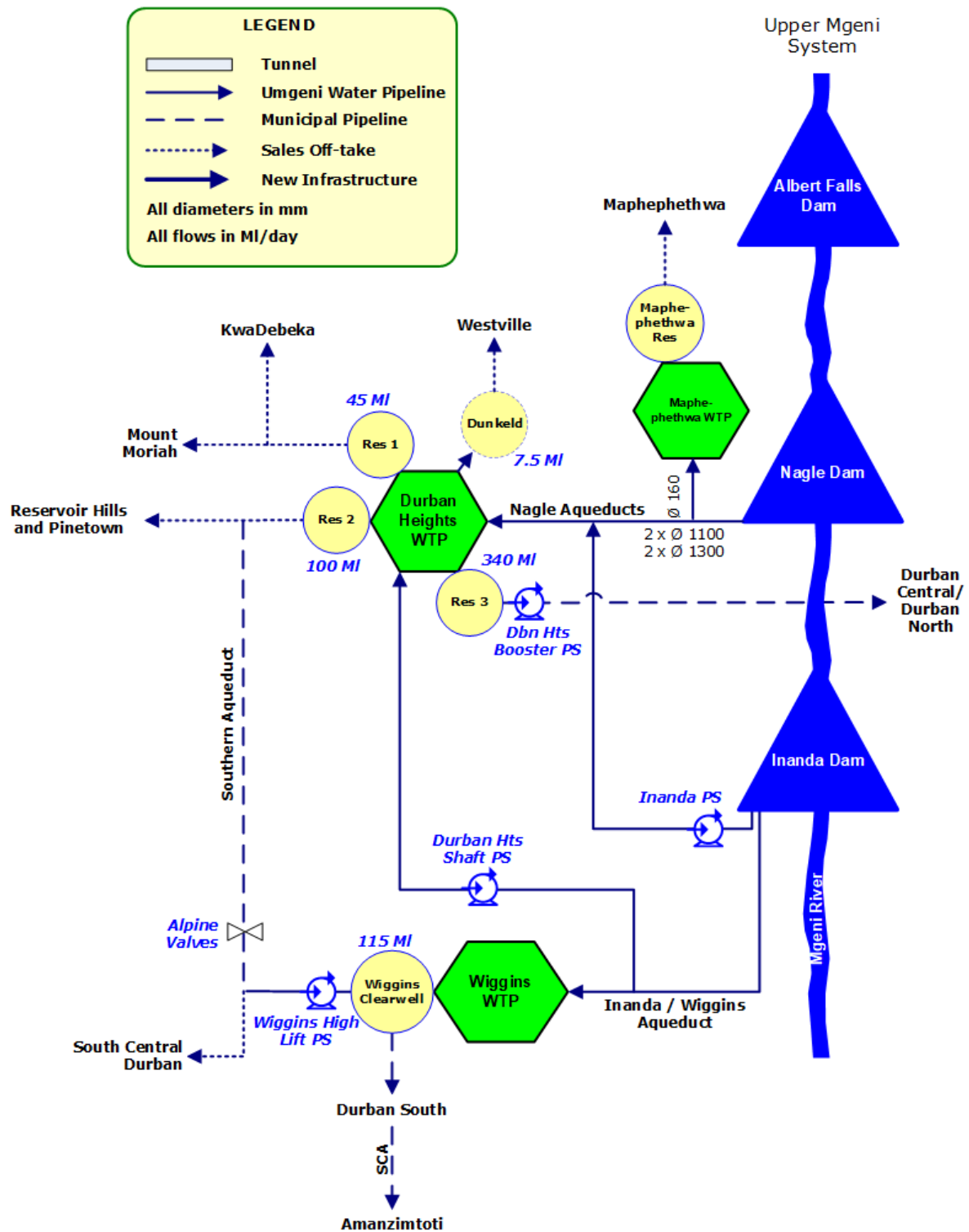


Figure 7.6 Schematic of the Lower uMgeni System.

7.2 Water Resources of the uMngeni System

7.2.1 Description of the uMngeni System Water Resource Region

a) Mooi/uMngeni Water Resource Region

i) Overview

The Mooi/uMngeni region (**Figure 7.7**) comprises of the two tertiary catchments of U20 (uMngeni River) and V20 (Mooi River). Water is stored in the Mooi River Catchment via the Spring Grove Dam and Mearns Weir for transfer into the uMngeni System to augment supply. While the focus on the Mooi River is on the upper reaches and the associated water transfer to the uMngeni, downstream parts of the Mooi River catchment are also of interest to uMngeni-uThukela Water as they influence releases of water from the Mearns Weir, which in turn impacts on water available for transfer to the uMngeni System.

The major urban centres of Durban and Pietermaritzburg are situated within the uMngeni catchment. There are a number of other urban and peri-urban centres within this region including Mooi River, Rosetta, Nottingham Road, Howick, Wartburg, Cato Ridge, and the greater surrounds of both Durban and Pietermaritzburg. The urban centres from Howick towards the coast receive their water from the uMngeni System.

The uMngeni River has been fully developed with the construction of four major dams, *viz.* Nagle (1950), Midmar (1965), Albert Falls (1976) and Inanda (1988). Water resources infrastructure on the Mooi River include the Spring Grove Dam, constructed in 2013, and the Mearns Weir, which was initially constructed in 1983 and raised in 2003. Both the Mooi and uMngeni catchments are no longer open to streamflow reduction activities such as afforestation, expansion of irrigated agriculture or the construction of storage dams, i.e. they are 'closed' catchments. The predominant land use in the Mooi catchment is commercial agriculture, which includes large-scale irrigation of pastures and summer cash crops, with an estimated water requirement of 51 million m³/annum (Umngeni Water, 2020). The other large water use is transfers to the uMngeni catchment.

In 1983, during a period of severe drought, the Mearns Emergency Transfer Scheme was constructed by DWS to enable water to be transferred from the Mooi River into the uMngeni catchment. The scheme consisted of a 3 m high weir and a pump station at Mearns on the Mooi River, a 13.3 km long, 1 400 mm diameter steel rising main to a break pressure tank situated at Nottingham Road and a 8.3 km long, 900 mm diameter steel gravity main to an outfall structure on the Mpofana River. The emergency scheme was operated for a short period until the drought broke and was then mothballed until 1993, when uMngeni-uThukela Water re-commissioned it for a short period during a drought cycle. Thereafter, the Mearns Emergency Transfer Scheme was operated as and when required until the commissioning of the Mooi-uMngeni Transfer Scheme Phase 1 (MMTS-1) in 2003.

The MMTS-1 ensured that a maximum flow of 3.2 m³/s could be transferred from the Mooi River into the uMngeni catchment on a more sustained basis. Raw water is pumped from a larger Mearns Weir on the Mooi River via the transfer pipeline to an outfall on the Mpofana River. From the Mpofana River, water flows into the Lions River and then into the uMngeni River upstream of Midmar Dam.

Phase 2 of the Mooi-uMngeni Transfer Scheme (MMTS-2), which incorporates Spring Grove Dam on the Mooi River and a transfer scheme to pump 4.5 m³/s was completed in 2016. The MMTS-2 has the flexibility of pumping 4.5 m³/s on a continuous basis from Spring Grove Dam or 3.2 m³/s from the Mearns Weir. Operation of this scheme depends on the water level in each of these water resources as well as the need for water at Midmar and Albert Falls Dams.

The construction of Spring Grove Dam increased the yield of the system, although the demand now exceeds the required 99% assurance of supply. The resulting deficit could extend for some time if the management of water resources and water losses, during the current deficit period, is not controlled. Approximately 280 Mℓ/day of water has been supplied during the year 2025, over and above the system yield of just under 1 100 Mℓ/day at a 1 in 100 year assurance level. During 2025, approximately 92 Mℓ/day was supplied over and above the water use licence for the system. Supply in the system is expected at a 1:100 year level of assurance although the licence is issued at the level of a 1:20 year. The total supply in 2025 was the equivalent of the quantity that could be delivered between a 1:5 and 1:10 year drought.

Although the current system storage as of March 2026 is considered acceptable and represents no risk of non-supply during the current 2025/26 year, there is a risk of non-supply in the longer term owing to demand growth and system losses. Water demand management data has shown that, of the total water purchases, less than 50% is deemed revenue water in this system. The system losses in the distribution network have escalated to concerning levels in the recent times, leading to the current situation. DWS first issued a Notice of Intent to issue a Directive in July 2023 to UUW, to comply with the abstraction licence. Since then, implementation was repeatedly delayed through requests for deferments and extensions, largely linked to municipal readiness and procurement constraints. DWS have issued a letter dated 21 January 2026, wherein an amended Plan of Action to comply with the abstraction licence by the end of June 2026 was accepted. DWS requested additional information from eThekweni Metro and Msunduzi Municipality at the beginning of 2026 to provide assurance that required water savings will be realised timeously. UUW continues to take steps, together with WSAs, to reduce abstraction volumes from the uMngeni System by reducing demand at the customer level. Water Service Authorities have to address water demand management, failing which water supply will have to be reduced at the UUW water treatment plants. Some of the water service authorities have made some progress on the water loss reduction initiatives and some have not.

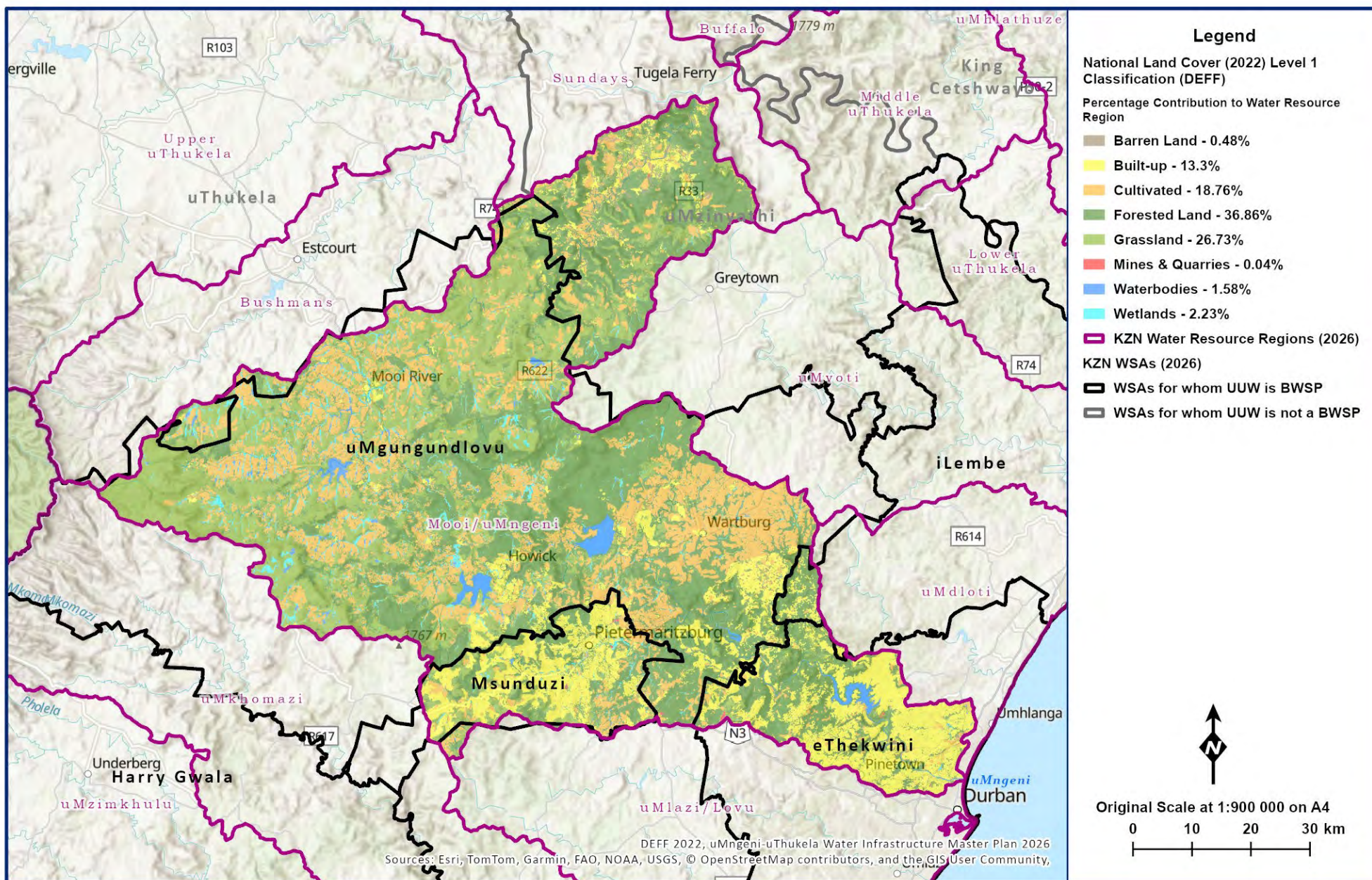


Figure 7.7 General layout of the Mooi/uMngeni Region.

ii) Surface Water

The hydrological statistics of the catchments in the Mooi-uMngeni Region are summarised in **Table 7.1**.

Table 7.1 Hydrological characteristics of the Mooi/uMngeni Water Resource Region (UUW, 2019).

Region	River (Catchment)	Area (km ²)	Annual Average			
			Evaporation (mm)	Rainfall (mm)	Natural Runoff (million m ³)	Natural Runoff (mm)
Mooi/uMngeni	Mooi River (V20) up to Mearns	1,637	1,342	800	306.1	187
	uMngeni River (U20)	4,439	1,214	932	685.8	155

iii) Groundwater

The Mooi/uMngeni Region occurs in the KwaZulu-Natal Coastal Foreland and North-western Middleveld Groundwater Regions (Section 2). This Groundwater Region is characterised by intergranular and fracture rock aquifers with extremely low to medium development potential. The underlying geology is mostly arenaceous rocks of the Ecca Formation.

Hydrogeological Units

The hydrogeologically relevant lithologies recognised in the Mooi/uMngeni region comprise sandstone, tillite and mudstone/shale supporting fractured groundwater regimes and dolerite intrusions and granite/gneiss supporting fractured and weathered groundwater regimes.

Geohydrology

The overall median yield (0.33 ℓ/s) of boreholes tapping the Natal Group Sandstone (NGS) identifies this lithology as one of the more productive hydrogeological units in the uMngeni catchment. The highest percentage of boreholes (8%) yielding greater than 4.5 ℓ/s can be found in this lithology.

The mudstone/shale of the Ecca Group occurs almost entirely inland at the head of uMngeni River and is the dominant lithology around Pietermaritzburg and Howick. Boreholes tapping these lithologies have median yields of 0.4 ℓ/s .

The tillite of the Dwyka Formation in the uMngeni catchment supports an overall median yield of 0.14 ℓ/s and a relatively high percentage (40%) of dry boreholes.

The granite/gneisses of the Natal Metamorphic Province (NMP) flank uMngeni River and are concentrated around Nagle and Inanda dams. This lithological unit supports a median yield of 0.18 ℓ/s .

An analysis of baseflow-derived stream run-off values per quaternary catchment in the uMngeni catchment suggests that groundwater recharge from rainfall varies in the range 3% to 7% of the mean annual precipitation.

In the Mooi catchment, natural groundwater discharge occurs in the form of springs, seeps and in isolated cases, uncapped artesian boreholes. The wetlands and dams in the headwaters of the Mooi River are supported by perennial groundwater seeps associated with the dolerite sill intrusions in the mudstone/shale lithologies. Springs rising in the sandstone and granite/gneiss lithologies relate to structural features (faults and fracture zones, lineaments). An analysis of baseflow-derived stream run-off values per quaternary catchment suggests that groundwater recharge from rainfall varies in the range 3% to 7% of the mean annual precipitation, similar to that found in the uMngeni catchment.

Groundwater Potential

The greatest widespread demand on the groundwater resources in the Mooi-uMngeni Region is represented by its use as a source of potable water for communities in the rural areas and, to a lesser extent, households in the farming areas. Other demands of a more concentrated nature are represented by its use to supplement rainfall and traditional surface water supplies for irrigation.

The sandstone of the Natal Group represents the most productive groundwater-bearing lithology, followed by mudstone/shale lithologies, the granite/gneiss lithologies and the tillite sediments of the Dwyka Tillite Formation.

A good to fair correlation exists between boreholes supporting yields in the moderate (greater than 0.5 ℓ/s to less than 3.0 ℓ/s) and high (greater than 3.0 ℓ/s) classification ranges and structural features represented by faults and remotely sensed lineaments (**Figure 7.8**).

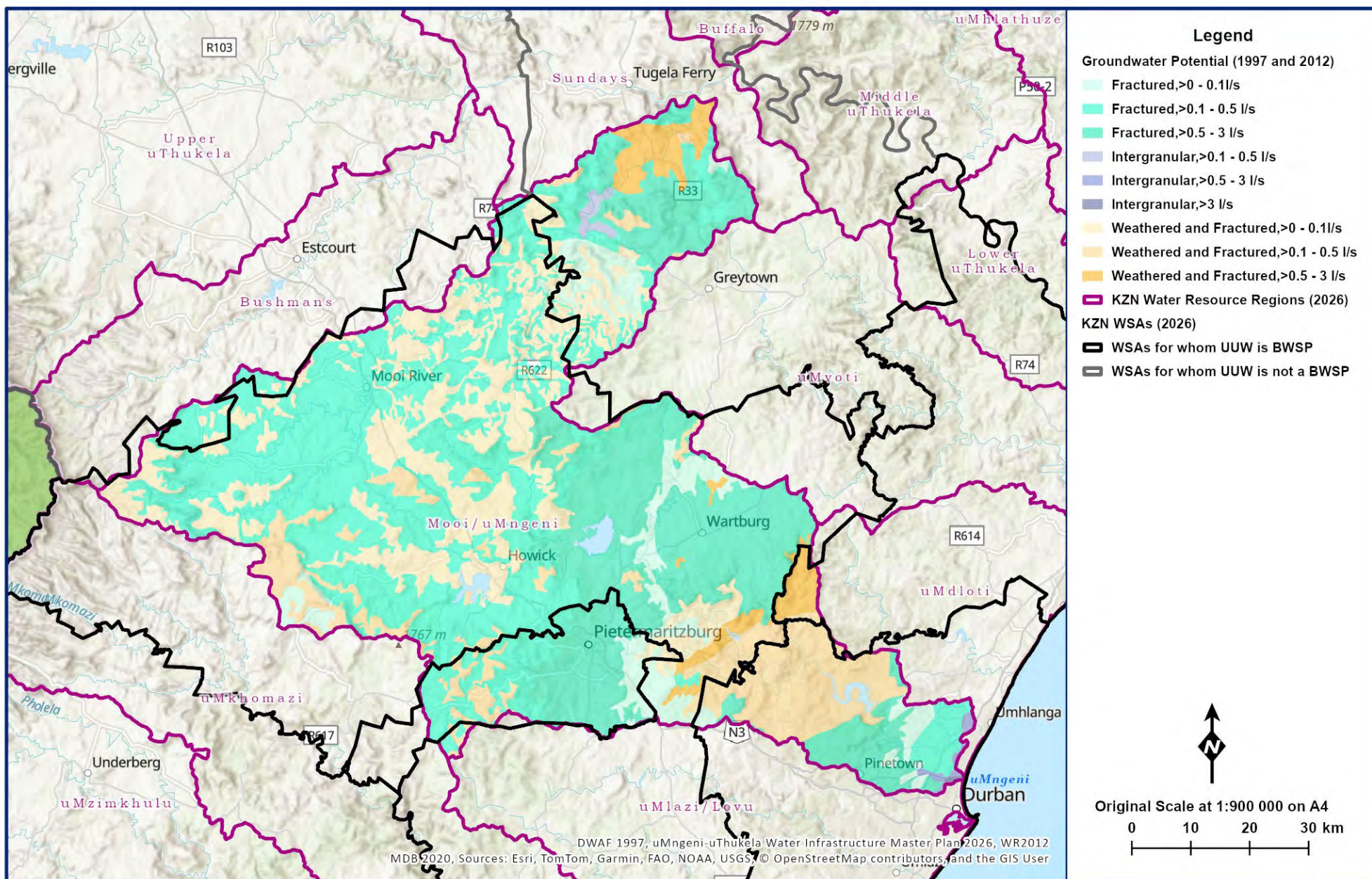


Figure 7.8 Groundwater potential in the Mooi/uMngeni Region.

iv) Water Quality

Surface Water

The algal response and nutrient loadings for Midmar Dam are shown in **Figure 7.9**. An increase in the amount of nutrients mobilized by runoff was noted in 2022 congruent with a greater rainfall amount and inflow volumes. This resulted in a peak in nutrients and suspended solids (25 922 tonnes/annum) loadings being recorded at Midmar Dam inflow. The high suspended solids load resulted in elevated turbidity results in Midmar Dam. A consistent decline was recorded from 2023 to 2024, however, an increase was noted in 2025. An increase in the inflow volume recorded in 2025 has resulted in an upward trend on the suspended solids and organic nutrients concentration.

The absence of flow measuring on Mthinzima River negates nutrients and suspended solids loads quantification. Sewage pollution is an on-going challenge impacting Mthinzima River. The presence of a wetland is playing a critical role in improving the water quality state of this input to Midmar Dam. The assimilative capacity of Midmar Dam has also played a major role in limiting the related water quality challenges. However, the cumulative impact of this sustained sewage pollution has contributed to the water quality challenges and aquatic weed growth recorded at Midmar dam. Midmar Dam is plagued by *Egeria densa* growth challenges, predominantly on the Mthinzima River inflow side of the impoundment. Numerous interventions, headlined by biocontrol release, have been implemented to manage the growth of *Egeria densa*. However, addressing the sewage contamination challenges will play a key role in suppressing infestation at the dam. The construction of the new Mpophomeni WWTW plant that is currently going through commissioning will play a key role in the management of sewage, thus decreasing the inputs into Midmar Dam.

The algal response and nutrient loadings for Spring Grove Dam are shown in **Figure 7.10**. An increase is reflected by the nutrients (phosphorus and total inorganic nitrogen) and suspended solids loadings. A peak in total inorganic nitrogen (20.42 tonnes) and suspended solids (361.45 tonnes) was recorded for 2025 with a notable increase in algal response. The increasing algal counts, coupled with persistent nutrient and sediment inflows, reflect a gradual rise in eutrophication risk within Spring Grove Dam. This highlights the need for targeted catchment management interventions, including improved agricultural runoff control, and continuous nutrient monitoring to mitigate potential algal bloom development.

The algal response and nutrient loadings for Mearns Weir are shown in **Figure 7.11**. The algal response in the Mearns Main Basin Integrated was flat when comparing 2024 and 2025. In 2025, 75% of algal observations were distributed around 1,155 cells/mL, a slight decrease from 1,171 cells/mL recorded in 2024, suggesting limited year-on-year variation. The maximum algal count in 2025 reached 19,047 cells/mL lower than 22,263 cells/mL observed in 2024.

An increase is reflected by the nutrient (phosphorus and total inorganic nitrogen) and suspended solids loadings recorded in 2025, particularly at the Little Mooi River inflow to

Mearns Dam. The recorded peak is associated with catchment inputs from intensive farming (including numerous piggeries and dairies). The Little Mooi catchment area is heavily utilised for both extensive and intensive commercial agriculture.

The algal response and nutrient loadings for Nagle Dam are shown in **Figure 7.12**. Nutrient enrichment from the Albert Falls and Nagle catchments has resulted in ongoing algal blooms in the Albert Falls and Nagle Dams since August 2024. This bloom was initially exacerbated by low water levels and limited water available for flushing in the dams in 2024. Algal count remained elevated through the first half of 2025, and a further notable increase was recorded from mid-July 2025 in both the Albert Falls and Nagle Dams, as well as associated Durban Heights and other raw waters.

Challenges associated with wastewater and agricultural inputs and resultant eutrophication of water resources were highlighted as high priority residual risks in recent Water Safety Plans. The very high nutrient loads entering the uMngeni system dams in 2022 and 2023, while mitigated with a well-flushed uMngeni system, were associated with predicted future increases in eutrophication and algal responses. 2024 nutrient loadings were low due to lower inflow volumes, but 2025 loadings are of significant concern and indicate increased nutrient concentrations and loadings.

The algal response and nutrient loadings for Inanda Dam are shown in **Figure 7.13**. An increasing trend in nutrient (phosphorus and total inorganic nitrogen) loadings into the dam was noted when comparing 2025 to 2024. High suspended solids (5185 – 158917 tonnes/annum) were recorded between 2018 and 2023, due to high inflow volumes and catchment run-off. Total phosphorus loads ranged from 45.7 – 224 tonnes/annum over the past five years, with a peak in 2021. Contributing factors to this increase include sewer issues and other catchment inputs from the Msunduzi Municipality. In addition, agricultural activities in the greater uMngeni catchment contribute to the increase in total inorganic nitrogen (combination of ammonia, nitrate and nitrite), which end up washing into the river and eventually ending up at Inanda Dam.

Algal counts and trophic status generally correlate with nutrient loading concentrations. Aligned to the trend in nutrient loading, the algal response in Inanda Dam has increased over the past three years. However, ongoing high nutrient loads entering Inanda Dam, while currently mitigated by a well-flushed uMngeni System, are associated with predicted potential future increases in eutrophication and algal responses and anticipated further deteriorating raw water quality when water levels decrease. The trophic status in the dam varies between hypertrophic (upper dam) and eutrophic in mid dam and main basin. The nuisance value of algal productivity increased to significant in the main basin from 2023 due to the storm flows washing the algae towards this area.

Groundwater

The ambient water quality of groundwater, in the Mooi/uMngeni Region, is generally excellent. 83% of recorded field observations of electrical conductivity parameters do not exceed a value of 450 mg/ℓ (70 mS/m). It appears that the least saline groundwater is associated with dolerite intrusions (median value of 11 mS/m) and the most saline with the tillite lithology (median value of 56 mS/m).

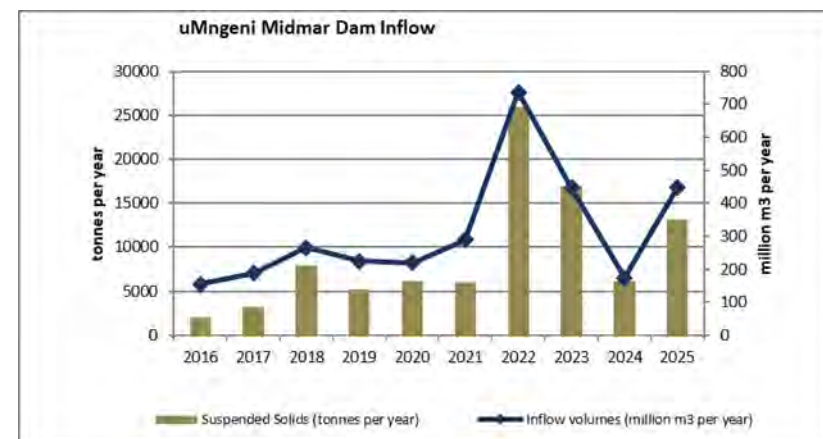
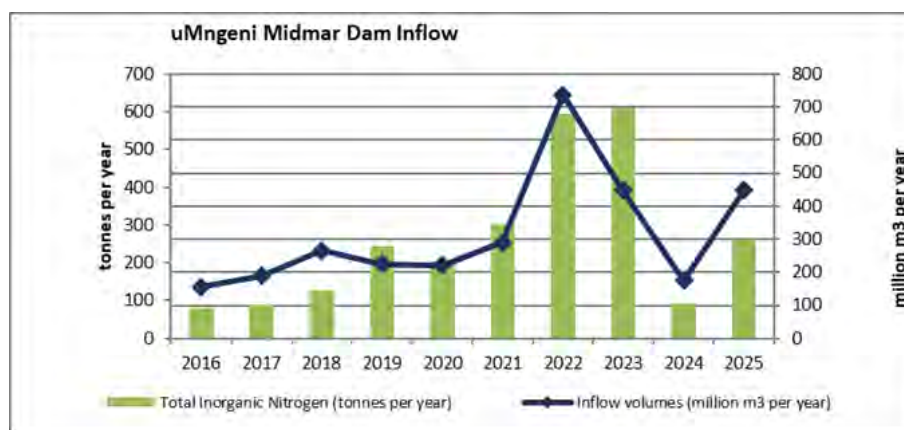
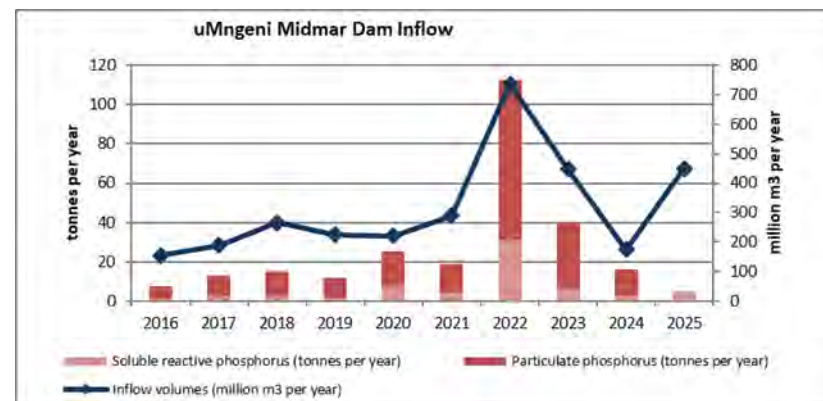
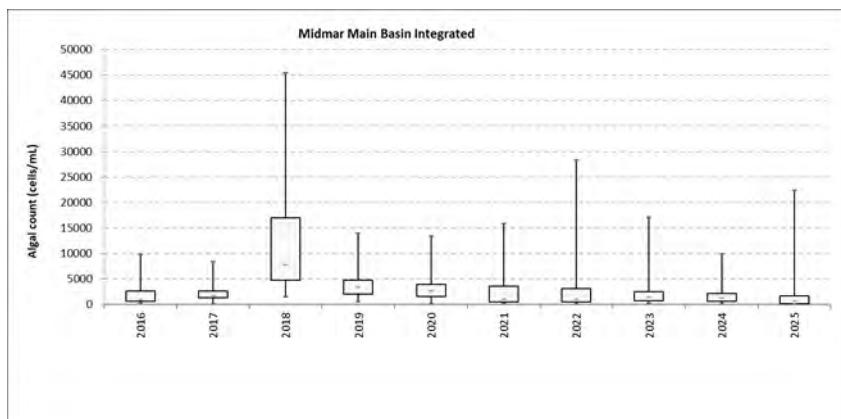


Figure 7.9 Algal response and nutrient loadings for Midmar Dam.

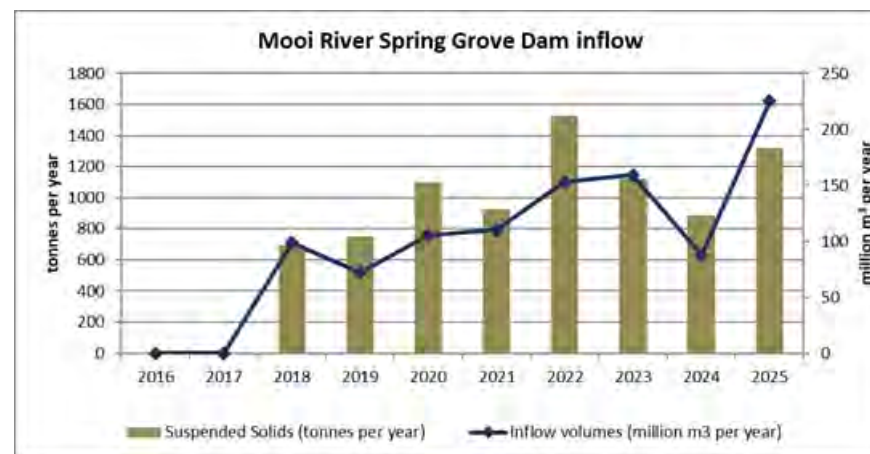
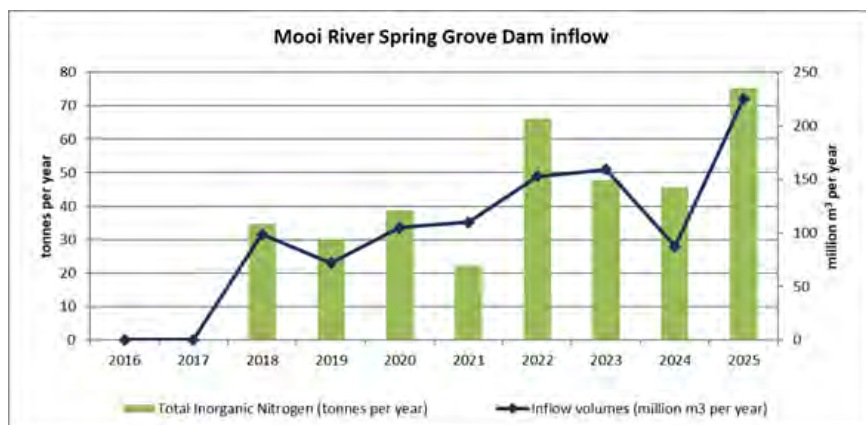
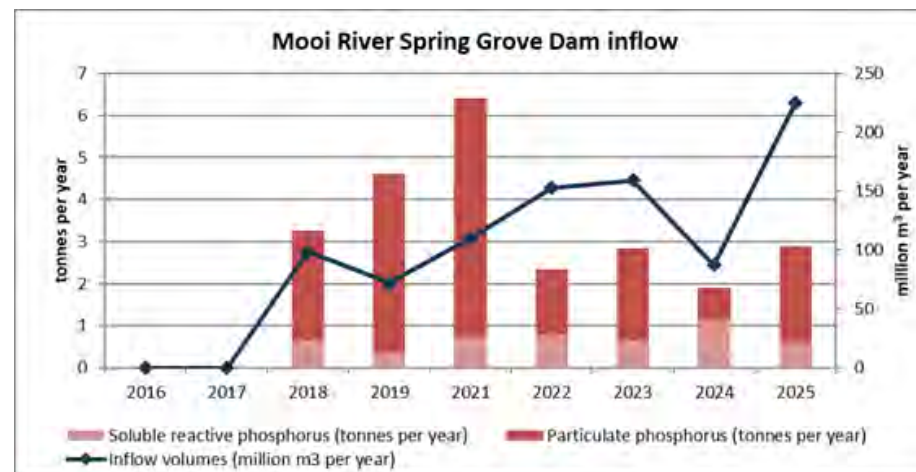
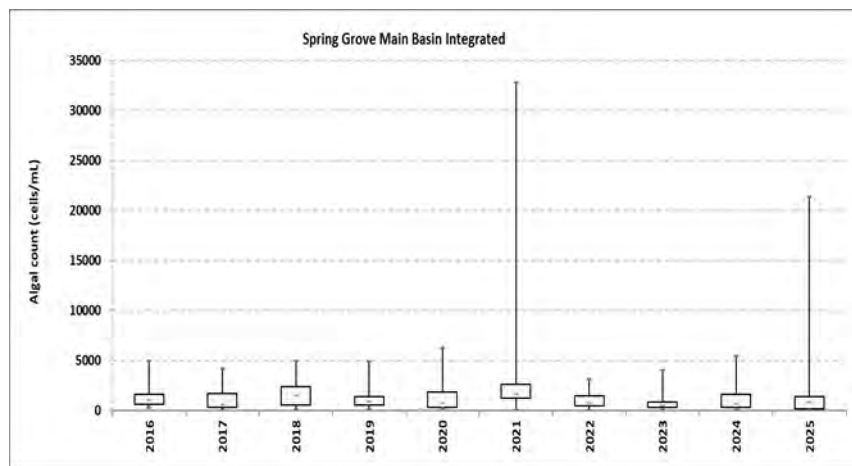


Figure 7.10 Algal response and nutrient loadings for Spring Grove Dam.

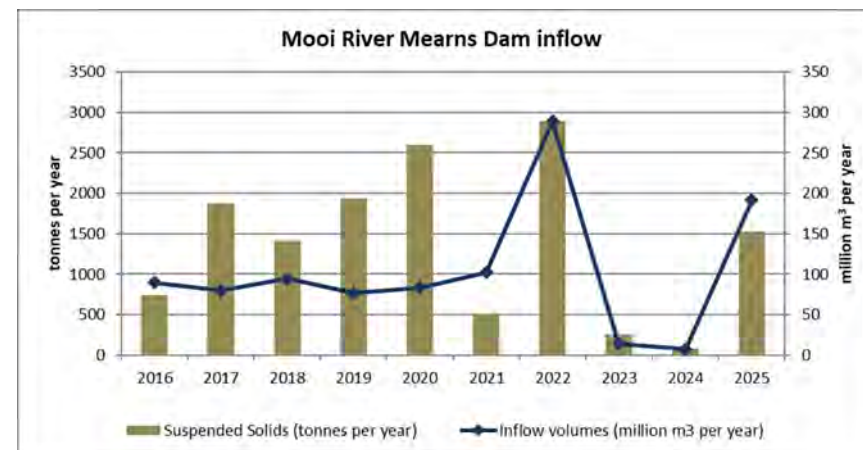
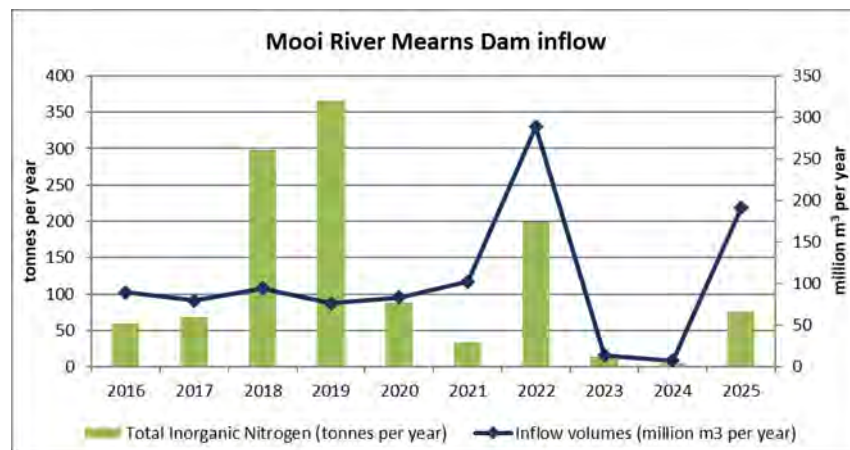
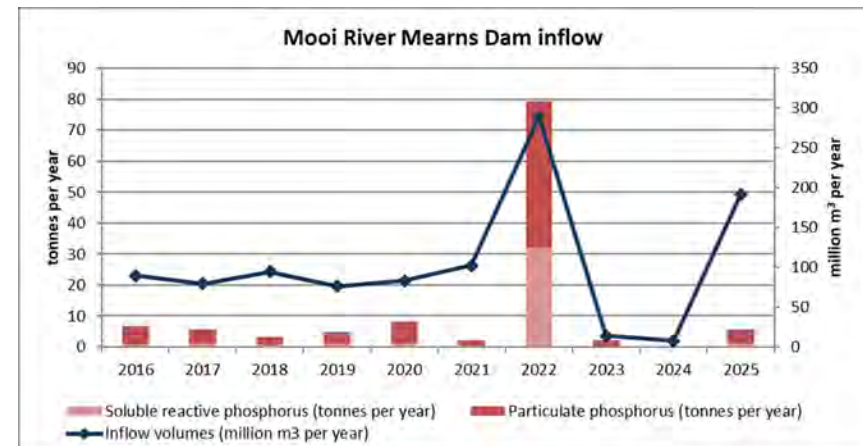
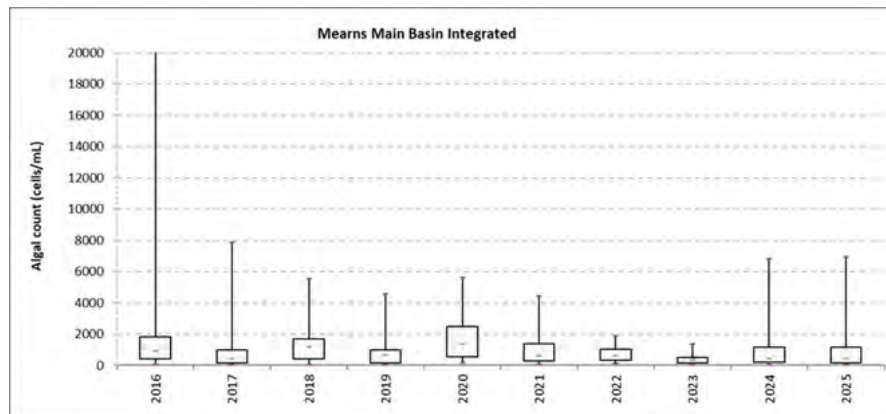


Figure 7.11 Algal response and nutrient loadings for Mearns.

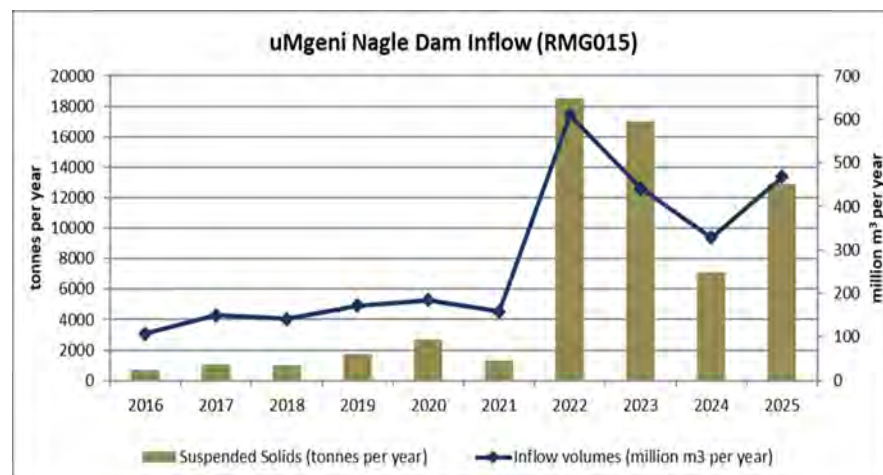
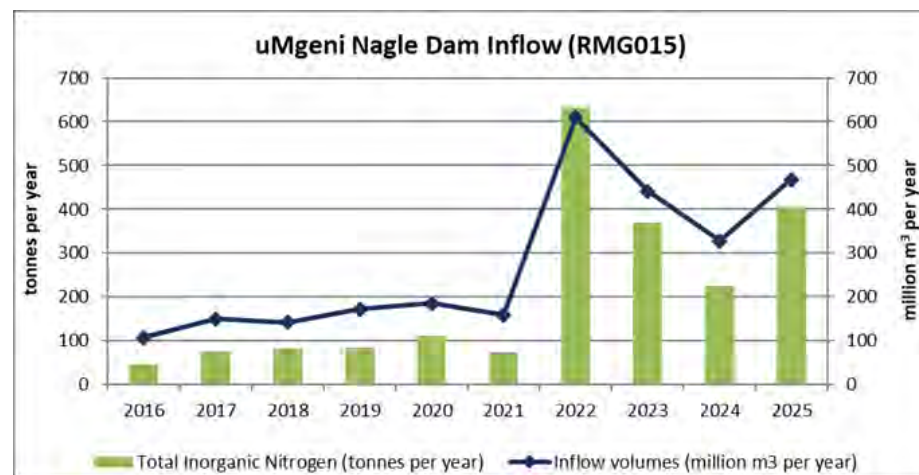
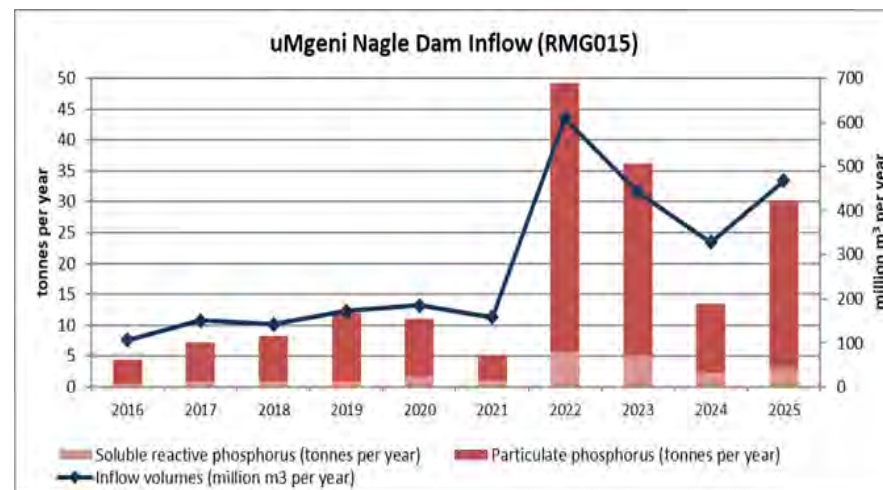
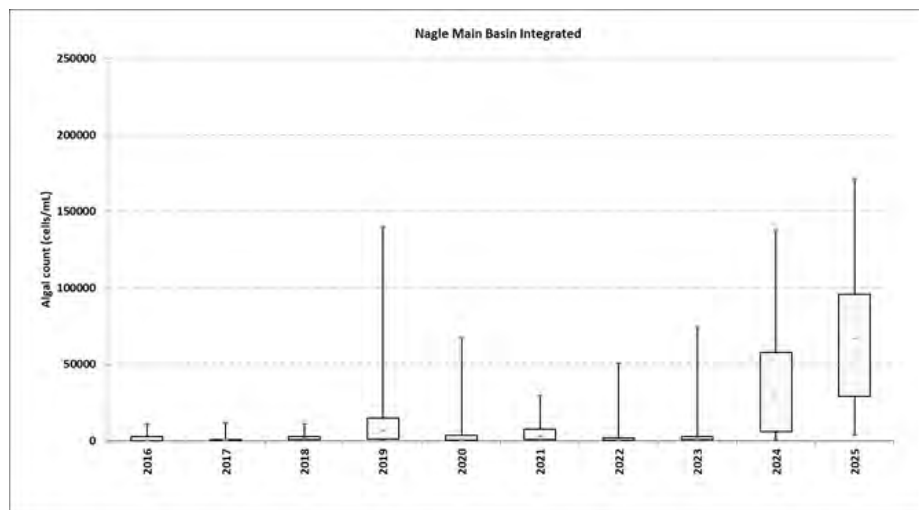


Figure 7.12 Algal response and nutrient loadings for Nagle Dam.

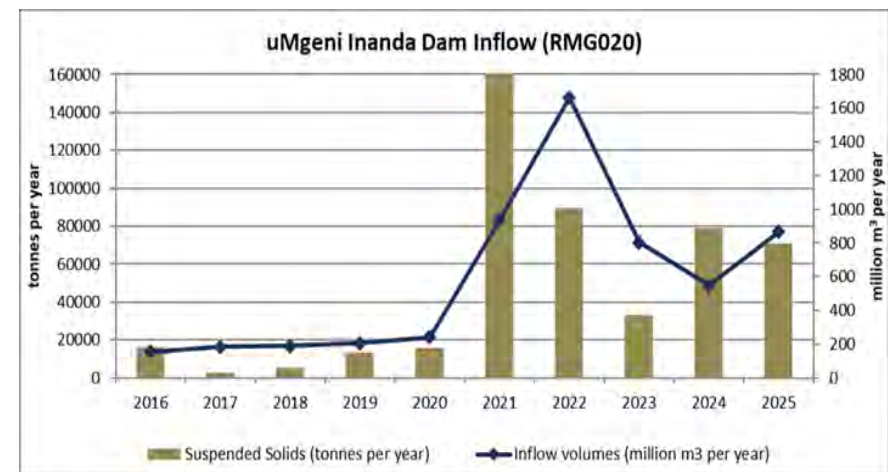
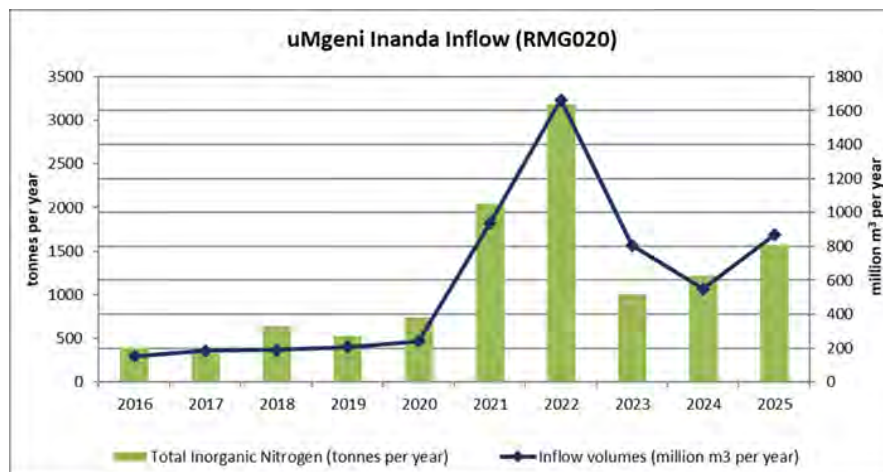
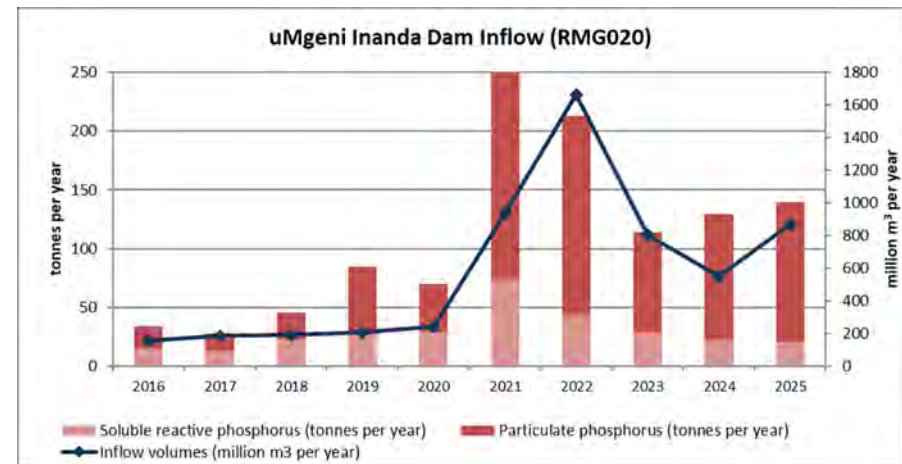
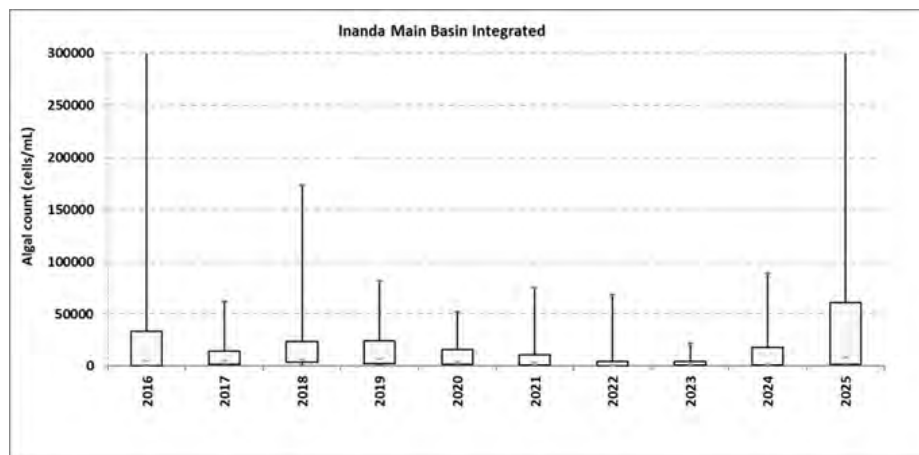


Figure 7.13 Algal response and nutrient loadings for Inanda Dam.

b) uMkhomazi Water Resource Region

i) Overview

The uMkhomazi River has its source at an elevation of approximately 3 000 m above sea level in the Drakensberg Mountains. The river flows in a south-easterly direction and enters the Indian Ocean near the town of uMkomaas about 40 km south of Durban. Several large tributaries, including the Loteni, Nzinga, Mkomazane, Elands and iXobho rivers flow into the uMkhomazi. The region includes the small towns of Bulwer, Impendle, Ixopo, uMkhomazi, Craigieburn and Magabheni which have small water requirements.

The Department of Water and Sanitation Reconciliation Strategy Study (DWA, 2010) confirmed that the uMkhomazi Water Project Phase 1, which includes the transfer of water from Smithfield Dam on the uMkhomazi River to the uMngeni System (**Section 7.5.2 (a)**), would be the most feasible for augmenting the water resources of the uMngeni System (**Figure 7.14**). Both eThekweni and Pietermaritzburg are the economic hub of KwaZulu-Natal, and need reliable, efficient and sustainable long-term water supplies from such a scheme. Phase 2 of uMkhomazi Water Project would be implemented later and when required. This second phase would be comprised of the construction of a large dam at Impendle further upstream on the uMkhomazi River to release water to the downstream Smithfield Dam. From a hydrological perspective, the uMkhomazi River Catchment comprises the tertiary catchment U10, as shown in **Figure 7.15**. The uMkhomazi River Catchment has a catchment area of 4 387 km². There is an estimated total of almost 1 000 small dams in the catchment with a combined storage of over 30 million m³ (DWS, 2015).

The catchment is currently undeveloped, with the main land use activities being commercial forestry and irrigation in the central areas around the towns of Bulwer, Richmond, Ixopo and Impendle. There is a large industrial abstraction for Sappi Saiccor near the coastal town of Umkomaas. Other water users include small towns and rural settlements, stock watering, dry-land sugarcane and invasive alien plants. The catchment is the third largest river in KwaZulu-Natal in terms of mean annual runoff (MAR).

ii) Surface Water

Based on the rainfall data analysis undertaken, it was concluded that the spatial distribution of rainfall gauging stations in the uMkhomazi River catchment is of great concern. The hydrological characteristics for this region are summarised in **Table 7.2** and **Table 7.3**. This catchment has an annual natural runoff of 1 078 million m³, 67% of which is generated upstream of the proposed Smithfield Dam site. The current net water use within the uMkhomazi River catchment is approximately 159 million m³/annum (15% of the total natural MAR), and it is estimated that this may grow to 192 million m³/annum by 2050 (DWS, 2015).

Table 7.2 Hydrological characteristics of uMkhomazi River catchment (DWS 2015).

Quaternary Catchment	Incremental Area (km ²)	MAP (mm)	MAE (mm)	Incremental Natural MAR		
				(Million m ³ /annum)	(mm/annum)	(% MAP)
U10A	418	1287	1,300	209.52	501	39
U10B	392	1176	1,300	164.49	420	36
U10C	267	1091	1,300	96.70	362	33
U10D	337	999	1,300	98.22	291	29
U10E	327	1034	1,300	100.92	309	30
U10F	379	963	1,300	67.08	177	18
U10G	353	981	1,250	70.12	199	20
U10H	458	924	1,200	82.66	180	20
U10J	505	878	1,200	77.99	154	18
U10K	364	793	1,200	40.42	111	14
U10L	307	758	1,200	29.56	96	13
U10M	280	858	1,200	40.06	143	17
Total	4387	981	1,252	1077.74	246	25

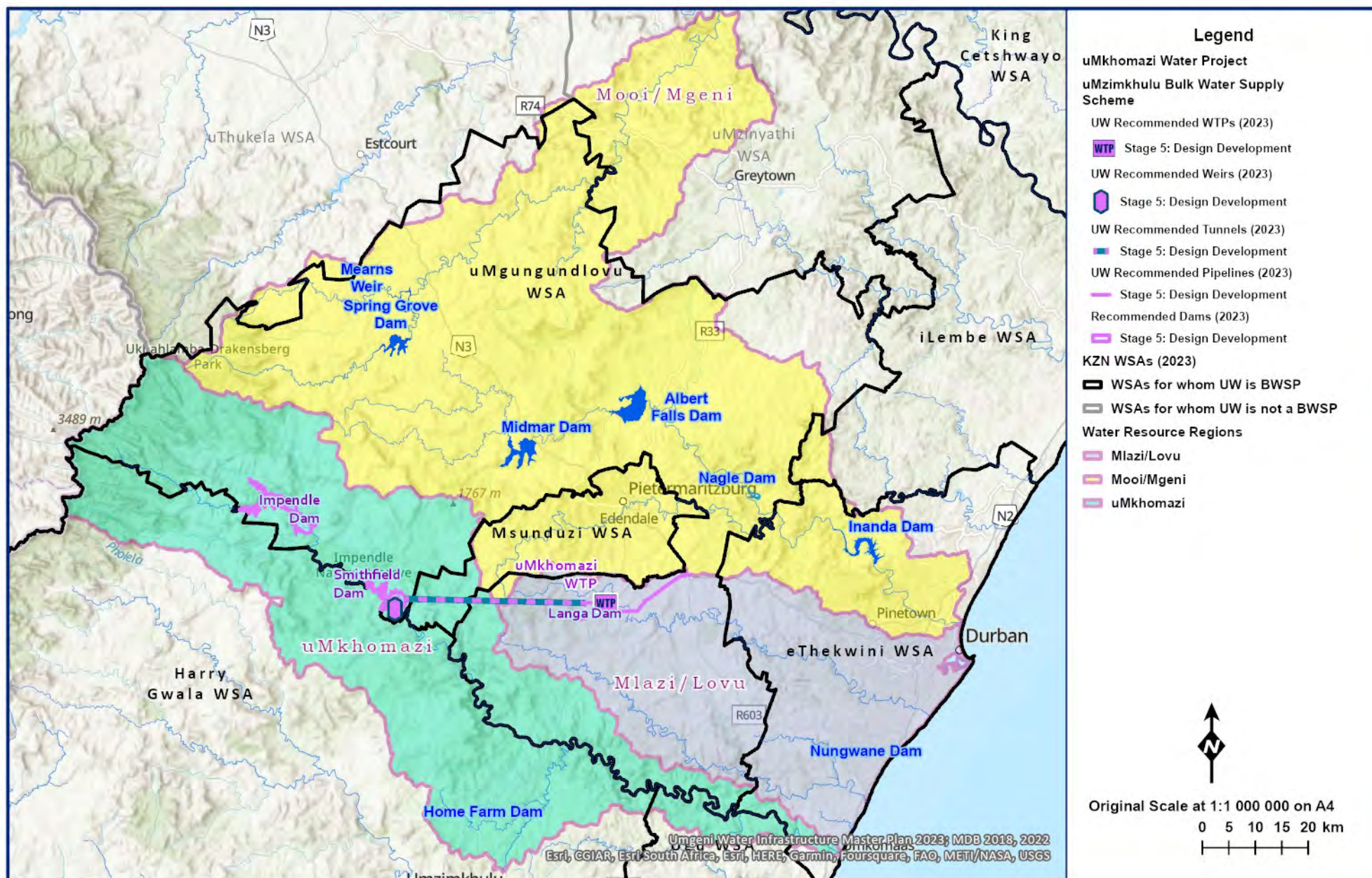


Figure 7.14 Locality map of the uMkhomazi, uMlazi and uMgeni river catchments.

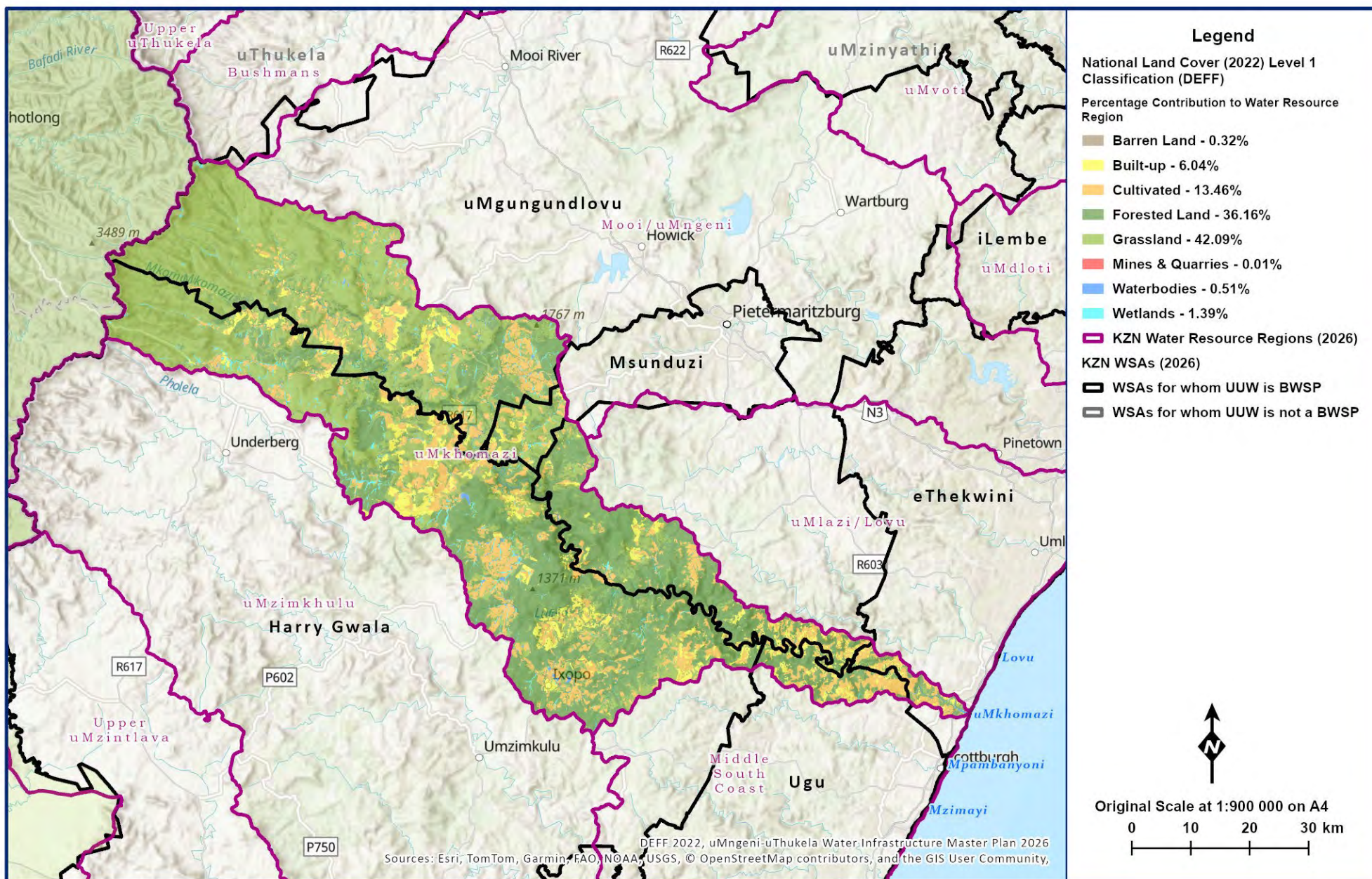


Figure 7.15 General layout of the uMkhomazi Region.

Table 7.3 Hydrological characteristics of the uMkhomazi Region (uMngeni-uThukela Water 2002 and DWA 2013).

Region	River (Catchment)	Incremental Area (km ²)	Annual Average			
			MAE (mm)	Rainfall (mm)	Natural Runoff (million m ³)	Natural Runoff (mm)
Mkhomazi	Impendle	1,422	1,300	1,138	567.9	399.4
	Smithfield	632	1,300	1,017	163.2	258.2
	Ngwadini	2,242	1,200	875	324.5	144.7
	Mkhomazi Estuary	91	1,200	855	11.3	124.2
	Luhane	46.3	1,361	980	7.5*	161.9

* Present day MAR

iii) Groundwater

The uMkhomazi Region occurs in the KwaZulu-Natal Coastal Foreland and Northwestern Middleveld Groundwater Regions (**Section 2**). As such this Groundwater Region is characterised by a combination of intergranular and fractured arenaceous rocks.

Hydrogeological Units

The hydrogeologically relevant lithologies recognised in the uMkhomazi Region comprise sandstone, tillite and mudstone/shale supporting fractured groundwater regimes and dolerite intrusions and granite/gneiss supporting fractured and weathered groundwater regimes.

Geohydrology

The Dwyka Tillite formation has the smallest coverage in comparison to the other lithological units in the catchment (**Figure 7.16**). It occurs just south of Richmond where it lies exposed in the river banks of uMkhomazi. The Eccia Group is represented by the mudstones/shale of the Pietermaritzburg, Vryheid and Volksrust Formation. The foothills of the Drakensberg Mountains at the head of uMkhomazi River and the central areas of the catchment are dominated by these lithologies. These lithologies support marginal to poor borehole yields (0.1 – 0.5 ℓ/s). However, the presence of extensive intrusive dolerite in the form of sheets and dykes has greatly enhanced the potential of the mudstones to store and yield groundwater.

Groundwater Potential

Primary groundwater supplies using boreholes fitted with hand pumps, wind pumps or submersibles are obtainable in most of the lithological units. The exceptions are the Dwyka formation (tillites) or massive granites. In these areas groundwater supply could be obtained within an adjacent fault valley where the potential for high yielding boreholes is much enhanced (**Figure 7.16**).

The sandstone of the Natal Group represents the most productive groundwater-bearing lithology, followed by mudstone/shale lithologies, the granite/gneiss lithologies and the tillite sediments of the Dwyka Tillite Formation.

Boreholes favourably located in the Natal Group Sandstone (NGS) provide good yields. Yields of 3 ℓ/s (greater than 10 000 ℓ/hr) are not uncommon where large scale fracturing/faulting provide conduits for groundwater movement

Boreholes located in metamorphic lithologies (gneisses) indicate yield characteristics in the range 0.1 to 0.5 ℓ/s , with a median value of 0.3 ℓ/s .

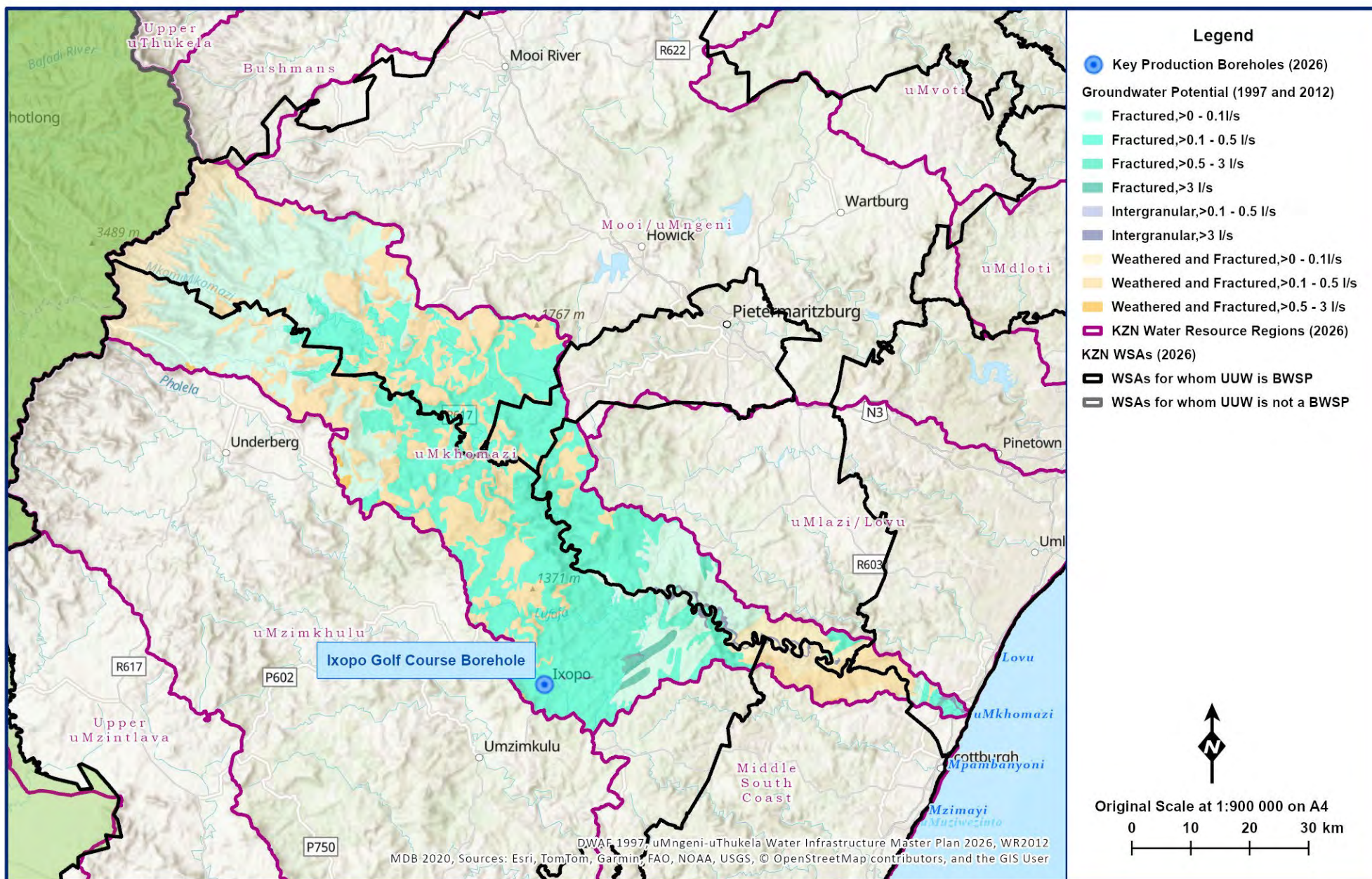


Figure 7.16 Groundwater potential in the uMkhomazi Region.

iv) Water Quality

Algal response is observed at Home Farm Dam and is shown in the graph below (**Figure 7.17**). The Home Farm Dam has been affected by nutrient inputs from sewage and agricultural pollution. The on-going pollution has resulted in eutrophication of the impoundment, leading to aquatic plant and algae growth. The aquatic weeds growth has created major challenges for the treatment plant by clogging the raw water pump, as well as water quality deterioration due to decomposition. **Figure 7.17** reflects a major increase in the algal count recorded in 2025. This indicates that there has been an increase in the nutrient enrichment.

The calculations for nutrient and suspended solids and loads are presently not feasible and are not done for this system. The absence of flow measuring devices upstream of Home Farm Dam negates quantification of the nutrient loads.

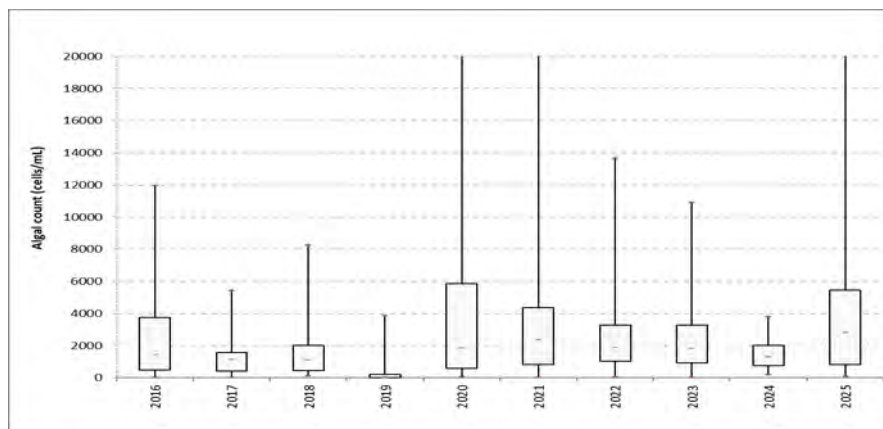


Figure 7.17 Algal response for Home Farm Dam.

7.2.2 Reserve

a) Mooi/uMngeni Water Resource Region

The quantity component of the Ecological Reserve for the uMngeni catchment has not yet been determined. The DWS (2016) study only determined the ecological classes in terms of present and target ecological classes. However, estimates of the Ecological Reserve indicate that the Ecological Reserve will have a large impact on the availability of water in the catchment. Considering that the catchment is already stressed, the determination and implementation of the Ecological Reserve will require careful consideration.

Estimates of environmental flow requirements represented as compensation flows released from the main dams in the uMngeni System are indicated in **Table 7.4**. As with the IFRs, the estuarine flow requirement (EFR) of the uMngeni River also has not been determined in a comprehensive manner.

Table 7.4 Summary of environmental (compensation) flow requirements.

Description	Simulated Compensation Flow	
	(m ³ /s)	(million m ³ /annum)
Midmar Compensation	0.900	28.40
Albert Falls Compensation	0.710	22.41
Inanda Compensation	1.500	47.34
uMngeni EFR	1.426	45.00

Present Ecological State (PES) represents how the ecological condition of a river has been modified from its natural conditions. The measure is based on water quality variables, biotic indicators and habitat information that has been collected. Results are classified on a 6-point scale, from Category A (Largely Natural) to Category F (Critically Modified). Target ecological category (TEC) represents improvements that must be done on the ecological condition of the river based on flow or non-flow related issues.

The PES of various rivers in the Mooi/uMngeni Region is detailed in the report (DWS 2016). The target ecological categories (TEC) of various rivers in the Mooi/uMngeni Region are in DWS, 2016. Various river nodes in the Greater Mooi/uMngeni Region require improvements as a result of non-flow-related/anthropogenic issues. If the REC is attainable then it has been included in the catchment configuration.

As part of the KZN Water Reconciliation Study (DWA 2011) to assess the impacts of re-utilising treated wastewater, a rapid reserve determination for the uMngeni River estuary was undertaken. The present ecological status of the estuary was found to be a Class E which indicates that it is highly degraded. The study shows that the estuary importance score is 82

which means that it is a highly important estuary. The study recommends that the ecological status of the uMngeni estuary should be improved to at least a category D.

The classes of water resources and resource quality objectives for the catchments of Mvoti to Mzimkhulu were published in the government gazette in 2017. Apart from the uMngeni System, other river systems classified included Mvoti, uMkhomazi, Umzimkhulu and Mtanvuna. This classification resulted from the findings of DWS (2016) study, and for uMngeni River these are as follows:

- The current present ecological state is recommended for the main uMngeni River.
- The uMngeni River between Midmar and Albert Falls has a Present Ecological Class of C and Recommended Ecological Class of C.
- The uMngeni River between Nagle and Inanda has a Present Ecological Class of C/D and a Recommended Ecological Class of C/D.
- uMngeni River Estuary has a Present Ecological Status of E and a Recommended Ecological Class of D.

The uMngeni River classification bears testimony to water quality deterioration downstream from Midmar Dam onwards. The deterioration is mainly linked to an increase in nutrients, linked to agricultural activities, particularly dairies, piggeries, etc. There is also increased pollution from growing settlements in the region. The water quality in the Msunduzi River downstream of Henley Dam is seriously affected by sewer infrastructure problems, including ingress of rainwater into the sewer system, which results in surcharges, overloading Darvill Waste Water Treatment Works. The estuary is under moderate flow modification, high pollution, high habitat loss and low fishing pressure.

A detailed assessment of the Ecological Reserve for the entire uThukela catchment was undertaken in 2004, and this included the Mooi River catchment. This assessment indicated an over allocation of water, particularly on the Little Mooi River. In order to ensure that the correct Reserve flows are maintained in the Little Mooi River, an approximate 50% curtailment of the existing registered irrigation and afforestation is required. Additionally, all existing farm dams will be required to release their rightful share of the Reserve. Currently none of these dams are contributing to the Reserve. Hence a compulsory licensing process will need to be completed by DWS before the Reserve can be fully implemented in the Mooi catchment.

The necessary river outlets have been included into the design of Spring Grove Dam to ensure that it will be able to release the required volumes of water needed for the Reserve.

b) Mkhomazi Water Resource Region

No comprehensive assessment, using the accepted standardised methodology, has been undertaken of the ecological Reserve of uMkhomazi River to date. A Reserve determination was undertaken in the late 1990's as part of the pre-feasibility investigations into a transfer

scheme from uMkhomazi to uMngeni catchment. The DWS (2016) study found that the present ecological state of the uMkhomazi River is in a B class in the upper reaches and a C class in the lower reaches. These ecological classes are also recommended for the proposed uMkhomazi-uMngeni Transfer Scheme, also known as the uMkhomazi Water Project (Section 7.5.2 (a)). It was estimated that 350 million m³/a (32%) of the catchment runoff should be earmarked for ecological water requirements to sustain the system's riverine health at a desirable level should the uMWP be implemented (DWS, 2015).

Taking into account the current conditions of the estuary with a present ecological class of a C, the reversibility of the current impacts and the ecological importance and the conservation requirements of the uMkhomazi Estuary, the current recommendation is for an ecological Class B category.

The present ecological state (PES) of various rivers in the uMkhomazi Region is detailed in the DWS report (DWS, 2016). The targeted ecological categories (TEC) of various rivers in the uMkhomazi Region are in the report. Various nodes require improvements as a result of non-flow-related/anthropogenic issues. If the REC is attainable then it has been included in the catchment configuration.

7.2.3 Existing Infrastructure and Yields

a) Mooi/uMngeni Water Resource Region

There are four major dams on the uMngeni River, namely Midmar (**Figure 7.18**), Albert Falls (**Figure 7.19**), Nagle (**Figure 7.20**) and Inanda (**Figure 7.21**) Dams. These dams are all used as part of the water supply system. The characteristics of these dams are summarised in **Table 7.5**, **Table 7.6**, **Table 7.7**, and **Table 7.8** respectively. The silt surveys for dams in the Mooi/uMngeni System should be undertaken every 15 years.

As part of the Mooi/uMngeni Transfer Scheme, water is pumped from either Spring Grove Dam or Mearns Weir located in the Mooi River catchment. A total volume of 92 million cubic metres was pumped from Mooi River into Midmar Dam between July 2024 and June 2025. The characteristics of Mearns Weir and Spring Grove Dam (**Figure 7.22** and **Figure 7.23**) are summarised in **Table 7.9**, and **Table 7.10**.

Henley Dam (**Figure 7.24** and **Table 7.11**), situated on the Msunduzi River, a tributary of uMngeni River is no longer used for water supply purposes. All significant dams within the Mooi/uMngeni Region are listed in **Table 7.19**.

Raw water is supplied from Midmar Dam under gravity to DV Harris WTP, and under pumping (8 m lift) to Midmar WTP. Water is released from Albert Falls Dam to Nagle Dam from where it is supplied under gravity to Durban Heights WTP. Raw water is supplied from Inanda Dam under gravity to Wiggins WTP. It is possible to pump water from Inanda Dam to Durban Heights WTP utilising two different pump sets, *viz.* the 'Shaft' pumps, comprising three pumps capable of delivering a maximum of 140 Mℓ/day with one standby and the 'Inanda' pumps, comprising two pumps capable of delivering a maximum of 120 Mℓ/day. Pumping from Inanda Pump Station has not been possible for some time: the station is currently undergoing refurbishments with the contract scheduled to conclude in September 2026. A total volume of 45 million cubic metres was pumped from Inanda Dam into Durban Heights WTP via Shaft Pumps between July 2024 and June 2025.

Under normal conditions, it is possible to pump a total of 260Mℓ/day from Inanda Dam to Durban Heights WTP. A fourth Shaft Pump, delivering 40Mℓ/day can increase the total pumping capacity to approximately 280Mℓ/day, although this could impact scheduled maintenance and operational flexibility. Hence, the maximum delivery is limited to 240Mℓ/d.

Other than Mearns Weir and Spring Grove Dam, there is one additional major dam in the catchment, i.e. Craigieburn Dam on the Mnyamvubu River, which is a tributary of the Mooi River. Craigieburn Dam is owned and operated by DWS. It has a capacity of 23.5 million m³ and mainly supplies water to approximately 2000 ha of predominantly citrus farming irrigation downstream of the dam and along the Mooi River at Mudén. There is also an intention to supply water from this dam to Greytown for treatment and potable distribution. Bulk Conveyance between CraigieBurn Dam is partly completed and about 4.2 km of the

delivery pipeline from the CraigieBurn Pumpstation remains incomplete. There is an abundance of farm dams in the Mooi catchment, especially in the upper reaches.

The yield information of the existing water resources infrastructure was revised in 2019 based on a re-evaluation of the hydrology of both Mooi and uMngeni catchments and is presented in **Table 7.13**.

- The yield results from UUW (2019) were based on improved calibration of rainfall-runoff modelling. Changes in yield values, when compared against previous studies, are a result of additional rainfall and runoff data, as well as revised land-use data. Good calibrations improved the confidence in the hydrology records and also resolved some imbalance issues noted in the previous models used to simulate the uMngeni System.
- A key recommendation of the study was that available yield volumes, determined for the dams in the Mooi-uMngeni System, should be reduced by raw water conveyance losses when compared with the potable water requirements of the system. The Midmar System showed minimal raw water losses whilst the Nagle System showed losses of up to 8% and the Inanda System a 5% loss for raw water conveyance.
- When these raw water conveyance losses are applied to the yields, the resultant yields approximate the original values and have hence not been changed on the supply systems.



Figure 7.18 Midmar Dam.

Table 7.5 Characteristics of Midmar Dam (DWS 2003; 2016a).

Catchment Details	
Incremental Catchment Area:	926 km ²
Total Catchment Area:	926 km ²
Mean Annual Precipitation:	1 011 mm
Mean Annual Runoff:	209.4 million m ³
Annual Evaporation:	1 300 mm
Raised Dam Characteristics	
Gauge Plate Zero:	1 021.7 mASL
Full Supply Level:	1 047.5 mASL
Spillway Height:	25.8 m
Net Full Supply Capacity:	235.414 million m ³
Dead Storage:	0.0 million m ³
Total Capacity:	235.414 million m ³
Surface Area of Dam at Full Supply Level:	17.93 km ²
Original Measured Dam Capacity	177.347 million m ³ (October 1963)
Second Measured Dam Capacity	177.113 million m ³ (October 1983)
Third Measured Dam Capacity	235.414 million m ³ (January 2003)
Dam Type:	Concrete gravity with earth embankments
Crest Length:	Spillway Section: 139.6 m Non-Spillway Section: 1 283.4 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	3 500 m ³ /s
Date of Completion:	1963
Date of Area Capacity Survey:	2003 – Year when the wall was raised
Date of next Area Capacity Survey:	2026



Figure 7.19 Albert Falls Dam.

Table 7.6 Characteristics of Albert Falls Dam (DWS 1993; 2016b).

Catchment Details	
Incremental Catchment Area:	728 km ²
Total Catchment Area:	1 654 km ²
Mean Annual Precipitation:	1 005 mm
Mean Annual Runoff:	131.1 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	634.3 mASL
Full Supply Level:	655.9 mASL
Spillway Height:	21.6 m
Net Full Supply Capacity:	289.133 million m ³ (March 1993)
Dead Storage:	0.975 million m ³
Total Capacity:	290.108 million m ³
Surface Area of Dam at Full Supply Level:	23.5 km ²
Original Measured Dam Capacity	289.4620 million m ³ (June 1974)
Second Measured Dam Capacity	289.167 million m ³ (March 1983)
Third Measured Dam Capacity	289.133 million m ³ (March 1993)
Dam Type:	Concrete with earth embankments
Crest Length:	Spillway Section: 100 m Non-Spillway Section: 1 930 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	3 447 m ³ /s
Date of Completion:	1976
Date of Area Capacity Survey:	2008
Date of next Area Capacity Survey:	2028



Figure 7.20 Nagle Dam.

Table 7.7 Characteristics of Nagle Dam (DWS 2004; uMngeni-uThukela Water 2015).

Catchment Details	
Incremental Catchment Area:	885 km ²
Total Catchment Area:	2 539 km ²
Mean Annual Precipitation:	940 mm
Mean Annual Runoff:	139.7 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	379.71 mASL
Full Supply Level:	403.81 mASL
Spillway Height:	24.1 m
Net Full Supply Capacity:	23.237 million m ³ (November 1987)
Dead Storage:	1.366 million m ³
Total Capacity:	24.6 million m ³
Surface Area of Dam at Full Supply Level:	1.56 km ²
Original Measured Dam Capacity	23.237 million m ³ (October 1963)
Second Measured Dam Capacity	23.237 million m ³ (November 1987)
Dam Type:	Concrete gravity dam
Crest Length:	Spillway Section: 121 m Non-Spillway Section: 272 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	4334 m ³ /s
Date of Completion:	1948
Date of Area Capacity Survey:	1987
Date of next Area Capacity Survey:	2026



Figure 7.21 Inanda Dam.

Table 7.8 Characteristics of Inanda Dam (DWS 1990).

Catchment Details	
Incremental Catchment Area:	618 km ²
Total Catchment Area:	4 082 km ²
Mean Annual Precipitation:	870 mm
Mean Annual Runoff:	60.1 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	115.8 mASL
Full Supply Level:	147.0 mASL
Spillway Height:	31.2 m
Net Full Supply Capacity:	241.685 million m ³ (April 2009)
Dead Storage:	9.964 million m ³
Total Capacity:	251.649 million m ³
Surface Area of Dam at Full Supply Level:	14.63 km ²
Original Measured Dam Capacity	258.677 million m ³ (October 1988)
Second Measured Dam Capacity	251.649 million m ³ (October 1990)
Dam Type:	Concrete with earth embankments
Crest Length:	Spillway Section: 140 m Non-Spillway Section: 468 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	4 000 m ³ /s
Date of Completion:	1989
Date of Area Capacity Survey:	2009
Date of next Area Capacity Survey:	2027



Figure 7.22 Mearns Weir.

Table 7.9 Characteristics of Mearns Weir (DWS, 2003).

Catchment Details	
Incremental catchment area	242 km ²
Total catchment area	887 km ²
Mean annual precipitation	857 mm
Mean annual runoff	44.12 million m ³
Annual evaporation	1 350 mm
Weir Characteristics	
Gauge plate zero	1375.11 mASL
Full supply level	1382 mASL
Spillway Height:	6.89 m
Original & Current Net full supply capacity	5.116 million m ³ (October 2003)
Dead storage	0.0 million m ³
Total capacity	5.116 million m ³
Surface area of weir at full supply level	2.375 km ²
Weir type	Concrete
Material content of a weir wall	Concrete
Crest length	165m
Type of spillway	Uncontrolled
Capacity of spillway	1 970 m ³ /s
Date of Completion:	2003*
Date of Area Capacity Survey:	2003
Date of next Area Capacity Survey:	2026 (In-progress)

*Construction of the initial weir completed in 1983



Figure 7.23 Spring Grove Dam.

Table 7.10 Characteristics of Spring Grove Dam (DWS 2013; Uuw 2013).

Catchment Details	
Incremental Catchment Area:	339 km ²
Total Catchment Area:	339 km ²
Mean Annual Precipitation:	1007 mm
Mean Annual Runoff:	131 million m ³
Annual Evaporation:	1 350 mm
Dam Characteristics	
Gauge Plate Zero:	1407.1 mASL
Full Supply Level:	1433.5 mASL
Spillway Height:	26.4 m
Original & Current Net Full Supply Capacity:	139.5 million m ³ (November 2013)
Total Capacity:	139.5 million m ³
Surface Area of Dam at Full Supply Level:	10.2 km ²
Dam Type:	Concrete with earth embankment
Crest Length:	Spillway Section: 70 m Non-Spillway Section: 231 m
Type of Spillway:	Uncontrolled
Capacity of Spillway:	1970 m ³ /s
Date of Completion:	2013
Date of Area Capacity Survey:	2013
Date of next Area Capacity Survey:	2028



Figure 7.24 Henley Dam.

Table 7.11 Characteristics of Henley Dam (uMngeni-uThukela Water 2017).

Catchment Details	
Incremental Catchment Area:	219 km ²
Total Catchment Area:	219 km ²
Mean Annual Precipitation:	940 mm
Mean Annual Runoff:	42.1 million m ³
Annual Evaporation:	1 200 mm
Dam Characteristics	
Gauge Plate Zero:	900 mASL
Full Supply Level:	923.3 mASL
Spillway Height:	23.3 m
Net Full Supply Capacity:	1.02 million m ³ (January 2019)
Dead Storage:	0.0 million m ³
Total Capacity:	1.02 million m ³
Surface Area of Dam at Full Supply Level:	0.3 km ²
Original Measured Dam Capacity	2.72 million m ³ (1942)
Second Measured Dam Capacity	5.87 million m ³ (1960)
Third Measured Dam Capacity	5.51 million m ³ (June 1983)
Fourth Measured Dam Capacity	5.41 million m ³ (November 1987)
Fifth Measured Dam Capacity	1.5 million m ³ (October 1993)
Sixth Measured Dam Capacity	1.02 million m ³ (January 2019)
Dam Type:	Concrete with earth embankment

Crest Length:	Spillway Section: N/A Non-Spillway Section: N/A
Type of Spillway:	Uncontrolled
Capacity of Spillway:	N/A
Date of Completion:	1942
Date of Area Capacity Survey:	2019
Date of next Area Capacity Survey:	2026

Table 7.12 Existing Dams in the Mooi/uMngeni Region

Impoundment	River	Capacity (million m ³)	Purpose
Spring Grove Dam	Mooi	139.5	Domestic
Craigie Burn Dam	Mnyamvubu	23.5	Irrigation
Mearns Weir	Mooi	5.1	Domestic
Midmar Dam	uMngeni	235.4	Domestic
Albert Falls Dam	uMngeni	289.1	Domestic
Nagle Dam	uMngeni	23.2	Domestic
Inanda Dam	uMngeni	241.7	Domestic

Table 7.13 Yield Information for the existing water resource infrastructure in the Mooi/uMngeni Region including transfers from the MMTS.

Phase	Position in system	Historic Firm Yield	Stochastic Yield (1 in 20 years risk of failure)		Stochastic Yield (1 in 50 years risk of failure)		Stochastic Yield (1 in 100 years' risk of failure)	
		million m ³ /annum	million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day
MMTS	Midmar Dam	167	217	594	195.0	534.0	183.0	501.4
	Nagle Dam	277	379	1038	348.0	953.4	333	912.3
	Inanda Dam	416	470	1288	446.0	1221.9	434	1189.0

Note: Yields indicated above are obtained from the UuW Report **MGENI-MOOI SYSTEM HYDROLOGY UPDATE STUDY, 2020**. Note that these yield figures represent volumes of water that can be abstracted from the dams and they do not consider the losses of water that occurs within the raw water bulk infrastructure.

Groundwater is mainly utilised in the uMngeni catchment by private landowners as the majority of towns are supplied by reticulated surface water. Groundwater is utilised to supplement irrigation and for stock watering. The exception is the Nottingham Road and Rosetta areas which are supplied by production boreholes. Very high yielding boreholes (140 kℓ/hr) have been drilled in the area. The contact zones between the shale's, sandstone and the intrusive dolerite dykes are the water bearing features in the areas. There are no faults or other structural features to target. In the Howick area groundwater is abstracted and bottled for commercial purposes. Although not accurately known it has been reported that the formal settlement of Mfolweni currently obtains their domestic water supply (in the order of 2 000 kℓ/day) from boreholes.

7.2.4 Operating Rules

a) Mooi/uMngeni Water Resource Region

The uMngeni and Mooi River systems are relatively complex in terms of their operation. In addition to the four dams, the uMngeni River System is augmented from the Mooi River System using the MMTS. The dams on the uMngeni River supply water directly to demand centres via various routes, allowing for flexibility in terms of the operation of the system (refer to description in the previous section and to the system schematic (**Figure 7.25**)).

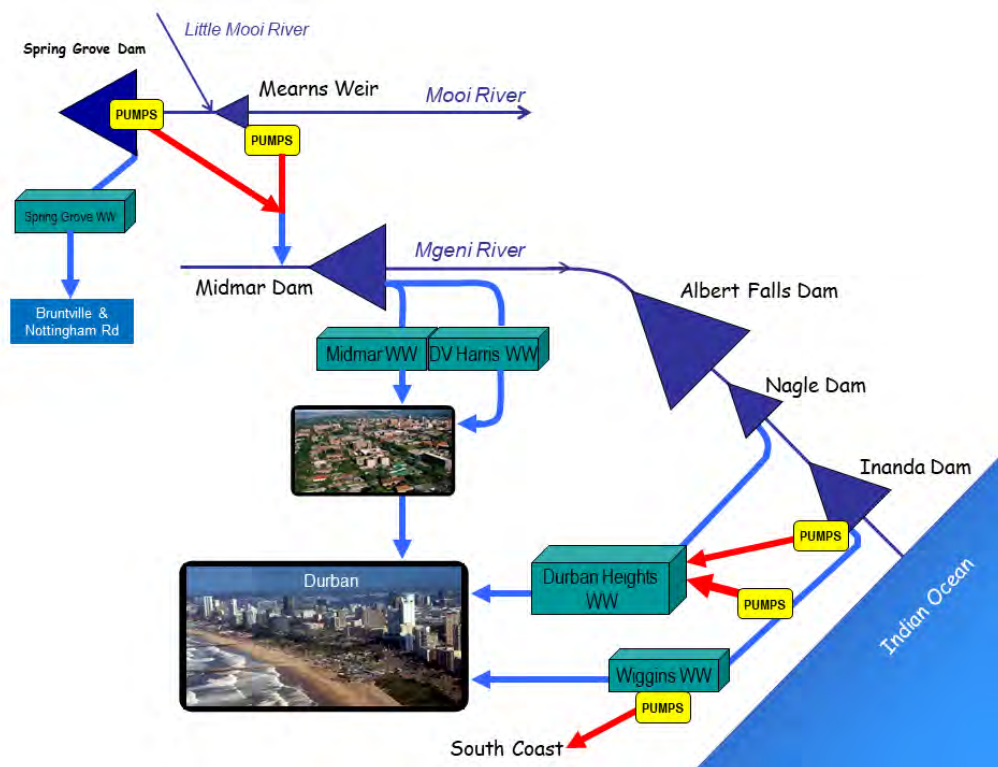


Figure 7.25 Schematic of the uMngeni System.

The area of Verulam, to the north of Durban, can be supplied from either the uMngeni System or from the Mdloti System (**Section 12**). The source of water to this area is determined through operational requirements and the water resource availability in the systems. There is also a linkage from the uMngeni System through to the Upper and Middle South Coast Regions. Water from the uMngeni System is utilised to supplement the supply from the local sources to this area (**Section 11**).

In years when the system storage is full or near full the uMngeni System demands are supplied under gravity (i.e. not utilising the pumps at Spring Grove Dam, Mearns Weir and Inanda Dam). However, if there is a risk of the system being depleted or if demands exceed the yield of the system a revised operating rule is implemented. In this instance, the cost of pumping

becomes a secondary consideration. This revised operating rule targets the maximum utilisation of the resource, through pumping at any time of the year, as long as there is excess water to pump from the donor catchment and is defined as follows:

- If Spring Grove Dam is below full supply level and Mearns Weir is above 50% of full supply capacity, then pumping through the MMTS is undertaken from Mearns Weir. This minimises the risk of water flowing over Mearns Weir and less water is lost from the Mooi System in this way. Pumping can also be augmented from the Spring Grove Pump Station to increase the volume pumped to a full $4.5\text{m}^3/\text{s}$.
- Pumping of greater than $4.5\text{m}^3/\text{s}$ is not recommended as this can result in an environmental impact on the receiving streams.
- If Spring Grove Dam is full or likely to spill then pumping through the MMTS is undertaken from the Spring Grove Pump Station which has a lower operating cost.
- Pumping through the MMTS is maximised until Midmar Dam and Albert Falls Dam reach full or near full supply capacity.
- Pumping from Mooi River is stopped when the uMngeni System is full or approaches full supply capacity with good rains predicted.
- Water is released from Albert Falls Dam to Nagle Dam from where water flows under gravity to the Durban Heights WTP.
- If Nagle Dam is spilling, then water is supplied to Durban Heights under gravity only and no pumping from Inanda Dam is undertaken;
- When Nagle or Albert Falls Dams are below full supply capacity, and are unlikely to reach full supply capacity in the season, then the supply of water to the Durban Heights WTP is maximised through pumping from Inanda Dam with augmentation, under gravity, from Nagle Dam. In this instance, all the Inanda Dam pumps ($120\text{ M}\ell/\text{day}$), including the Shaft pumps ($140\text{ M}\ell/\text{day}$), are operated to maximise the supply from Inanda Dam and prevent spills as far as possible; and
- Allow for possible down-time on all pumping routes in the system to account for scheduled maintenance and unplanned operational interruptions (e.g. as a result of power failures).

The option to use rainfall forecasts to predict dam levels, and therefore optimise pumping requirements, is available. The use of forecasting periods of high and low rainfall periods helps to refine the pumping operating rule and determine periods when pumping could be decreased so as to minimise unnecessary energy usage.

b) Mkhomazi Water Resource Region

The current water resources of the uMngeni System are insufficient to meet the long-term water demands of the system (DWS, 2015). The DWS Reconciliation Strategy Study (DWS, 2017) indicates that a development on the uMkhomazi River, the third-largest river in KwaZulu-Natal in terms of mean annual runoff (MAR), to transfer water to the existing

uMngeni System, is the most feasible option for supporting the uMngeni System. The economy of KZN will be constrained without this augmentation scheme.

The proposed uMkhomazi Water Project comprises the following components (DWS, 2015):

- A 251 million m³ dam at Smithfield on the uMkhomazi River;
- A 32 km tunnel between the Smithfield Dam and Baynesfield in the uMlaza Catchment;
- The option of a new 15.7 million m³ Langa Balancing Dam at Baynesfield has been excluded; this means that the 600 Mℓ/day water treatment plant will not operate when the uMkhomazi tunnels are taken out of service for maintenance and inspection work; and
- A gravity potable water pipeline to link this system to uMngeni-uThukela Water's 57' Pipeline. The Smithfield Dam storage capacity of 226 million provides a 1:100 yield of 600 Mℓ/day and this should accommodate the increase in demand in the uMngeni System for 30 to 40 years. Once the yield of the Smithfield Dam is fully utilised then an additional dam could be constructed on the uMkhomazi River at Impendle and, with an additional tunnel at Smithfield Dam, the yield of the system would then increase by an additional 600 Mℓ/day allowing for the long-term growth of the system. The uMkhomazi Water Project is described in **Section 7.5.2 (a)**.

7.3 Supply Systems

7.3.1 Overview

The Upper uMngeni System serves urban, peri-urban and rural settlements within the uMgungundlovu, Msunduzi, iLembe and eThekweni (Outer West) municipal areas (Error! Reference source not found.). The system extends from Howick / Mpophomeni / Vulindlela in the west, to Wartburg / New Hanover / Dalton / Ozwatini in the east, to Cato Ridge / Mpumulanga in the South and to Eston / Umbumbulu in the South West. The Mooi River System covers Bruntville and Mooi River to the north, Vaalekop, Rosetta, Nottingham Road, Balgowan, Lidgetton, Lions River to the south.

With the recent commissioning of eThekweni Metro Municipality's Western Aqueduct, the system has now been further extended to the Ntuzuma / Inanda / KwaMashu Supply systems. The system derives its water resource from the Upper uMngeni River, fed from Midmar Dam, with augmentation from the Mooi-uMngeni Transfer Scheme (MMTS) (**Section 7.2.3 (a)**). Water is treated at two Water Treatment Plants (WTP's), namely the Midmar WTP located in Howick and the D.V. Harris WTP located in Pietermaritzburg.

The Upper uMngeni sub system is a highly integrated system and therefore to describe it adequately it has been divided into Sub-systems, which have been further divided into links. This is illustrated **Table 7.14.Error! Reference source not found.**

Table 7.14 Upper uMngeni System

System	Water Treatment Plant	Link
Spring Grove node	Spring Grove	- Spring Grove WTP to Bruntville Reservoir - Spring Grove WTP to Rosetta Reservoir - Spring Grove WTP to Nottingham Road Reservoir
Howick-North node	Midmar	Mill Falls Pump Station to Howick-North Reservoir
Howick-West node	Midmar	- Mill Falls Pump Station to Howick-West Reservoir - Howick-West Reservoir to Mphophomeni Supply area - Howick-West Reservoir to Groenekloof Reservoir - Groenekloof Reservoir Supply Area
Midmar WTP to Umlaas Road Reservoir node	Midmar	'251 Pipeline: Midmar WTP to D.V. Harris Off-Take '53 Pipeline: D.V. Harris WTP to Umlaas Road Reservoir '61 Pipeline: D.V. Harris WTP to World's View Reservoir '61 Pipeline: World's View Reservoir to ED4 '61 Pipeline: ED4 to Umlaas Road Reservoir - Ashburton Supply - Richmond Pipeline - Thornville/Hopewell Supply
Umlaas Road Reservoir node	Midmar & D.V. Harris	'57 Pipeline - Eston / Umbumbulu Pipeline - Lion Park / Manyavu Pipeline
uMshwathi BWSS node	D.V. Harris	- Msunduzi Supply '69 Pipeline (Claridge Reservoir to Wartburg Reservoir) - Wartburg Reservoir to Bruyns Hill Reservoir - Wartburg Reservoir to Dalton Reservoir - Dalton Reservoir to Ozwathini Reservoir

7.3.2 Upper uMngeni System - Spring Grove Water Treatment Plant

The Spring Grove WTP, **Table 7.15**, commissioned in June 2023, abstracts water from Spring Grove Dam as part of the Mpofana BWSS to supply the village of Rosetta, Mooi River, Bruntville and Nottingham Road in Mpofana Municipality. The commissioning of this plant allowed for the decommissioning of the old Rosetta WTP. The WTP began producing an average of 5.6 Mℓ/day after the Bruntville pipeline was commissioned in June 2024. It has a current utilisation of 9.0 Mℓ/day.

The WTP has a current design capacity of 20 Mℓ/day, upgradable to 60 Mℓ/day in the future.

Table 7.15 Characteristics of the new Spring Grove WTP.

WTP Name:	Spring Grove WTP
System:	Mpofana Bulk Water Supply System
Maximum Design Capacity:	20 Mℓ/day
Current Utilisation:	9.0 Mℓ/day
Raw Water Storage Capacity:	139 million m ³
Raw Water Supply Capacity:	20 Mℓ/day
Pre-Oxidation Type:	Pre-chlorination
Primary Water Pre-Treatment Chemical:	SUDFLOC 3456
Total Coagulant Dosing Capacity:	2.5 ppm
Rapid Mixing Method:	Hydraulic jump
Clarifier Type:	Pulsators
Number of Clarifiers:	3
Total Area of all Clarifiers:	140 m ²
Total Capacity of Clarifiers:	3.2 m ³ /hr
Filter Type:	Rapid gravity Filters
Number of Filters:	4
Filter Floor Type	Concrete with perforated nozzle
Total Filtration Area of all Filters	194 m ²
Total Filtration Design Capacity of all Filters:	20 Mℓ/day
Total Capacity of Backwash Water Tanks:	184 m ³
Total Capacity of Sludge Treatment Plant:	3 Mℓ/day
Capacity of Used Washwater System:	200 m ³ x 2
Primary Post Disinfection Type:	Chlorine
Disinfection Dosing Capacity:	3.6 ppm x 3
Disinfectant Storage Capacity:	4000 ℓ
Total Treated Water Storage Capacity:	5 Mℓ



Figure 7.26 Spring Grove WTP (Google Earth)

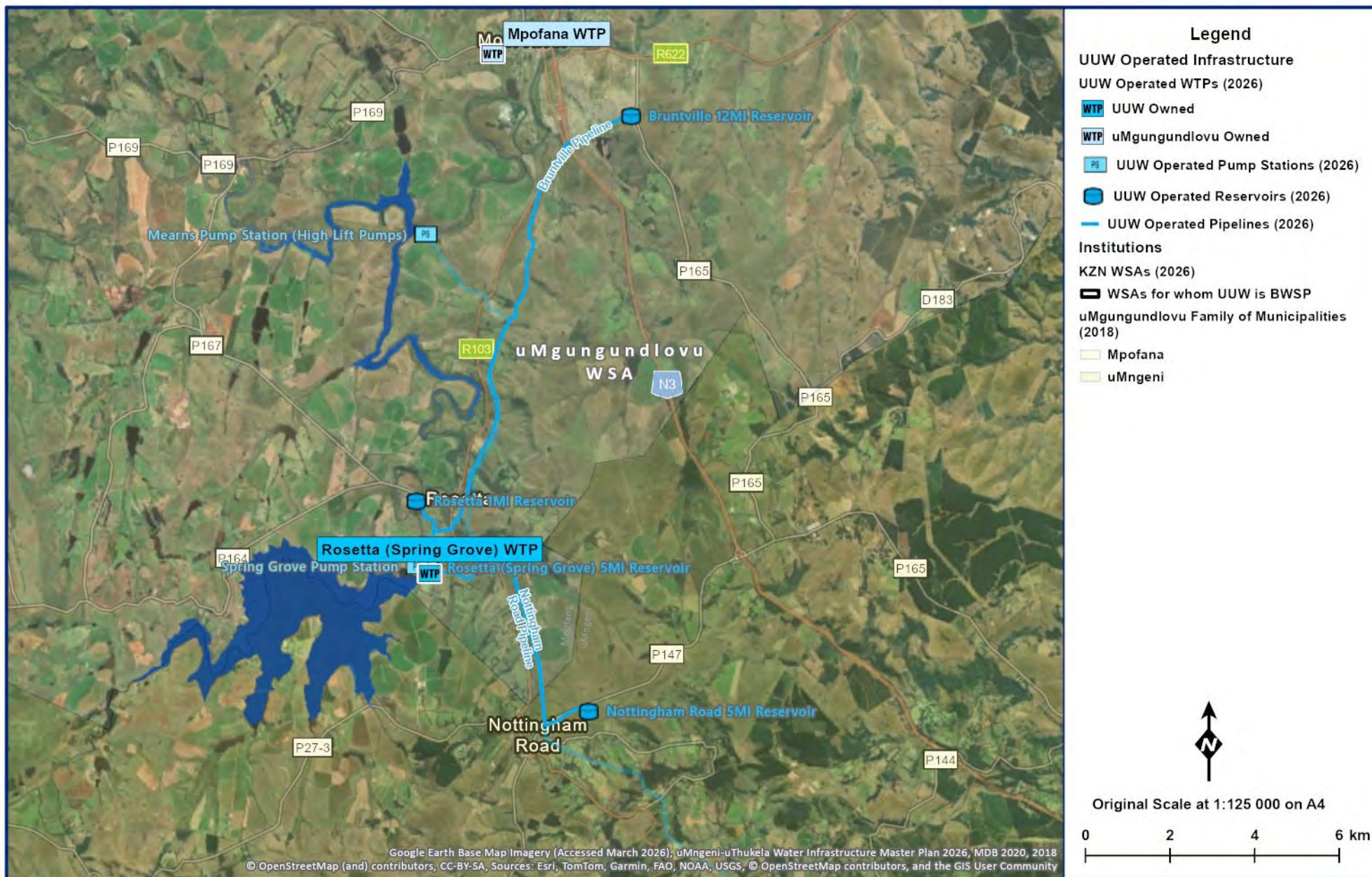


Figure 7.27 Spring Grove WTP supply system.

Table 7.16 Pump details: Spring Grove Supply-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Mooi River	Spring Grove	Bruntville Pump No 1	✓		KSB Omega 200-520 (VSD)	Spring Grove WTW	Bruntville Reservoir	107.07	95.05	15.77
Mooi River	Spring Grove	Bruntville Pump No 2		✓	KSB Omega 200-520 (VSD)	Spring Grove WTW	Bruntville Reservoir	107.07	95.05	15.77
Mooi River	Spring Grove	Bruntville Pump No 3	✓		KSB Omega 200-520 (VSD)	Spring Grove WTW	Bruntville Reservoir	107.07	95.05	15.77
Mooi River	Spring Grove	Nottingham Road No 1		✓	KSB Omega 250-800 (VSD)	Spring Grove WTW	Nottingham Road Reservoir	158.77	145	19.99
Mooi River	Spring Grove	Nottingham Road No 2	✓		KSB Omega 250-800 (VSD)	Spring Grove WTW	Nottingham Road Reservoir	158.77	145	19.99
Mooi River	Spring Grove	Nottingham Road No 3		✓	KSB Omega 250-800 (VSD)	Spring Grove WTW	Nottingham Road Reservoir	158.77	145	19.99

Table 7.17 Reservoir details: Spring Grove Supply-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Mooi River	Bruntville	Bruntville 12 Mℓ	12	Distribution	1494,51	1488,00
Mooi River	Nottingham Road	Nottingham Road	5	Distribution	1527,00	1524,20
Mooi River	Rosetta	Rosetta	1.0	Distribution	TBD	TBD

Table 7.18 Pipeline details: Spring Grove Supply-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Mooi River	Bruntville Pipeline	Spring Grove Pump Station	Bruntville Reservoir	13.4	650	Steel	36*	4
Mooi River	Nottingham Road Pipeline	Spring Grove Pump Station	Nottingham Road Reservoir	7.3	650	Steel	36*	5
Mooi River	Rosetta Pipeline	Bruntville Pipeline	New Rosetta 1 Mℓ Reservoir	0.95	250	Steel	6.36	4

*Based on 1.5 m/s

a) Spring Grove Node

The Spring Grove System is shown in **Figure 7.26**.

i) Spring Grove WTP to Bruntville Reservoir

Water is pumped from the Spring Grove pump station, through a 650 mm diameter steel pipeline to a 12 Mℓ reservoir in Bruntville. The construction of this reservoir and pipeline was completed in June 2023.

ii) Spring Grove WTP to Nottingham Reservoir

Water is pumped from the Spring Grove pump station, through a 650 mm diameter steel pipeline to a 5 Mℓ reservoir in Nottingham. The construction of this reservoir and pipeline was completed in June 2023.

iii) Spring Grove WTP to Rosetta Road Reservoir

Water is pumped to the Rosetta Reservoir from the Spring Grove pump station utilising the Bruntville reservoir pumps. This reservoir is fed through a 250 mm diameter off-take from the 650mm diameter rising main going to Bruntville Reservoir.

7.3.3 Upper uMngeni System – Midmar WTW

The Midmar WTP (**Figure 7.28, Table 7.19**), which was commissioned in 1996, draws raw water from Midmar Dam. Water from the dam is supplied under pumping via the '251 Pipeline (**Table 7.20**). The '251 raw water pipeline consists of two sections– two gravity pipelines feed water from the dam to a raw water pump station, and two rising mains from the pump station to the WTP. The new raw water pipeline was implemented as a risk mitigation measure to ensure the sustainability of supply should any one of the mains be out of service. Four pump sets are currently installed in the raw water pump station (3 duty + 1 standby) (**Table 7.21**). The details for the WTP clearwells are shown in

Table 7.22.



Figure 7.28 Midmar Water Treatment Plant after the upgrade.

In 2018, the Midmar WTP capacity was upgraded from 250 Mℓ/day to 395 Mℓ/day. The WTP supplies water to Howick and Mpophomeni, most of the south-western and southern suburbs of Pietermaritzburg, Greater Edendale, Vulindlela, Thornville, Hopewell, Richmond and the Umlaas Road node via the '61 and '261 Pipelines. It also serves eThekweni Municipality's Outer West area (comprising Cato Ridge, Georgedale, Camperdown, Gillitts, and Hillcrest), as well as consumers on the Lion Park and Eston-Umbumbulu pipelines from the Umlaas Road node. The supply area has also now been extended to eThekweni Metropolitan Municipality's Western Aqueduct, which supplies areas as far east as Inanda, Ntuzuma and KwaMashu.

The primary source of water for the Umlaas Road Reservoir node is the Midmar WTP, although this is supported by a potential maximum of 35 Mℓ/day from the D.V. Harris WTP via the '53 Pipeline. This, not only reduces the operational risk of having a single pipeline supplying Umlaas Road, but also allows uMngeni-uThukela Water to transfer some of the demand off the '61 Pipeline system, especially during high demand periods and planned outages.

Table 7.19 Characteristics of the Midmar WTP.

WTP Name:	Midmar
System:	Upper uMngeni System
Maximum Design Capacity:	395 Mℓ/day
Current Utilisation:	385.25 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	395 Mℓ/day @ velocity of 1.3 m/s
Pre-Oxidation Type:	Pre-chlorination
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	35 l/hr (according to Operating Manual)
Rapid Mixing Method:	Static Mixer
Clarifier Type:	Pulsator Clarifier
Number of Clarifiers:	5
Total Area of all Clarifiers:	3380 m ²
Total Capacity of Clarifiers:	500 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	18
Filter Floor Type	Plate Design
Total Filtration Area of all Filters	2520 m ²
Total Filtration Design Capacity of all Filters:	395 Mℓ/day
Total Capacity of Backwash Water Tanks:	2100 m ³
Total Capacity of Sludge Treatment Plant:	360 - 900 m ³ /hr (rating on thin sludge pumps)
Capacity of Used Washwater System:	10 Mℓ/day
Primary Post Disinfection Type:	Chloramination
Disinfection Dosing Capacity:	15 kg/hr
Disinfectant Storage Capacity:	8 x 1 ton full chlorine cylinders + 20 ton of ammonia delivered
Total Treated Water Storage Capacity:	7 Mℓ

Table 7.20 Pipeline details: '251 Pipeline.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'251 Pipeline	Midmar Raw Water Pump Station	Midmar WTP	3.30	1600	Steel	347.91	38
Upper uMngeni	'251 Pipeline	Midmar Dam	Midmar Raw Water Pump Station	0.40	1600	Steel	347.91	69
Upper uMngeni	'251 Pipeline	Midmar Dam	Midmar Raw Water Pump Station	0.40	1600	Steel	347.91	29
Upper uMngeni	'251 Pipeline	Midmar Raw Water Pump Station	Midmar WTP	3.30	1600	Steel	347.91	29
Upper uMngeni	'251 Pipeline	Midmar WTP	Midmar Reservoir	6.50	1600	Steel	347.91	29
Upper uMngeni	'251 Pipeline	Midmar Reservoir	D.V. Harris WTP	8.06	1600	Steel	347.91	29

* Based on a velocity of 2 m/s

Table 7.21 Pump station details: Midmar Raw Water Pump Station.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Midmar Raw Water	Pump No 1	✓		Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131
Upper uMngeni	Midmar Raw Water	Pump No 2	✓		Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131
Upper uMngeni	Midmar Raw Water	Pump No 3	✓		Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131
Upper uMngeni	Midmar Raw Water	Pump No 4		✓	Sulzer Bros:SM 602-570	Midmar Dam	Midmar WTP	15	35	131

Table 7.22 Clearwell details: Midmar WTP.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Midmar WTP	Midmar Clearwells	7	Bulk	979.00	974.0*

*Assumed value

a) Howick-North Sub-System

The Howick-North Sub-System is shown in **Figure 7.29**.

i) Mill Falls Pump Station to Howick-North Reservoir Complex

The Howick-North Reservoir Complex consists of four reservoirs having varying top water levels (**Table 7.23**). Water treated at Midmar WTP is pumped from the Mill Falls Pump Station (**Table 7.24**) through a 400 mm diameter steel pipeline (**Table 7.25**) to Reservoir 3 (4.5 Mℓ/day) and via a 300mm diameter pipeline to the new Reservoir 4 (6.5 Mℓ/day). Howick Reservoir 2 (0.9 Mℓ/day) has been decommissioned.

Howick Reservoir 1 (1.2 Mℓ/day) is not currently operational, but future use is expected when a request is received from uMgungundlovu District Municipality to supply water to the high lying areas. The existing 300 mm diameter pipeline from Reservoir 1 to Reservoir 3 has been abandoned.

The old supply pipeline (Greendale pipeline) is no longer in use, but has been left in place as an emergency rising main. Alternatively, it could be used in future, as a back-feed reticulation line by uMgungundlovu District Municipality (**Table 7.25**).

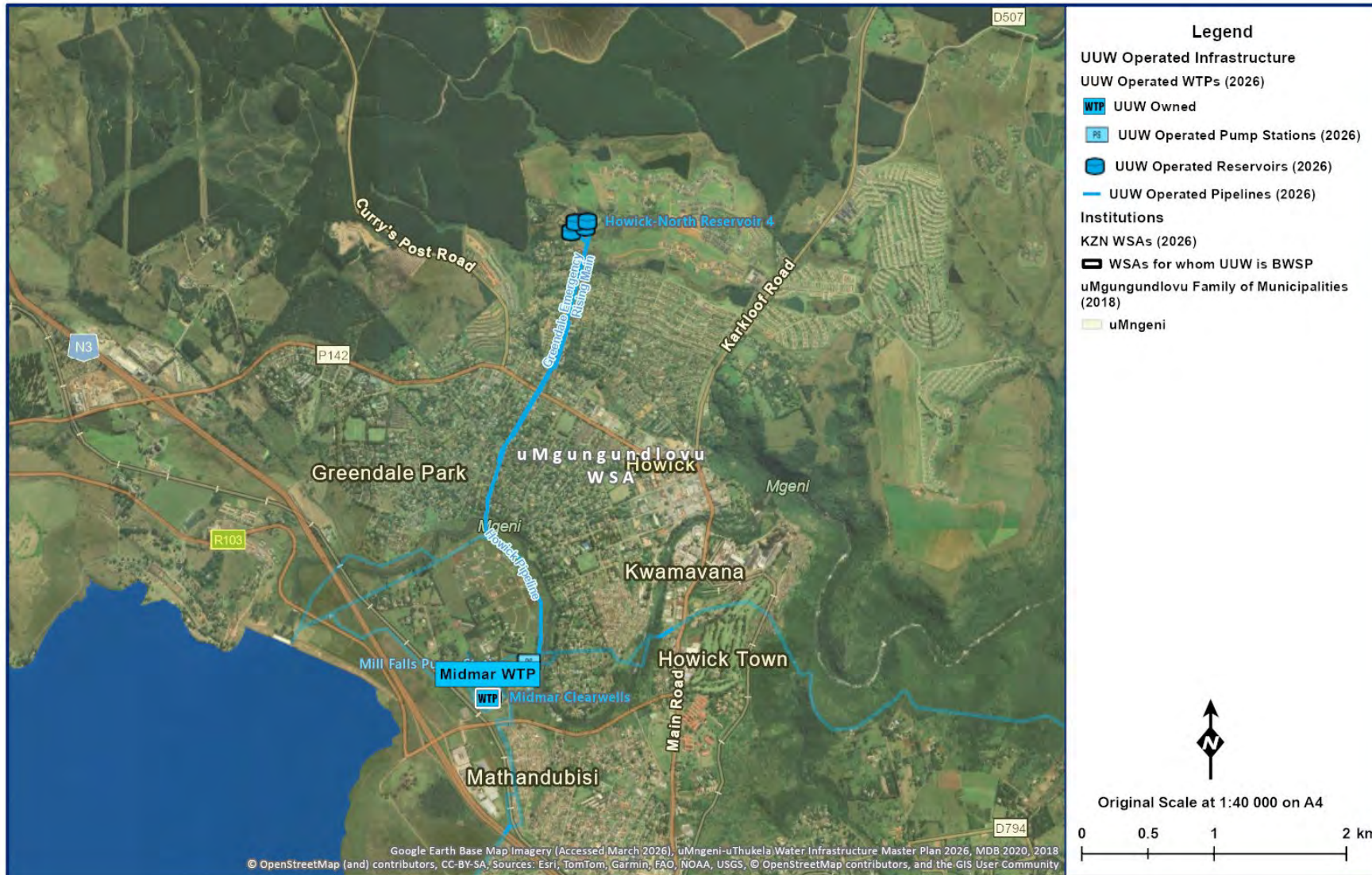


Figure 7.29 General Layout of the Howick-North Sub-System.

Table 7.23 Reservoir details of the Howick-North Sub-System

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Howick-North	Howick-North Reservoir 1 (Not currently in service)	1.2	Terminal	1113.98	1111.30
Upper uMngeni	Howick-North	Howick-North Reservoir 2 (Decommissioned)	0.9	Terminal	1104.81	1102.06
Upper uMngeni	Howick-North	Howick-North Reservoir 3	4.5	Terminal	1105.66	1098.04
Upper uMngeni	Howick-North	Howick-North Reservoir 4	6.5	Terminal	1105.66	1098.04

Table 7.24 Pump details: Howick-North Sub-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Mill Falls	Howick Pump No 1		✓	KSB:WKLn 125-3	Midmar WTP	Howick Reservoir	75	99.0	4.5
Upper uMngeni	Mill Falls	Howick Pump No 2		✓	KSB:WKLn 125-3	Midmar WTP	Howick Reservoir	75	99.0	4.5
Upper uMngeni	Mill Falls	Howick Pump No 3	✓		KSB:ETA 150-50	Midmar WTP	Howick Reservoir	75	77.4	6.9

Table 7.25 Pipeline details: Howick-North Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	Howick Pipeline	Mill Falls Pump Station	Howick Reservoir	2.5	400	Steel	16.30	29
Upper uMngeni	Howick Pipeline	Mill Falls Pump Station	Howick Reservoir	2.5	300	AC	9.20	29

* Based on a velocity of 1.5 m/s

b) Howick-West Sub-System

The Howick-West Sub-System is shown in **Figure 7.31**

i) Mill Falls Pump Station to Howick-West Reservoir

Water from the Mill Falls Pump Station (**Table 7.26**) is also pumped to the Howick-West Reservoir Complex (**Table 7.27**) through a 700 mm diameter steel pipeline (**Table 7.28**). The original 375 mm diameter asbestos cement pipe from Midmar WTP to Howick-West Reservoir is now utilised as a back-feed pipeline (**Table 7.28**). This back-feed pipeline supplies potable water to Merrivale, a low-cost housing scheme at Howick West, online consumers and the Midmar WTP.

ii) Howick-West Reservoir to Groenekloof Reservoir

The Howick-West Reservoir Complex consists of two 8.25 Mℓ reservoirs and one 16 Mℓ reservoir (**Table 7.27**). These reservoirs provide storage for the residential communities in Howick-West and Mpophomeni and serves as balancing reservoirs within the bulk supply system. The additional 16Mℓ Reservoir has been commissioned to ensure adequate storage to meet the current and projected demand of the supply area.

Water is pumped from the Howick-West Pump Station (**Table 7.26**), situated at the Howick-West Reservoir Complex, to the Groenekloof Reservoir through a 600 mm diameter pipeline ('67 Pipeline) (**Table 7.28**).

iii) Howick-West to Mpophomeni Reservoir Supply Area

From the Howick-West Pump Station, water is also pumped to the Mpophomeni Reservoir through a 5.8 km long, 250 mm diameter AC pipeline (**Table 7.28**).

iv) Groenekloof Reservoir Supply Area

The Groenekloof Reservoir Complex (**Table 7.27**) consists of three reservoirs with a combined capacity of 17.27 Mℓ.

The Groenekloof Reservoir Complex has a 300 mm diameter back-feed pipeline (old '67 Pipeline) (**Table 7.28**) that supplies consumers in Hilton and Cedara. This Complex also supplies the Vulindlela reservoirs and Blackridge Reservoir.

A 600 mm diameter pipeline from Groenekloof Reservoir feeds the Groenekloof Pump Station (**Table 7.28**). The pump station has high-lift pumps that supply Vulindlela Reservoirs 2 - 5 and low-lift pumps that supply Vulindlela Reservoir 1 (**Table 7.26**). The Vulindlela reservoirs supply the Vulindlela area through a network consisting of reservoirs and reticulation pipelines.

Groenekloof Reservoir also supplies Blackridge Reservoir (**Table 7.27**), through a 250 mm diameter pipeline ('56 Pipeline) (**Table 7.28**). There is a 160 mm diameter off-take along this pipeline supplying Sweetwaters Reservoir (**Table 7.27 and Table 7.28**).

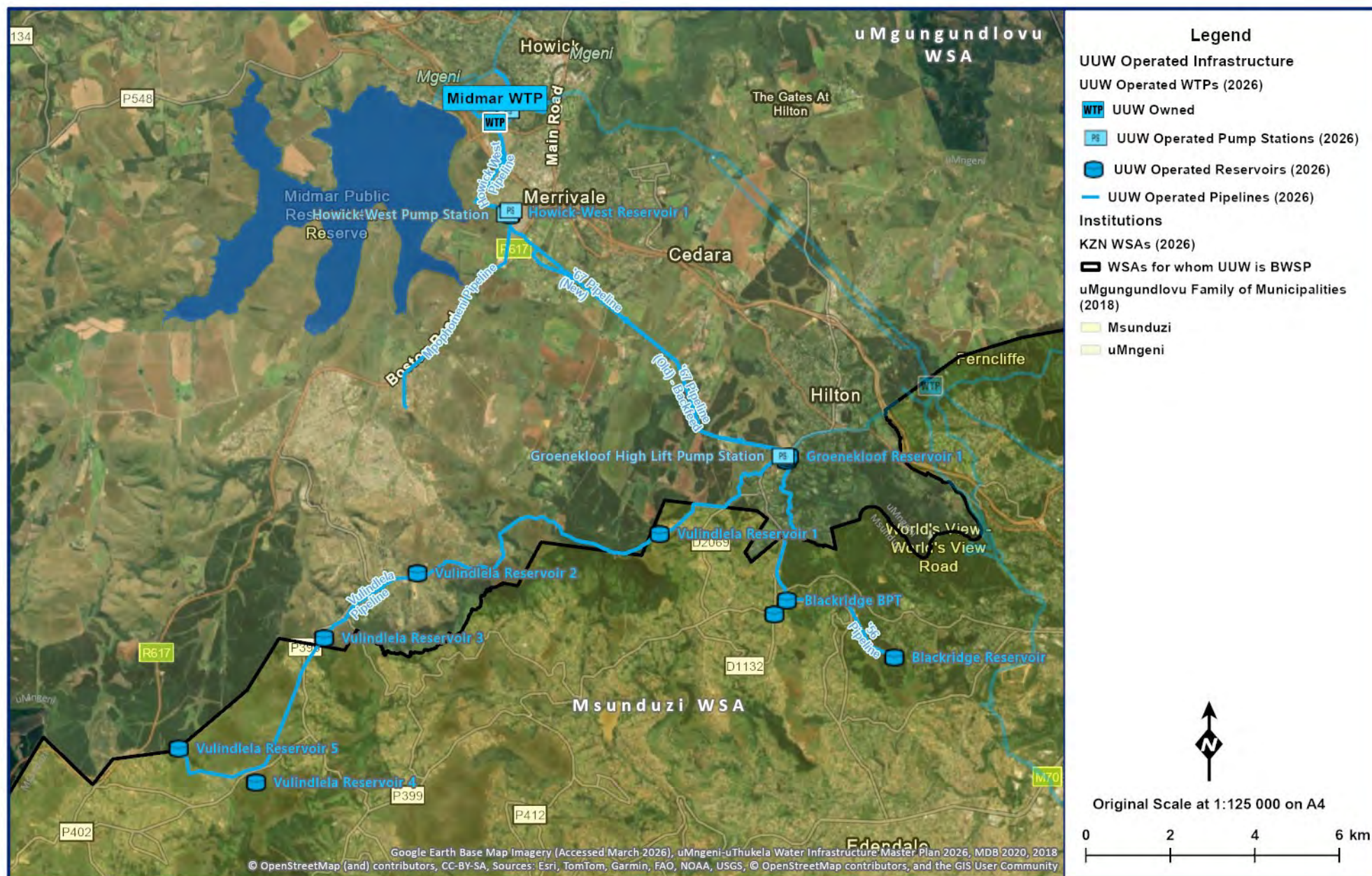


Figure 7.31 General Layout of the Howick-West Sub-System.

Table 7.26 Pump details: Howick-West Sub-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Mill Falls	Howick-West Pump No 1	✓		KSB	Midmar WTP	Howick-West	86	107	25.1
Upper uMngeni	Mill Falls	Howick-West Pump No 2		✓	KSB	Midmar WTP	Howick-West	86	107	25.1
Upper uMngeni	Howick-West	Mpophomeni Pump No 1	✓		KSB:WKLn 150/3	Howick-West Reservoir	Mpophomeni Reservoir	56	120	6.1
Upper uMngeni	Howick-West	Mpophomeni Pump No 2		✓	KSB:WKLn 150/3	Howick-West Reservoir	Mpophomeni Reservoir	56	120	6.1
Upper uMngeni	Howick-West	Groenekloof No 1	✓		KSB:ROL 250-620	Howick-West Reservoir	Groenekloof Reservoir	87	130	18.0
Upper uMngeni	Howick-West	Groenekloof No 2		✓	KSB:ROL 250-620	Howick-West Reservoir	Groenekloof Reservoir	87	130	18.0
Upper uMngeni	Groenekloof	Low Lift Pump No 1	✓		Amalgamated Power Eng:DSM 150-46	Groenekloof Reservoir	Vulindlela Reservoir 1	103	120	7.1
Upper uMngeni	Groenekloof	Low Lift Pump No 2	✓		Amalgamated Power Eng:Omega 150-605	Groenekloof Reservoir	Vulindlela Reservoir 1	103	120	7.1
Upper uMngeni	Groenekloof	Low Lift Pump No 3		✓	Amalgamated Power Eng:DSM 150-46	Groenekloof Reservoir	Vulindlela Reservoir 1	103	120	7.1
Upper uMngeni	Groenekloof	High Lift Pump No 1	✓		Amalgamated Power Eng:RKB Size 200-37	Groenekloof Reservoir	Vulindlela Reservoirs 2 - 5	226	351	11
Upper uMngeni	Groenekloof	High Lift Pump No 2	✓		Amalgamated Power Eng:RKB Size 200-37	Groenekloof Reservoir	Vulindlela Reservoirs 2 - 5	226	351	11
Upper uMngeni	Groenekloof	High Lift Pump No 3		✓	Amalgamated Power Eng:WL 200/7	Groenekloof Reservoir	Vulindlela Reservoirs 2 - 5	226	351	11

Table 7.27 Reservoir details: Howick-West Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Howick-West	Howick-West Reservoir 1	8.3	Distribution	1125.1	1118.1
Upper uMngeni	Howick-West	Howick-West Reservoir 2	8.3	Distribution	1125.1	1118.1
Upper uMngeni	Howick-West	Howick-West Reservoir 3	16	Distribution	1125.1	1118.1
Upper uMngeni	Blackridge	Blackridge Reservoir	2.2	Terminal	1006.0	1004.0*
Upper uMngeni	Sweetwaters**	Sweetwaters Reservoir	0.5	Terminal	1107.0	1103.0
Upper uMngeni	Vulindlela	Vulindlela Reservoir 1	10.0	Distribution	1313.9	1307.9
Upper uMngeni	Vulindlela	Vulindlela Reservoir 2	10.0	Distribution	1410.0	1404.0
Upper uMngeni	Vulindlela	Vulindlela Reservoir 3	0.6	Distribution	1403.9	1399.7
Upper uMngeni	Vulindlela	Vulindlela Reservoir 4	0.2	Distribution	1425.8	1422.5
Upper uMngeni	Vulindlela	Vulindlela Reservoir 5	9.2	Distribution	1494.0	1488.0
Upper uMngeni	Hilton	Groenekloof Reservoir 1	2.3	Distribution	1210.6	1205.1
Upper uMngeni	Hilton	Groenekloof Reservoir 2	5.0	Distribution	1210.6	1205.4
Upper uMngeni	Hilton	Groenekloof Reservoir 3	10.0	Distribution	1210.6	1205.1

* Estimated

** Reservoir owned and operated by Msunduzi Municipality

Table 7.28 Pipeline details: Howick-West Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Upper uMngeni	Howick West Pipeline	Mill Falls Pump Station	Howick-West Reservoir	3.30	700	Steel	66.6	46
Upper uMngeni	Howick West Pipeline (Backfeed)	Howick-West Reservoir	Midmar WTP (Backfeed)	3.40	375	AC	19.0	46
Upper uMngeni	Mpophomeni Pipeline	Howick-West Pump Station	Mpophomeni Reservoir	5.80	250	AC	8.5	46
Upper uMngeni	'67 Pipeline (New)	Howick-West Pump Station	Groenekloof Reservoir	9.80	600	Steel	49.0	28
Upper uMngeni	'67 Pipeline (Old) (Backfeed)	Groenekloof Reservoir	Howick-West Reservoir	9.80	300	AC	12.2	43
Upper uMngeni	Vulindlela Pipeline	Groenekloof Pump Station - Low-Lift Pump Station	Vulindlela Reservoir 1	4.25	400	Steel	21.7	29
Upper uMngeni	Vulindlela Pipeline	Groenekloof Pump Station - High-Lift Pump Station	Vulindlela Reservoir 5	27.90	500	Steel	34.0	29
Upper uMngeni	'56 Pipeline	Groenekloof Reservoir	Blackridge BPT	7.30	250	uPVC	8.5	41
Upper uMngeni	Sweetwaters Pipeline	'56 Pipeline (Upstream of Blackridge BPT)	Sweetwaters Reservoir	4.40	250	uPVC	8.5	41
Upper uMngeni	'56 Pipeline	Blackridge BPT	Blackridge Reservoir	3.30	250	uPVC	8.5	41

c) Midmar WTP to Umlaas Road Reservoir Sub-System

The Midmar WTP to Umlaas Road Reservoir Sub-System is shown in **Figure 7.32**.

i) '251 Pipeline (Midmar WTP to D.V. Harris Off-Take)

Downstream of Midmar WTP, the '251 Pipeline (**Table 7.31**) conveys potable water via the 45 Mℓ Midmar Reservoir (**Table 7.29**) to the inlet of the Midmar Tunnel (**Table 7.30**). Downstream of the tunnel, the '251 Pipeline resumes and delivers water into the '61 Pipeline (**Table 7.31**) at Ferncliffe near the D.V. Harris WTP. The '251 Pipeline ends at an off-take to the D.V. Harris WTP, and this allows for an emergency supply of potable water to the D.V. Harris WTP.

While the capacity of this pipeline is 347 Mℓ/day, the flow is restricted to 330 Mℓ/day due to the capacity of the Midmar Tunnel.

The Midmar Reservoir is situated on the '251 Pipeline, just upstream of the inlet portal of the Midmar Tunnel. As there is limited, clear water storage at Midmar WTP itself, Midmar Reservoir serves as the off-site potable water storage facility for the Midmar WTP. It also serves as a break-pressure tank for the '251 Pipeline prior to its entry into the tunnel. The reservoir was constructed in 1996 when the supply to the '61 Pipeline was transferred across from the D.V. Harris WTP to the then newly constructed Midmar WTP.

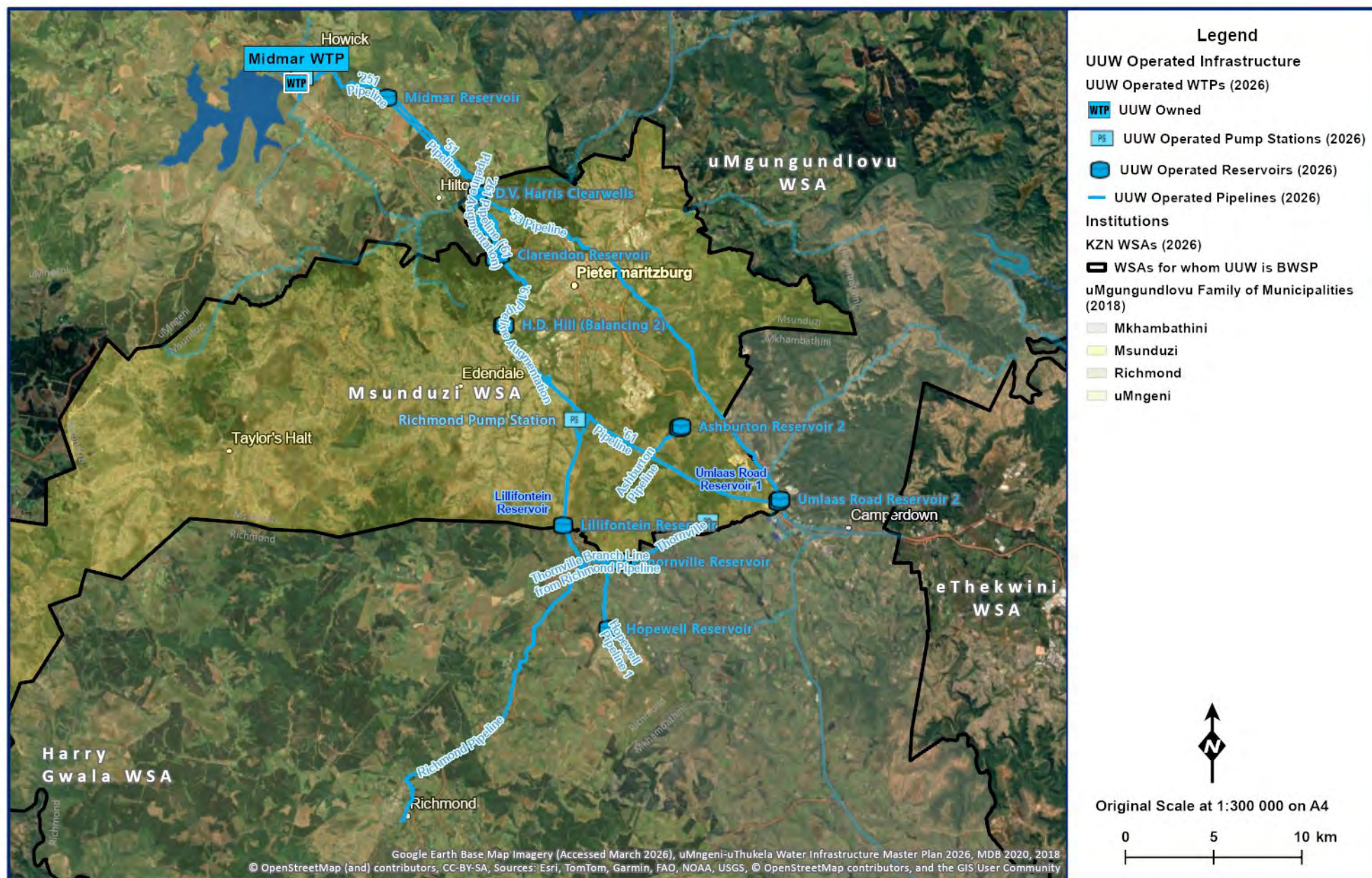


Figure 7.32 General Layout of the Midmar WTP to Umlaas Road Reservoir Sub-System.

Table 7.29 Reservoir details: Midmar WTP to Umlaas Road Reservoir Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Cedara	Midmar Reservoir	45.0	Bulk	1014.0	1001.0
Upper uMngeni	Clarendon	Clarendon Reservoir	25.0	Terminal	970.0	965.0*
Upper uMngeni	World's View	World's View Reservoir	80.0	Bulk	962.0	954.8
Upper uMngeni	Thornville	Thornville Reservoir	2.0	Terminal	954.9	949.7
Upper uMngeni	Hopewell	Hopewell Reservoir	0.5	Terminal	872.4	864.4
Upper uMngeni	Lillifontein	Lillifontein Reservoir	5	Bulk	1022.8	1014.8
Upper uMngeni	Ashburton	Ashburton High-Level Reservoir	0.5	Terminal	775.3	773.3
Upper uMngeni	Ferncliffe	D.V. Harris Clearwells	4.1	Bulk	978.9	977.1
Upper uMngeni	H.D. Hill	H.D. Hill (Balancing 1)	22.4	Distribution	869.3	862.4
Upper uMngeni	H.D. Hill	H.D. Hill (Balancing 2)	22.3	Distribution	869.3	862.4
Upper uMngeni	Cedara	St. Josephs Reservoir	0.1	Terminal	1074.2	1072.2

* Estimated

Table 7.30 Tunnel details: Upper uMngeni System.

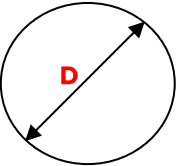
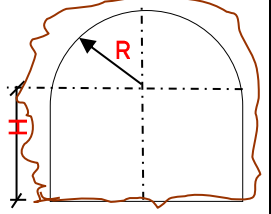
System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Upper uMngeni	Midmar Tunnel	6337	1800	1600	Concrete Lined	1996		
Upper uMngeni	Hilton Tunnel	6215	1800	1600	Concrete Lined	1959		

Table 7.31 Pipeline details: Midmar WTP to Umlaas Road Reservoir Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'251 Pipeline	Midmar WTP	Midmar Reservoir	6.50	1600	Steel	347.9	29
Upper uMngeni	'251 Pipeline	Midmar Tunnel Outlet	D.V. Harris WTP	8.06	1600	Steel	347.9	29
Upper uMngeni	'61 Pipeline	D.V. Harris WTP offtake	World's View Reservoir	6.20	1000, 900 and 800	Steel	330.0	46
Upper uMngeni	'60 Pipeline	D.V. Harris WTP offtake	World's View Reservoir	6.20	900 and 1200	Steel	330.0	12
Upper uMngeni	'61 Pipeline	World's View Reservoir	H.D. Hill	29.60	1000 and 1000	Steel	271.7	46
Upper uMngeni	'61 Pipeline	H.D. Hill	ED2 (Duplication)	8.90	1000 and 1000	Steel	271.7	23
Upper uMngeni	'61 Pipeline	ED2 (old)	Richmond P/L off-take	4.0	800	Steel	87.0	46

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'61 Pipeline	ED2 (new)	Richmond P/L off-take (Augmentation)	4	1300	Steel	229.5	14
Upper uMngeni	'61 Pipeline	Richmond P/L off-take	Umlaas Road	13.00	800	Steel	87.0	46
Upper uMngeni	'61 Pipeline	ED4	Umlaas Road	13.00	1100	Steel	133	11
Upper uMngeni	Ambleton Pipeline	Off-Take from '61 Pipeline	Ambleton Reservoir	2.00	160	Steel	3.5	33
Upper uMngeni	Ashburton Pipeline	Off-Take from '61 Pipeline	Ashburton Reservoir	2.70	160	Galvanised Mild Steel	3.5	33
Upper uMngeni	'Richmond Pipeline	Lillifontein Reservoir	Thornville Reservoir 1	4.9	350	Steel	6.2	11
Upper uMngeni	'Richmond Pipeline	Lillifontein Reservoir	Richmond Reservoir	22.6	450	Steel	7.6	11
Upper uMngeni	Hopewell Pipeline	Thornville Reservoir	Hopewell Reservoir	4.91	200	mPVC	5.4	39
Upper uMngeni	Thornville	Thornville Reservoir	De-commissioned Pump Station	7.90	160/200	Steel/AC	8.9	39
Upper uMngeni	Baynesfield	Thornville Reservoir	Baynesfield	4.95	200	AC	5.4	39
Upper uMngeni	'53 Pipeline	D.V. Harris WTP	Umlaas Road	26.60	762	Pre-Stressed Concrete	35.0	67

* Capacity based on velocity of 2 m/s

ii) 61 Pipeline: D.V. Harris to World's View Reservoir

The configuration of the pipelines between D.V. Harris WTP and World's View Reservoir is shown in **Figure 7.33**. It shows the current operating arrangement which is as follows:

- Clarendon Reservoir is fed from D V Harris WTP through the '60 pipeline; and
- World's View Reservoir is fed from Midmar WTP through the '61 pipeline - a 1000 mm diameter and the newer 900/1200 mm diameter pipeline.

When the demand downstream of World's View Reservoir reaches 245 Mℓ/day, the 800 mm diameter '60 pipeline will have to be utilised to augment the supply from Midmar WTP into World's View Reservoir. This will mean that Clarendon Reservoir will then have to be fed from Midmar WTP. Clarendon Reservoir supplies the Msunduzi Municipalities Symons and Hathorns Reservoirs, and these feed the majority of Pietermaritzburg central town and surrounds.

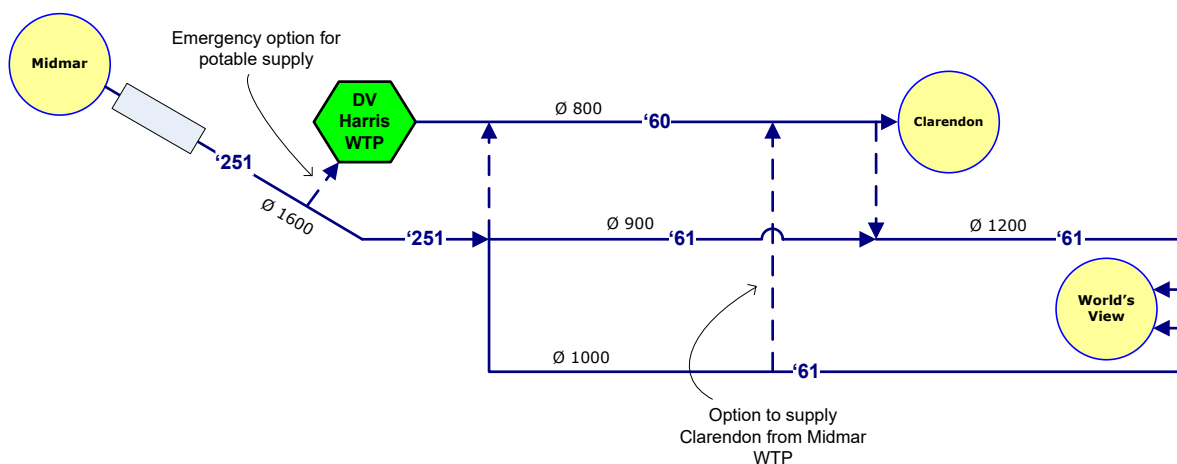


Figure 7.33 D.V. Harris WTP and World's View Reservoir pipeline configuration.

iii) '61 Pipeline: World's View Reservoir to ED2

Dual 1 000 mm diameter gravity pipelines provide water from World's View Reservoir to the ED2 offtake (

Table 7.31) which is a sales point to The Msunduzi Municipality's Edendale area. One of these pipelines is a dedicated supply to the western portions of The Msunduzi Municipality, consisting of Edendale (ED1 and ED2 (ED3-closed)). The two pipelines connect via a cross connection at ED2.

The H.D. Hill Balancing Reservoir supplies Bisley Reservoir (mainly Pietermaritzburg's western suburbs); with supply zones from Masons, Masons Industrial, Oribi and Bisley.

iv) '61 Pipeline: ED2 to Umlaas Road Reservoir

Two pipelines, an 800 mm and 1 300 mm diameter pipeline from ED2 to the Richmond Offtake and an 800 mm and 1 100 mm pipeline from ED4 to Umlaas Road, supply water from ED2 to Umlaas Road Reservoir. There are off-takes on-route for Edendale (ED4), Richmond, Foxhill Emergency, Ashburton Reservoir and the now decommissioned Thornville/Hopewell Supply (**Table 7.32** and **Table 7.31**). The Foxhill Emergency supply zone demands have increased significantly.

v) Ashburton Supply

An off-take from the '61 Pipeline supplies the Ashburton High-Level Reservoir (**Table 7.29**) through a 160mm diameter galvanised mild steel pipeline (**Table 7.31**). The reservoir feeds directly into the Msunduzi Municipality's Ashburton Lower Reservoir. The supply zone off this reservoir is the Ashburton and Lynnfield Park areas.

vi) Richmond/Thornville/Hopewell Supply

A 600 mm diameter off-take from the '61 Pipeline supplies the 16 Mℓ Lillifontein Reservoir via the Richmond Pump Station. The Thornville Reservoir (**Table 7.29**) is supplied under gravity through a 350 mm diameter pipeline (**Table 7.31**). The reservoir serves the Thornville and Baynesfield area. An off-take on the pipeline to Baynesfield supplies water to the Hopewell Reservoir (**Table 7.29**) which serves as reticulation storage for the Hopewell community.

The rising main from the '61 Pipeline to Thornville is used as a back-feed gravity main, after the commissioning of the Richmond Pipeline, to supply users along that line (i.e. supply from the Thornville Reservoir to the Thornville Pump Station). The Thornville pump station has been decommissioned.

Richmond is supplied under gravity via a 450 mm diameter steel pipeline from Lilliefontein Reservoir to the Richmond Reservoir Complex. Potable water is then distributed from the existing Richmond Reservoir Complex to the Richmond reticulation network.

vii) '53 Pipeline: D. V. Harris WTP to Umlaas Road Reservoir

The '53 Pipeline is a pre-stressed concrete pipeline that was commissioned in 1968 (**Table 7.31**). It was initially constructed to supply raw water from Midmar Dam to the Umlaas Road WTP. The pipeline was decommissioned in 2002 and the Umlaas Road Reservoir then only received potable water from the Midmar WTP via the '61 Pipeline. The '53 Pipeline was re-commissioned in 2006 as a potable pipeline from the D.V. Harris WTP to augment the supply to the Umlaas Road Reservoirs (9 Mℓ and 45 Mℓ).

Table 7.32 Pump details: Thornville/Hopewell Supply.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Thornville (Decommissioned)	Thornville Pump No 1	✓		KSB:WKLn 65/4Na	'61 Pipeline	Thornville Reservoir	100.0	112.0	1.5
Upper uMngeni	Thornville (Decommissioned)	Thornville Pump No 2	✓		KSB:WKLn 65/4Na	'61 Pipeline	Thornville Reservoir	100.0	112.0	1.5
Upper uMngeni	Thornville (Decommissioned)	Thornville Pump No 3	✓		KSB:WKLn 65/4 Na	'61 Pipeline	Thornville Reservoir	100.0	112.0	1.5
Upper uMngeni	Richmond	Richmond Pump No 1	✓		KSB Omega 300-860A	'61 Pipeline	Richmond Reservoir	50-140	65-165	*23-44
Upper uMngeni	Richmond	Richmond Pump No 2	✓		KSB Omega 300-860A	'61 Pipeline	Richmond Reservoir	50-140	65-165	*23-44

* Initial to ultimate capacity

d) Umlaas Road Reservoir Sub-System

The Umlaas Road Reservoir Sub-System is shown in **Figure 7.34**. The Umlaas Road Reservoir Complex consists of a 9 Mℓ reservoir and a 45 Mℓ reservoir (**Table 7.33**), which are interlinked. The reservoir complex has two off-takes. The '57 Pipeline (**Table 7.34**) supplies potable water to the Eston and Umbumbulu supply zones as well as the Camperdown and Mkhambathini areas. The Manyavu supply zones as well as the Lion Park Pipeline are currently fed directly from the '61 Pipeline to ensure adequate pressure along the newly commissioned pipeline.

i) '57 Pipeline

The '57, '157 and '257 Pipelines (800, 1000 and 1600 mm diameter respectively) run from Umlaas Road Reservoir to Point M, the sales point to eThekweni Municipality (**Table 7.34**).

ii) Eston/Umbumbulu Pipeline

Downstream of Umlaas Road Reservoir, Eston/Umbumbulu Pipeline draws water from the 1000 mm diameter '57 Pipeline. It feeds eThekweni Municipality's Umbumbulu Reservoir. The recently commissioned Umbumbulu pump station serves as a pressure booster on this line. En-route, there is an off-take to the Eston Reservoirs (**Table 7.34**). Further off-takes from this pipeline feed into the Greater Eston Bulk Water Supply Scheme and the Mid Illovu/Ukhalo System.

iii) Lion Park / Manyavu Pipeline/Mkhambathini

There are off-takes along the route of the 800 mm diameter '57 Pipeline for Mkhambathini Municipality (**Table 7.34**). The supply to eThekweni Municipality has been decommissioned. A 150 mm diameter AC pipeline and a newly constructed 350 mm diameter steel pipeline, off-take from the '61 Pipeline, supplies individual consumers along the Lion Park Road. This pipeline was extended in 2011 to feed the rural area of Manyavu (**Table 7.34**).

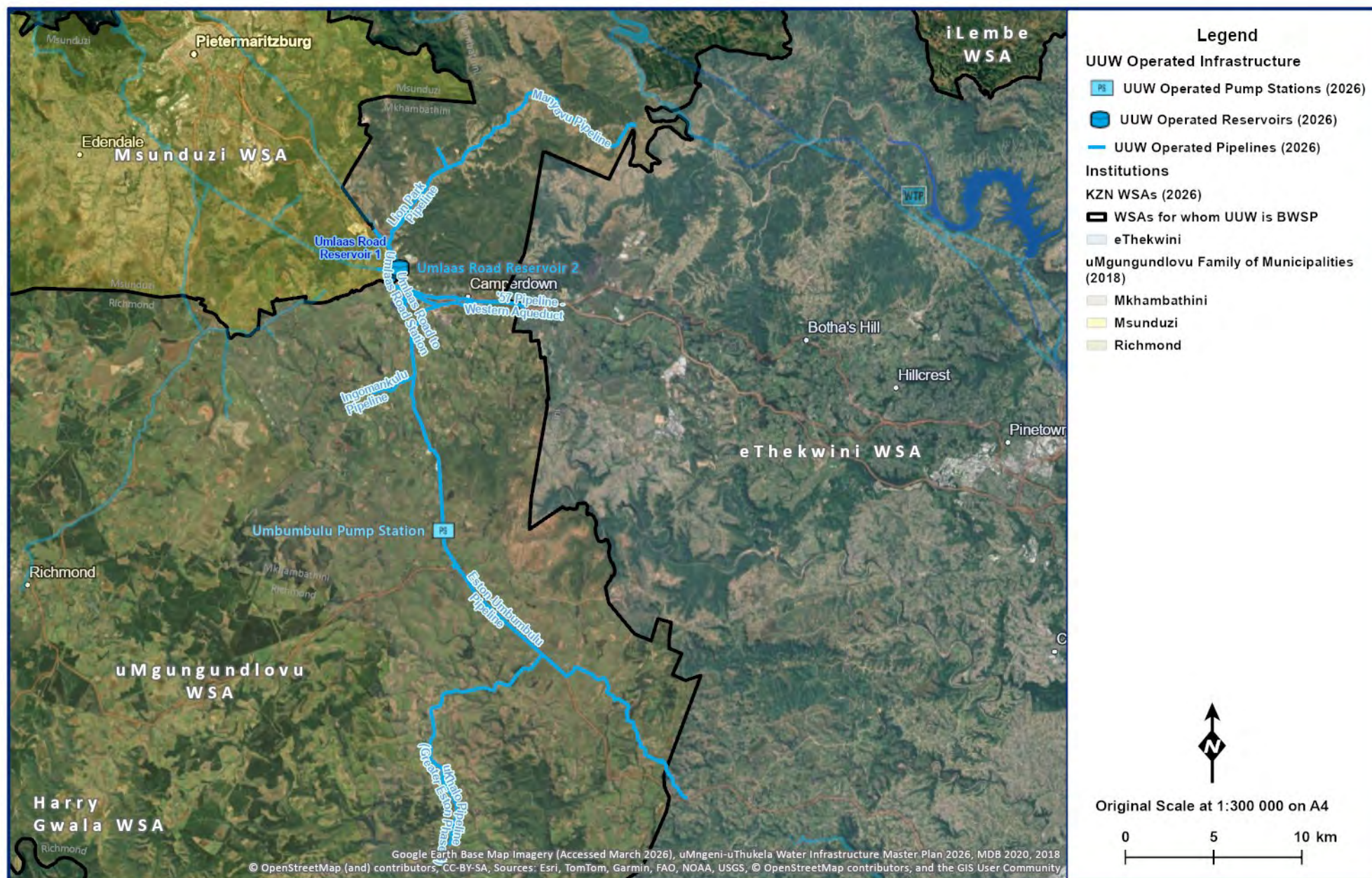


Figure 7.34 General Layout of the Umlaas Road Reservoir Sub-System.

Table 7.33 Reservoir details: Umlaas Road Reservoir Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Umlaas Road Node	Umlaas Road Reservoir 1	9.10	Distribution	844.0	837.9
Upper uMngeni	Umlaas Road Node	Umlaas Road Reservoir 2	45.00	Distribution	844.0	836.8
Upper uMngeni	Eston Reservoir 1	Eston Reservoir 1	2.50	Terminal	791.0	786.7
Upper uMngeni	Eston Reservoir 2	Eston Reservoir 2	2.50	Terminal	791.0	786.7

Table 7.34 Pipeline details: Umlaas Road Reservoir Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'57 Pipeline	Umlaas Road	Cato Ridge Bifurcation	8.60	800	Steel	87.08	53
Upper uMngeni	'257 Pipeline	Umlaas Road (Phase 3)	Cato Ridge Bifurcation	8.50	1000	Steel	135.90	30
Upper uMngeni	'357 Pipeline	Umlaas Road	Point M	8.10	1600	Steel	347.00	16
Upper uMngeni	Eston-Umbumbulu Pipeline	'57 Pipeline (Phase 3)	Eston Reservoir	16.10	600	Steel	48.93	29
Upper uMngeni	Eston-Umbumbulu Pipeline	Eston Reservoir	Umbumbulu	13.10	450	Steel	27.52	21
Upper uMngeni	Lion Park Pipeline	Umlaas Road Reservoir	Lion Park	8.60	160	Steel	3.48	52
Upper uMngeni	Lion Park Pipeline	Umlaas Road Reservoir	Lion Park	8.60	350	Steel	16.6	8
Upper uMngeni	Lion Park Pipeline	Lion Park	Consumers along the '53 Pipeline	4.60	90	HDPE	1.10	22
Upper uMngeni	Manyavu Pipeline	Lion Park	Manyavu	1.00	250	uPVC	8.50	15
				2.00	160	uPVC	3.50	15
				13.00	150	Klambon	3.10	15

* Capacity based on velocity of 2 m/s

7.3.4 D.V. Harris Water Treatment Plant

Raw water from Midmar Dam is conveyed under gravity to the D.V Harris WTP (**Figure 7.35 and Table 7.35**) via the 1600 mm diameter '51 Pipeline (**Table 7.37**). On route, the raw water passes through a raw water tunnel at Hilton (**Table 7.30**).

The WTP has a design capacity of 110 Mℓ/day, but Process Services and Operations have installed Activated Carbon filters to increase the capacity to 130 Mℓ/day. There is no need to expand the plant because it is able to accommodate the maximum raw water available from Midmar Dam. The yield at a 99% assurance of supply at Midmar Dam, with MMTS 1 and MMTS 2, is 476 Mℓ/day. Midmar WTP will treat 376 Mℓ/day and the balance of 100 Mℓ/day will be treated at D.V. Harris WTP.



Figure 7.35 D.V. Harris Water Treatment Plant.

There is the option for a potable water supply from Midmar WTP through the '251 Pipeline into the clearwells of the plant (**Figure 7.33**). This serves as an emergency supply should there be planned or unplanned downtime at the plant.

From the clearwells (**Table 7.36**) at the D.V. Harris WTP, potable water is supplied to the Clarendon, Belfort and Claridge Reservoirs, which feed the northern and eastern suburbs of The Msunduzi Municipality and Greater Wartburg and Table Mountain areas for uMgungundlovu District Municipality. The WTP also supplies potable water to the Umlaas Road Reservoir via the re-commissioned '53 Pipeline (**Table 7.31**) to feed areas within uMgungundlovu District Municipality and eThekweni Municipality.

Table 7.35 Characteristics of D.V. Harris WTP.

WTP Name:	D.V. Harris WTP
System:	Upper uMngeni System
Maximum Design Capacity:	130 Mℓ/day (100 Mℓ/day Main Plant and 30 Mℓ/day Dissolved Air Flotation)
Current Utilisation:	114.23 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	229 Mℓ/day
Pre-Oxidation Type:	Prechlorination
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	12mg/ℓ
Rapid Mixing Method:	Hydraulic Jump
Clarifier Type:	Degremont Pulsators
Number of Clarifiers:	4 (Main Plant)
Total Area of all Clarifiers:	1182 m² (Main Plant)
Total Capacity of Clarifiers:	100 Mℓ/day (Main Plant)
Filter Type:	Rapid gravity Sand Filters
Number of Filters:	21 + 4 Dissolved Air Flotation
Filter Floor Type	Concrete
Total Filtration Area of all Filters	827.82 m² Main Plant
Total Filtration Design Capacity of all Filters:	115 Mℓ/day Main Plant
Total Capacity of Backwash Water Tanks:	Backwash Water comes from Clearwell 1 – 1.38 Mℓ
Total Capacity of Sludge Treatment Plant:	
Capacity of Used Washwater System:	0.4Mℓ
Primary Post Disinfection Type:	Chloramination
Disinfection Dosing Capacity:	10mg/ℓ
Disinfectant Storage Capacity:	
Total Treated Water Storage Capacity:	5.52 Mℓ (Note there is no on-site reservoir, only clearwells)

Table 7.36 Details of the D.V. Harris clearwells.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	D.V. Harris WTP	D.V. Harris Clearwells	5.52	Bulk	978.9	977.09

Table 7.37 Pipeline details: '51 Pipeline.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity * (Mℓ/day)	Age (years)
Upper uMngeni	'51 Pipeline	Midmar Dam	D.V. Harris WTP	10.80	1 600	Concrete	229.68	66

* Based on a velocity of 2 m/s

a) uMshwathi Sub-System

The D.V. Harris WTP supplies the uMshwathi BWSS (**Figure 7.36**). This includes supply to the Wartburg and Table Mountain areas for the uMgungundlovu District Municipality. Water is sold to The Msunduzi Municipality at the WTP and is then conveyed to the Belfort and Claridge Reservoirs. At this point, the water is “bought back” from Msunduzi Municipality through two pipelines known as the Ottos Bluff buy back (which supplies the Albert Falls, Mpolweni and Thokozani areas) as well as the Claridge-Wartburg buy back (which supplies water to the Greater Wartburg area).

i) Table Mountain Supply

Another three “buy back” points further downstream of Msunduzi Municipality’s infrastructure are located below the Copesville reservoir. The first is known as the Whispers reservoir buy back (which feeds the area of Bishopstowe). The other two buy backs are located at the Lower Glen Lyn Break-Pressure Tank. One off-take is known as the Lower Glynn buy back (which also feeds the area of Bishopstowe). Another off-take from the break-pressure tank supplies the Table Mountain Pipeline (**Table 7.38**), which feeds the Table Mountain Reservoir (**Table 7.36**). From the Table Mountain Reservoir, potable water is supplied to the rural communities in Table Mountain within the uMgungundlovu District Municipality.

ii) '69 Pipeline (Claridge Reservoir to Wartburg Reservoir)

uMngeni-uThukela Water’s Wartburg Pipeline, also known as the ‘69 Pipeline, supplies potable water to the Albert Falls, Wartburg, Cool Air, New Hanover, Dalton and Swayimane areas (**Table 7.38**).

Water is currently conveyed between D.V. Harris WTP and Claridge Reservoir along a 6.7 km long 1 000 mm diameter steel pipeline, which The Msunduzi Municipality owns. uMngeni-uThukela Water buys water back from The Msunduzi Municipality at Claridge Reservoir.

Potable water from the Claridge Reservoir previously flowed under gravity through the ‘69 Pipeline (**Table 7.38**) to the Old and New Wartburg Pump Stations (**Table 7.39**). There were off-takes to Albert Falls, Mpolweni as well as private connections en-route. From the pump stations, the ‘69 Pipeline continued as a rising main to the Wartburg Reservoirs (**Table 7.38**).

This configuration has changed with the completion of Phases 1, 2 and 3 of the uMshwathi Regional Bulk Water Supply Scheme (URBWSS) (**Section 7.5.2 (f)**). A new 800mm diameter pipeline has been constructed (Phase 1) in parallel to the existing 300 mm diameter pipeline from Claridge Reservoir to Wartburg. Similarly, a new pump station has been constructed to boost pressure in this line. The new pump station, named the Mpolweni Pump Station, was commissioned at the end of June 2019. The Wartburg Pump Stations were decommissioned. The existing 300 mm diameter NB steel pipeline is being used as a back feed line from Wartburg Reservoir to supply the existing consumers along this line. Similarly, the existing

300 mm diameter NB steel section from Claridge Reservoir is used to supply the existing consumers and the Albert Falls area. This section of pipeline terminates at the new 8 Mℓ reservoir in Wartburg.

iii) Wartburg Reservoir to Bruyns Hill Reservoir

The Bruyns Hill and adjacent area of Swayimane was previously supplied water via a 250 mm diameter steel pipeline from the Wartburg Reservoir. The pipeline was initially a gravity line to the old Bruyns Hill Pump Station (**Table 7.39**) and then a 250 mm diameter rising main to the Bruyns Hill Reservoir (**Table 7.38**).

The old Bruyns Hill pump station was decommissioned after the new Bruyns Hill pump station at Wartburg Reservoir and a 450 mm diameter steel rising main as well as a new 6 Mℓ Bruyns Hill reservoir were commissioned.

iv) Wartburg to Dalton

The new 8 Mℓ Wartburg Reservoir supplies the new 10 Mℓ Dalton Reservoir via the New Dingle Pump Station (**Table 7.39**). The areas of Dalton and Cool Air are supplied from the old 0.8 Mℓ Dalton reservoir. Specifically, the 110 mm diameter old rising main from Cool Air pumpstation (now de-commissioned), is used as a backfeed line from the Dalton reservoir now feeding the Cool Air area.

v) Dalton to Ozwathini

A 700 mm diameter NB steel pipeline from 10 Mℓ Dalton Reservoir conveys water to a 12 Mℓ reservoir at Ozwathini. The Dalton reservoir was completed at the end of August 2019.

The area of Cool Air is supplied via a back feed line which was the rising main to the old Cool Air pump station (now decommissioned).

There is a further 400mm diameter off-take that supplies water to the eNadi and Efaye community.

Another 200mm diameter offtake conveys water to a 1.5Mℓ reservoir and 0.5Mℓ elevated tank at Montebello Hospital. This reservoir was commissioned in February 2026 as part of Phase 4 of the Umshwathi BWSS.

The 12 Mℓ Ozwathini Reservoir supplies the Ozwathini and Appelsbosch supply zones whilst the Nondabulo reservoir supplies the iLembe Municipality.

The uMshwathi BWSS phase 4 and 5 aim to extend this system further into the uMshwathi, Ndwedwe and Maphumulo LMs. Phase 4 consists of 56km of pipelines and numerous reservoirs that will supply the Central/Southern Ndwedwe and is in the process of implementation by UUW.

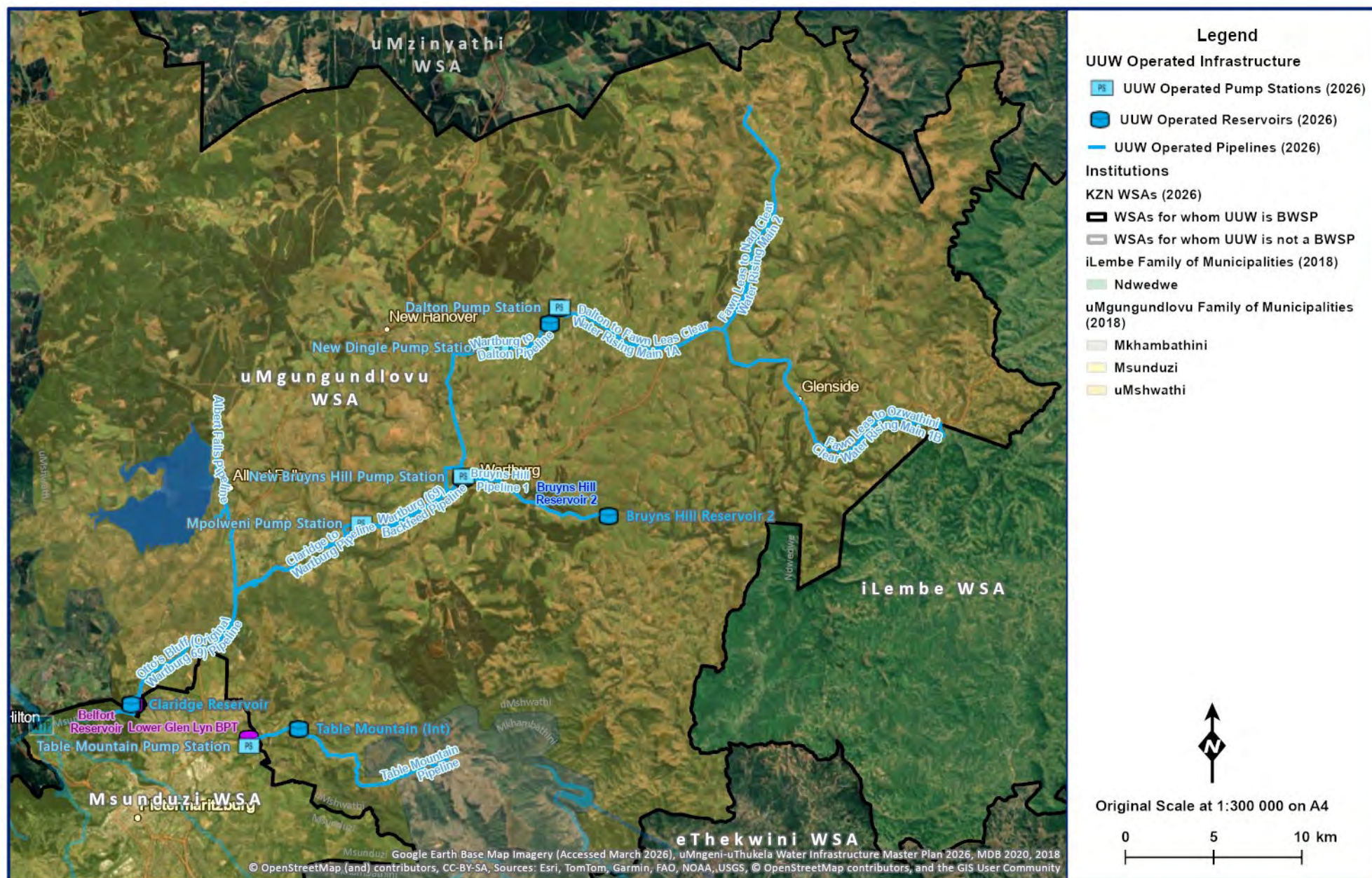


Figure 7.36 General layout of the uMshwathi Sub-System.

Table 7.38 Pipeline details: Wartburg Sub-System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Upper uMngeni	Table Mountain Pipeline	Lower Glen Lyn BPT	Table Mountain Reservoir	14.80	150	uPVC	2.12*	67
Upper uMngeni	Wartburg Pipeline ('69 Pipeline) (Decommissioned)	Claridge Reservoir/Belfort Reservoir	Old Wartburg Break Pressure Tank and Pump Station	19.30	300	Steel		
Upper uMngeni	Wartburg Pipeline ('69 Pipeline)	Claridge Reservoir/Belfort Reservoir	Mpolweni Pump Station	19.30	800	Steel	87**	9
Upper uMngeni	Wartburg Pipeline ('69 Pipeline) (Decommissioned)	Wartburg Break Pressure Tank and Pump Station	1.5 Mℓ Wartburg Reservoir	6.80	300	Steel		
Upper uMngeni	Wartburg Pipeline ('69 Pipeline)	Mpolweni Pump Station	8 Mℓ Wartburg Reservoir	6.80	800	Steel		8
Upper uMngeni	Wartburg Pipeline (Decommissioned)	Wartburg Reservoir	Dingle Break Pressure Tank and Pump Station	9.50	250/200	FC	8.50/5.40*	35
Upper uMngeni	Wartburg Pipeline	8 Mℓ Wartburg Reservoir	New Dingle Break Pressure Tank and Pump Station	9.50	700	Steel	66	9
Upper uMngeni	Wartburg Pipeline (Decommissioned)	Dingle Break Pressure Tank and Pump Station	Cool Air Reservoir	13.90	160	FC	2.60***	35
Upper uMngeni	Wartburg Pipeline (now a back-feed line)	Cool Air Reservoir	Dalton 0.8 Mℓ Reservoir	1.30	110	uPVC	1.64*	35
Upper uMngeni	Wartburg Pipeline	New Dingle Break Pressure Tank and Pump Station	10 Mℓ Dalton Reservoir	13.90	700	Steel	66	9
Upper uMngeni	Wartburg Pipeline	10 Mℓ Dalton Reservoir	12 Mℓ Ozwathini Reservoir	20	700	Steel	66	9

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Upper uMngeni	eNadi/eFaye Pipeline	Wartburg Pipeline	Res A eNadi		400	Steel		
Upper uMngeni	Montebello Pipeline	Wartburg Pipeline	Montebello		200	Steel		
Upper uMngeni	Bruyns Hill Pipeline	Wartburg Reservoir	Bruyns Hill Pump Station	9.50	450	mPVC	8.49*	29
Upper uMngeni	Bruyns Hill Pipeline	Bruyns Hill Pump Station	Bruyns Hill Reservoir (decommissioned in 2012)	3.69	250	uPVC	3.00***	N/A
Upper uMngeni	Bruyns Hill Pipeline	Bruyns Hill Pump Station	Bruyns Hill Reservoir	3.69	250	Steel	8.50	15
Upper uMngeni	Albert Falls Pipeline	Wartburg Pipeline	Thokozani Reservoir	10.30	200	uPVC	5.44*	23

* Based on velocity of 2 m/s ** Restricted due to insufficient head *** Restricted due to pipe class

Table 7.39 Pump details: Wartburg Sub-System.

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Cool Air (Decommissioned)	Dalton Pump No 1	✓		KSB:ETA 40-250/5	Cool Air Reservoir	Dalton Reservoir	58.0	100.0	0.46
Upper uMngeni	Cool Air (Decommissioned)	Dalton Pump No 2		✓	KSB:ETA 40-250/5	Cool Air Reservoir	Dalton Reservoir	58.0	100.0	0.46
Upper uMngeni	New Bruyns Hill	Pump No 1	✓		KSB:WKLN 80/2	Wartburg	Bruyns Hill	43.0	184	1.63
Upper uMngeni	New Bruyns Hill	Pump No 2		✓	KSB:WKLN 80/2	Wartburg	Bruyns Hill	43.0	184	1.63
Upper uMngeni	Bruyns Hill (Decommissioned)	Pump No 1								

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	Bruyns Hill (Decommissioned)	Pump No 2								
Upper uMngeni	Dingle (Decommissioned)	Pump No1	✓		KSB:WL 65/7	Wartburg	Cool-Air Reservoir	178	271	1.17
Upper uMngeni	Dingle (Decommissioned)	Pump no 2		✓	KSB:WL 65/7	Wartburg	Cool-Air Reservoir	178	271	1.17
Upper uMngeni	Table Mountain	Pump No 1	✓		KSB:ETA new 60-250	Lower Glen-Lyn	Table Mountain Reservoir	20.0	75.00	1.3
Upper uMngeni	Table Mountain	Pump No 2	✓		KSB:ETA new 50-250	Lower Glen-Lyn	Table Mountain Reservoir	20.0	75.00	1.3
Upper uMngeni	Table Mountain	Pump No 3		✓	KSB:F/A 50-250	Lower Glen-Lyn	Table Mountain Reservoir	20.0	75.00	1.3
Upper uMngeni	Old Wartburg (Decommissioned)	Pump No 1		✓	KSB:WKLn 5016 No	Wartburg Pipeline	Wartburg Reservoir	164.0	189.0	0.52
Upper uMngeni	Old Wartburg (Decommissioned)	Pump No 2		✓	KSB:WKLn 5016 No	Wartburg Pipeline	Wartburg Reservoir	164.0	189.0	0.52
Upper uMngeni	New Wartburg (Decommissioned)	Pump No 1	✓		KSB:WL -100/4	Wartburg Pipeline	Wartburg Reservoir	164.0	239.0	3.24
Upper uMngeni	New Wartburg (Decommissioned)	Pump No 2	✓		KSB:WL -100/4	Wartburg Pipeline	Wartburg Reservoir	164.0	239.0	3.24
Upper uMngeni	Mpolweni	Pump No 1	✓		Kiloskar SCT 300/77	Wartburg Pipeline	Wartburg Reservoir	23.5	123	39
Upper uMngeni	Mpolweni	Pump No 2	✓		Kiloskar SCT 300/77	Wartburg Pipeline	Wartburg Reservoir	23.5	123	39
Upper uMngeni	Mpolweni	Pump No 3		✓	Kiloskar SCT 300/77	Wartburg Pipeline	Wartburg Reservoir	23.5	123	39

System	Pump Station Name	Pump Set	Pump Status		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
			Duty	Standby						
Upper uMngeni	New Dingle	Pump No 1	✓		KSB Omega 300-700B	Dalton Pipeline	Dalton Reservoir	178	271	22.89
Upper uMngeni	New Dingle	Pump No 2		✓	KSB Omega 300-700B	Dalton Pipeline	Dalton Reservoir	178	271	22.89

Table 7.40 Reservoir details: Wartburg Sub-System.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Wartburg	Wartburg Reservoir 1	0.50	Distribution	963.5	958.4
Upper uMngeni	Wartburg	Wartburg Reservoir 2	1.50	Distribution	963.5	958.7
Upper uMngeni	Wartburg	Wartburg Reservoir 3	8.00	Distribution	963.5	956.2
Upper uMngeni	Belfort	Claridge Reservoir	50.00	Distribution	940.3	931.6
Upper uMngeni	Bruyns Hill	Bruyns Hill Reservoir 1	0.40	Distribution	1006.0	1002.0
Upper uMngeni	Bruyns Hill	Bruyns Hill Reservoir 2	6.00	Distribution	1006.0	1002.0
Upper uMngeni	Cool Air	Cool Air Reservoir	0.50	Distribution	1013.1	1008.3
Upper uMngeni	PMB East	Table Mountain (Int)	0.10	Distribution	909.0	907.0

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Upper uMngeni	Dalton	Dalton Res 1	0.80	Distribution		1067.00
Upper uMngeni	Dalton	Dalton Res 2	10.00	Distribution	1076.41	1067.01
Upper uMngeni	Montebello	Montebello	2.00	Distribution	948	944.5*
Upper uMngeni	Ozwathini	Ozwathini	12.00	Distribution	1052.0	1045.0
Upper uMngeni	Ozwathini	Nondabula	1.10	Distribution	1053.5*	1050.0*

7.3.5 Lower uMngeni System

The Lower uMngeni System (Error! Reference source not found. and **Figure 7.6**) serves the greater eThekweni Municipal area from lower Pinetown/KwaDabeka in the west, to Phoenix/Inanda/Verulam in the north, to the Durban seaboard in the east and to Amanzimtoti/KwaMakuta in the south. It also provides water to the northern coastal areas of Ugu District Municipality. The system derives its water resources from the uMngeni River, being fed from Nagle and Inanda Dams, which are supported by Albert Falls Dam, Midmar Dam and the MMTS.

Water is treated at uMngeni-uThukela Water's Durban Heights WTP (**Table 7.41**) located in Westville, Wiggins WTP (**Table 7.47**) located in Cato Manor and Maphephethwa WTP (**Table 7.52**) located in the Inanda Dam area. uMngeni-uThukela Water sells water to eThekweni Municipality "at the fence" of these WTPs and thus does not own nor operate the bulk distribution pipelines downstream of these WTPs. However, operational and infrastructure changes within the eThekweni Municipality's system, which is served by these WTPs, have a profound influence on the WTPs operational and infrastructure requirements.

Continuous effort (uMngeni-uThukela Water in collaboration with eThekweni Municipality) has gone into optimising the overall efficiency of the distribution system to share the load better between the two large WTPs. One example of these initiatives has involved the transfer of demand from areas previously supplied from Durban Heights WTP onto Wiggins WTP. This demand transfer commenced in January 2005 and involved the transfer of 40 - 60 Mℓ/day onto Wiggins WTP.

Durban Heights WTP has a rated capacity of 615 Mℓ/day. The primary raw water source for the WTP is Nagle Dam, which has limited storage and is in turn supplied from Albert Falls Dam located upstream of Nagle Dam on the uMngeni River. Raw water is conveyed from Nagle Dam to Durban Heights WTP via two systems comprising a series of siphons and gravity tunnels. System 1, Nagle Aqueducts 1 and 2, comprises 11 tunnels (14.57 km) which are inter-connected by siphons (29.7 km) with a capacity of 260 Mℓ/day. System 2, Nagle Aqueducts 3 and 4 comprises 6 tunnels (21.3 km) which are inter-connected by siphons (15.4 km) with a capacity of 440 Mℓ/day.

Durban Heights WTP is primarily gravity-fed with raw water from Nagle Dam via Aqueducts 1 to 4 as shown in **Figure 7.37** and detailed in **Table 7.42**, **Table 7.43** and **Table 7.44**. Aqueducts 1 to 4 have a total design capacity of 700 Mℓ/day at a total head of 404 metres above sea level (mASL), which is the top water level (TWL) of Nagle Dam.

Table 7.41 Characteristics of the Durban Heights WTP.

WTP Name:	Durban Heights WTP
System:	Lower uMngeni System
Maximum Design Capacity:	615 Mℓ/day
Current Utilisation:	56575 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	710 Mℓ/day
Pre-Oxidation Type:	Pre-chlorination
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	Other
Rapid Mixing Method:	Hydraulic Jump
Clarifier Type:	Pulsator Clarifier
Number of Clarifiers:	18
Total Area of all Clarifiers:	6580 m ²
Total Capacity of Clarifiers:	611 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	100
Filter Floor Type	Plate Design
Total Filtration Area of all Filters	6227 m ²
Total Filtration Design Capacity of all Filters:	615 Mℓ/day
Total Capacity of Backwash Water Tanks:	2326 m ³
Total Capacity of Sludge Treatment Plant:	30 000 kg/day of thin sludge
Capacity of Used Washwater System:	25.2 Mℓ/day
Primary Post Disinfection Type:	Chlorine gas
Disinfection Dosing Capacity:	
Disinfectant Storage Capacity:	24 ton
Total Treated Water Storage Capacity:	506 Mℓ

Raw water can be supplemented to Durban Heights WTP via the Inanda Pump Station through a 1 100 mm diameter NB steel pipeline connecting onto Aqueduct 1 and through the Durban Heights Shaft Pump Station which pumps water from the Wiggins Aqueduct (Figure 7.37).

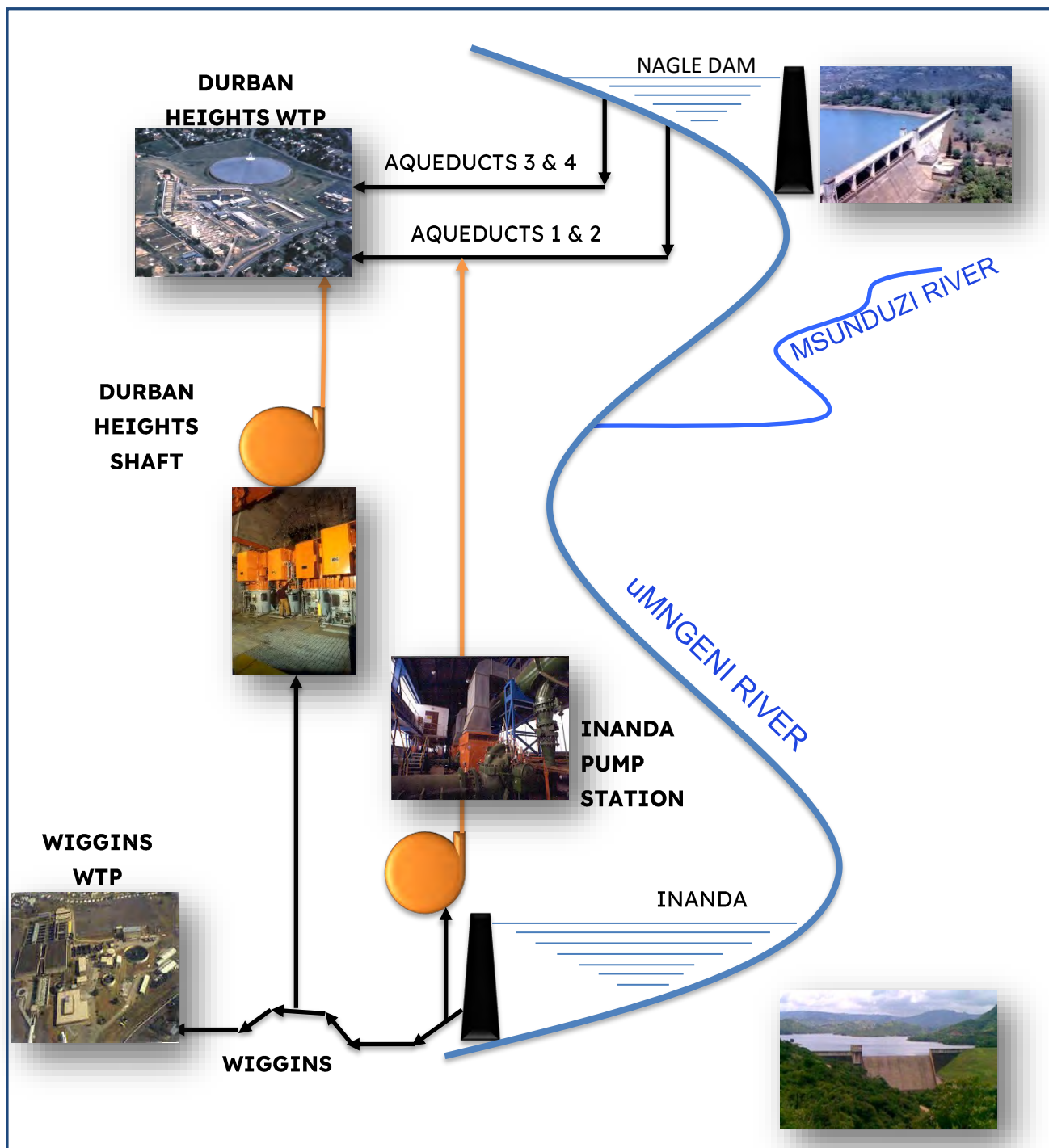


Figure 7.37 Layout of the Central Supply System.

Table 7.42 Tunnel details: Nagle Aqueduct System (Aqueduct 1 and 2).

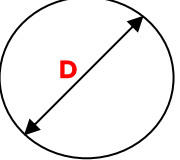
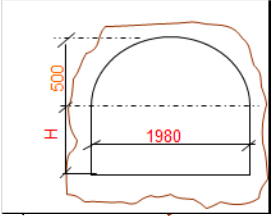
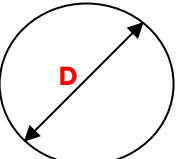
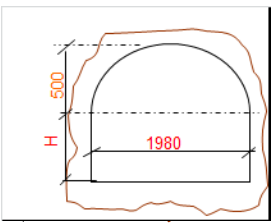
System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Lower uMngeni	Nagle Aqueduct 1 & 2 - Tunnel T1	533	1500	990	concrete lined	1949 & 1957		
	Nagle Aqueduct 1 & 2 - Tunnel T2	296	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T3	861	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T4	232	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T5	3995	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T6	2243	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T7	1682	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T8	996	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T9	1246	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T10	1751	1500	990	concrete lined			
	Nagle Aqueduct 1 & 2 - Tunnel T11	735	1500	990	concrete lined			

Table 7.43 Tunnel details: Nagle Aqueduct System (Aqueduct 3 and 4).

System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Lower uMngeni	Nagle Aqueduct 3 & 4 - Umzwempi Tunnel T1	254	1505	1302	concrete lined - full	1967 & 1972		
		245			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Umbava Tunnel T2 Nagle Aqueduct 3 & 4 - Ngabayena Tunnel T2 Nagle Aqueduct 3 & 4 - Janokwe Tunnel T2 Nagle Aqueduct 3 & 4 - Shangase Tunnel T2 Nagle Aqueduct 3 & 4 - Ensutha Tunnel T2	1940	1505	1302	concrete lined - full			
		2866			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Mkhizwane Tunnel T3 Nagle Aqueduct 3 & 4 - Nokwenzewa Tunnel T3	562	1746	978	concrete lined - full			
		3114			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Amabedhlana Tunnel T4 Nagle Aqueduct 3 & 4 - Showe Tunnel T4	1350	1505	1302	concrete lined - full			
		3281			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Langefontein Tunnel T5	1257	1505	1302	concrete lined			
		3585			concrete lined - partial			
	Nagle Aqueduct 3 & 4 - Kraanskloof Tunnel T6	1210	1505	1302	concrete lined			
		1677			concrete lined - partial			

Note: Tunnel 3 has a different cross section shape to tunnels 1, 2, 4, 5 and 6

Table 7.44 Siphon Pipeline details: Nagle Aqueducts.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Lower uMngeni	Aqueduct 1	Nagle Dam	Durban Heights WTP	29.7	900	Steel	100	7677
Lower uMngeni	Aqueduct 2	Nagle Dam	Durban Heights WTP	29.7	1 000	PCP and Steel	160	6869
Lower uMngeni	Aqueduct 3	Nagle Dam	Durban Heights WTP	15.4	1 400	PCP	220	5859
Lower uMngeni	Aqueduct 4	Nagle Dam	Durban Heights WTP	15.4	1 400	PCP	220	5354

Table 7.45 Reservoir details: Durban Heights WTP.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Lower uMngeni	Durban Heights	Reservoir 1	45	Bulk	264.84	259
Lower uMngeni	Durban Heights	Reservoir 2	100	Bulk	272	265
Lower uMngeni	Durban Heights	Reservoir 3	343	Bulk	272	247
Lower uMngeni	Durban Heights	Dunkeld Reservoir*	9	Bulk	264.84	259

* Owned by EWS

Table 7.46 Pump details: Durban Heights WTP.

System	Pump Station Name	Number of Pumps		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
		Number of Duty Pumps	Number of Standby Pumps						
Lower uMngeni	Durban Heights Booster Pump Station	4	1	KSB Omega 200-670	Durban Heights	eThekwinini Northern Aqueduct	104	35	110
Lower uMngeni	Durban Heights Shaft Pump Station	3	1	Sulzer Bbk 620-022 4 stage	Wiggins Aqueduct	Durban Heights WTP	152	180	50
Lower uMngeni	Inanda Pump Station	3	1	Sulzer SM 303-800	Inanda Dam	Durban Heights WTP	140	200	50

Table 7.47 Characteristics of the Wiggins WTP.

WTP Name:	Wiggins WTP
System:	Lower uMngeni System
Maximum Design Capacity:	350 Mℓ/day
Current Utilisation:	334 335 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	350 Mℓ/day
Pre-Oxidation Type:	Ozone
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	Polymeric Coagulant
Rapid Mixing Method:	Hydraulic Jump
Clarifier Type:	Pulsator Clarifier
Number of Clarifiers:	4
Total Area of all Clarifiers:	3980 m ²
Total Capacity of Clarifiers:	360 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	24
Filter Floor Type	Monolithic
Total Filtration Area of all Filters	6688 m ²
Total Filtration Design Capacity of all Filters:	350.16 Mℓ/day
Total Capacity of Backwash Water Tanks:	
Total Capacity of Sludge Treatment Plant:	
Capacity of Used Washwater System:	2.78 Mℓ/day
Primary Post Disinfection Type:	Hypochlorite
Disinfection Dosing Capacity:	240 ℓ/hr
Disinfectant Storage Capacity:	
Total Treated Water Storage Capacity:	120 Mℓ

Wiggins WTP is primarily gravity-fed with raw water from Inanda Dam via the Wiggins Aqueduct (**Figure 7.37** and **Table 7.48** and **Table 7.49**). The Wiggins Aqueduct has a total design capacity of 350 Mℓ/day at a total head of 147 mASL, which is the top water level (TWL) of Inanda Dam.

Table 7.48 Tunnel details: Inanda-Wiggins Aqueduct System.

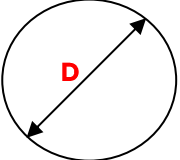
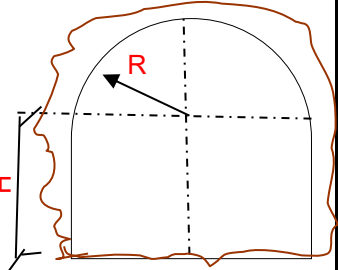
System	Name	Total Length (m)	Height (m)	Radius (m)	Lining	Year Constructed	Transition	Semi-Arc
Lower uMngeni	Inanda Wiggins Aqueduct - Emolweni Tunnel	5320	1350	1220	steel lined	1993		
Lower uMngeni	Inanda Wiggins Aqueduct - Clermont Tunnel	5400	1350	1220	steel lined	1993		
Lower uMngeni	Inanda Wiggins Aqueduct - Reservoir Tunnel	2560	1350	925	steel lined	1984		
Lower uMngeni	Inanda Wiggins Aqueduct - University Tunnel	1040	1350	925	steel lined	1984		
Lower uMngeni	Inanda Wiggins Aqueduct - Sherwood Tunnel	3350	1350	925	steel lined	1984		

Table 7.49 Pipeline details: Inanda-Wiggins Aqueduct.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (Mℓ/day)	Age (years)
Lower uMngeni	Inanda Wiggins Aqueduct	Inanda Dam	Durban Heights WTP	11.8	2620	Steel	550	3233
Lower uMngeni	Inanda Wiggins Aqueduct	Durban Heights WTP	Wiggins WTP	5.9	2315	Steel	350	4142

Table 7.50 Reservoir details: Wiggins WTP.

System	Reservoir Site	Reservoir Name	Capacity (Mℓ)	Reservoir Function	TWL (mASL)	FL (mASL)
Lower uMngeni	Wiggins	Reservoir 1	120	Bulk	103	96.6

Table 7.51 Pump details: Wiggins WTP.

System	Pump Station Name	Number of Pumps		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
		Number of Duty Pumps	Number of Standby Pumps						
Lower uMngeni	Wiggins High Lift Pumps (small)	2	1	APE 300-300-370 HMNA	Wiggins WTP	Ridge Reservoir/Lamont Reservoir	31	130	28
Lower uMngeni	Wiggins High Lift Pumps (big)	1	1	APE Model 6920 5-stage	Wiggins WTP	Ridge Reservoir/Lamont Reservoir	31	130	108

Table 7.52 Characteristics of the Maphephethwa WTP.

WTP Name:	Maphephethwa WTP (upgrade commissioned in December 2015)
System:	Lower uMngeni System
Maximum Design Capacity:	5 Mℓ/day
Current Utilisation:	4.1 0 Mℓ/day
Raw Water Storage Capacity:	None
Raw Water Supply Capacity:	5.3 Mℓ/day
Pre-Oxidation Type:	Chlorine
Primary Water Pre-Treatment Chemical:	Aluminium Sulphate
Total Coagulant Dosing Capacity:	250 kg/day at 50 mg/ℓ (maximum)
Rapid Mixing Method:	Flow over weirs
Clarifier Type:	Circular clarifiers with mechanical sludge scrapers
Number of Clarifiers:	2
Total Area of all Clarifiers:	226 m ²
Total Capacity of Clarifiers:	5 Mℓ/day
Filter Type:	Rapid Gravity Filters
Number of Filters:	4
Filter Floor Type	Monolithic
Total Filtration Area of all Filters	50 m ²
Total Filtration Design Capacity of all Filters:	5 Mℓ/day
Total Capacity of Backwash Water Tanks:	195 m ³
Total Capacity of Sludge Treatment Plant:	5 Mℓ/day
Capacity of Used Washwater System:	11.7 m ³ /day
Primary Post Disinfection Type:	Gaseous Chlorine
Disinfection Dosing Capacity:	1.5 kg/hr
Disinfectant Storage Capacity:	70 kg cylinders with automatic changeover
Total Treated Water Storage Capacity:	2.5 Mℓ

7.3.6 Status Quo and Limitations of the Upper uMngeni – Spring Grove Node

a) Overview

The demand off the Spring Grove node for the period December 2024 to November 2025 was approximately 8.09 Mℓ/day. The Mooi River System supplies one WSA, namely, Mpofana Local Municipality, within the UMDM jurisdiction.

b) Spring Grove Water Treatment Plant

The Spring Grove WTP started producing 5.6 Mℓ/day, when the Bruntville pipeline was commissioned in June 2024. The WTP has a current design capacity of 20 Mℓ/day, upgradable to 60 Mℓ/day in the future.

There are no recommendations for an upgrade at this stage.

The demand placed on the Spring Grove Water Treatment Plant is presented in **Figure 7.38** together with the future forecast sales. The current average WTP production is approximately 5.6 Mℓ/day.

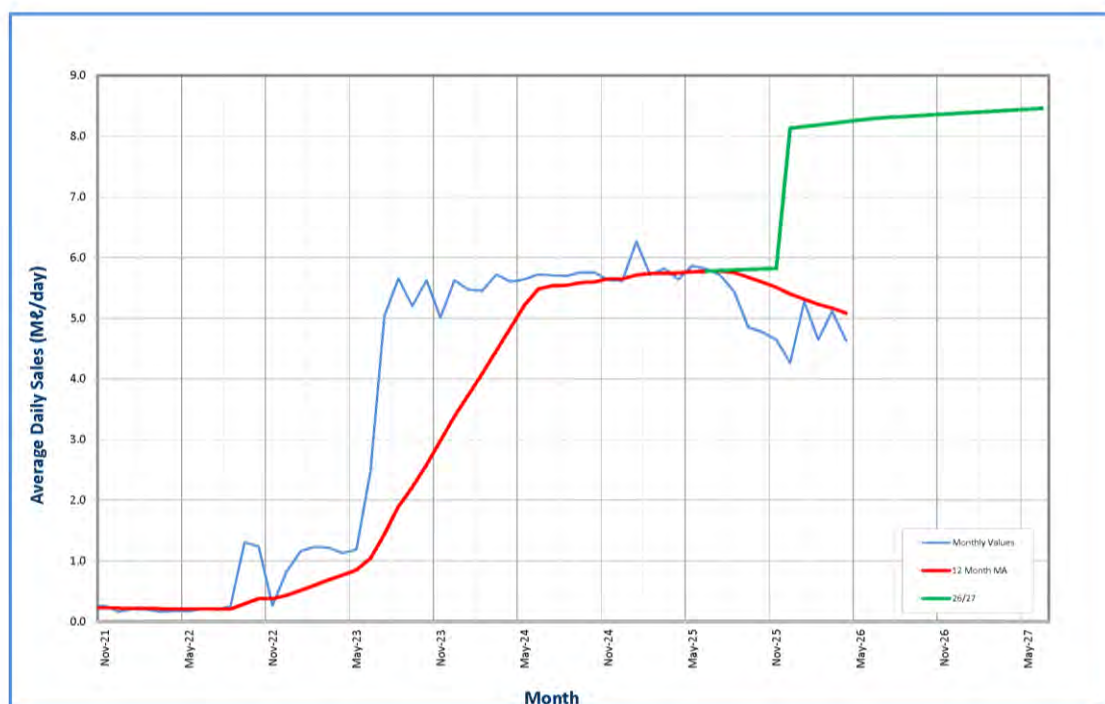


Figure 7.38 Water demand from Spring Grove WTP

The projected increase in demand is based on the growth in the Bruntville area as well as the supply from the Bruntville Reservoir to the Mooi River CBD.

An analysis of daily historical production (December 2024 to November 2025) of the Spring Grove WTP is presented in **Figure 7.39**. It shows that for 0.55% of the time the WTP was being operated above the optimal operating capacity (16 Ml/day) and 0% above its design capacity (20 Ml/day).

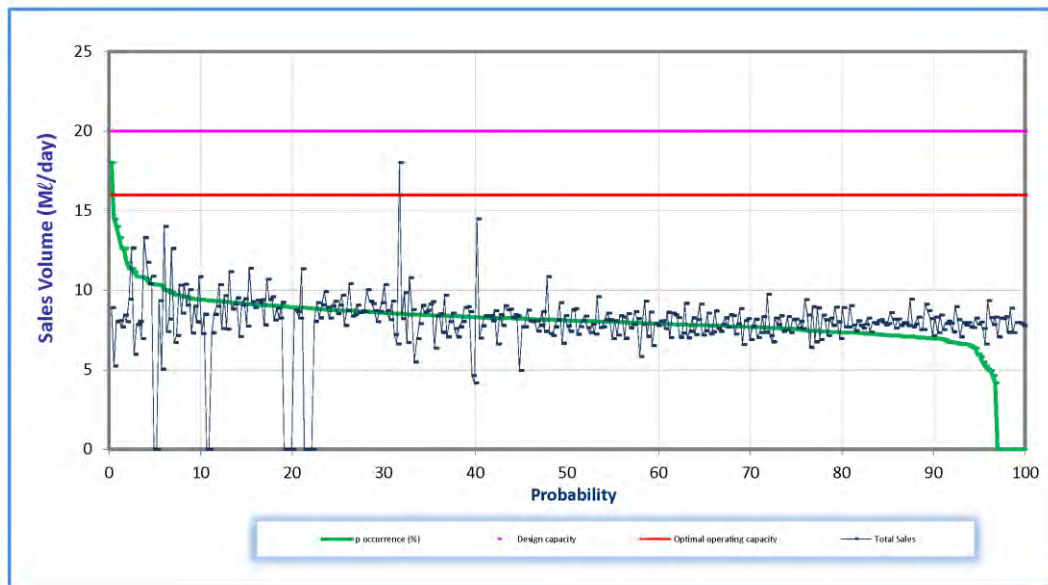


Figure 7.39 Analysis of historical production at Spring Grove WTP (November 2024 to October 2025).

7.3.7 Status Quo and Limitations of the uMngeni System

a) Overview

The demand off the Upper uMngeni System for the period December 2024 to November 2025 is approximately 476.75 Ml/day. **Figure 7.40** illustrates the distribution of this demand between the three WSAs.

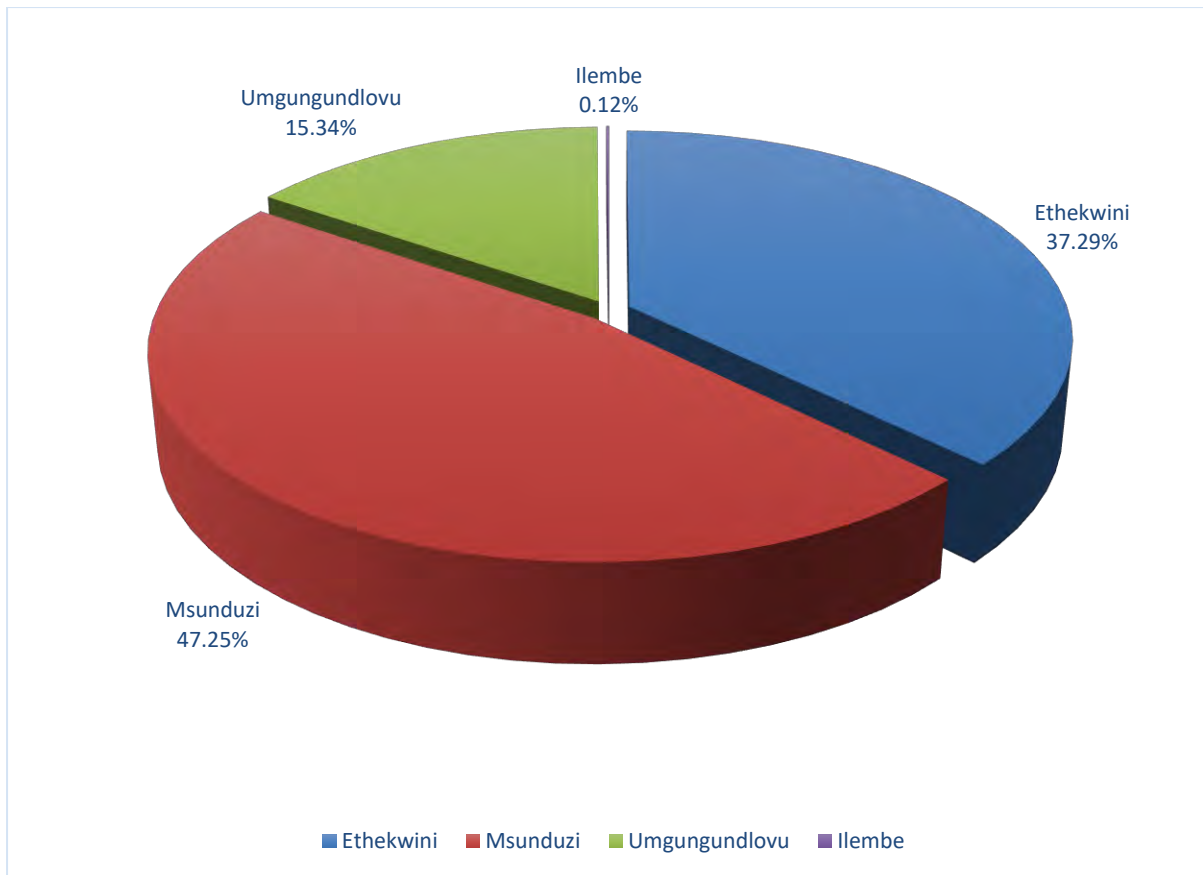


Figure 7.40 Distribution of Demands in Upper uMngeni per WSAs (October 2023).

Over recent years, eThekweni Municipality has made an effort into optimising the operation of its distribution systems that are served by the Lower uMngeni System. Amongst other things, this has led to them implementing new infrastructure in order to undertake a load shifting exercise.

eThekweni Municipality's Western Aqueduct project, which was fully commissioned in 2020, represents the most significant of these load-shifting operations. The intention is for those areas, currently being served under pumping from the Lower uMngeni System (viz. from Durban Heights WTP), to be transferred onto the Upper uMngeni System, and served under gravity from Midmar WTP via the Western Aqueduct (WA). These areas include Greater Inanda, KwaDabeka, Mt Moriah and Pinetown South. Further to this, eThekweni Municipality plans to link the WA into their Northern Aqueduct thereby extending this supply to the municipality's northern areas as far as the Dube TradePort Development Zone. Whilst this measure will free up additional capacity within the Lower uMngeni System, which can then be redirected elsewhere within eThekweni Municipality, it does place considerable additional load on much of uMngeni-uThukela Water's infrastructure in the Upper uMngeni System. This includes the '57, '61 and '251 Pipeline systems, Midmar WTP, and ultimately on the water resources available from Midmar Dam (**Section 7.2.3 (a)**). The augmentation of the '57 Pipeline (completed in 2011) and the '61 pipeline (commissioned in 2014) were undertaken in

order to provide sufficient capacity in this portion of the supply network to meet the required demands of the WA.

With the completion of the second phase of the MMTS (**Section 7.2.3 (a)**), and the catchment hydrology update undertaken in 2019, the 99% assured yield of the uMngeni System, at Midmar Dam, has increased from 322.5 Mℓ/day (173.8 million m³/annum) to 501.4 Mℓ/day (183.0 million m³/annum) excluding raw water conveyance losses. However, even an increased yield at Midmar Dam will be insufficient to support the proposed full Western Aqueduct load shift for any significant period, and further water resource developments will be required to serve the increasing demand of eThekweni Municipality. However, additional water resource developments within the Mooi-uMngeni System are not considered beneficial as this catchment is now considered fully utilised. An alternative water resource option that is currently being investigated is the uMkhomazi Water Project (uMWP) (**Section 7.5.2 (a)**) which would transfer raw water from the uMkhomazi River to a WTP near Baynesfield, with potable water then being supplied to the Umlaas Road area to feed into the '57 Pipeline and subsequently into the WA. The earliest that it is envisaged that the scheme could be completed and operational is 2035.

Midmar Dam's yield has now been maximised following the completion of phase 2 of the MMTS. It is prudent that all future bulk distribution infrastructure upgrades within the Upper uMngeni System (Midmar WTP - Umlaas Road) be limited to the water resources capacity that Midmar Dam can support (bearing in mind that Midmar Dam must also contribute to the water resource requirements downstream of it).

An assessment was undertaken in 2014 to determine the "load shift potential from the Lower uMngeni System to the Upper uMngeni System" (**Section 7.2.2 (e)**). EWS have requested that uMngeni-uThukela Water provide additional water to Umbumbulu to satisfy future demand growth. EWS agreed that this additional demand would decrease the availability of water at Point 'M'.

As mentioned in **Section 7.2.2 (e)**, only 330 Mℓ/day is available through the '61 System after the tunnel. Significant infrastructure costs would have to be incurred to overcome this hydraulic constraint, and taking into account, the water resource constraint mentioned above, this upgrade is not considered practical.

Hence, the water available to meet demands downstream of Umlaas Road Reservoir is limited until the uMWP is commissioned. Further to this, the available water for eThekweni Municipality will decrease over time as the demands upstream of the Umlaas Road Reservoir increase. The full WA load shift requirement will not be accommodated by the Upper uMngeni System until the uMWP is commissioned.

b) Midmar Water Treatment Plant

The demand placed on the Midmar Water Treatment Plant, over the past few years, is presented in **Figure 7.41**. Forecast sales are shown on the same figure. The current average WTP production is approximately 393.94 Mℓ/day.

The steep increase in supply is due to Msunduzi Municipality's demand along the '61 Pipeline Supply System exceeding the projected demand. It is further strained due to an increase in supply to eThekweni Municipality's demand to point M. eThekweni Municipality commissioned the Western Aqueduct and have requested that uMngeni-uThukela Water supply the maximum of 200 Mℓ/day during commissioning and thereafter supply the demand as projected.

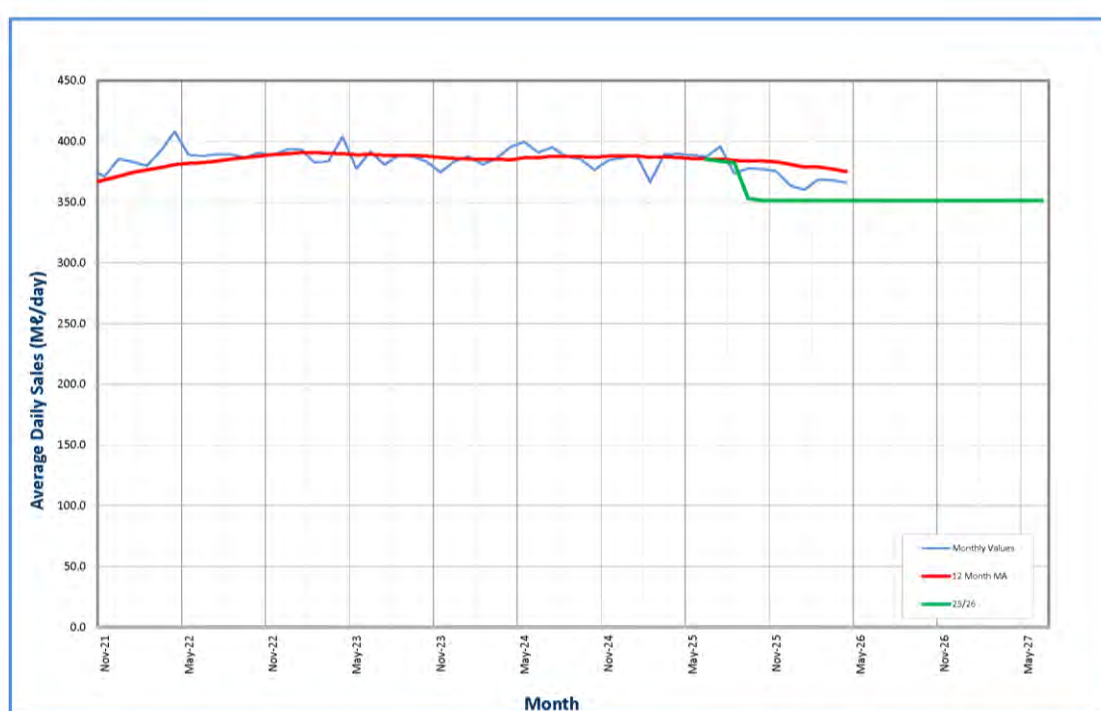


Figure 7.41 Water demand from Midmar WTP.

An analysis of daily historical production (December 2024 to November 2025) of the Midmar WTP is presented in **Figure 7.42**. It shows that for 99.73% of the time the WTP was being operated above the optimal operating capacity and 1.37% above its design capacity. This is an increase from the 97.82% above the optimal operating capacity of the previous reporting period. The result of this is that WSA's are going to be prohibited from implementing any new developments because UUW will not have the infrastructure capacity to meet the projected demand. The Department of Water and Sanitation (DWS) have issued a directive to UUW to observe the abstraction license agreement along the uMngeni System. Discussions with UMDM, Msunduzi Municipality and eThekweni Metropolitan Municipality on demand

projections, have proposed and agreed to reduce demand over the next four years if abstraction licence conditions are to be met.

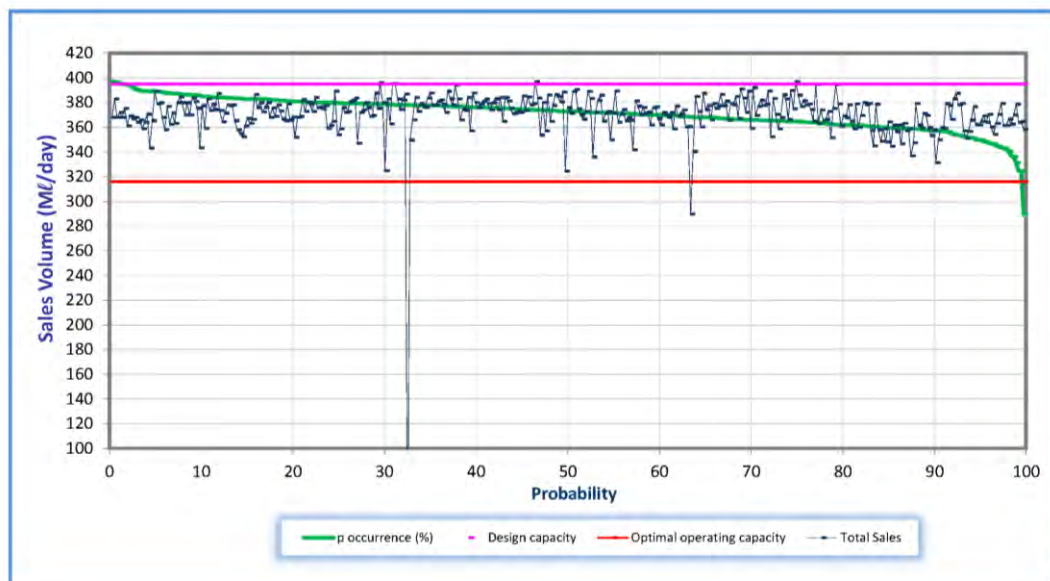


Figure 7.42 Analysis of historical production at Midmar WTP (December 2024 to November 2025).

c) Howick-North Sub-System

i) Mill Falls Pump Station to Howick-North Reservoirs

The Howick North Reservoir Complex (6.6 Mℓ) functions as a terminal reservoir under the current operating conditions. With the current average demand at 4.81Mℓ/day, the reservoir does not have enough storage to meet its 48-hour storage requirement. A new reservoir, at a higher level, is proposed, to supply future developments. This reservoir, which needs to be constructed by uMgungundlovu District Municipality, will be supplied from the Howick-North Reservoir Complex. The Howick-North Reservoir Complex will thereafter become a distribution reservoir.

The pumps at Mill Falls and the pipeline to the reservoir were recently upgraded and hence there is sufficient capacity, when the additional resource becomes available from the uMkhomazi Water Project, in this infrastructure for the near future.

d) Howick-West Sub-System

i) Mill Falls Pump Station to Howick-West Reservoir

The pump station and pipeline to Howick-West Reservoir have adequate capacity to serve the short to medium-term demands of Howick-West, Mpophomeni and Groenekloof demands. A review of this system will have to be undertaken for the long-term demand when the upgraded Vulindlela phases 1 and 2 is commissioned.

ii) Howick-West Reservoir to Groenekloof Reservoir

The Howick-West Reservoir Complex (32 Mℓ) serves as a distribution reservoir with bulk supply lines to Groenekloof and Mpophomeni Reservoirs, and with direct supply into the Howick-West reticulation network. The current demand on this reservoir is approximately 48.35 Mℓ/day.

Water is pumped from the Howick-West Reservoir to Mpophomeni Reservoir (an uMgungundlovu District Municipality reservoir). Off-takes from this pumping main have the effect of continuously changing the system curve, which affects the duty point of the pumps.

iii) Groenekloof Reservoir Supply

The 17.3 Mℓ Groenekloof Reservoir serves as a balancing reservoir for Vulindlela, Sweetwaters and Blackridge. The current demand out of Groenekloof Reservoir is 31.56 Mℓ/day. The high lift pumps to Vulindlela Reservoirs 2-5 have a capacity of approximately 22 Mℓ/day, which meets the current demand of 14.72 Mℓ/day. Phase 1 of the Vulindlela BWSS was implemented in 2026 however the new pumpstation at Res 2 was not commissioned due to lack of power supply. Phase 2 is anticipated to be completed by the end of 2028. This will result in the decommissioning of the Vulindlela High-Lift pumps at Groenekloof, with water supply then coming directly from Howick West reservoir to Reservoir 2. The storage requirements at Groenekloof will be re-assessed.

iv) Blackridge Reservoir Supply

The current demand from the Blackridge Reservoir is approximately 5.97 Mℓ/day, including Ephayaphini. The capacity of the reservoir is 2.2 Mℓ. The reservoir functions as a terminal reservoir that should ideally have 48 hours of storage (7.0Mℓ). This is a reticulation requirement and the responsibility for the upgrade, therefore lies with the Municipality.

e) Midmar WTP to Umlaas Road Sub-System

i) '251 Pipeline: Midmar WTP to D.V. Harris Off-Take

Due to limiting head conditions in the upper portion of the '251 Pipeline, the maximum flow obtainable through this pipeline is 330 Mℓ/day. Augmentation of all pipeline elements downstream of the '251 Pipeline should therefore be based on a maximum available flow of 330 Mℓ/day.

ii) Clarendon Reservoir

The current demand from Clarendon Reservoir is approximately 26.66 Mℓ/day. The capacity of the reservoir is 25 Mℓ. The reservoir function is a terminal reservoir, which should have 48 hours of storage. The Clarendon reservoir should therefore be upgraded to minimise risk. This is a reticulation requirement and the responsibility to provide this storage requirement lies with the Municipality. The Msunduzi Municipalities' operational philosophy places the supply zones from Symons and Hathorns on Clarendon Reservoir.

iii) '61 Pipeline: D.V. Harris to World's View Reservoir

This section of pipeline has been augmented to accommodate the maximum flow of 330 Mℓ/day. The Worlds View reservoir has two 40 Mℓ compartments and the current throughput is approximately 318.39 Mℓ/day.

iv) '61 Pipeline: World's View Reservoir to ED2

This dedicated pipeline serving The Msunduzi Municipality has sufficient capacity to satisfy the growing annual average daily demand (AADD). For a peak flow of 1.3 x AADD the pipeline could reach its capacity by 2030. However, with the proposed interlinking of the two '61 pipelines and the anticipated relief from the '61 Pipeline of the WA demand, once the uMWP is commissioned, the current pipeline capacity is considered adequate.

v) '61 Pipeline: ED2 to Umlaas Road Reservoir

The Msunduzi Municipality plans to formalise the low-income housing in the Shenstone/Ambleton area. These developments will be supplied with potable water from the ED4 off-take. It is expected that the increase in demand at this point will be in the region of 1.5% annually over the next 5 years.

The Richmond off-take to Lilliefontein remains a problematic section of pipeline with illegal connections resulting in lost revenue for UuW.

A 1300 mm diameter pipeline was constructed, from ED2 to the Richmond off-take in 2012 to augment the 800 mm diameter pipeline. This will ensure adequate capacity for growth in demand towards 2030 when the uMWP is commissioned.

vi) ED4 to Umlaas Road

The dual 61' Pipelines from ED4 to Umlaas Road have sufficient capacity to supply the current and future needs of the Umlaas Road Demand Zone. The demand at this zone will decrease once the uMWP is commissioned.

vii) Ashburton Supply

The average flow in this pipeline is currently 1.54 Mℓ/day. This system has sufficient capacity for the short and medium term.

viii) Thornville / Hopewell Supply

The average demand through this pipeline is currently 3.24 Mℓ/day. Thornville Reservoir is now supplied from the Richmond pipeline via the Lilliefontein Reservoir. The Thornville Pump Station was decommissioned, with the rising main now being utilised as a backfeed line for customers along this route.

ix) T Pipeline: D. V. Harris WTP to Umlaas Road Reservoir

This pipeline currently supplies approximately 24.83 Mℓ/day to Umlaas Road Reservoirs. This ageing pipeline has an operational history of frequent bursts and caution has to be taken to not exceed the current “safe load carrying capacity” of 35 Mℓ/day.

f) Umlaas Road Sub-System

The current demand at Umlaas Road Reservoir is 161.102 Mℓ/day. The reservoir serves primarily as a distribution reservoir, supplying reservoirs in Mkhambathini Municipality and eThekweni Municipality.

i) '57 Pipeline

The existing 800 mm diameter pipeline serves a minimal demand in Camperdown. The combined capacity of the 1000mm diameter and the new 1600 mm diameter pipeline is 485 Mℓ/day, which is sufficient to satisfy the future demands of the WA.

ii) Eston/Umbumbulu Pipeline

The capacity of this pipeline is restricted to 18.67 Mℓ/day due to the ground level profile along the pipeline route. The flow is restricted to ensure that the hydraulic grade line is at least 20 m above a high point at Stoney Ridge. The current flow in this pipeline is 13.57 Mℓ/day. uMgungundlovu District Municipality supplies the Greater Eston area with potable water from this pipeline.

EWS have requested that uMngeni-uThukela Water provide additional water to Umbumbulu to satisfy future demand growth in the area. This demand growth due to planned and unplanned commercial and residential developments in Umbumbulu as well as a load shed of a portion of Adams Mission onto the Umbumbulu Reservoir. This means that the capacity of this pipeline is insufficient to meet the current demands. uMngeni-uThukela Water has implemented the Umbumbulu Booster Pump Station as a short-term solution to meet the rapid growth in demand and a pipeline augmentation in the medium to long term.

iii) Lion Park / Manyavu Pipeline

The current demand on this pipeline is approximately 4.32 Mℓ/day. uMngeni-uThukela Water constructed a pipeline from an off-take on the Lion Park Pipeline to serve the Manyavu community (circa 2007). The Manyavu demand was expected to grow to about 6 Mℓ/day by 2040. uMngeni-uThukela Water has augmented the Lion Park Pipeline by constructing a new 350 mm diameter steel pipeline to ensure the sustainability of the supply to this area.

g) D.V. Harris Water Treatment Plant

The demand on the plant is made up of supply to the Msunduzi and uMshwathi Municipalities, as well as a supply to the Umlaas Road Reservoir via the '53 Pipeline. The supply through the '53 Pipeline varies between 25 to 35 Mℓ/day depending on the operational requirements at Umlaas Road Reservoir. While Clarendon can be supplied from the Midmar WTP, the current operating rule is to supply Clarendon Reservoir from D.V. Harris WTP to maximise the availability on the '251 pipeline to serve the Umlaas Road Sub-System.

Due to the configuration of the '61 Pipelines between D. V. Harris WTP and Clarendon Reservoir (**Figure 7.33**), it is expected that Clarendon Reservoir will have to be fed from Midmar WTP on a continuous basis going forward. The demand on the plant will be reduced if the '53 Pipeline is decommissioned when the uMWP is commissioned towards the year 2035. There will thus be no need to upgrade D.V. Harris WTP in the short to medium term.

The demand placed on the plant over the past few years is presented in **Figure 7.43**. Projected sales over the next year are also shown in the same figure. The current production at the plant is approximately 111.3 Mℓ/day.

uMshwathi BWSS phases 1, 2 and 3 have now been fully commissioned. The expected demand increased as potable water was supplied to the areas of Cool Air, Dalton, Ozwathini, eNadi, Efaye and Swayimana. Phase 4 & 5 are currently in construction and design, respectively.

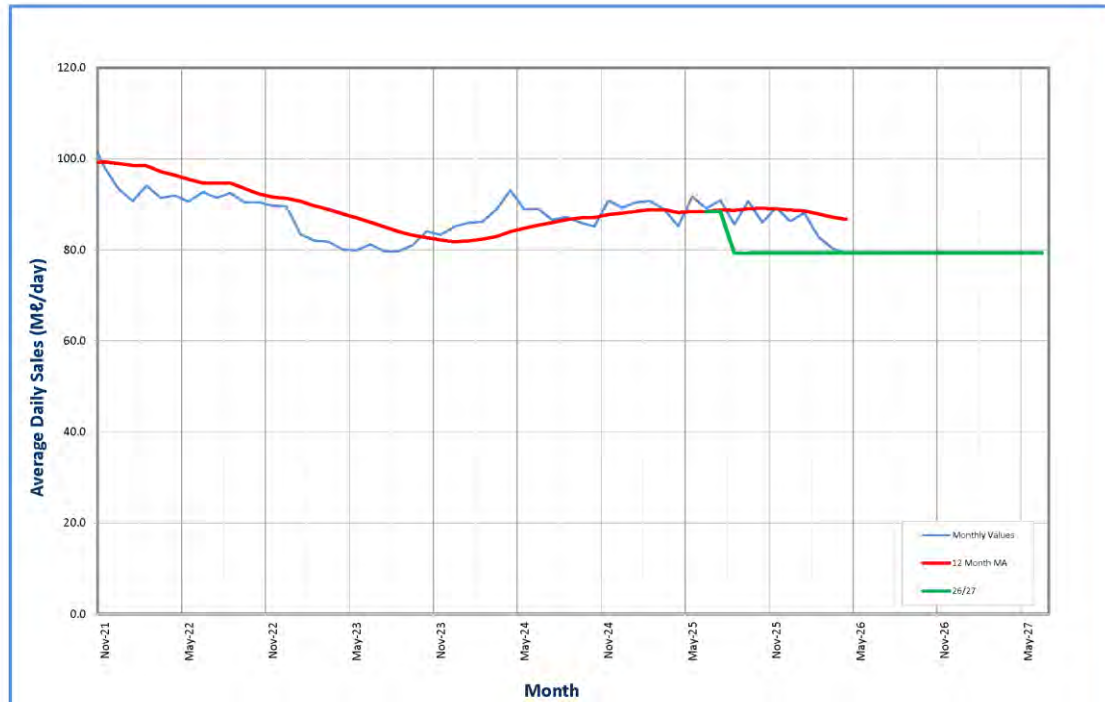


Figure 7.43 Water demand from D. V. Harris WTP.

An analysis of daily historical production (December 2024 to November 2025) of the D.V. Harris WTP is presented in **Figure 7.44**. It shows that for 93.46% of the time the WTP was being operated above the optimal operating capacity when compared to 93.7% over the previous year. The plant operated above design capacity for 3.0% of the time compared to 2.7% in the previous year. This is an alarming trend for both WTP's and discussions with the WSA's are ongoing to reduce the Non-Revenue Water component as this is the biggest contributor to the growing demand off the WTP's. The Department of Water and Sanitation (DWS) have issued a pre-directive to UUW to observe the abstraction license agreement along the uMngeni System. Discussions with UMDM and Msunduzi Municipality on demand projections have proposed and agreed to reduce demand over the next two years for the abstraction licence conditions to be met.

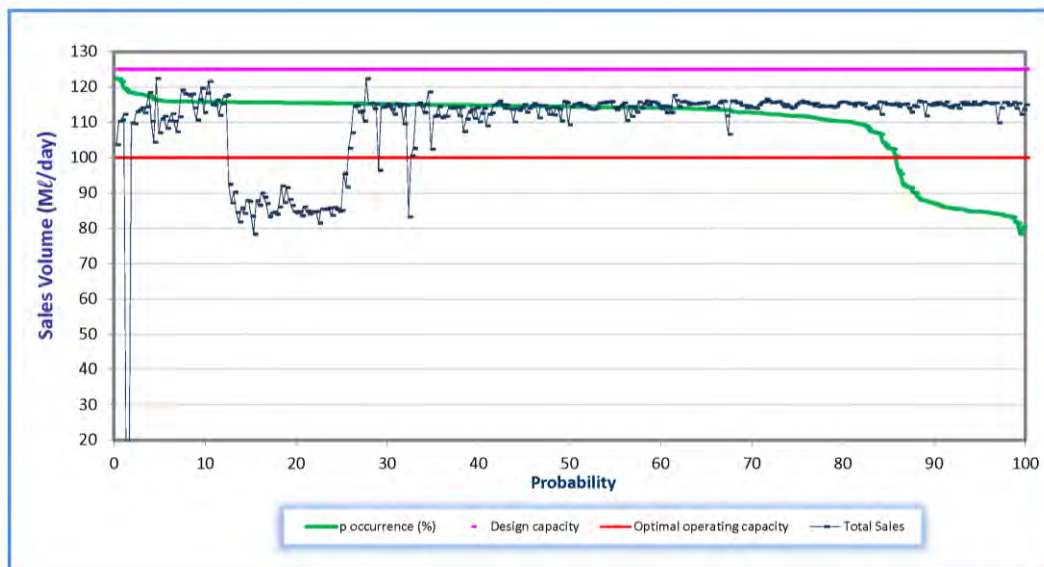


Figure 7.44 Analysis of historical production at D.V. Harris WTP (November 2023 to October 2024).

h) uMshwathi Sub- System

i) Pipeline from D V Harris WTP to Claridge Reservoir/Msunduzi Supply

The current total supply to the Msunduzi pipeline (Belfort and Claridge reservoirs) from DV Harris WTW is 61.54 Mℓ/day.

The main distribution pipeline leaving DV Harris is a 1000 mm diameter steel pipeline, approximately 6.7km in length, belonging to the Msunduzi Municipality. This pipeline transmits water from DV Harris to the Claridge and Belfort Storage Reservoirs. A bulk meter at DV Harris WTP measures the quantity of water sold to Msunduzi Municipality.

Uuw has an off take on the Belfort Reservoir outlet pipeline from where water is bought back from the Msunduzi Municipality for supply to parts of the Wartburg and Table Mountain areas.

Uuw completed the construction of the 50 Mℓ Claridge Reservoir in the year 2000. This reservoir is situated adjacent to the 23Mℓ Belfort Reservoir. With increasing demand growth on the uMshwathi and Table Mountain systems, the existing 1000 mm diameter pipeline has constraints to meet the current and projected demands.

A hydraulic analysis has shown that the maximum flow under gravity, with the available head difference of 39.74 m, is 63 Mℓ/day along the existing 1000 mm diameter pipeline. This is inadequate to meet the future demand. A demand projection has recently been undertaken and this shows that 120 Mℓ/day will be required to supply the demands of the area in 2053.

UUW, therefore, needs to augment the pipeline from DV Harris to the Claridge Reservoir to meet future demands.

ii) '69 Pipeline: Claridge Reservoir to Wartburg Reservoir

The '69 Pipeline has been upgraded to supply the uMshwathi Municipality and the western areas of iLembe District Municipality. This pipeline has been fully commissioned and the “old” pipeline has been decommissioned. The total demand through the system at present is approximately 16.26 Mℓ/day.

iii) Wartburg Reservoir to Bruyns Hill Reservoir

The Wartburg Reservoir functions primarily as a bulk reservoir for the Bruyns Hill and Cool Air Reservoirs. To function as a bulk reservoir, it should have 15 hours of the AADD supply to Cool Air and Bruyns Hill Reservoirs.

Water demands from the Swayimane area have consistently increased over the years. This growth is expected to continue with the planning of further low cost housing in the area. iLembe District Municipality has also requested a supply to its Southern Ndwedwe region from Bruyns Hill.

The new pipeline from Bruyns Hill Pump Station to Bruyns Hill Reservoir is a 450 mm diameter steel pipe. The supply from Wartburg Reservoir to Bruyns Hill Pump Station has been completed and can now support this new demand node, relieving the hydraulic constraint between Wartburg Reservoir and Bruyns Hill Pump Station. The storage capacity at Bruyns Hill Reservoir has been increased and should be adequate for the next 20 years.

iv) Wartburg Reservoir to Dalton Reservoir

The supply pipelines from Wartburg Reservoir to the 10 Mℓ Dalton are adequate for the current demand. Phases 2 and 3 of the uMshwathi BWSS are complete and commissioned.

i) Durban Heights Water Treatment Plant

Construction of the 400 Mℓ/day Western Aqueduct (WA) has now been commissioned by eThekweni Municipality (excluding Contract 5, which has been postponed to 2025). Sub-systems supplied from Durban Heights WTP and which are planned to be transferred to the WA include: Outer and Inner West, Tshelimnyama, Pinetown, Kwadabeka, Ntuzuma and Mzinyathi. Water currently available from Point M to the WA, based on the 1:100 year yield from the uMngeni system, is approximately 200 Mℓ/day until the proposed uMkhomazi Water Project (uMWP) is commissioned (**Section 7.4.2 (a)**).

eThekweni Municipality plan to transfer the demands off Durban Heights WTP and onto the Western Aqueduct. However, until the uMWP has been commissioned, Durban Heights WTP

will need to continue to supply Pinetown with 50 Mℓ/day and a minimum pumping of 30 Mℓ/day to Ntuzuma. No significant reduction in sales has occurred since the Western Aqueduct was commissioned in 2019. The estimated reduction in demand on Durban Heights was forecast to be approximately 20 Mℓ/day.

The approximate 20 Mℓ/day that was to be freed up would have been utilised to meet the increasing demands of other nodes along the extension of the Northern Aqueduct. These include the demands of new housing developments in the Verulam/Tonga area, Grange and that of the proposed Dube TradePort. By virtue of its high elevation of 272 meters above sea level the Durban Heights WTP is able to supply a major portion of the eThekweni Municipality coastal demands via gravity. Portions of the Municipality's Outer West Area are however supplied via pumping. Treated water is sold by UUW to eThekweni Municipality "at the fence", and the Municipality is responsible for the entire distribution network. Due to supply problems primarily on their Northern Aqueduct pipeline from Durban Heights WTP, and in an effort to reduce pumping costs eThekweni Municipality constructed the 400 Mℓ/day Western Aqueduct pipeline (excluding Contract 5, as postponed to 2027). The intention was to shift some of its water supply load from the Durban Heights WTP to the Upper uMngeni System supplied from Midmar Dam, viz. the Midmar and DV Harris WTP's. The subsystems supplied from Durban Heights WTP, which are planned to be transferred to the Western Aqueduct, include Outer West, Pinetown, Tshelimnyama, kwaDabeka, Ntuzuma and Mzinyathi.

The 400 Mℓ/day Western Aqueduct was commissioned in 2019, with the understanding that the full capacity is constrained based on both the 1:100 year yield and associated infrastructure from the Upper uMngeni System; until the proposed uMkhomazi Water Project (uMWP) is commissioned (**Section 7.4.2 (a)**). The water available for the Western Aqueduct diminishes over time due to the increasing demands from the inland region upstream. The water availability data is provided in (**EWS, May 2015**)

Table 7.54 Water Availability at Point M.

Year	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2035
Water available at Pt M				Western Aqueduct *Commissioned						Initial date uMWP	Revised date uMWP
Mℓ/day	210	209	207	206	204	203	201	200	198	197	182

****Note: Western Aqueduct full 400 Mℓ/day capacity constrained until proposed uMWP commissioned***

An analysis of historical production for the Durban Heights WTP (October 2024 to November 2025) is presented in **Figure 7.45**, and shows that for 97.8% of the time the WTP was being operated above the optimal operating capacity (80% of design capacity) and 2.5% of the time

the WTP was operated at above design capacity. The previous year Durban Heights WTP was operating above the optimal operating capacity for 95.6% of the time. Comparison of the statistical analysis year-on-year illustrates that there was an increase in times that the WTP design capacity was continues to be exceeded, as well as increase in average demand from the WTP. This may be attributed to increased sales due to the filling and commissioning of phase two (of three phases) of the new 1200 mm diameter Northern Aqueduct.

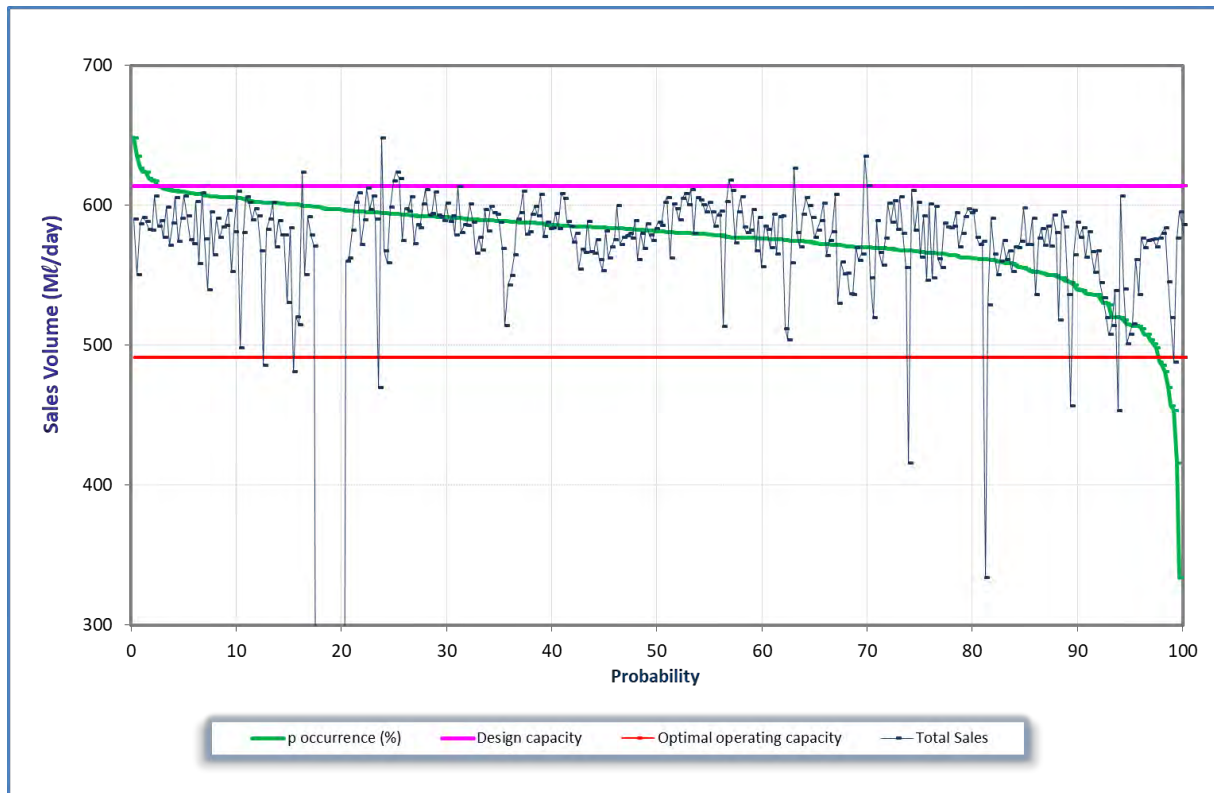


Figure 7.45 Analysis of historical production at Durban Heights WTP from December 2024 to November 2025.

Current raw water abstractions from the uMngeni System continue to exceed the Water Use Licence, which is potentially a criminal offense; in this regard a Notice of Intent to issue a Directive was received from DWS, dated 18 July 2023 for contravening the conditions of the Water Use Licence (WUL). In light of the DWS intent to issue a Directive, the proposed developments and associated demand within the EWS area of supply were discussed with the municipality during August 2025, **but not** included in the forecast sales figures. To ensure abstractions are equal to or less than the WUL amount, a decrease in sales forecast for the ensuing years were mutually agreed. A year-on-year decrease in demand of 9.1% is expected for the ensuing financial year. Thereafter a 0.3%, 0.0% and 0.0% decrease per annum was estimated over the 4 years, respectively. Note: as per the Plan of Action submitted to DWS the 9.1% decrease is reported to occur during the first four months of the 2025/26 Financial Year and “level out” over the ensuing eight months from October 2025 to June 2026. The Plan ought to give the Municipality the time needed to plan and implement WC/WDM initiatives,

which will then reduce the demand in the system. The WC/WDM initiatives explain forecast levelling off trend of the 12-month moving average as illustrated in **Figure 7.46**.

Demand for the 2024/2025 financial year was 575.0 Mℓ/day. An increase of 9.6 Mℓ/day or 1.7% was recorded over the year.

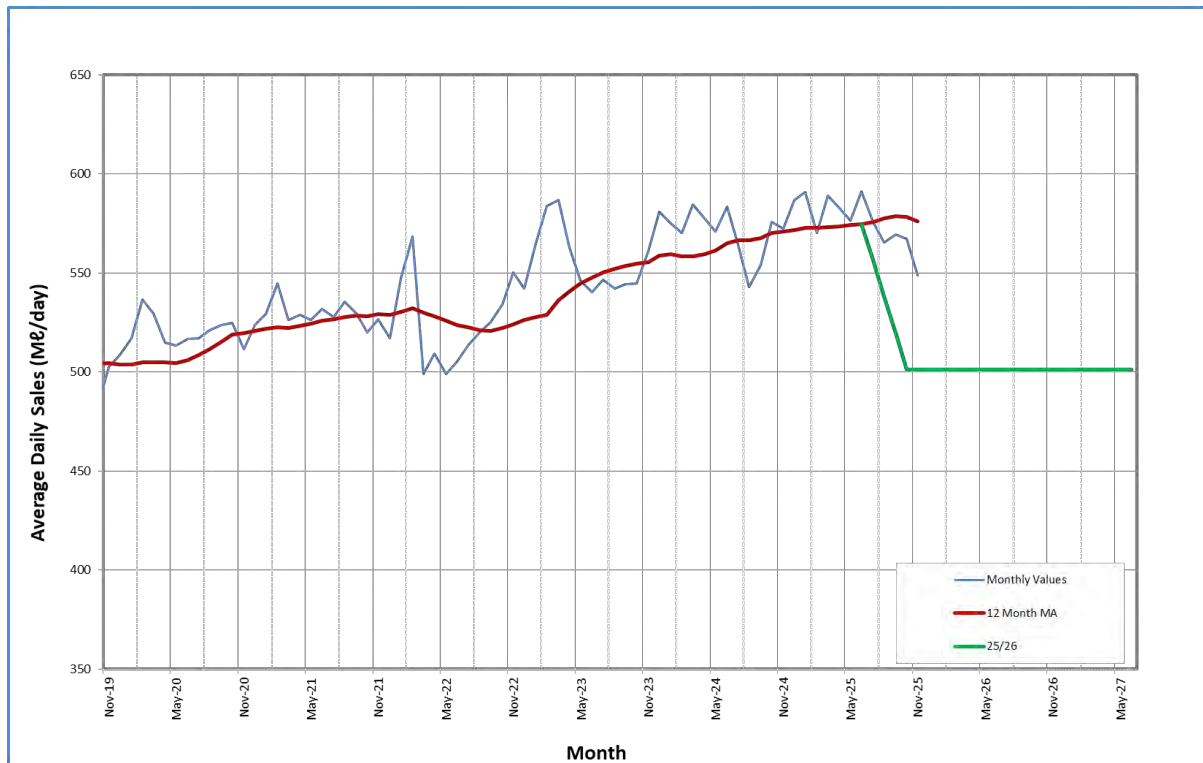


Figure 7.46 Historical demand curve for Durban Heights WTP.

j) Wiggins Water Treatment Plant

Wiggins WTP supplies the Amanzimtoti/KwaMakuta areas located in the southern portion of eThekweni Municipality. Due to water resource constraints at Nungwane Dam (**Section 11.2.3 (a)**) and the limited capacity of Amanzimtoti WTP, it is necessary to augment the supply to areas downstream of the Amanzimtoti WTP with flows from Wiggins WTP via the South Coast Augmentation (SCA) Pipeline. This will be required until such time as a new regional bulk water supply system is developed on the lower reaches of the uMkhomazi River (**Section 11.7.3 (d)**). In the interim, the Wiggins WTP sub-system should have sufficient treatment and distribution capacity to meet the short and medium-term demands of Amanzimtoti and the South Coast Pipeline (SCP).

Figure 7.47 shows the current configuration of the existing SCA pumped supply infrastructure linking the Wiggins WTP sub-system to Amanzimtoti WTP. This system has certain operational capacity constraints that still have to be rectified to ensure that the Wiggins WTP system continues as the point of supply for Amanzimtoti and the SCP in the future.

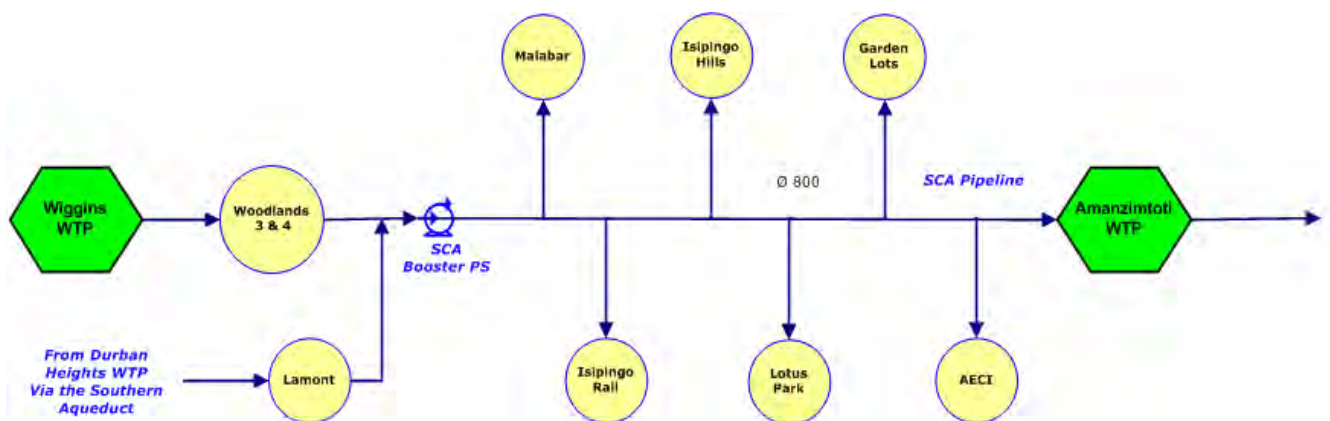


Figure 7.47 Extent of the South Coast Augmentation Scheme.

The South Coast Augmentation Booster Pump Station was commissioned in December 2013 and serves as a medium-term infrastructure development strategy to meet current and projected demands off the SCA Pipeline up to the year 2020.

An analysis of historical production at the Wiggins WTP (December 2024 to November 2025) is presented in **Figure 7.48** and shows that for 95.2% of the time the WTP was being operated above the optimal operating capacity (80% of design capacity) and 4% of the time the WTP was operated at above design capacity.

Demands from Wiggins WTP over the 2024/2025 financial year remained 'constant', the marginal increase in sales to eThekweni Municipality may be attributed to challenges in the SCA Pipeline supply to Amanzimtoti WTP, with load-shedding having an effect on the municipality water supply systems, as well as undue delays, which are beyond UuW control, in replacing the gravity aqueduct sales meter. This meter accounts for approximately two thirds of the supply volumes from the WTP. A slight increase in demand of 0.6 Mℓ/day (0.2%) when compared with the prior year demand growth (**Figure 7.51**). The previous year Wiggins WTP was operating above the optimal operating capacity for 94.9% of the time.

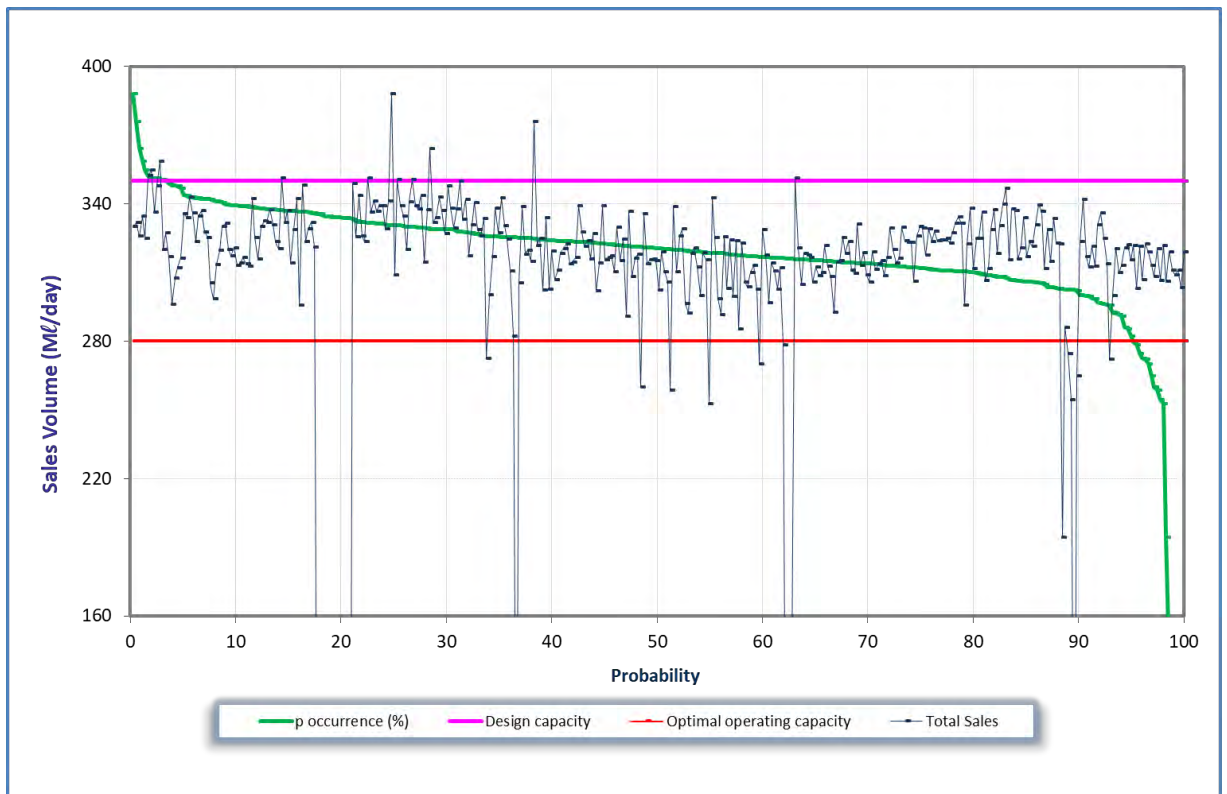


Figure 7.48 Analysis of historical production at Wiggins WTP from November December 2024 to November 2025.

The historical and projected water demand from the Wiggins WTP is presented in **Figure 7.49**.

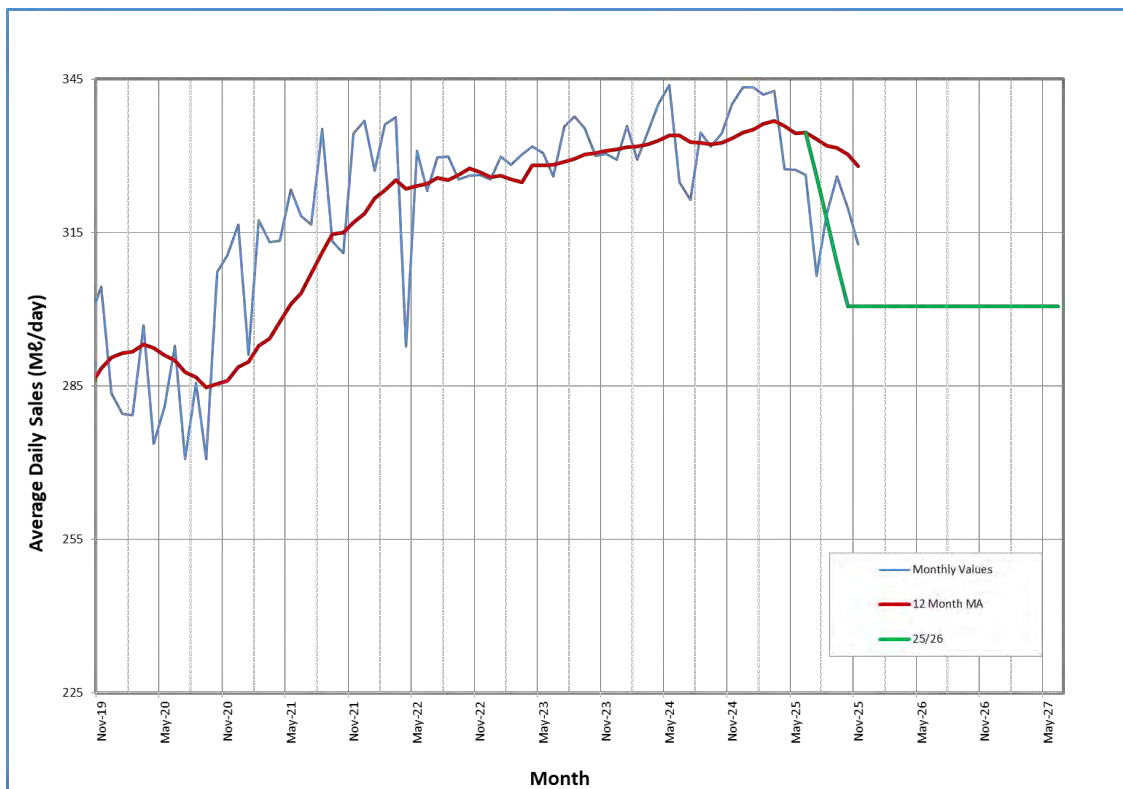


Figure 7.49 Historical demand curve for Wiggins WTP.

k) Maphephethwa Water Treatment Plant

Maphephethwa WTP (**Figure 7.51**) was originally commissioned as a rural scheme under a turnkey contract. The works is located in the Inanda Dam area and draws water off one of the Nagle Dam raw water aqueducts supplying Durban Heights WTP. The raw water is filtered through a set of four slow sand filters. The filtered water is chlorinated and supplied into a 1 Mℓ on-site storage/distribution reservoir. The original works had slow sand filters with a treatment capacity of 0.75 Mℓ/day.

The works was upgraded to a design capacity of 5 Mℓ/day in 2014. The WTP is currently operated at 0 Mℓ/day. Raw water to the works is drawn from Nagle Aqueduct No. 2, which delivers water to Durban Heights WTP, via a 160 mm internal diameter PVC pipeline. The off-take point of the Aqueduct is located 260 m from the works. The raw water supply pipeline to the WTP is fitted with a pre-chlorination unit, flow meter and a flow control valve.

An analysis of historical production at the Maphephethwa WTP (December 2024 to November 2025) is presented in **Figure 7.51**. It shows that for 36.5% of the time, the WTP was being operated above the optimal operating capacity (80% of design capacity) and 0.0% of the time the WTP was operated at above design capacity (based on the upgraded capacity of the plant).

Figure 7.52 shows that the demand on this WTP remained 'constant' during 2024/2025. The works currently produces an average of 3.8 Mℓ/day (as at the end of October 2025). It is envisaged that the demand will decrease to conform with the DWS Notice and ensure that water abstractions adhere to the WUL conditions during 2026 (**Figure 7.52**).

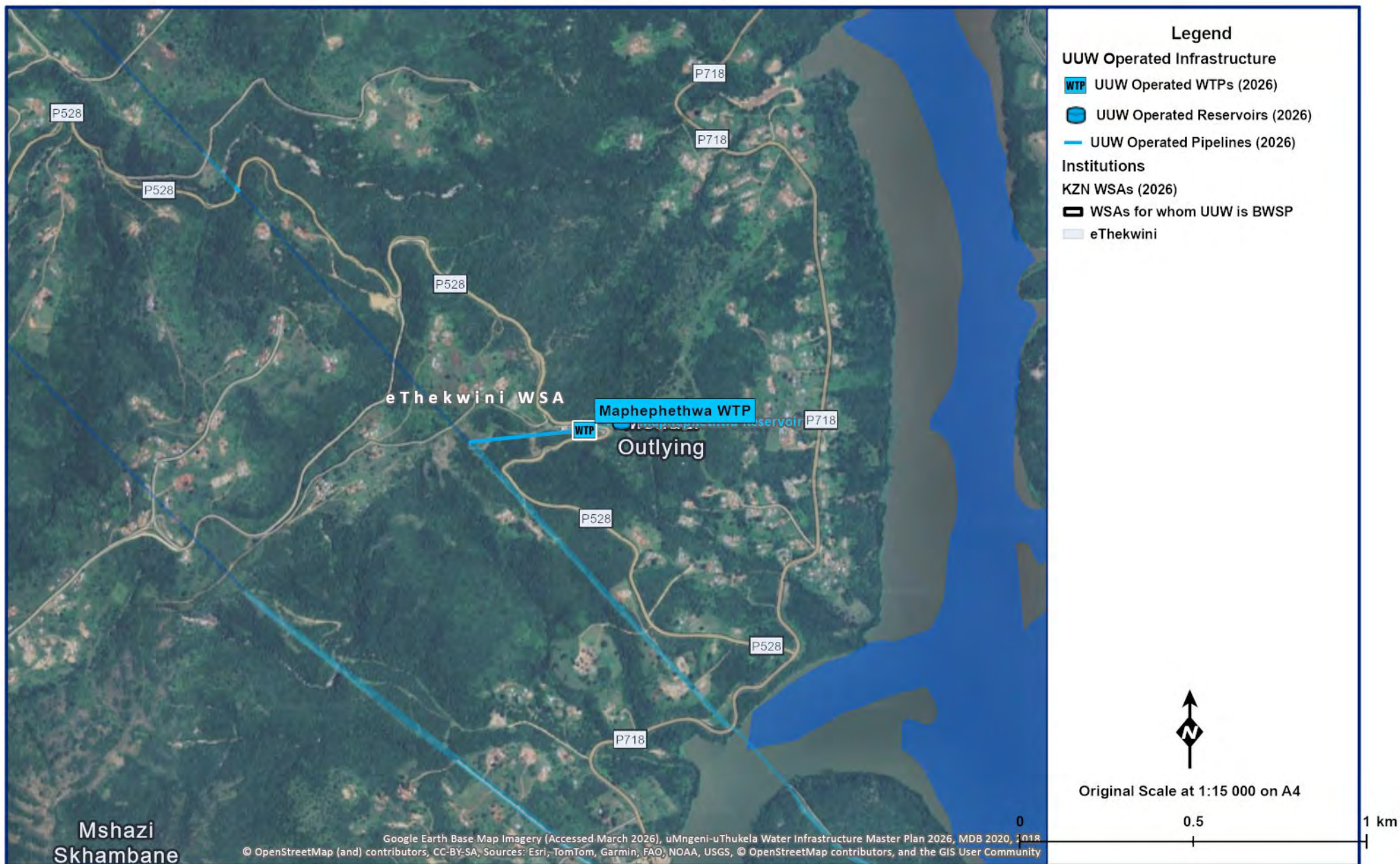


Figure 7.50 Maphephethwa Water Treatment Plant.

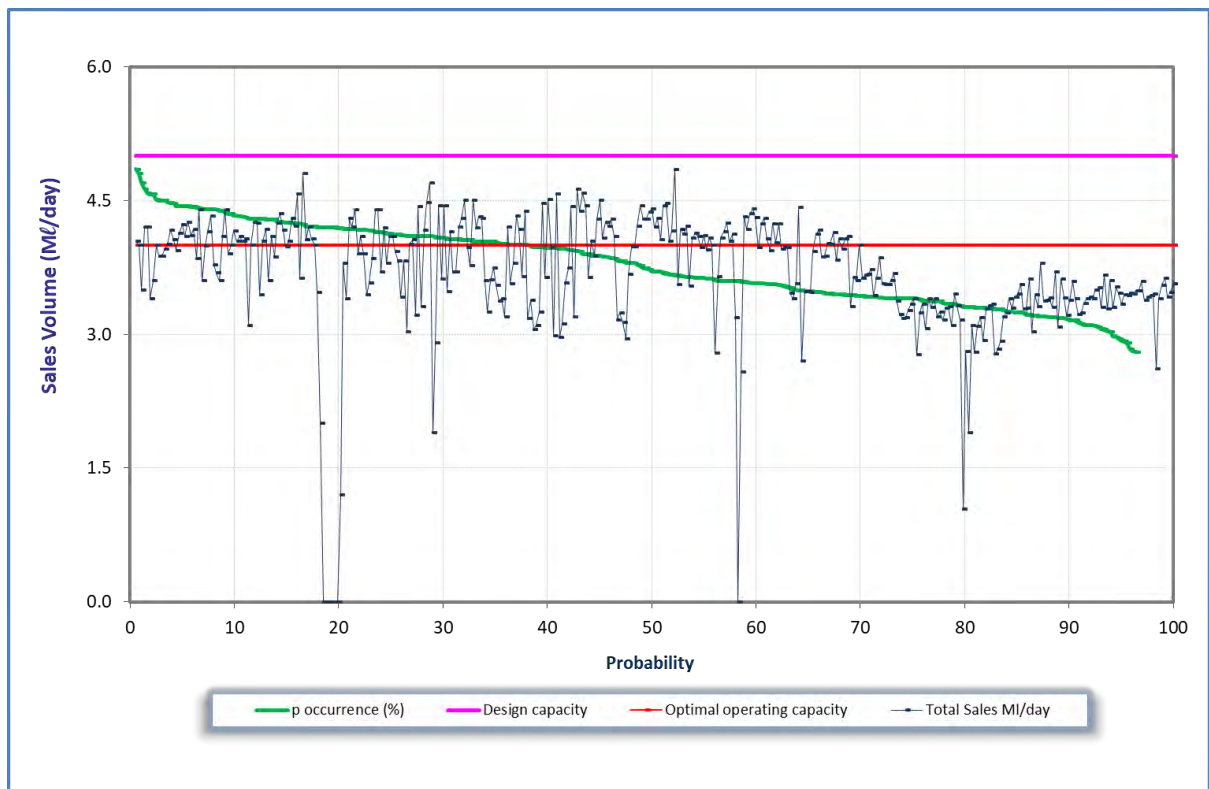


Figure 7.51 Analysis of historical production at Maphephethwa WTP from December 2024 to November 2025.

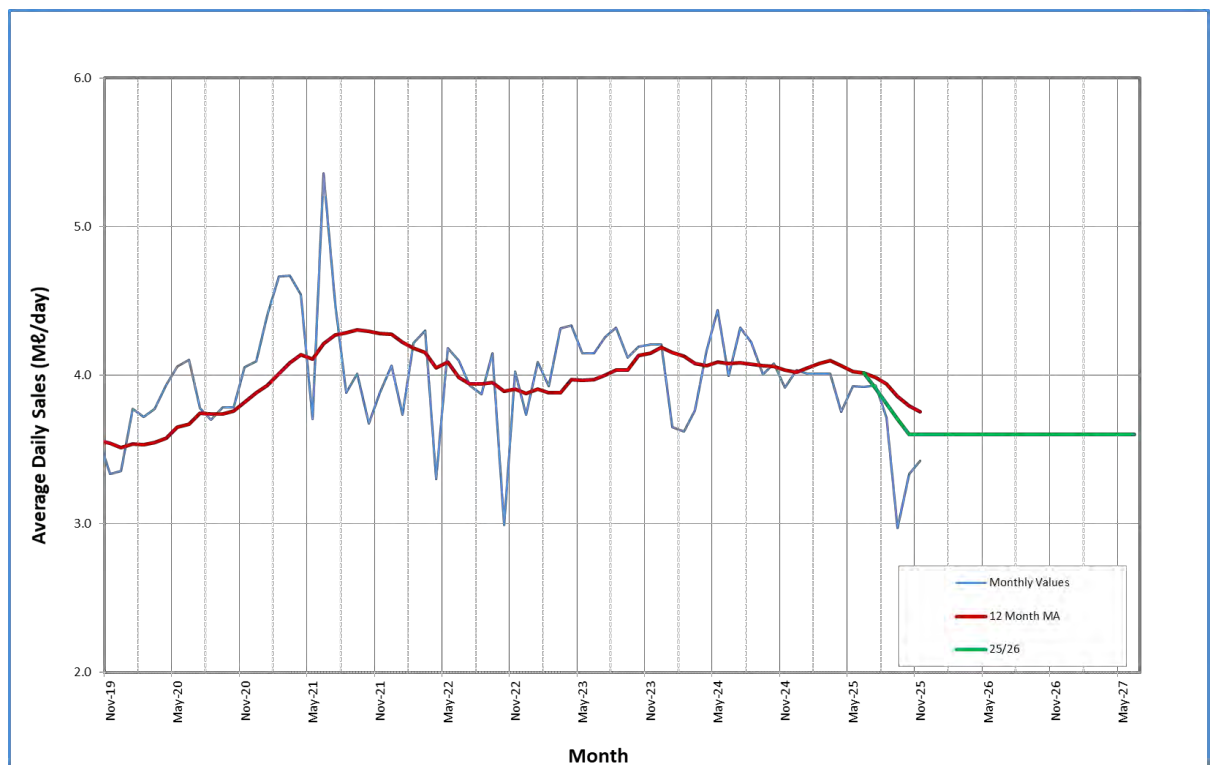


Figure 7.52 Historical demand curve and projections for Maphephethwa WTP.

7.3.8 KwaXimba Water Treatment Plant

The KwaXimba Water Treatment Plant is shown in **Figure 7.53**. At the time of this IMP, the KwaXimba WTP had not operated for 12 months and therefore there is insufficient data for the analysis. This WTP will therefore be discussed in the IMP 2027.



Figure 7.53 KwaXimba Water Treatment Plant.

7.4 Water Balance/Availability

The current uMngeni System can be considered as a “stressed” catchment and **Table 7.53** indicates yields for the levels of assurance that are below levels that EWS require.

Table 7.53 Yield Information for uMngeni System.

Stochastic Yield (1 in 5 years risk of failure)		Stochastic Yield (1 in 10 years risk of failure)		Stochastic Yield (1 in 20 years' risk of failure)	
million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day	million m ³ /annum	Mℓ/day
510.0	1397.3	497.0	1361.6	470.0	1287.7

A graphical representation of the 1:100-year yield information (worst drought in 100 years) for the uMngeni System is presented in **Figure 7.54**. The graph also shows the yield of the proposed Smithfield Dam on the uMkhomazi River, which is 220 million m³/a. The projected water demand line for the uMngeni System is shown on the graph and these demands are based on 0 % growth until the next augmentation, i.e., Smithfield Dam.

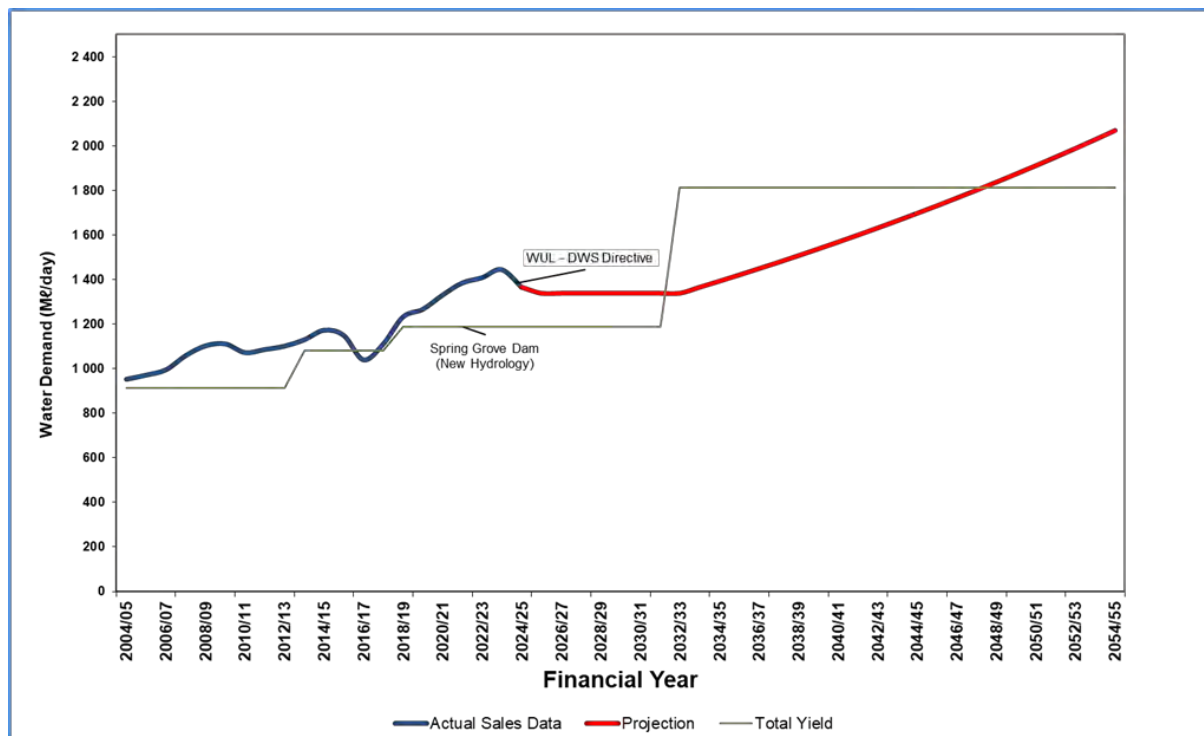


Figure 7.54 uMngeni System balance.

7.5 Recommendations for the uMngeni System

7.5.1 System Components

a) Mooi/uMngeni Water Resource Region

In evaluating the long-term water security of the uMngeni System, water resources analyses were undertaken by the DWS Reconciliation Strategy Study (DWS 2024). Analyses indicate that further augmentation of the system is required. In this regard, the option that has been approved is the uMkhomazi-uMngeni Transfer Scheme (known as the uMkhomazi Water Project; **Section 7.5.2 (a)**), although the following augmentation options are also still being investigated, the reuse of treated effluent and seawater desalination. Yields of the proposed infrastructure (uMkhomazi Water Project) are listed in **Table 7.54**. In the interim, annual operating analyses (AOAs) are conducted to determine the short-term operations and allocations of water, together with the monitoring and operationalisation of the decisions taken by uMngeni System Joint Operations Committee (JOC).

b) uMkhomazi Water Resource Region

The current water resources of the uMngeni System are insufficient to meet the long-term water demands of its own system. Past investigations have indicated that, possibly, the most suitable long-term solution would be to develop a scheme that transfers raw water from the still undeveloped uMkhomazi River to the uMngeni Catchment. Water resources development options on the uMkhomazi River (**Figure 7.55**) have been investigated with a number of potential sites and transfer options being considered. The recommended scheme, known as the uMkhomazi Water Project (uMWP) (**Section 7.5.2 (a)**) will comprise of two phases.

The first phase (uMWP-1) will consist of the once-off constructed 251 million m³, 58 m high Smithfield Dam (**Table 7.54 and Figure 7.56**) on the uMkhomazi River near Richmond from where water would gravity feed through a 32 km, 3.5 m diameter transfer tunnel. Treated water would be transferred from a 600 Mℓ/day WTP, near the outlet of the tunnel, through potable water pipelines to an appropriate delivery node within the uMngeni catchment (**Section 7.5.2 (a)**). DWS anticipates that the uMWP-1 will be implemented in and around 2030/31. The yields of the proposed water resource infrastructure (DWA, 2015) for the uMkhomazi Region are listed in **Table 7.54** and **Table 7.55**.

The second phase (uMWP-2) will comprise the construction of a large dam at Impendle further upstream on the uMkhomazi River. Once in place, water would be released from the Impendle Dam down the uMkhomazi River for abstraction and transfer at Smithfield Dam (**Table 7.54**). The Impendle Dam could be built either in two phases or as a once-off constructed scheme component. The uMWP-2 would only be implemented at a future date when needed.

The Harry Gwala District Municipality Regional Bulk Water Supply scheme (formerly known as the Greater Bulwer-Donnybrook Regional Water Supply Scheme) will supply water to the areas around the Stephen Dlamini Dam.

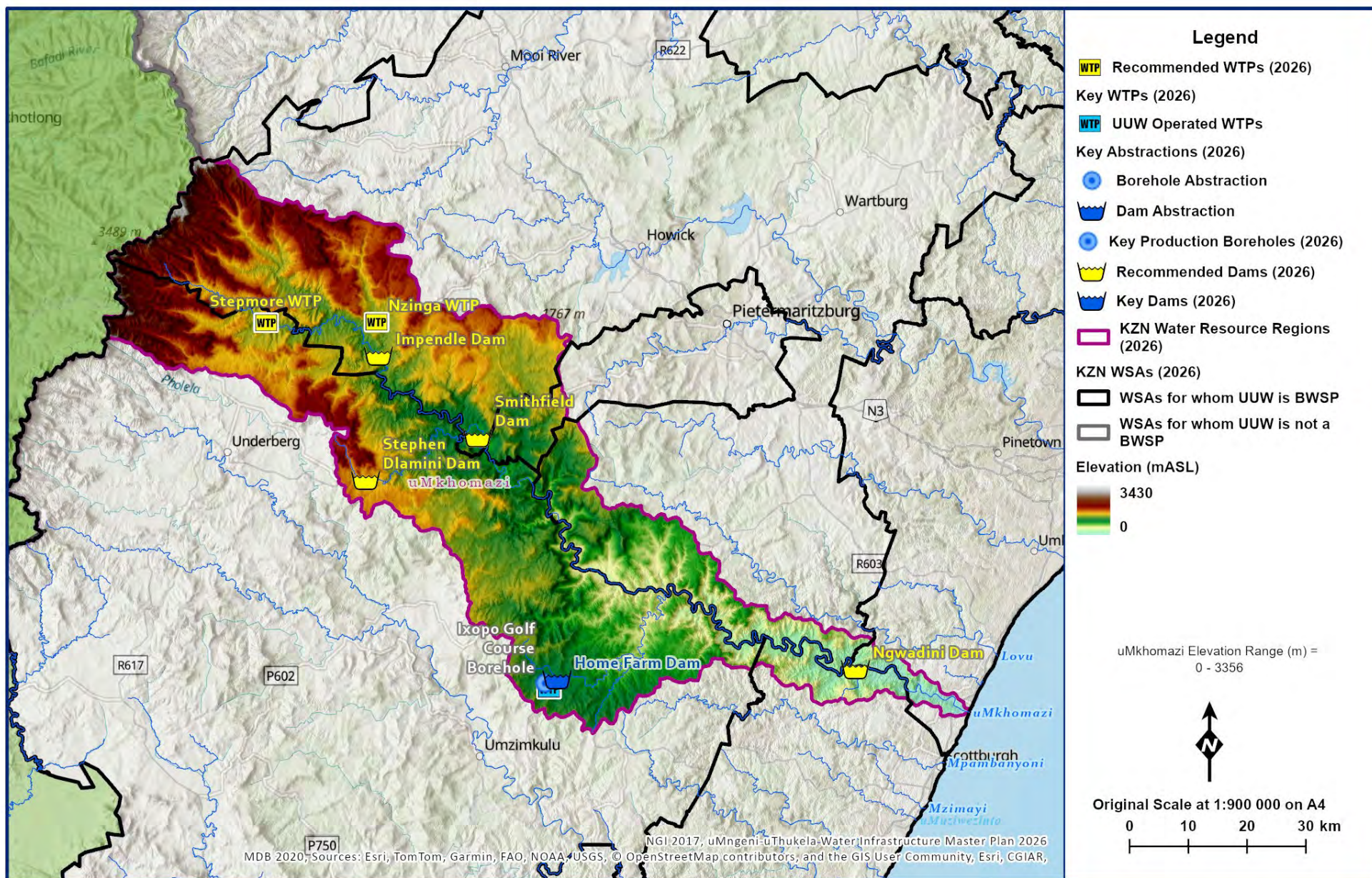


Figure 7.55 uMkhomazi Water Resource Region proposed infrastructure.



Figure 7.56 Artistic impression of Smithfield Dam.

Table 7.54 Proposed water resource infrastructure for the uMkhomazi Region.

Impoundment	River	Capacity (million m ³)	Yield (million m ³ /year)	Stochastic Yield (million m ³ /year)
			Historical	1:100
Smithfield Dam	uMkhomazi	226	172 (471 Mℓ/day)	220 (602 Mℓ/day)
Impendle Dam	uMkhomazi	270	204 (559 Mℓ/day)	228 (625 Mℓ/day)
Ngwadini Dam	uMkhomazi (Off-channel)	10	32 (88 Mℓ/day)	34 (93 Mℓ/day)
Stephen Dlamini Dam	Luhane	9.9	3.2* (8.9 Mℓ/day)	3.4* (9.3 Mℓ/day)

excl. Ecological reserve

Previous studies were reviewed regarding the Lower uMkhomazi Off-Channel Storage Dam (Ngwadini Dam) option to provide a reliable water supply to the South Coast area. The construction of Phase 1 – Ngwadini Off Channel Storage Dam is currently in progress. This phase comprises of Ngwadini Abstraction Works, Goodenough Weir and Abstraction Works, Desilting structures, Raw water storage reservoir, 1km Rising main and 7 km raw water gravity main. Phase 2 will comprise of the Water Treatment Works; Gravity Bulk Potable water main; and Command Reservoir.

The current total demand for the South Coast is 66 Mℓ/day with Ugu District Municipality's current demand being approximately 17 Mℓ/day and eThekweni Municipality's demand being approximately 49 Mℓ/day. The yield of the uMkhomazi River, with Sappi's allocation and the Reserve supplied, is 93 Mℓ/day. Raw water from the Ngwadini Off Channel Storage Dam will be transferred via a bulk pipeline to a new Water Treatment Plant, a storage reservoir and finally to the South Coast Pipeline (SCP).

DWA (2013) undertook a detailed hydrological assessment on the uMkhomazi and Upper uMlaza River Catchments with the purpose of updating and extend the simulations for the area. The results from the hydrology assessment were used in a number of yield assessment scenarios to determine the impact of releasing water from Smithfield Dam to augment Ngwadini Dam. The scenarios and impacts on yield are shown in **Table 7.55**.

Table 7.55 Yields for proposed water resource infrastructure for uMkhomazi Region (DWA 2013).

Scenario	Time Slice	Support Releases (Smithfield to Ngwadini)	Ngwadini Dam Yield/Target (1:100)		Smithfield Dam Yield (1:100)	
			Mℓ/day	Million m ³ /annum	Mℓ/day	Million m ³ /annum
Ngwadini Dam	2012	None	93	34	-	-
Ngwadini & Smithfield	2050	None	66	24	602	220
Ngwadini & Smithfield	2050	Yes	70	26	600	219
Ngwadini & Smithfield	2050	Yes	95	35	586	214
Ngwadini & Smithfield	2050	Yes	150	55	537	196

c) Overview of Recommendations for the Upper uMngeni System

- **Figure 7.57, Figure 7.58, Figure 7.59, Figure 7.60 and Figure 7.61** illustrate schematically the Upper uMngeni System in its current configuration and how it will need to be upgraded over the next 30 years to accommodate the future growth in water demands. This Section should be read in conjunction with these Figures. Construction of Phase 1 of the uMkhomazi Water Project; and Decommissioning of the '53 Pipeline.

Other infrastructure upgrades and additions that will be required over the next 30 years include:

- Increase the capacity of the Mills Falls to Howick West Supply System
- Augmentation of the Vulindlela BWSS;
- Whilst the Clarendon and Blackridge Reservoirs should be upgraded, it is recommended that this requirement be transferred to The Msunduzi Municipality as the additional 48-hour emergency storage requirement is a WSA responsibility.

- Augmentation of the Umbumbulu System, construction of a new pump station and pipeline.

d) Midmar Water Treatment Plant

The Western Aqueduct was commissioned in 2020/2021. The Midmar WTP had been upgraded from its treatment capacity of 250 Mℓ/day to 375 Mℓ/day in 2018 to accommodate the new demand on the Western Aqueduct. Midmar WTP and D.V. Harris WTP, combined, can now supply 525 Mℓ/day of potable water. This is slightly above the 99% assured yield of Midmar Dam of 501.4 Mℓ/day (183.0 million m³/annum) (excluding raw water conveyance losses) when supported by the MMTS.

e) Howick-North Sub-System

The Howick Reservoir Complex will have to supply newly developed areas to the north of Howick. This high-level reservoir serves as a distribution reservoir that should have 48 hours of storage. The total storage is currently 6.6 Mℓ/day following the addition of a 6.5 Mℓ reservoir in October 2014 and the total current demand is 4.6 Mℓ/day.

f) Howick-West Sub-System

i) Mills Falls to Howick - West Reservoir

The rapid growth in demand of the Vulindlela Supply System impacts on the capacity of the upstream supply systems, especially the Mills Falls to Howick West Supply System. This system must be augmented to meet the 20-year demand of 81 Mℓ/day, starting in 2028.

ii) Howick - West Reservoir to Groenekloof Reservoir

Storage at Howick-West Reservoir was increased by 16 Mℓ to bring the total storage to 32.5 Mℓ (**Section 7.5.2 (d)**). This would then adequately serve as a distribution reservoir until 2030. A new 400 mm diameter pipeline, dedicated to serve the Mpophomeni area, will be required by UMDM once the new Khayalisha housing development is constructed. The existing 250 mm diameter pipeline will then become a backfeed from the Mpophomeni Reservoir.

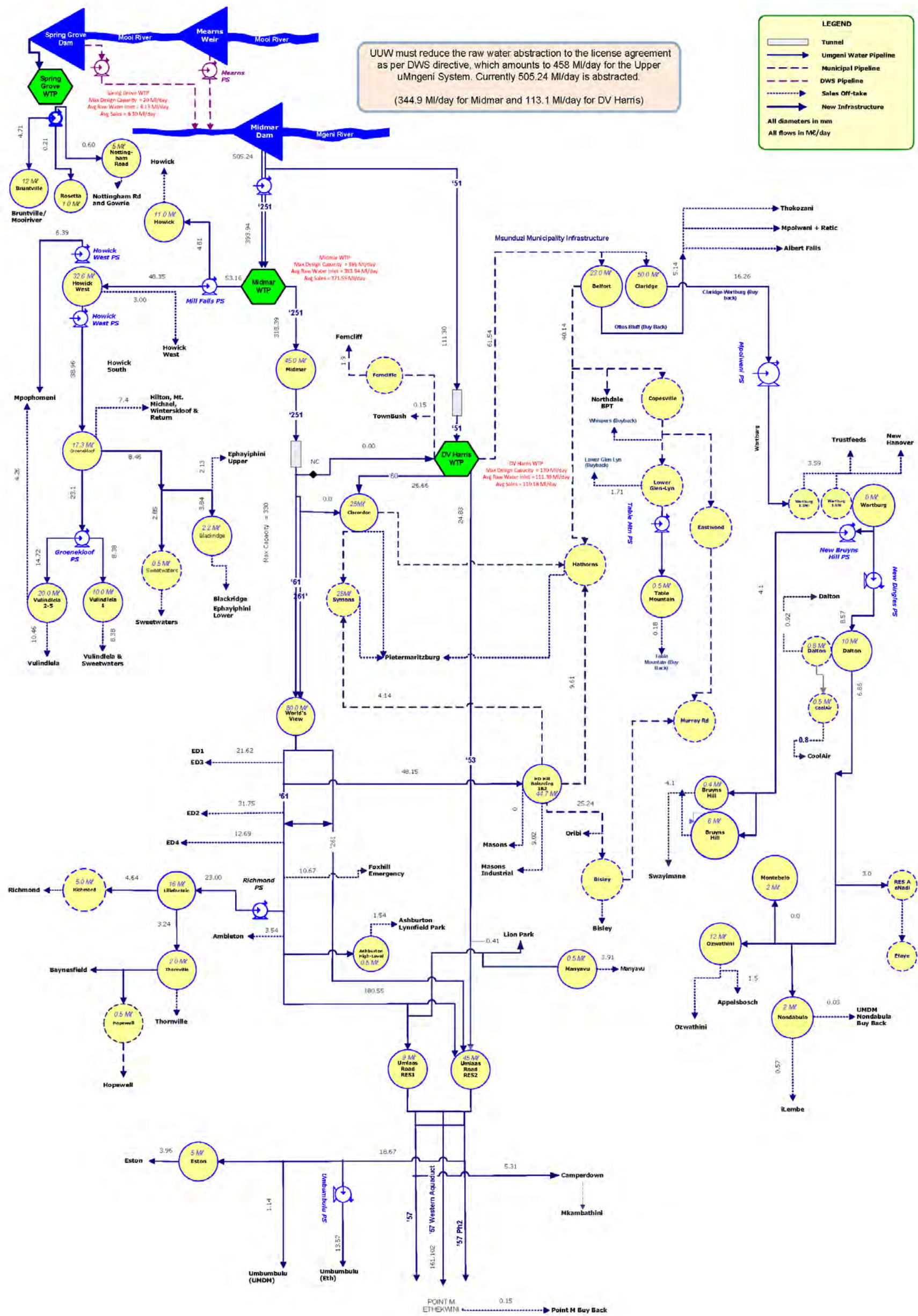


Figure 7.57 Demand on the Upper uMgeni System as at February 2026

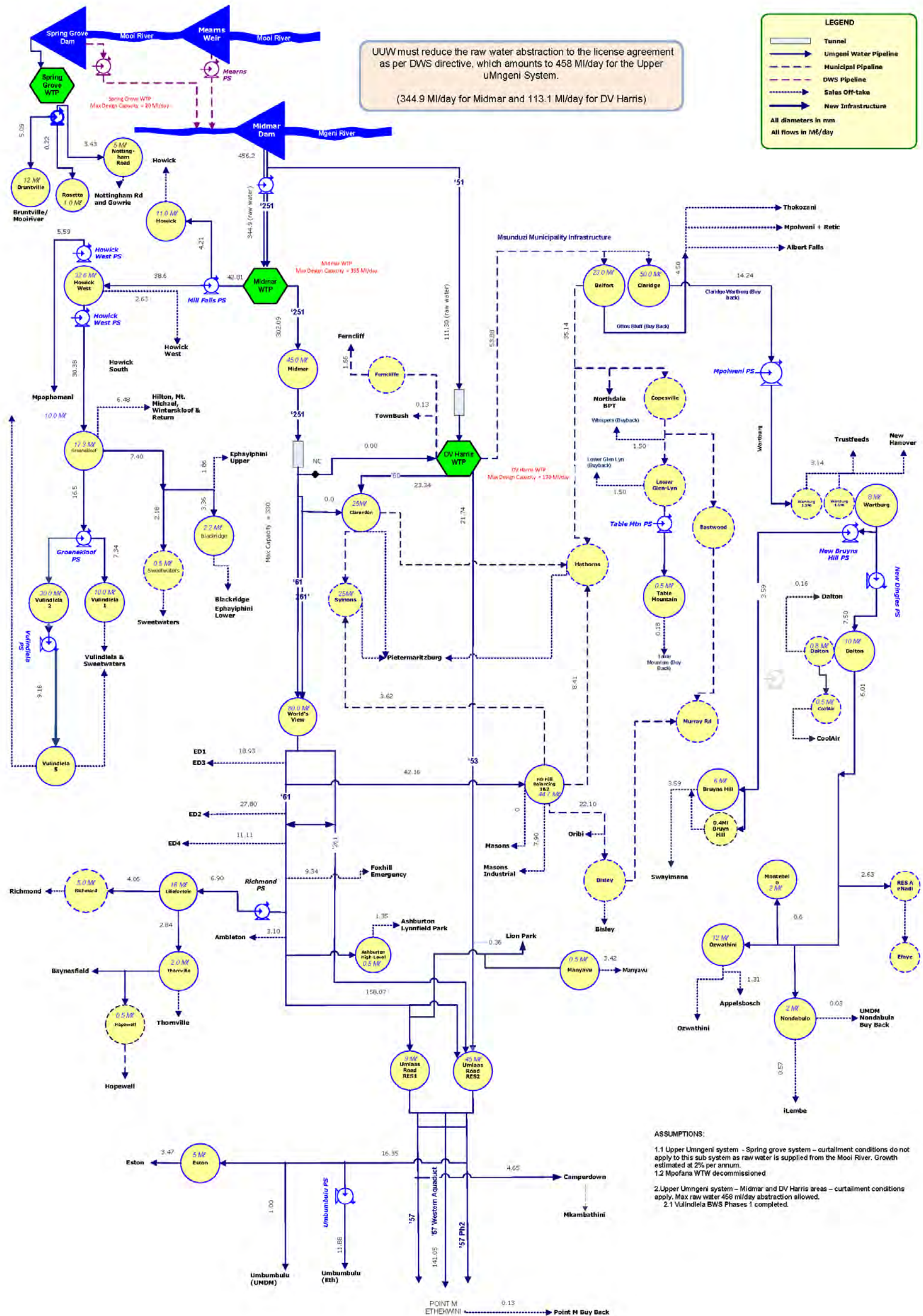


Figure 7.58 Five year demand projection for the Upper uMgeni System.

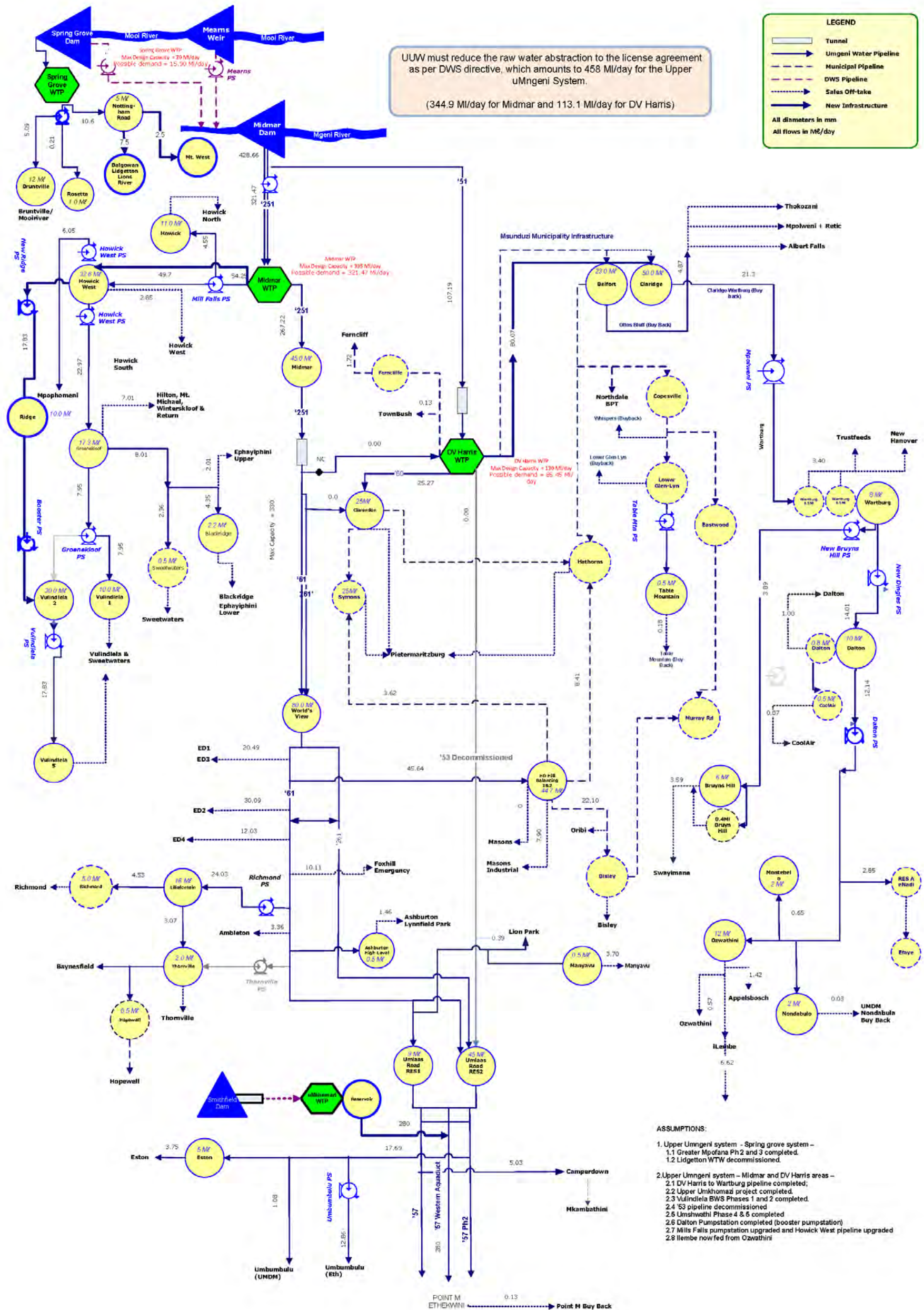


Figure 7.59 Ten year demand projection for the Upper uMgeni System.

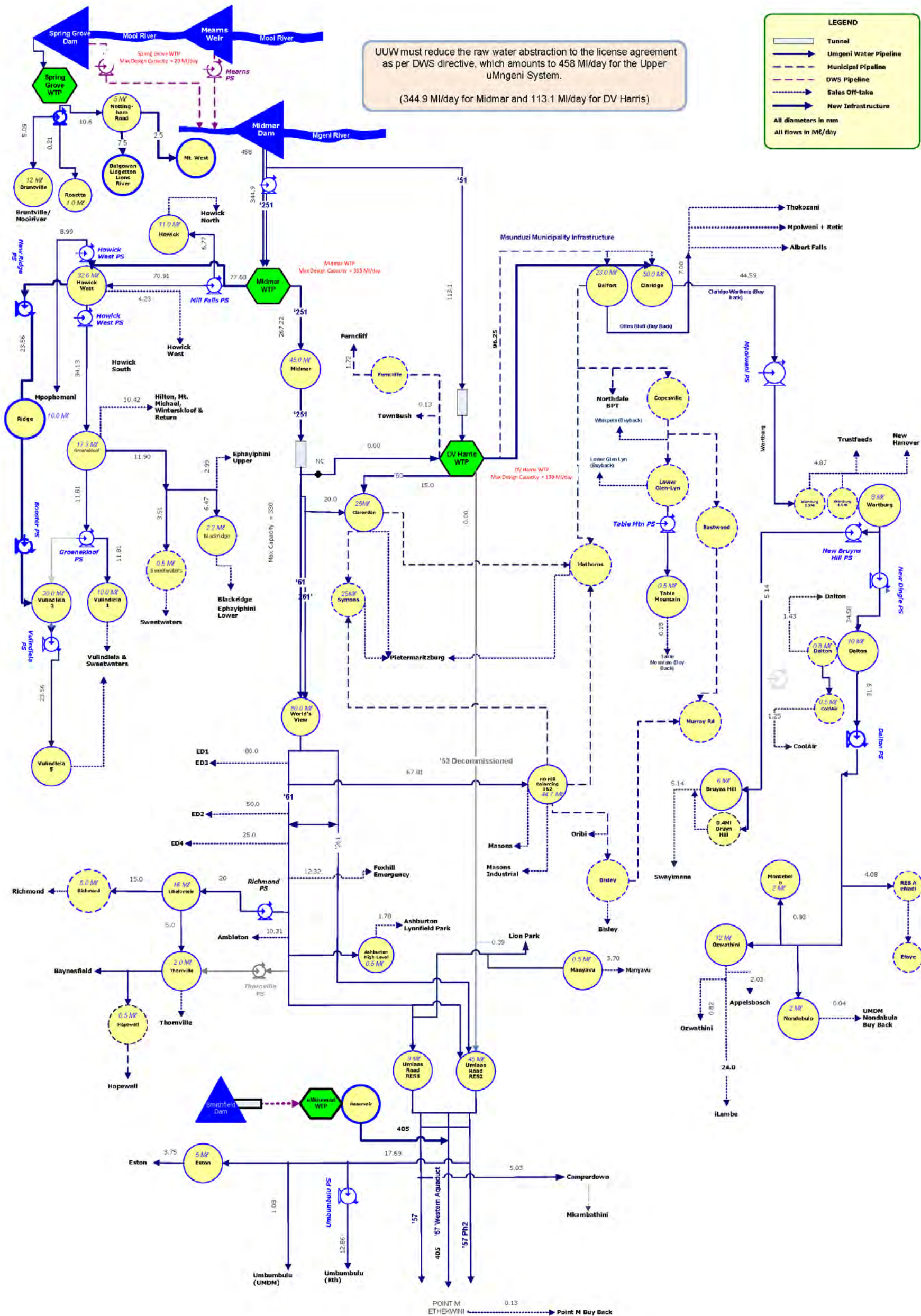


Figure 7.61 Thirty year demand projection for the Upper uMngeni System.

iii) Vulindlela BWSS

The current demand on the Vulindlela BWSS is approximately 22.2 Mℓ/day and the projected demand is 63.1 Mℓ/day in 2050.

The existing capacity of the system is capable of serving the current demand; although, future growth will exceed the system capacity.

Extensive hydraulic analyses were conducted to optimise the hydraulic efficiency of the Vulindlela BWSS. The results of the hydraulic analyses indicated that the following infrastructure requirements, some of which have been completed in the first phase of construction:

Phase 1 : Overall 98% complete; anticipated final completion date is September 2025

- Construction of a new 20 Mℓ Reservoir and all ancillary works – 100% complete;
- A new 2.4 km of DN600 epoxy lined pipeline from Reservoir 4 to Reservoir 5 to replace the existing DN300 rising main - 100% complete;
- Conversion of the existing DN200 rising main to gravity main from Reservoir 5 to Reservoir 4 - 100% complete;
- A new DN200 steel gravity bulk pipeline from Reservoir 4 to Reservoir 3, tying into the existing branch pipelines supplying Reservoirs 4 and 3 respectively - 100% complete.
- Construct a new Pump Station at Reservoir 2 - 70% complete;
- Installation of an adequate new power supply to the new Reservoir 2 pump station – 0 % complete; due to Eskom payment delays being addressed
- Modification of inlet & outlet pipework at Reservoir 2 and Reservoir 5, as well as the tie in details for the new connections required at reservoirs 3 and 4 - 100% complete.
- Completion Certificate has been issued to the contractor for phase 1 contract with major incomplete scope. The majority of the incomplete scope was due to no electrical provision to ensure conformance to the GCC2015 contract whereby commissioning could not be conducted. The outstanding scope of phase 1, is being interrogated and added to the phase 2 contract.

Phase 2 :

- The design and Bill of Materials is currently being finalised. Phase 2 anticipated to commence construction in 2027.

g) Midmar WTP to Umlaas Road Sub-System

i) '61 Pipeline: World's View Reservoir to ED4

This section of infrastructure allows for the maximum of 330 Mℓ/day that the tunnels can deliver. No further infrastructure is required.

ii) Thornville/Hopewell Supply

Thornville Reservoir can be supplied from both the Richmond pipeline and the existing Thornville Pump Station. The rising main from the '61 Pipeline to Thornville, operated as a

back-feed gravity main when the Richmond BWSS was commissioned in 2015, supplying water to Thornville from the Richmond Pipeline.

iii) '53 Pipeline: D. V. Harris WTP to Umlaas Road Reservoir

This pipeline needs to remain operational until such time as the uMWP is commissioned. Thereafter it is recommended that it be decommissioned. In the interim, caution should be taken not to exceed the “safe load carrying capacity” of 35 Mℓ/day. The operational philosophy for the '53 pipeline, allows a maximum of 30 Mℓ/day.

h) Umlaas Road Sub-System

An analysis of the Umlaas Road Reservoir Complex showed that the augmentation to the '61 Pipeline system resulted in little or no stress on the reservoirs. This coupled with the fact that eThekweni Municipality have indicated that they have sufficient storage in their system, and that they do not wish uMngeni-uThukela Water to augment the Umlaas Road storage, means that there is no planned augmentation of storage at Umlaas Road. Additional storage will be constructed as part of the uMWP.

i) Eston/Umbumbulu Pipeline

The capacity of this pipeline is restricted to 15 Mℓ/day due to the ground level profile along the pipeline route. The flow is restricted to ensure that the hydraulic grade line is at least 20 m above a high point at Stoney Ridge. A booster pump station and a 900 mm diameter steel pipeline has been constructed to increase the flow through this pipeline to a maximum 22 Mℓ/day (**Section 8.5.2 (e)**). The projected growth in demand is envisaged to peak at 50 Mℓ/day by the year 2047. To ensure the sustainability of supply, uMngeni-uThukelaWater will initiate a feasibility study to augment the existing supply system with a new pipeline.

i) DV Harris to Claridge Pipeline

The major constraint in this system is the maximum capacity of the pipeline from DV Harris WTP to Claridge/Belfort Reservoir. A hydraulic analysis has shown that the maximum flow, under gravity, with the available head difference of 39.74 m is 63 Mℓ/day along the existing 1000 mm diameter pipeline, which is inadequate to meet the current demand. This constraint is currently having a negative effect on the supply of potable water to the Greater uMshwathi BWSS.

The delay in the implementation of this project is a result of an oversight when planning and implementing the uMshwathi BWSS, i.e. the infrastructure necessary for the supply of water to the uMshwathi BWSS is inadequate. It is anticipated that Phase 4 will be completed in December 2029. Phase 5 contracts 1 and 3 were completed in February 2026 and Contract 3 is anticipated to be completed in July 2026. When the projects in iLembe District Municipality (IDM) have been completed, there will be insufficient supply; it is acknowledged that the 2053

demand of 130ML/d will not be available but supply will improve once the over abstraction on the uMngeni System has been addressed and UWP is commissioned.

The hydraulic analysis has shown that the augmentation of the pipeline from DV Harris WTP to Claridge Reservoir is necessary to increase the flow, with the current available head, to a maximum of 130 Mℓ/day. This project is currently in the design stage.

The analysis has indicated that a new 1400 mm diameter pipeline is required to meet this maximum flow.

j) Recommendations for Lower uMngeni System

Figure 7.62 illustrates, schematically, the demands on the Lower uMngeni System in its current configuration. Future demands in this area will be supplied by the Lower uMngeni System Water Treatment Plants and through the Western Aqueduct. As such, there are no new infrastructure projects planned for this area at this time. The following project has, however, been recommended to address operational challenges:

- Replacement of the existing pump sets at the Wiggins High Lift Pump Station (HLPS). There is a short-term risk of pump failure (non-supply) as the existing pumps are not appropriate for the current application. The project, currently on hold at completion of Detailed Design Stage, will not alter the capacity of the pump station but aims to satisfy the duty envelope more efficiently from both an energy and maintenance perspective. The HLPS was originally (1996) used as an emergency back-up supply to Durban Heights but has more recently become a permanent supply. In the long term, there is a need to consider system optimisation of the municipality's distribution network considering future demands and reliance on the HLPS.

Note: the uMngeni Catchment is closed with respect to Water Use Licences and currently abstractions far exceed the authorised volumes. Hence no rationale for committing further resources to pursuing supply side interventions within the uMngeni Catchment. In the short term UUW recommends demand side interventions until the uMkhomazi Water Project is available to augment the uMngeni System. With NRW estimated to be almost 60% within eThekweni Municipality there is a significant opportunity to promptly improve water supply downstream from the WTP's via WC/WDM interventions. These interventions should help to reduce the demand on the oversubscribed Lower uMngeni System "freeing up" the existing supply to the Municipality from a corresponding decrease in water lost from the system.

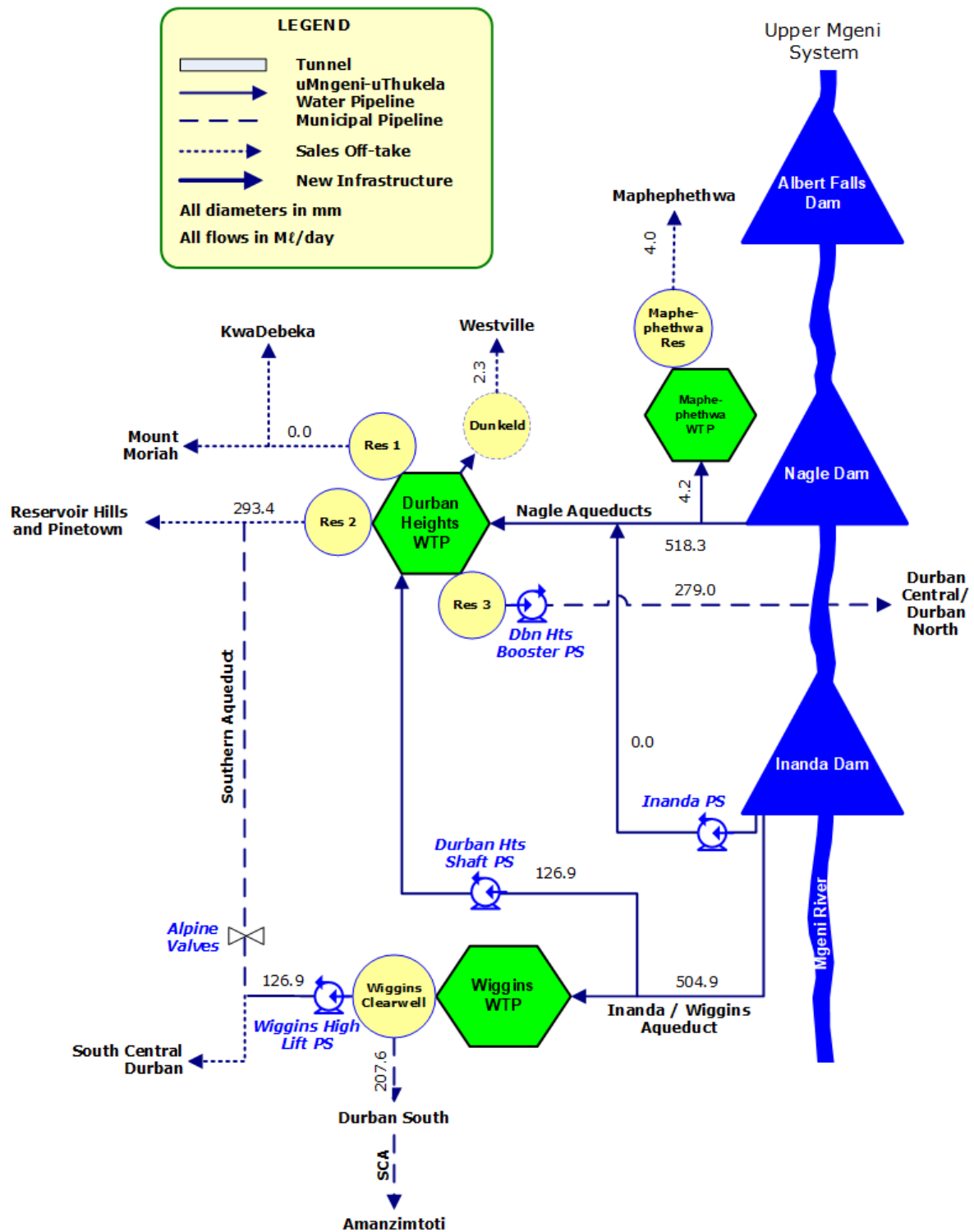


Figure 7.62 Schematic of the Lower uMngeni System.

7.5.2 Projects

a) uMkhomazi Water Project

Planning No.	114.0
Project No.	UI0530
Project Status	Design Development

i) Project Description

With the commissioning of Phase 2B of the Mooi-uMngeni Transfer Scheme (MMTS-2), the water resources available in the Mooi and uMngeni catchments, to augment the uMngeni System, are now fully utilised (Section 7.2.3 (a)). The MMTS-2 increased the safe assured yield of the uMngeni System to 434 million m³/annum

Over recent years, eThekweni Municipality has put considerable effort into optimising the operation of its distribution systems that are served by the Lower uMngeni System. Amongst other things, this has led to them implementing new infrastructure in order to undertake a significant load shifting exercise.

eThekweni Municipality's Western Aqueduct project was fully commissioned in 2020/2021, and represented the most significant of these load-shifting operations. The intention was for those areas currently being served under pumping from the Lower uMngeni System (viz. from Durban Heights WTP) to be transferred onto the Upper uMngeni System, and served under gravity from Midmar WTP via the Western Aqueduct (WA). After the implementation of MMTS-2, further water resource developments within the Mooi-uMngeni System are not considered to be beneficial due to resource limitation. Further augmentation of the uMngeni System will then be required.

Water resource development on the uMkhomazi River has been identified as the next major project to secure long-term water resources for eThekweni's Western Aqueduct supply zone. During the late 1990's, the then DWAF (now DWS) and uMngeni-uThukela Water jointly commissioned a pre-feasibility study to investigate various options for developing the uMkhomazi River's water resources, such that they could be utilised to augment those of the uMngeni River System.

A two-phased scheme was proposed, and the overall project area is shown in **Figure 7.63**. Phase 1 of the proposed uMkhomazi Water Project (uMWP-1) will involve the construction of Smithfield Dam, located along the central reaches of the uMkhomazi River midway between Lundy's Hill Bridge and Deepdale. Smithfield Dam will be the primary impoundment, whilst for Phase 2, a second dam (Impendle Dam) will be constructed upstream of the Smithfield site (just downstream of the uMkhomazi River/Nzinga River confluence).

The feasibility study for Phase 1 is complete and off-take agreements have been signed. Currently, the detailed design and construction is being procured. This scheme will be a gravity feed into the existing system and whilst it is a large expensive scheme, it is cheaper per unit of water supplied than other alternatives investigated. Phase 2 would only be implemented once the yield of Phase 1 (Smithfield Dam) has been fully utilised.

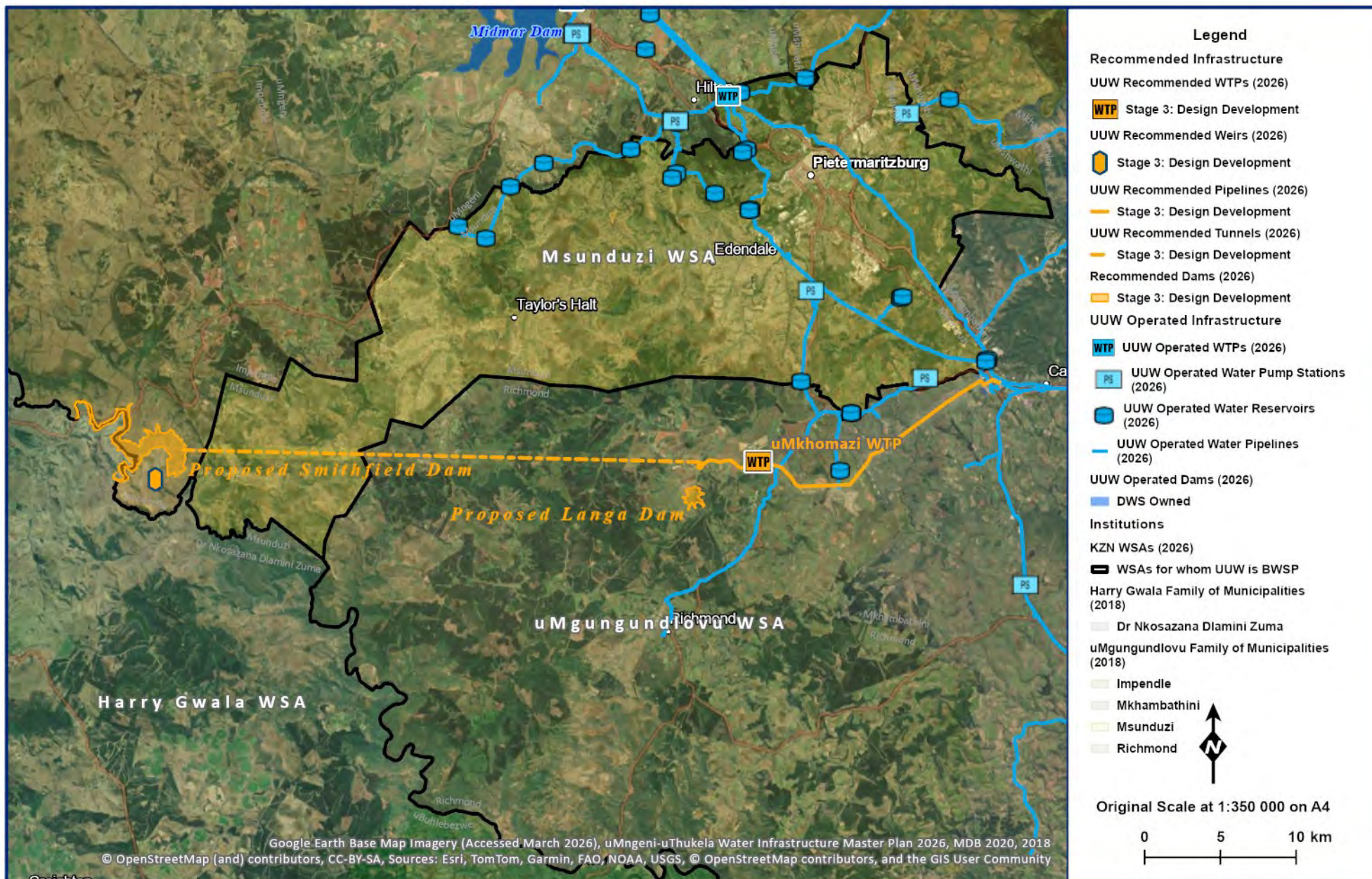


Figure 7.63 uMkhomazi Water Project.

Succinct details of the proposed potable water infrastructure are as follows:

Water treatment plant design: In order to meet the proposed phased increases in demand as well as a requirement to provide support to the uMngeni System, the capacity of the uMWP-1 WTP is proposed to be 500 Ml/day. A further 125 Ml/day phase would be required in 2044. The proposed WTP layout (**Figure 7.64**) was constrained by the requirement for gravity supply in the overall system between Smithfield Dam and the Umlaas Road tie-in, as well as a requirement to keep the WTP footprint to a minimum. The proposed plant layout combines features of accessible and compact unit process configuration, minimum lengths of interconnecting pipework, minimum volume of excavation and ease of future extension. The recommended WTP processes are pre-chlorination, coagulation/flocculation, high-rate clarifiers, rapid gravity filtration, granular activated carbon (GAC) filtration, final chlorination and sludge treatment.

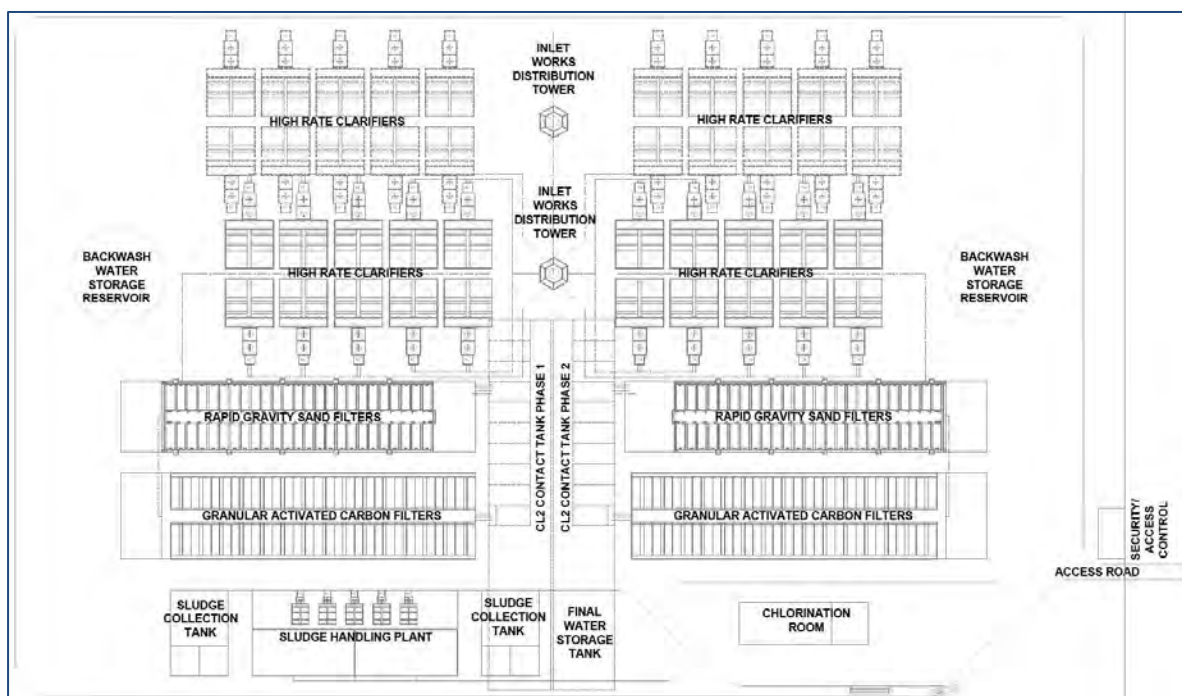


Figure 7.64 Layout of Water Treatment Plant.

Potable water reservoir: The potable water reservoir was sized to accommodate a minimum of six hours of the daily WTP capacity. Based on the WTP phasing discussed above the first 500 M_l/day WTP phase would require 125 M_l of storage, with a further 31.25 M_l/day required when the next 125 M_l/day WTP phase is constructed in 2044, i.e. a total of 156.25 M_l of storage for the uMWP-1.

The reservoir for the uMWP-1 would require a footprint of 2.2 hectares. In light of a requirement to keep the WTP footprint to a minimum, it was proposed that potable water storage be constructed beneath various WTW structures.

Potable water pipeline. The potable water pipeline (**Figure 7.65**) was designed to accommodate an average annual daily demand of 602 Mℓ/day; equivalent to the 1:100 year yield of the Smithfield. The peak design capacity was 753 Mℓ/day. Pipelines ranging from 2 820 mm diameter (15.1 km) to 2 540 mm diameter is proposed to convey the peak demand of 753 Mℓ/day.

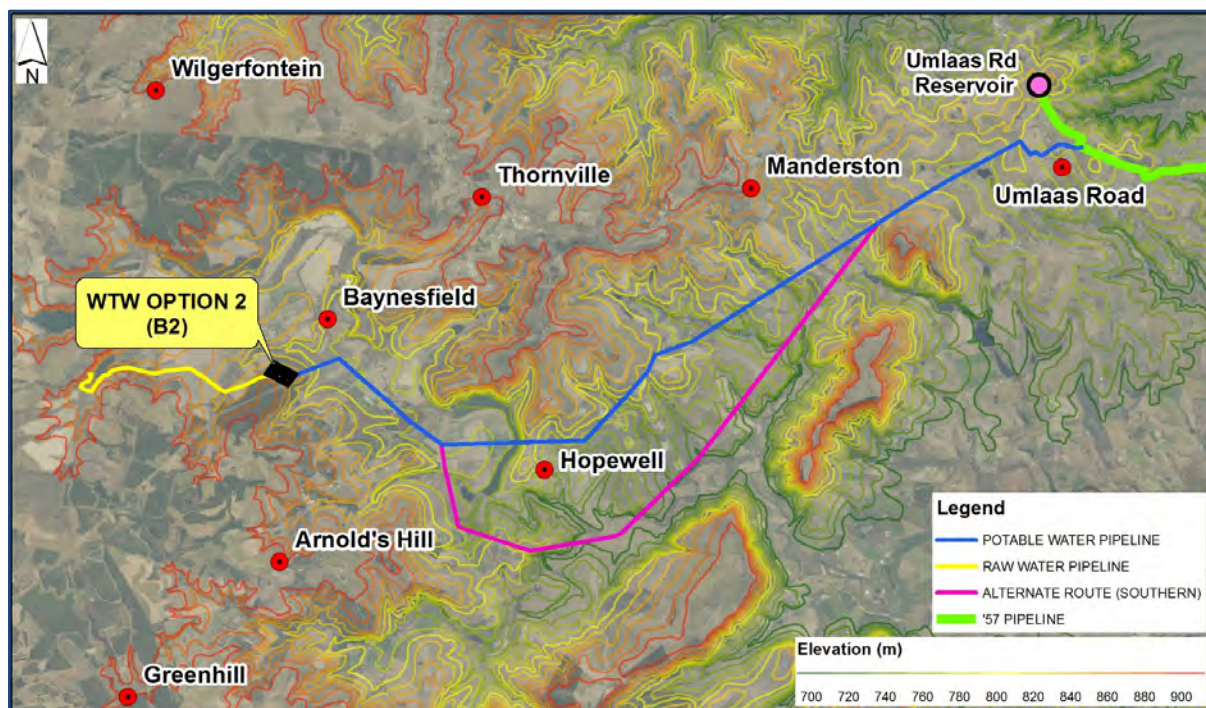


Figure 7.65 Layout of pipeline.

Key information on this project is summarised in **Table 7.56**.

Table 7.56 Project description: uMkhomazi Water Project.

Project Components	Water Resource Components (to be developed by DWS): Smithfield Dam – having a storage capacity 251 million m³ (31% of MAR), earth core rockfill dam. A Transfer Tunnel – 3.5 m bored diameter (3.0 m lined diameter), concrete-lined (where necessary), overall length of 32 km. 3km of 3 000 mm Raw Water Pipeline. Potable Water Supply Components (to be developed by uMngeni-uThukela Water): Water Treatment Plant (WTP) – to be located near Baynesfield Estate with an initial capacity of 500 Mℓ/day and allowance for further module to increase capacity to 625 Mℓ/day. 156.25 Mℓ potable water storage reservoir at WTP. Bulk Potable Water Pipelines – 2 820mm diameter (15.1 km) and 2 540 mm diameter (4.6 km) gravity mains from the WTP to '57 pipeline.
Capacity	625 Mℓ/day

ii) Institutional Arrangements

DWS will plan, develop and own the water resource and raw water infrastructure up to the WTP. The operation and management component of this infrastructure will be decided at the time of commissioning. uMngeni-uThukela Water will design, build, own, operate and maintain all water supply infrastructure from (and including) the WTP. uMngeni-uThukela Water will purchase raw water from DWS as per a revised raw water agreement and sell potable water from this system to eThekweni, the Msunduzi and uMgungundlovu municipalities, as per the existing bulk water supply agreements.

iii) Beneficiaries

The scheme will primarily serve the eThekweni Municipal area and to a lesser extent portions of uMgungundlovu District Municipality. Assuming 200 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 625 Mℓ/day may be 3 125 000 people.

iv) Implementation

The project is divided into three components:

- Module 1: Technical Feasibility Study: Raw Water (Appointment by Department of Water and Sanitation). The study was completed in 2015;
- Module 2: Environmental Impact Assessment (Joint appointment by Department of Water Affairs and uMngeni-uThukela Water). EIA was awarded;
- Module 3: Technical Feasibility Study: Potable Water (Appointment of PSP by uMngeni-uThukela Water). The study was completed in 2015.

The project should have been implemented by 2020 in order to achieve a 99% level of assurance of supply to the uMngeni System. However, the earliest probable commissioning of this scheme is 2034/35.

The estimated cost of the entire project (raw and potable components) is approximately R 33 billion at 2020 prices. This is made up of R 24.5 billion for the raw water component to be implemented by DWS and R 8 billion for the potable component to be implemented by uMngeni-uThukela Water.

b) Impendle BWSS

Planning No.	105.44
Project No.	UI0544A – CI.00240
Project Status	Detailed design

i) Project Description

The area of Impendle has unreliable sources of water and many small run-off-river abstraction and borehole schemes. This project will increase the level of assurance of supply to the community of Impendle as requested by uMgungundlovu District Municipality. The water schemes are part of the Impendle bulk water supply project for the Impendle Local Municipality.

The Impendle Municipality's topography predominantly comprises rolling hills, mountains and scattered settlements covering an area of 948 km². Due to the nature of the area's topography and extended scattered settlements, two separate bulk water supply schemes are proposed.

One bulk scheme will serve the north western part of the Municipality that includes communities from Stepmore to the Lotheni area. The second bulk scheme will provide water to the communities on the east (**Figure 7.66**).

Stepmore

The proposed source for the scheme is a new river intake to be constructed on the uMkhomazi River. Raw water from this intake will be delivered to a proposed Stepmore Water Treatment Plant (WTP), where the water will be purified. The WTP is situated on a greenfield site and will have a initial capacity of 1.6 Mℓ/day upgradable to 3.0 Mℓ/day when required. From a high-lift pump station within the WTP site, purified water will be delivered through a clear water rising main to Lotheni 1 Reservoir with a capacity of 1Mℓ. From Lotheni 1 Reservoir a gravity main will convey water to Lotheni 2 Reservoir. From the Lotheni 1 and 2 Reservoirs, distribution mains will convey the water by gravity to existing distribution networks in the areas of Stepmore, Inkangala and Lotheni.

uMngeni-uThukela Water will be responsible for the implementation of the Bulk Works from the Abstraction and Water Treatment Plant to the Lotheni 2 Reservoir. Detailed design for the Stepmore area is complete.

Nzinga

The proposed source for the scheme is a new river intake to be constructed on the uMkhomazi River. Raw water from this intake will be pumped to the proposed Nzinga Raw Water Pump Station (NRWPS) located approximately 190 metres from the intake structure. From the NRWPS, raw water will be delivered through a 325/355 mm diameter x 7.6 km long rising main to the Nzinga WTP located on the same site as the existing WTP. The pipeline is

designed to supply 275 kℓ/hr of raw water. The BWSS will be operated and maintained by uMngeni-uThukela Water. Detailed design for the Nzinga area is 25% completed.

Key information on this project is summarised in **Table 7.57**.

Table 7.57 Project information: Impendle BWSS.

Project Components:	Nzinga Waterworks • The proposed plant has a capacity of 13 Mℓ/day with an abstraction capacity of 18 Mℓ/day. • 355 mm diameter x 7.6 km long rising main. • 1 Mℓ Nzinga Reservoir. Stepmore Waterworks • The proposed plant has a capacity of 1.6 Mℓ/day upgradable to 3.0 Mℓ/day with an abstraction capacity of 4.0 Mℓ/day • 1 Mℓ Lotheni 1 Reservoir. • 650 kℓ Lotheni 2 Reservoir. • Construction of approximately 11,5 km of 100 mm diameter to 200 mm diameter uPVC and steel pipelines.
Capacity:	15 Mℓ.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain this bulk scheme and will sell potable water to the uMgungundlovu District Municipality as per the Bulk Water Supply Agreement. The uMgungundlovu District Municipality will then reticulate to the end consumers through existing and new supply infrastructure.

iii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Impendle Local Municipality with an estimated population of 37 000.

iv) Implementation

The detail design and construction monitoring of the Nzinga Project is based on a fee-based contract and at the time of tender the value of construction was estimated at R172 million. The construction duration of this project is anticipated to be six years. The total cost is estimated to be R386 million at 2021 prices.

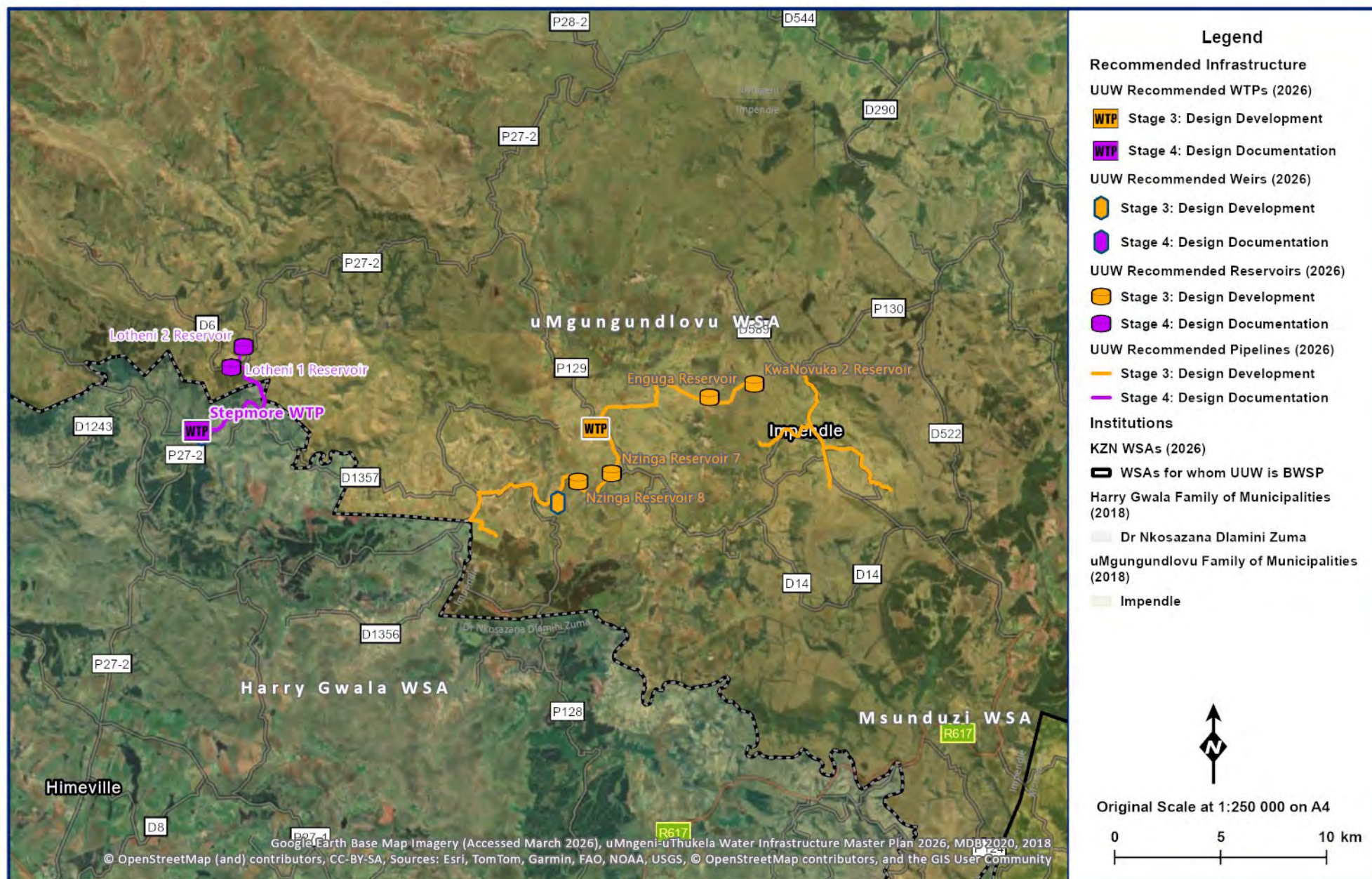


Figure 7.66 General layout of the Impendle Project Areas.

c) Greater Mpofana Bulk Water Supply Scheme

Planning No.	105.24
Project No.	CI.0001
Project Status	Phase 1: Commissioned Phase 2 – PreliminaryDesign

i) Project Description

Sustained housing development and tourism related activities are increasing the water demand at several nodes along Main Road R103 between Lions River (uMngeni Local Municipality) and Mooi River (Mpofana Local Municipality). This growth is beginning to stress local water resources and water supply infrastructure in the area. The Greater Mpofana Region (described in this report as the area from Mooi River to Lidgetton) does not have a reliable water supply. Much of the area relies on boreholes and run of river abstraction. With increasing demands, the future supply is not considered sustainable.

A regional bulk water supply scheme referred to as the Greater Mpofana Bulk Water Supply Scheme (GMBWSS) is being implemented to ensure that the area has a reliable water supply that will sustain this growth into the future.

Phase 1 of the project has been commissioned and handed over to operations and is now fully operational. This project provides a sustainable bulk water supply to the towns of Mooi River, Rosetta and Nottingham Road. (**Figure 7.67**) depicts that raw water is sourced from Spring Grove Dam on the Mooi River to the Spring Grove WTP situated adjacent to the dam. From there, potable water is pumped to two command reservoirs. The first reservoir is located at Bruntville in Mooi River. This reservoir serves the greater Mooi River area and has the potential to supply the Mudén/Rocky Drift area. The second reservoir is at Nottingham Road, which supplies Balgowan, Lidgetton, Nottingham Road, Gowrie Estates and Lions River.

Phase 2 is currently in the detailed design stage of the project and will provide a sustainable bulk water supply to the towns of Lidgetton and Lions River including the rural hinterland surrounding the abovementioned towns in KwaZulu-Natal. It entails the construction of a pipeline from the Nottingham Road reservoir to the new Balgowan reservoir and extending to Lidgetton.

Phase 3 will entail the construction of the pipeline from the Nottingham Road reservoir to a new reservoir at Mount West. This supply will require a booster pump station at the Nottingham Road reservoir.

The scheme is to be built in phases to gradually increase the supply area (**Figure 7.68**)

Key information on this project is summarised in **Table 7.58**

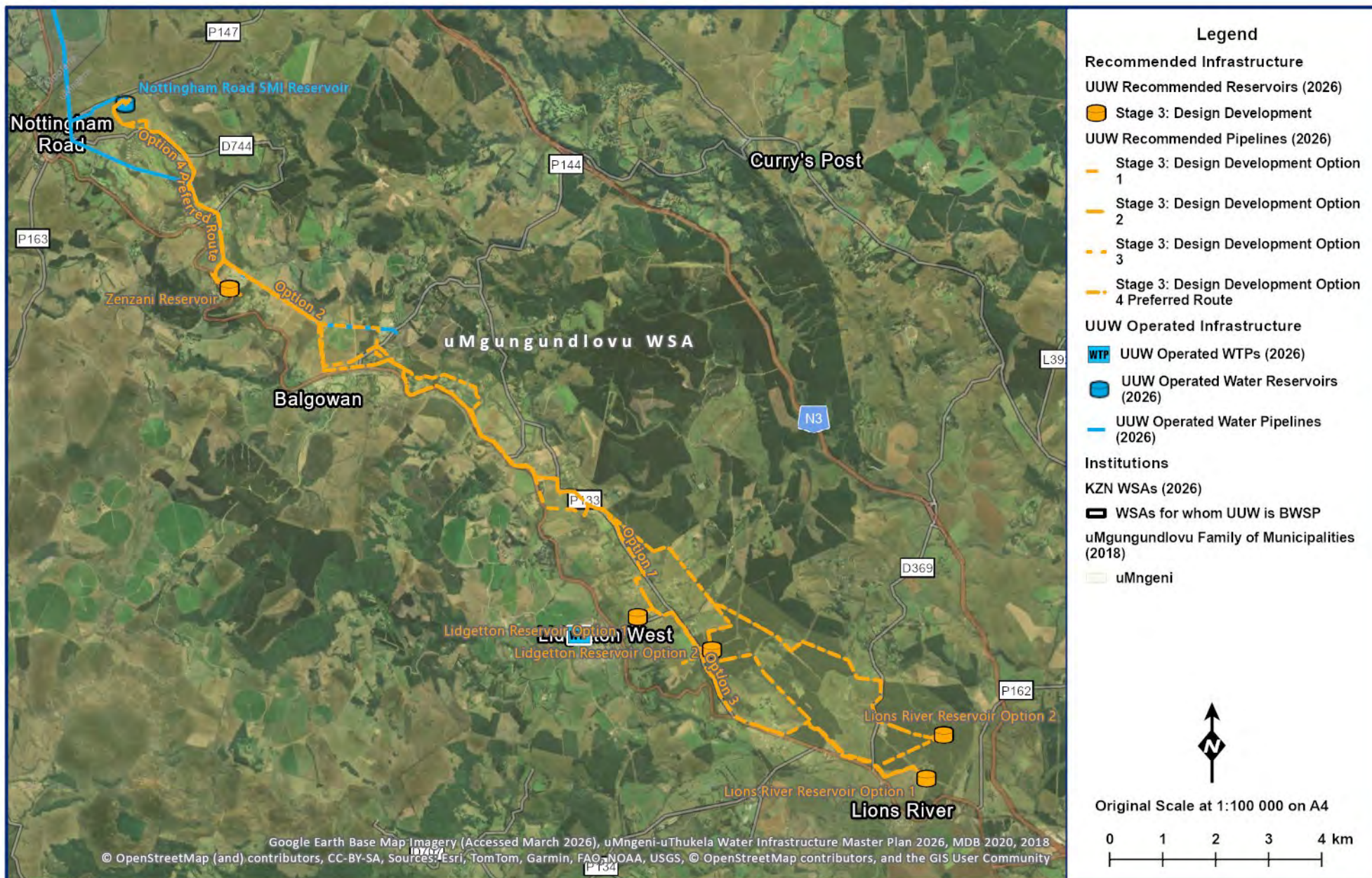


Figure 7.67 Greater Mpofana Bulk Water Supply Scheme Phase 2.

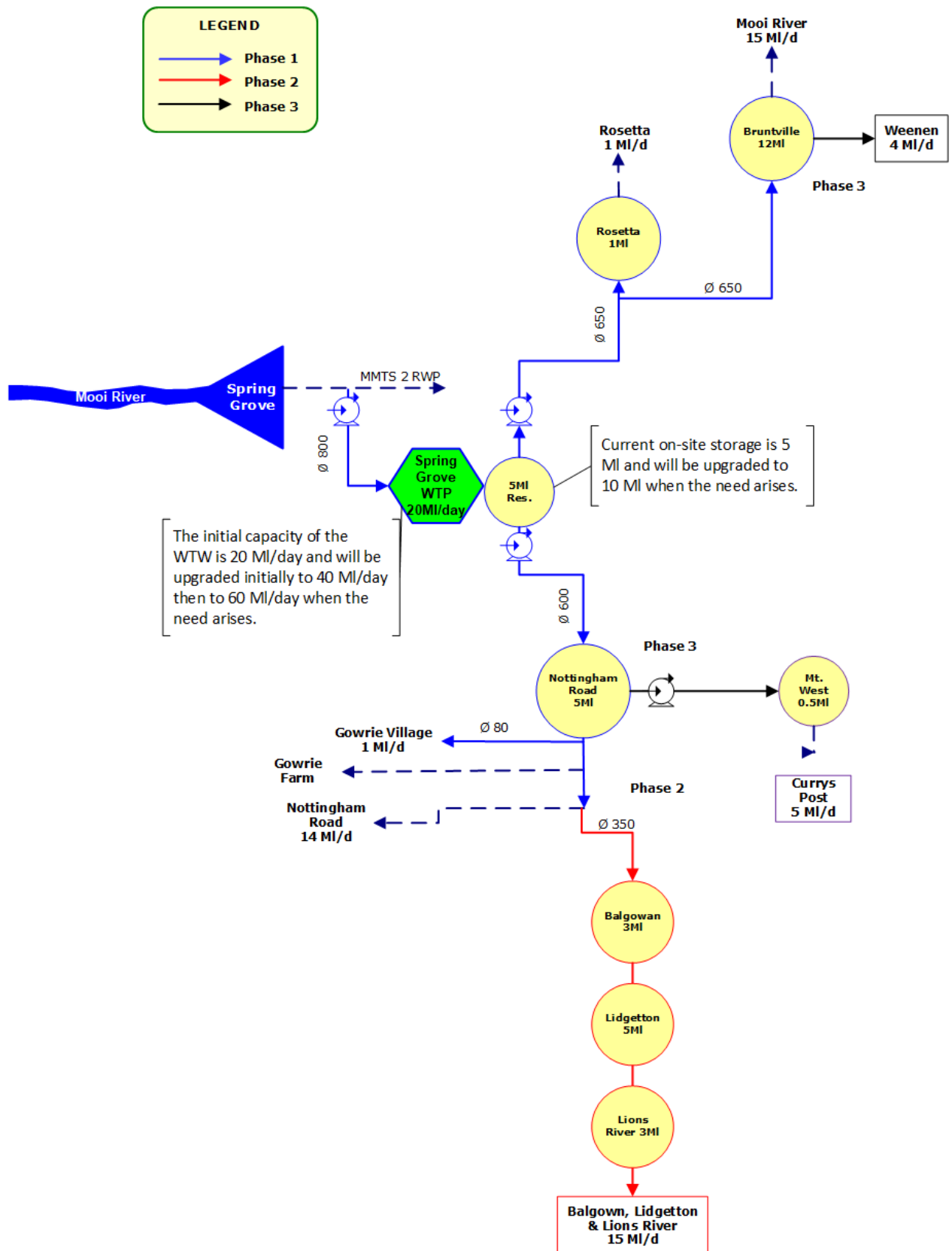


Figure 7.68 Schematic of Greater Mpofana BWSS.

Table 7.58 Project information: Greater Mpofana Bulk Water Supply Scheme.

Project Components:	Phase 1: 20 Mℓ/day Water Treatment Works, associated pump stations, 600 mm diameter pipeline to Nottingham Road and 5 Mℓ reservoir, and 650 mm diameter pipeline to Rosetta and Bruntville in Mooi River with 12 Mℓ reservoir at Bruntville. (Complete) Phase 2: Pipeline from Nottingham Road Reservoir to Balgowan and then Lidgetton and Lions River including three Reservoirs.
Capacity (WTP):	20 Mℓ/day; a further upgrade to be undertaken to 40 Mℓ/day when required and reaching an ultimate capacity of 60 Mℓ/day.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain this bulk scheme and will sell potable water to the uMgungundlovu District Municipality as per the Bulk Water Supply Agreement. The uMgungundlovu District Municipality will then reticulate to the end consumers through existing and new supply infrastructure.

iii) Beneficiaries

The scheme will serve residential and tourist establishments in the Mpofana Municipality and uMngeni Municipality within the uMgungundlovu District Municipality. It will also be a source of potable water for low-cost housing in Bruntville and Lions River in the Mpofana and uMngeni municipalities respectively. The forecasted water demand for the Greater Mpofana BWSS is shown in **Table 7.59**

Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated initial capacity was 20 Mℓ/day. The current supply to the area is 12 Mℓ/day.

Table 7.59 Water forecasts for the Greater Mpofana BWSS.

Mpofana Municipality	2013	2043
Mooi River	7.3	15.24
Weenen & Msinga	0.00	8.00
Rosetta	0.4	0.85
Mpofana Total	7.7	24.10
Mngeni Municipality	2013	2043
Nottingham Road	1.50	13.6
Mount West & Curry's Post	0.0	5.1
Balgowan & Lions River	0.0	14.8
Mngeni Total	1.5	33.5
Total Volume - Expected	9.2	57.6

iv) Implementation

The project is phased with the first phase consisting of a 20 Mℓ/day WTP at Spring Grove Dam and separate pumping mains to new reservoirs at Bruntville (12 Mℓ) and Nottingham Road (5 Mℓ). The total cost for Phase 1 was R 849 million as at November 2021. Construction has been completed and the project has been commissioned.

Phase 2 is currently at Detailed Design stage. The estimated cost for Phase 2 is R 450 million as at April 2026.

d) Umbumbulu Pipeline

Planning No.	105.a
Project No.	
Project Status	New project

i) Project Description

The capacity of the current pipeline is restricted to 15 Mℓ/day due to the ground level profile along the pipeline route. The flow is restricted to ensure that the hydraulic grade line is at least 20 m above a high point at Stoney Ridge. The current flow in this pipeline is 11 Mℓ/day. The hydraulic analysis has indicated that a new 900mm NB steel pipeline would adequately meet the future 50 Mℓ/day (2045) demand (**Figure 7.69**). This supply could be from the '57 Pipeline or could ultimately be supplied directly from the uMkhomazi Water Project Pipeline. The existing pipeline will be decommissioned once this pipeline is constructed.

Table 7.60 Project information: Umbumbulu.

Project Components:	Designed to deliver approximately 50 Mℓ/day at 2045 demand projections.
Capacity:	50 Mℓ/day ultimate.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain the pipeline and will sell potable water from this system to uMgungundlovu District Municipality and eThekweni Municipality as per existing bulk water supply agreements.

iii) Beneficiaries

The beneficiaries will be the Greater Eston region, including the Umbumbulu and the Adams Mission communities. Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 23 Mℓ/day may be 230 000 people.

iv) Implementation

The construction duration of this project is anticipated to be 5 years and can only be implemented when the uMkhomazi BWSS is implemented. The total cost is anticipated to be R 983 million as at May 2026 .

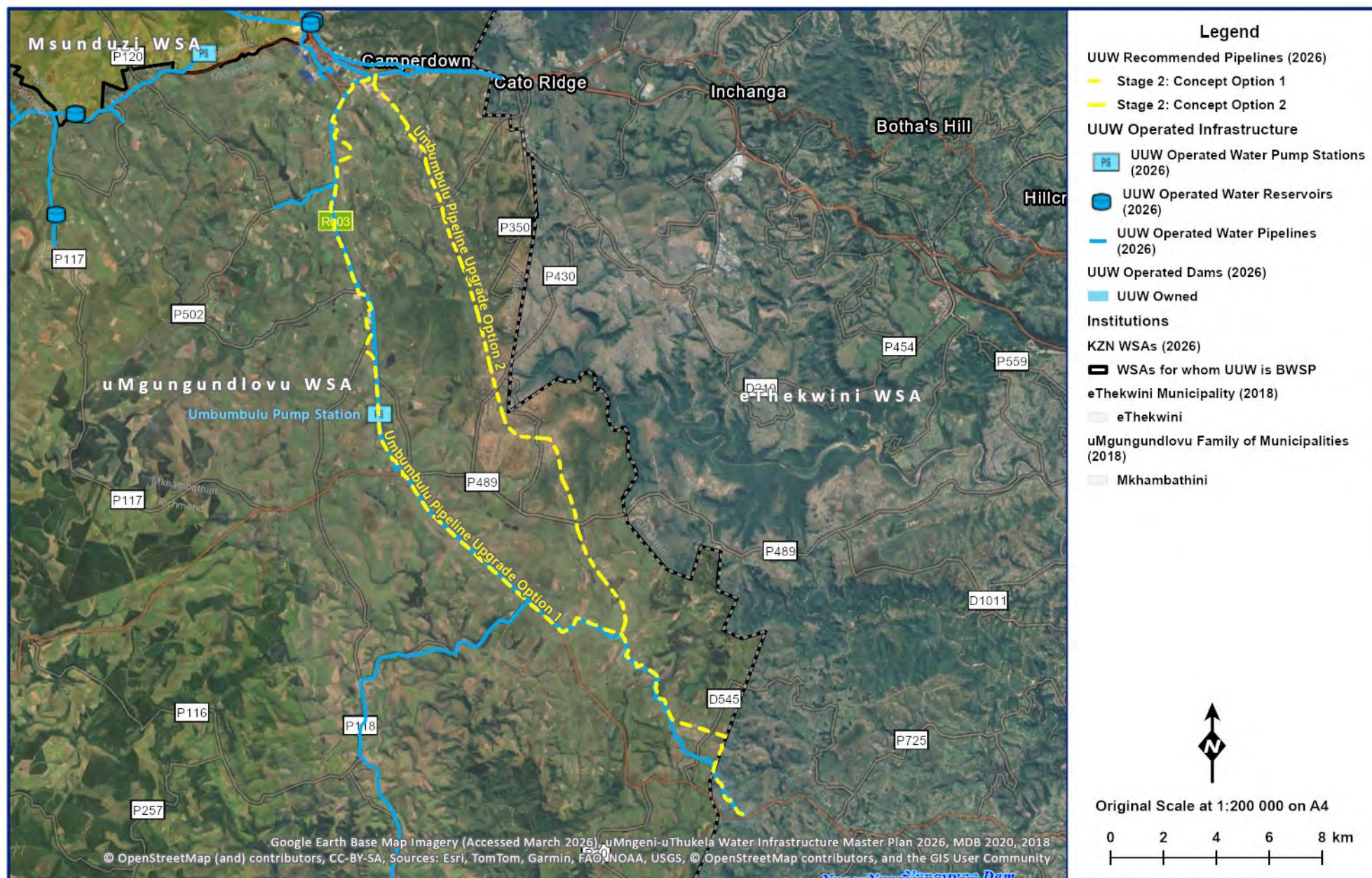


Figure 7.69 General layout of the Umbumbulu Pipeline Upgrade.

e) Vulindlela Upgrade

Planning No.	105.42
Project No.	CI.00035
Project Status	Phase 1: Partial completion Phase 2 ; Procurement

i) Project Description

The Vulindlela Bulk Water Supply Scheme (BWSS) was handed over to the Msunduzi Municipality (MM) in 2013 as part of uMngeni-uThukela Water's rationalization strategy. uMngeni-uThukela Water's responsibility ends at the sales meters downstream of the Vulindlela Pump Station. The Vulindlela area has suffered from an insufficient and interrupted water supply. The Msunduzi Local Municipality requested uMngeni-uThukela Water look at a more optimal bulk supply option for the Vulindlela BWSS to ensure an improved supply.

The Vulindlela system (**Figure 7.70**) receives potable water from the Groenekloof Reservoir Complex (TWL of 1210.6 mASL) through two pumping systems via two bulk supply systems. The high-level pumping system feeds two command reservoirs, namely, Reservoir 2 (TWL of 1410.2mASL) and Reservoir 5 (TWL of 1493.93mASL) and two additional reservoirs, Reservoir 3 and Reservoir 4. The low level pumping system only feeds command Reservoir 1. Potable water is then gravity fed from Reservoir 2 to Reservoirs 13 to 19, whilst potable water is gravity fed from Reservoir 5 to Reservoirs 6 to 12.

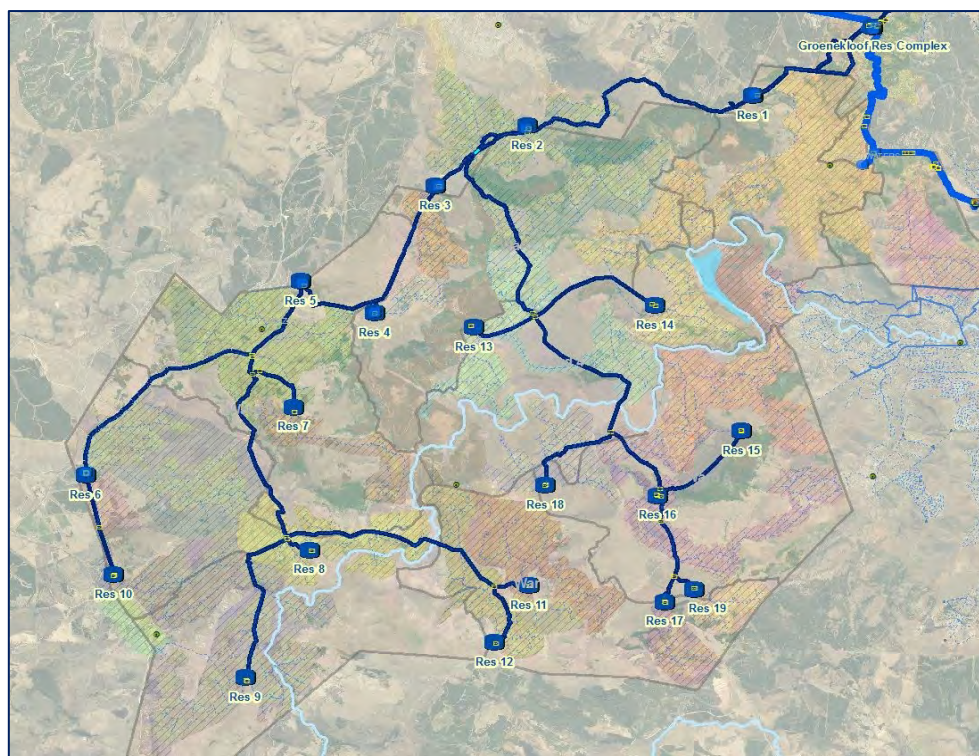


Figure 7.70 General layout of the Vulindlela System.

The Groenekloof High Lift Pump Station consists of three pumps, each with a design duty of 8.64 Mℓ/day at a generated head of 300 m. The current operating philosophy is for two pumps as duty and one as standby, thus having a total duty capacity (theoretical) of 17.28 Mℓ/day. The pumps “hunt” on their curves due to the fact that they have to pump against two different system resistance curves along the same pipeline in their supply of water to Reservoir 2 and Reservoir 5.

The Groenekloof Reservoir serves as a balancing reservoir for Vulindlela, Sweetwaters and Blackridge (**Figure 7.70**). The current demand out of Groenekloof Reservoir is 23 Mℓ/day. An alternative configuration to supply the Vulindlela Reservoir 2 from the existing Howick West Reservoir Complex has been identified and adopted. This configuration will be more efficient and eliminate the need to augment the Groenekloof supply network.

Key information on this project is summarised in **Table 7.61** and illustrated in **Figure 7.71**

Table 7.61 Project information: Vulindlela Upgrade.

Project Components:	• Construct a new pump station at Howick West Reservoir Complex to supply Vulindlela Reservoir 2 by installing 3 x 22 Mℓ/day pump sets (2 x operating and 1 x standby). • Construct an 800mm diameter pipeline of 11 km in length from Howick West Pump Station to Reservoir 2. • Construct the Pump Station at Reservoir 2 consisting of 2 x 18 Mℓ/day pump sets (1 x operating and 1 x standby). • Construct one 15 Mℓ Reservoir (25 Mℓ required in total) at Reservoir 2 site as additional storage to the existing 10 Mℓ reservoir. • Construct a back-feed pipeline of 300mm diameter with a length of 6 km, from Reservoir 5 to supply Reservoir 3 and Reservoir 4.
Capacity:	45 Mℓ/day.

ii) Institutional Arrangements

The Vulindlela BWSS will be operated and maintained by uMngeni-uThukela Water.

iii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Msunduzi Municipality and UMDM. Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 45 Mℓ/day may be 50 000 people.

iv) Implementation

The following scope has been completed under Phase 1:

- Construction of a new 20 Mℓ Reservoir and all ancillary works;
- A new 2.4 km of DN600 epoxy lined pipeline from Reservoir 4 to Reservoir 5 to replace the existing DN300 rising main;

- Conversion of the existing DN300 rising main to gravity main from Reservoir 5 to Reservoir 4;
- A new DN200 steel gravity bulk pipeline from Reservoir 4 to Reservoir 3, tying into the existing branch pipelines supplying Reservoirs 4 and 3 respectively.
- Construct a new Pump Station at Reservoir 2 – PARTIAL COMPLETION
- Modification of inlet & outlet pipework at Reservoir 2 and Reservoir 5, as well as the tie in details for the new connections required at reservoirs 3 and 4.

Phase 2 , yet to commence, will entail the following:

- Installation of an adequate new power supply to the new Reservoir 2 pump station;
- DN800 rising main from Howick West to Vulindlela Reservoir 2.
- 10Mℓ Reservoir at the midway ridge site.
- New Howick West Pump Station.
- New Mpophomeni Booster Pump Station.

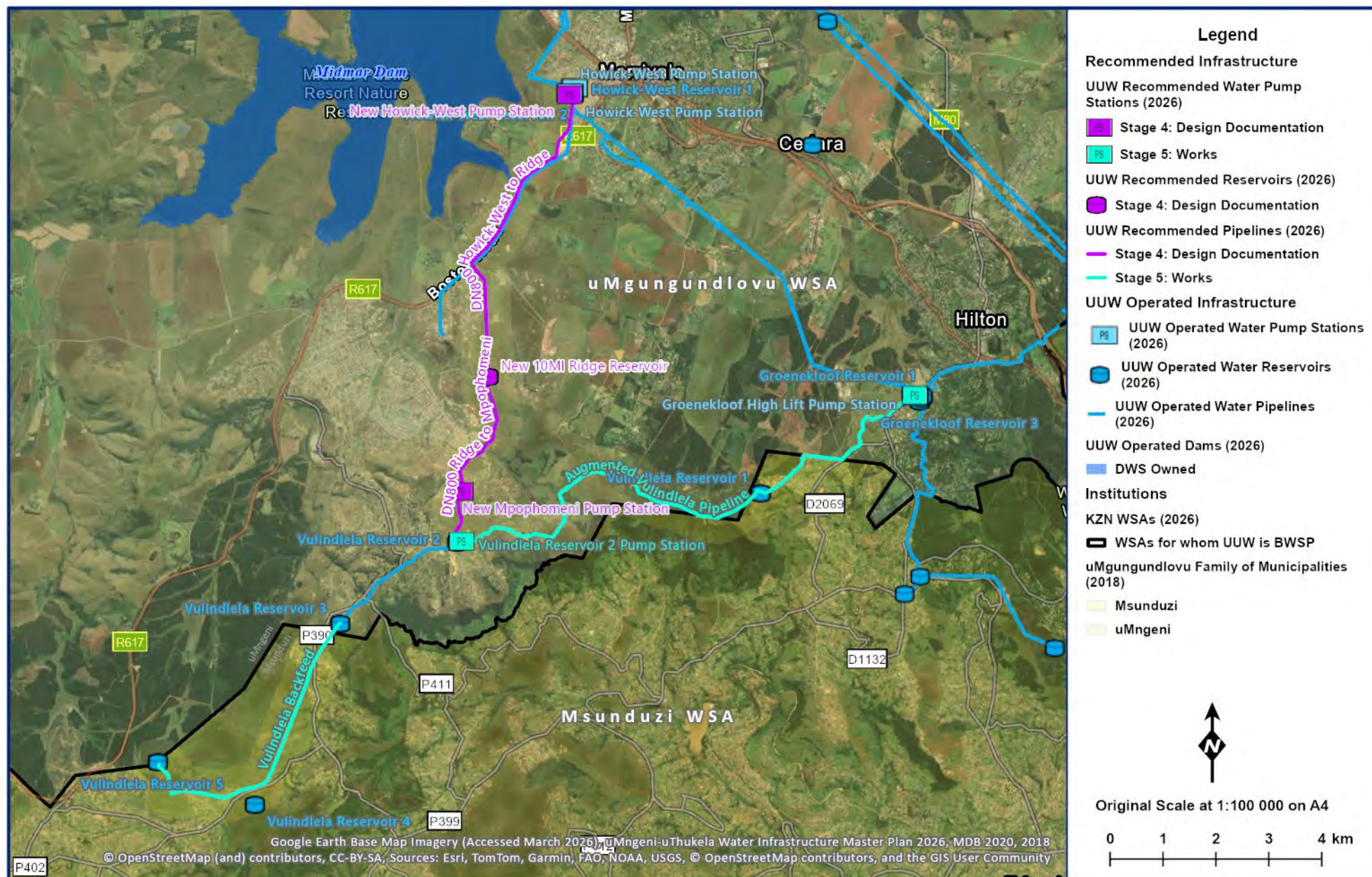


Figure 7.71 Vulindlela Upgrade.

f) Table Mountain Upgrade

Planning No.	105.41
Project No.	
Project Status	New project

i) Project Description

uMgungundlovu District Municipality requested uMngeni-uThukela Water to consider the augmentation of the existing Table Mountain supply infrastructure to meet current and future demand. The initial assessment indicated that the current infrastructure is inadequate to sustain current demand.

The hydraulic analysis indicated that significant augmentation is required to meet current and future demands. Complete upgrade of the pump station, the bulk supply pipeline and a 4 Mℓ/day reservoir is required to ensure an improved supply and greater assurance of supply over the next 20 years.

A pre-feasibility study identified two possible scenarios to augment the supply to the Greater Table Mountain area. Scenario 1 entails the upgrade of the Lower Glen Lyn Break Pressure Tank to a 2 Mℓ storage facility, replacing the existing Table Mountain pump sets with three new pump sets to meet the current and projected demand and construct a new 4 Mℓ Reservoir at Table Mountain.

Scenario 2 entails a direct feed off a proposed new 23 Mℓ Msunduzi Municipality Whispers Reservoir thus eliminating the need of augmenting the Glen Lyn Break Pressure Tank. The other components, i.e., the pump station and Table Mountain Reservoir would be as per Scenario 1.

Msunduzi Municipality in February 2017 informed uMngeni-uThukela Water that they are revising their Water Master Plan due to the changes in the demarcation of boundaries. The site for the proposed 23 Mℓ Whispers Reservoir now falls within uMshwati Local Municipality. Msunduzi Municipality is negotiating with uMshwati Local Municipality to purchase the land for the construction of the proposed reservoir. The timing is uncertain.

uMgungundlovu District Municipality requested that uMngeni-uThukela Water meet the 3 Mℓ/day demand over the next 5 years. uMngeni-uThukela Water together with uMgungundlovu District Municipality and Msunduzi Municipality agreed to implement some of the recommendations as per Option 1 for the upgrade of the Table Mountain Bulk Water Supply Scheme (BWSS) to meet a demand of 3.0 Mℓ/day. This entails the construction of a 300 mm NB, 500 m long suction pipeline, the installation of 2 x 3.2 Mℓ/day pump sets and the upgrade of the existing switchgear. The cost for the partial upgrade will be attached to the asset management maintenance budget. This project is complete. However, due to the

integrity of the rising main to the Table Mountain Intermediate Reservoir, the supply is limited to 2.8 Ml/day.

Key information on this project is summarised in **Table 7.62** and **Figure 7.72**

Table 7.62 Project information: Table Mountain Upgrade.

Project Components:	• 350 mm diameter pipeline, 4.4 km in length. • 4 Mℓ Reservoir.
Capacity:	4 Mℓ.

ii) Institutional Arrangements

The infrastructure from the buy-back meter will be owned, operated and maintained by uMngeni-uThukela Water.

iii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Greater Table Mountain area with estimated population of 13 500.

iv) Implementation

The implementation of this project is dependent on the augmentation of the Msunduzi Municipality Supply network. Msunduzi Municipality estimate that the augmentation of their water supply system will be implemented by 2027. This project is on hold until such time as a definite directive is obtained for the implementation of the Msunduzi Municipality Supply Network.

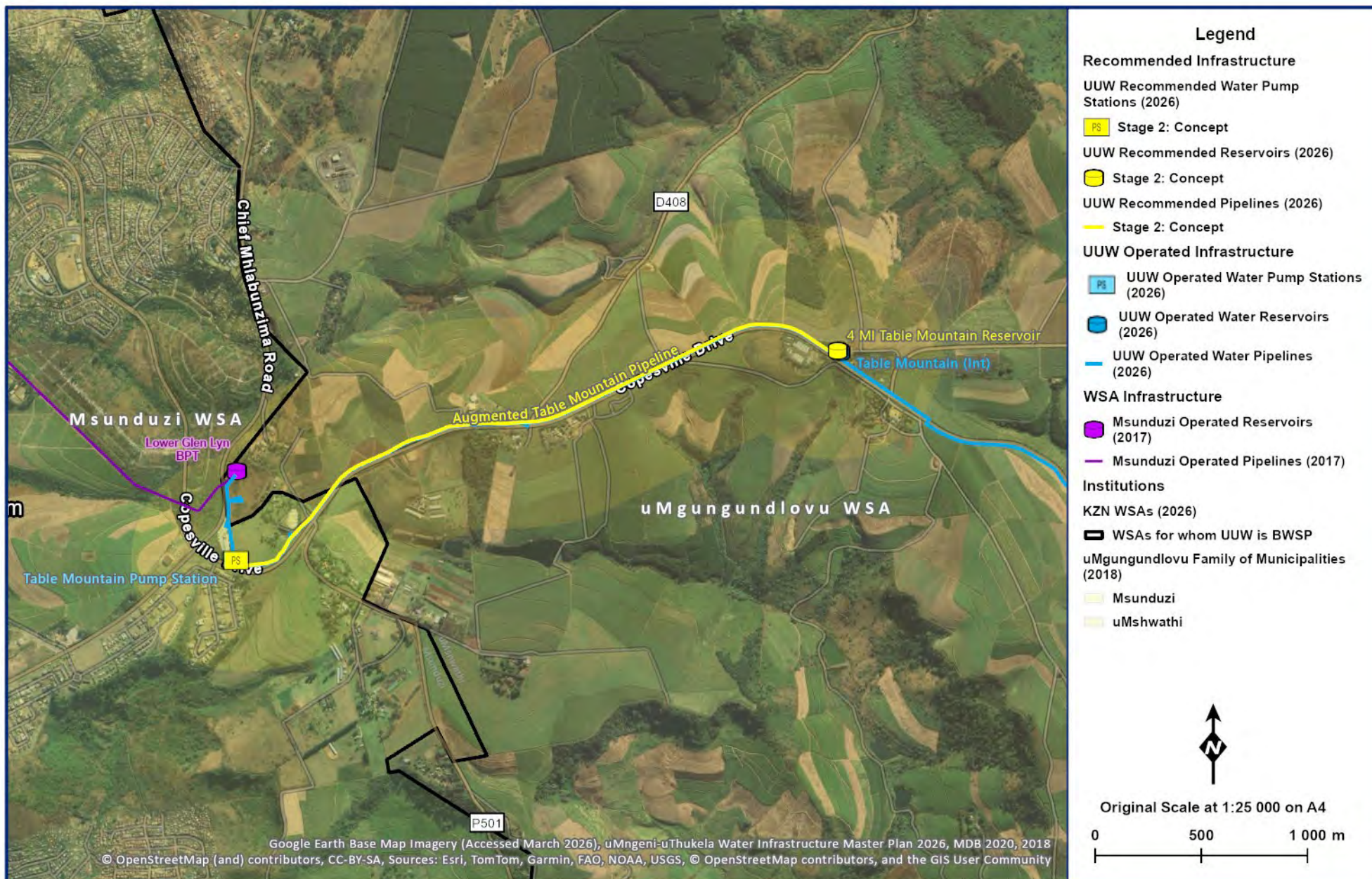


Figure 7.72 Table Mountain Upgrade.

g) Hydropower Unit at the Mpofana Outfall

Planning No.	609.2
Project No.	CI.00003
Project Status	Detailed Design

i) Project Description

A Detailed Feasibility Study (DFS) to assess the viability of a Hydropower Unit on the Mooi-uMngeni Transfer Scheme (MMTS) was initiated in 2013. A cost benefit model was developed to investigate the benefit of installing larger pipe sizes under the second phase of the MMTS in the gravity section of the pipe from the Gowrie Break Pressure Tank to the Mpofana Outfall Site (**Figure 7.73**). It was identified that a 914 mm diameter steel pipe had the highest Internal Rate of Return (IRR), and therefore is the optimal size for installation. The residual head available for power generation at the outfall site under full flow conditions for a new pipe scenario is 148 m, and under aged pipe conditions is 128 m.

The DFS has shown that a dual turbine powerhouse at the Mpofana Outfall Site, with twin turbo type turbines, each capable of discharging 2.25 m³/s at 148 m head, can produce 2.698 MW each (5.396 MW total).

Electrical transmission of the power generated will be fed back into the National Grid at the Gowrie Substation in Nottingham Road. The recoupment of costs will be offset against the power generated and billed to uMngeni-uThukela Water, for the MMTS, by Eskom.

A hydropower unit on the MMTS will recover between 19.7 and 16.8 GW.hr/annum of power, based on MMTS operation for 6 months of the year at 83% efficiency, and depending on the age of the supply pipelines.

This project has been delayed by several unsuccessful negotiations with land owners to purchase land for the substation required. UUW are seeking intervention through the uMngeni Municipality leadership before engaging the courts for expropriation.

ii) Institutional Arrangements

The new infrastructure will be owned, operated and maintained by uMngeni-uThukela Water.

iii) Beneficiaries

The MMTS Hydropower Project is economically feasible with an expected payback period of 5 years. Thereafter the project will save uMngeni-uThukela Water and hence consumers an estimated R36 million per annum at the current electricity tariff.

This saving in the operating costs can be offset in the tariff, which will benefit all consumers within uMngeni-uThukela Water's area of jurisdiction.

iv) Implementation

The total cost is estimated to be approximately R 350 million as at 2024 prices. uMngeni-uThukela Water obtained permission from the Department of Water and Sanitation for access to their infrastructure and is now at the Detailed Design phase of the hydropower unit.

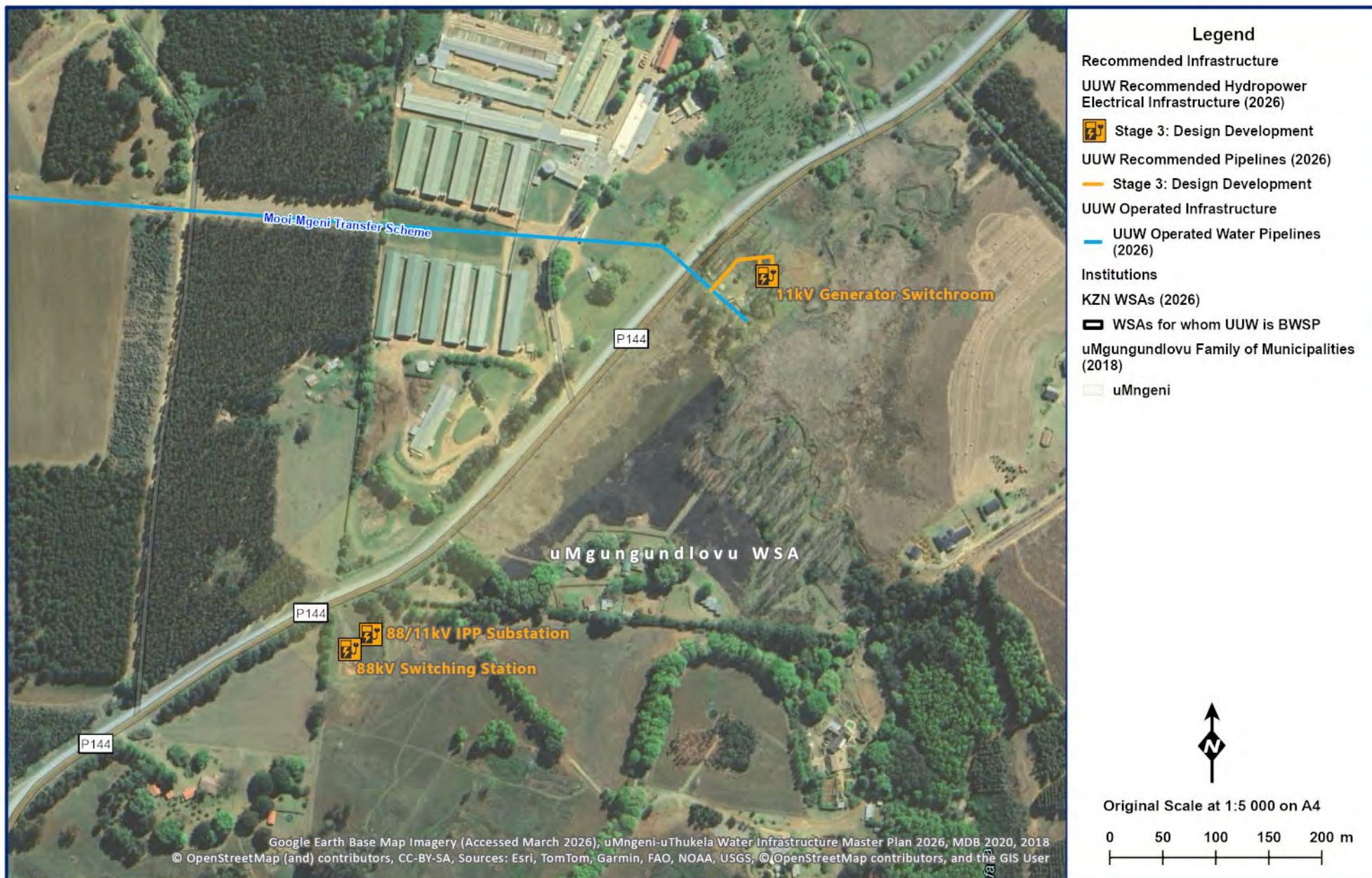


Figure 7.73 Layout of the proposed hydropower unit at the Mpofana Outfall.

h) D.V Harris to Claridge Pipeline

Planning No.	-
Project No.	CI.00448
Project Status	Turnkey

i) Project Description

The major constraint in this system is the maximum capacity of the pipeline from DV Harris WTP to Claridge/Belfort Reservoir. A hydraulic analysis has shown that the maximum flow, under gravity, with the available head difference of 39.74 m is 63 Mℓ/day along the existing 1000 mm diameter pipeline, which is inadequate to meet the current demand.

This constraint is currently having a negative effect on the supply of potable water to the Greater uMshwathi BWSS.

The delay in the implementation of this project is because of oversight when planning and implementing the uMshwathi BWSS, i.e. the infrastructure necessary for the supply of water to the uMshwathi BWSS is inadequate. The current projected date for completion is January 2029.

When the projects in iLembe District Municipality (IDM) have been completed, there will be insufficient supply; it is acknowledged that the 2053 demand of 130MI/d will not be available but supply will improve once the over abstraction on the uMngeni System has been addressed and uMkomasi Water Project commissioned.

The hydraulic analysis has shown that the augmentation of the pipeline from DV Harris WTP to Claridge Reservoir is necessary to increase the flow, with the current available head, to a maximum of 130 Mℓ/day.

The analysis has indicated that a new 1400 mm diameter pipeline is required to meet this maximum flow.

Table 7.63 Project information: DV Harris to Claridge Pipeline.

Project Components:	Designed to deliver approximately 130 Mℓ/day at 2055 demand projections.
Capacity:	130 Mℓ/day ultimate.

ii) Institutional Arrangements

uMngeni-uThukela Water will own, operate and maintain the pipeline and will sell potable water from this system to uMgungundlovu District Municipality and Msunduzi Municipality as per existing bulk water supply agreements.

iii) Beneficiaries

The beneficiaries will be the Greater uMshwathi region, Msunduzi Municipality's northern region and sections of iLembe DM's areas. Assuming 100 ℓ/person/day, the estimated number of beneficiaries from the anticipated capacity of 130 Mℓ/day may be 1 300 000 people.

iv) Implementation

The construction duration of this project is anticipated to be 3 years and will be implemented by end of 2027. The total cost is anticipated to be R 450 million as at November 2024.

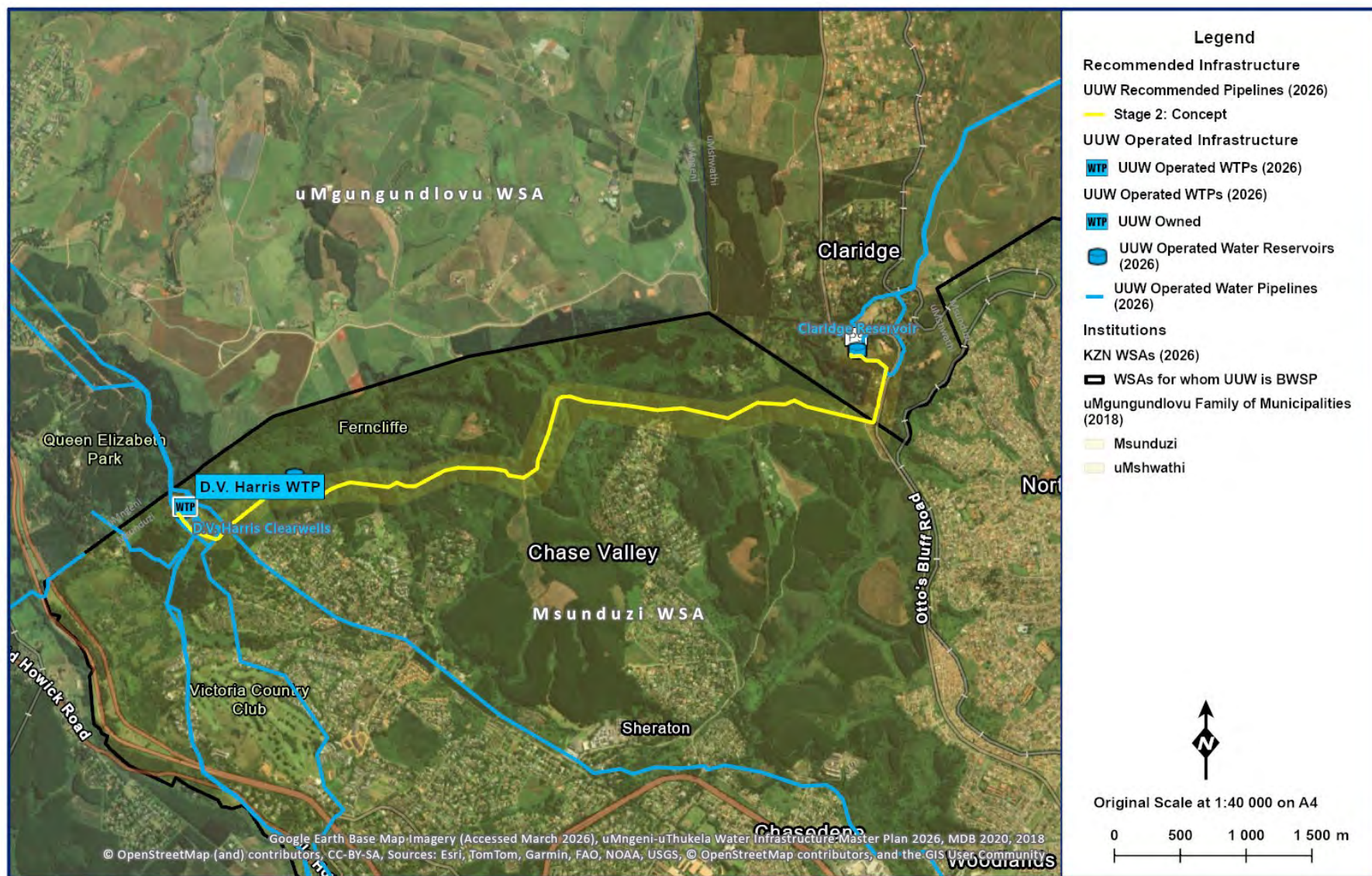


Figure 7.74 Layout of the DV Harris to Claridge Pipeline Augmentation.

7.6 Management and Operation of uMgungundlovu Water Treatment Plants (WTPs)

In 2016, uMgungundlovu District Municipality requested that uMngeni-uThukela Water manage and operate four WTPs under their jurisdiction. uMngeni-uThukela Water agreed to the request under a Memorandum of Understanding (MOU).

The four WTP's (**Figure 7.75**) are:

- Appelsbosch WTP (Decomissioned)
- Lidgetton WTP;
- Mpofana WTP; and
- Rosetta WTP; (Decommissioned)

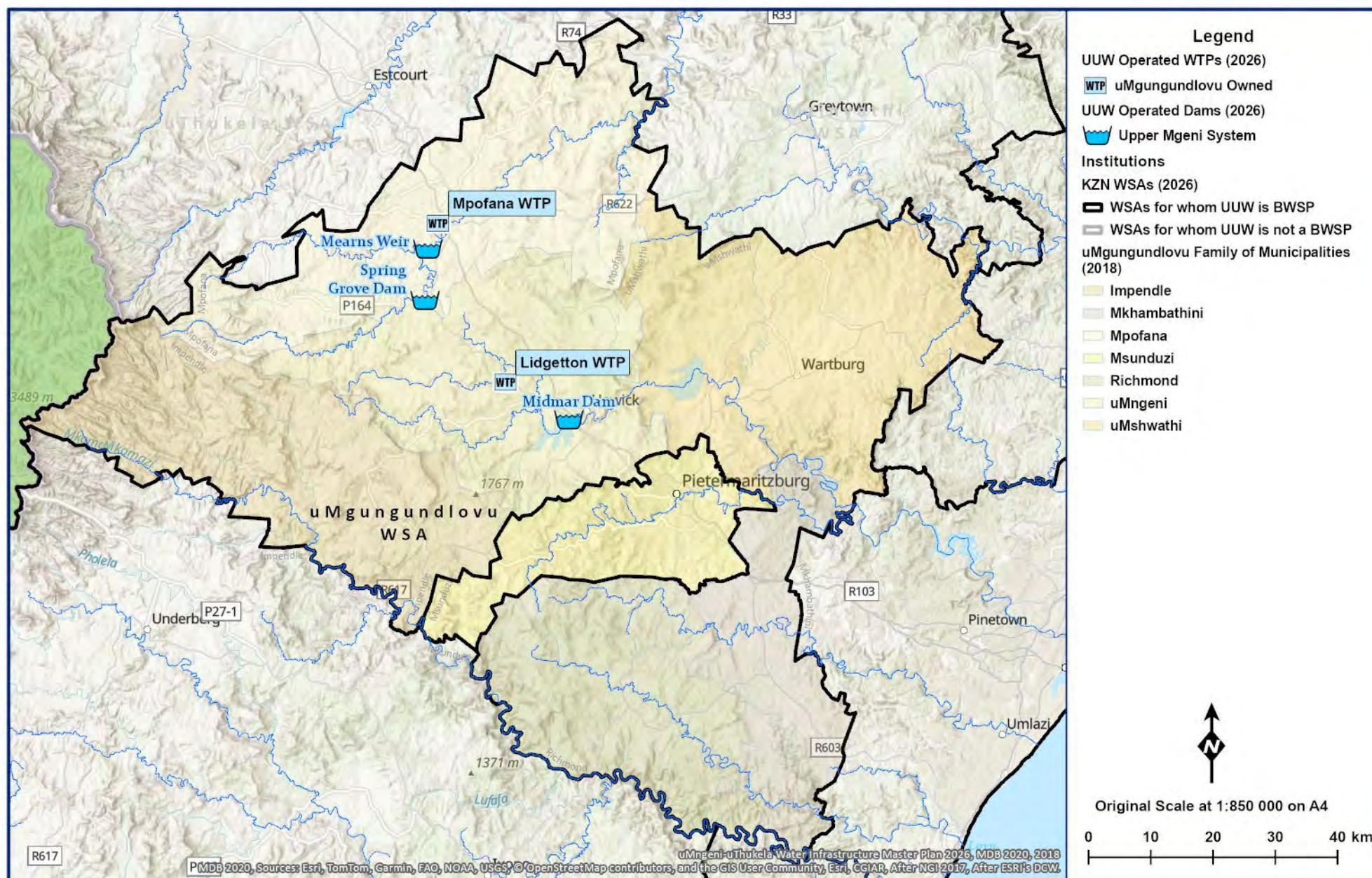


Figure 7.75 General layout of the four uMgungundlovu WTPs being operated and managed by uMngeni-uThukela Water.

7.6.1 Lidgetton WTP

The Lidgetton WTP (**Table 7.64; Figure 7.76**) is located in uMngeni Municipality and supplies the village of Lidgetton from the Lions River (**Figure 7.77**).

Plans are in place to implement the Mpofana BWSS Phase 2, which is the supply to Lidgetton from the Mpofana BWS, as there is an increase in demand in this area. In the interim, the capacity of the existing plant has been “upgraded” (**Figure 7.78**), by the addition of package clarifiers and filters as shown in **Table 7.64**.

Table 7.64 Characteristics of the Lidgetton WTP.

	Current	Package Plant 2019/2020
WTP Name:	Lidgetton WTP	Lidgetton WTP
System:	UMDM	UMDM
Maximum Design Capacity:	0.5 MLD	1 MLD
Current Utilisation:	0.448 MLD	N/A
Raw Water Storage Capacity:	-	-
Raw Water Supply Capacity:	2.3 MLD @ 22.5 m	1.2 MLD @ new system head
Pre-Oxidation Type:	N/A	N/A
Primary Water Pre-Treatment Chemical:	N/A	Polymeric Coagulant
Total Coagulant Dosing Capacity:	N/A	2 x 6 l/h
Rapid Mixing Method:	N/A	Static mixer
Clarifier Type:	N/A	Package Lamella clarifiers
Number of Clarifiers:	N/A	2
Total Area of all Clarifiers:	N/A	38 m ²
Total Capacity of Clarifiers:	N/A	2.4 MLD
Filter Type:	Slow sand filtration	Pressure filters
Number of Filters:	3	4
Filter Floor Type	-	-
Total Filtration Area of all Filters	75 m ²	14 m ²
Total Filtration Design Capacity of all Filters:	0.5 MLD	2.4 MLD
Total Capacity of Backwash Water Tanks:	N/A	To be determined
Total Capacity of Sludge Treatment Plant:	N/A	To be determined
Capacity of Used Washwater System:	N/A	To be determined
Primary Post Disinfection Type:	Calcium hypochlorite granules	Sodium hypochlorite
Disinfection Dosing Capacity:	2 x 6 l/h	2 x 6 l/h

Disinfectant Storage Capacity:	20L drums; stored in the chemical room	To be stored in 25 L drums ,in the chemical room
Total Treated Water Storage Capacity:	Onsite sump: Estimated to be 80 m ³	Onsite sump: Estimated to be 80 m ³



Figure 7.76 Lidgetton WTP sand wash bays with old dosing system (uMgungundlovu District Municipality 2010)

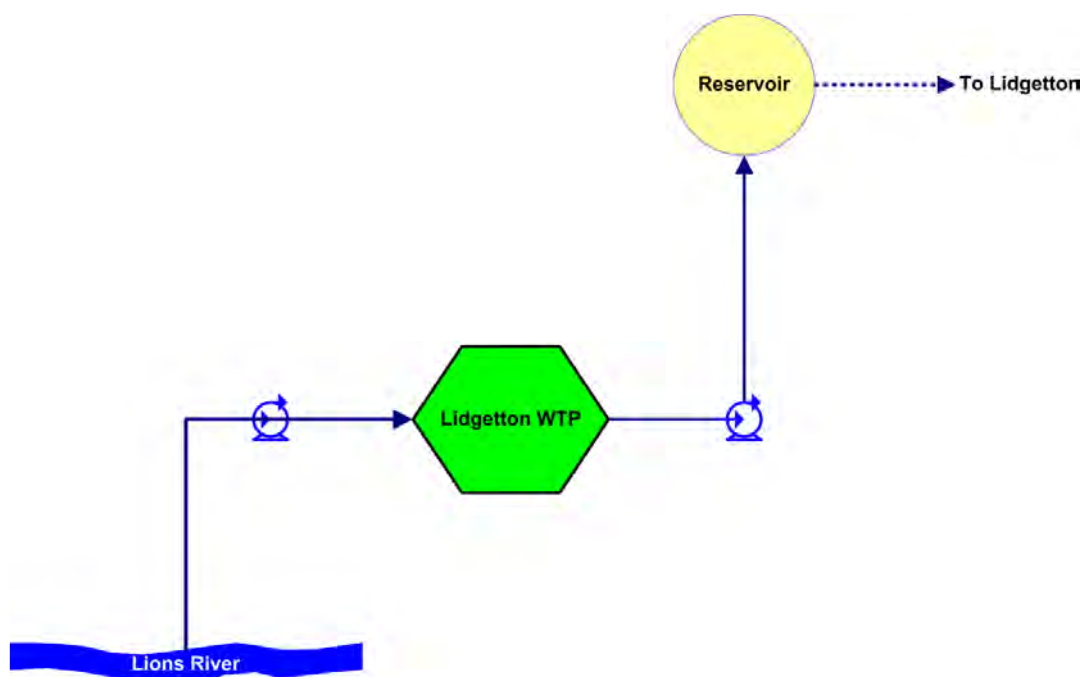


Figure 7.77 Schematic of the Lidgetton System (subject to verification).



Figure 7.78 1 Ml/day being constructed at the Lidgetton System.

An analysis of daily historical production (November 2022 to October 2023) of the Lidgetton WTP is presented in **Figure 7.79**. It shows that for 28.88% of the time the WTP was being operated above the optimal operating capacity for the period as stipulated and 17.98 % above the upgraded design capacity.

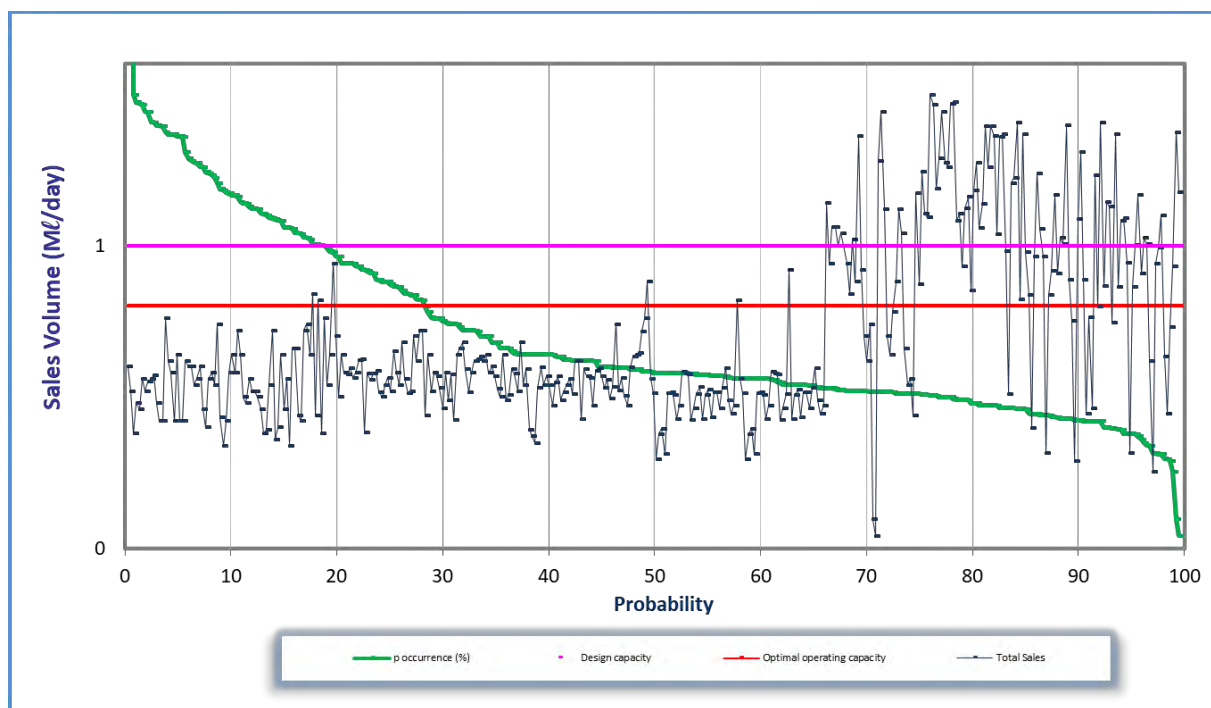
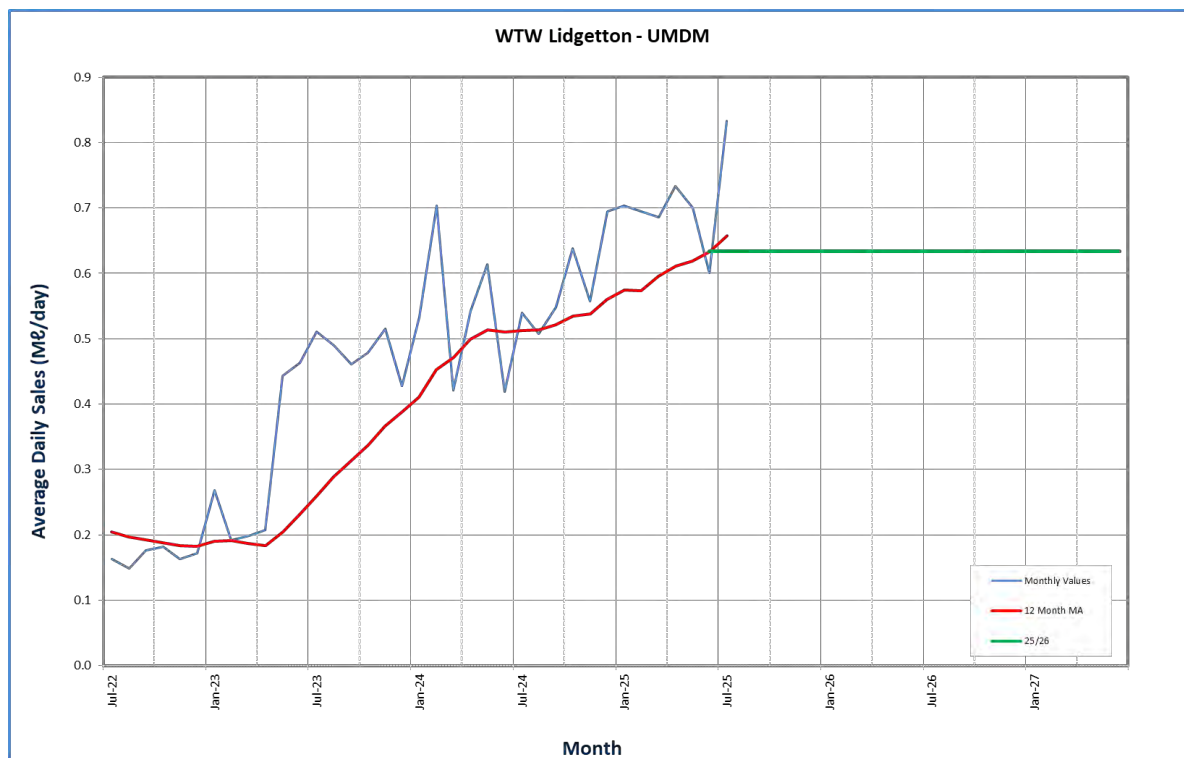


Figure 7.79 Analysis of historical production at Lidgetton WTP (November 2022 to October 2023).

The growth in demand is estimated at 1.5 % per annum over the next two years (). It is envisaged that the 1 M_l/day package plant will, thereafter, be fully operational.

Figure 7.80 Water demand from Lidgetton WTP.



This plant will be decommissioned when the Mpofana BWSS Phase 2 Supply System is implemented by the year 2027.

7.7 uMzinyathi Water Treatment Plants

7.7.1 Mudén WTP and Supply System

a) Description of the Mudén WTP and Supply System

The Mudén Water Supply Scheme is located in the lower reaches of the Mooi catchment in the Mvoti Local Municipality (**Figure 7.81**) and is operated by the uMzinyathi WSA.

The scheme is currently supplied from boreholes and abstractions from the Mooi River (**Table 7.65**). The long-term water demand for the uMzinyathi DM section of the Mudén Water Supply Scheme is estimated at 15.78 Mℓ/day. The Mooi River remains the most viable source of water for the scheme. The MAR at the abstraction point was calculated at 49.85 million m³, according to page 33 of the Mudén All Town Recon Strategy (Department of Water and Sanitation, 2011. First Stage Reconciliation Strategy for Mudén Water Supply Scheme Area - uMvoti Local Municipality).

Table 7.65 Summary of Mudén WTP Supply System existing infrastructure (DWS 2011).

Scheme Area	Source	Water Treatment Plant	Reservoir Capacity (Mℓ)
Mudén	Mooi River	Mudén WTP – 11.00 Mℓ/day, conventional plant	8
	Boreholes	Borehole – 1.58 Mℓ/day	

The raw water sources for the Mudén Supply System is 1) the Mooi River, which supplies the Mudén WTP, and 2) seven boreholes, which supply directly into reticulated networks (**Figure 7.82**). Abstraction from the Mooi River takes place at several locations, however, the ideal abstraction position for the scheme is at an existing irrigation canal in Mudén. The canal's supply is from a weir constructed on the Mooi River, located approximately 7 km from the existing Mudén WTP (**Table 7.66** and **Figure 7.83**). The irrigation canal feeds water to the existing treatment plant via gravity, from where it is distributed to the Mudén and Opathe areas. The Craigieburn Dam, which is situated between Mooi River and Greytown, augments the flow in the Mooi River as and when required.

The pump details, reservoir details and pipeline details for the Mudén Supply System are listed in **Table 7.67**, **Table 7.68** and **Table 7.69** respectively.

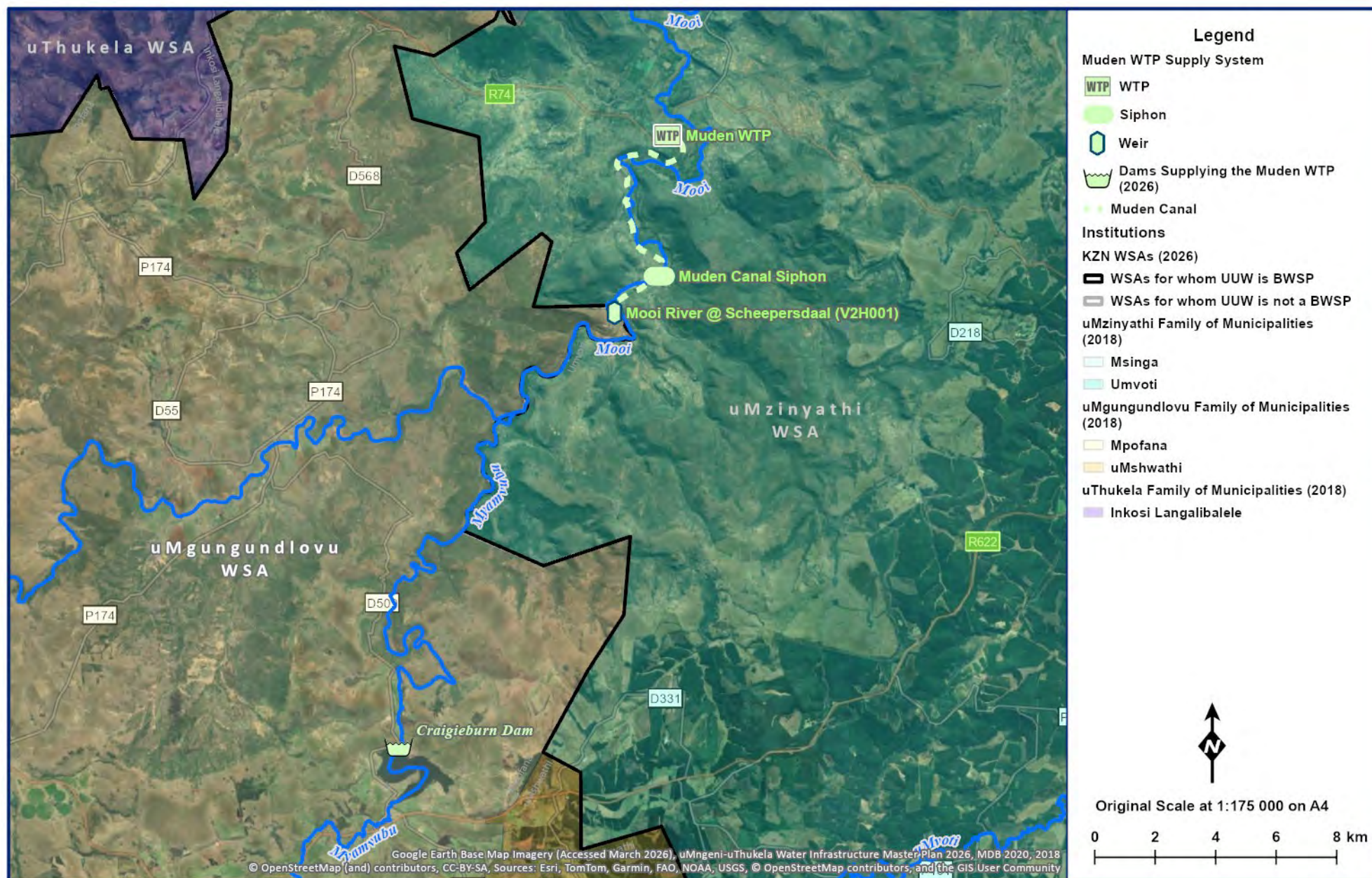


Figure 7.81 Mudén WTP supply system.

The characteristics of the Mudén WTP are shown in **Table 7.66**.

Table 7.66 Characteristics of the Mudén WTP.

WTP Name:	Mudén WTP
System:	Mvoti Supply System
Maximum Design Capacity:	11 Mℓ/day (3 Mℓ/day old plant + 8 Mℓ/day new plant)
Current Utilisation:	2.798 Mℓ/day
Raw Water Storage Capacity:	0 Mℓ
Raw Water Supply Capacity:	3.0 Mℓ/day due to constraint of irrigation canal
Pre-Oxidation Type:	None
Primary Water Pre-Treatment Chemical:	Polymeric Coagulant
Total Coagulant Dosing Capacity:	13 ℓ/hour (running at 50%)
Rapid Mixing Method:	Conventional Paddle Flash Mixer
Clarifier Type:	Dortmund manual clarifiers
Number of Clarifiers:	6 (2 old and 4 new)
Total Area of all Clarifiers:	140.4 m ² (28.08 m ² old and 112.32 m ² New)
Total Capacity of Clarifiers:	12.5 Mℓ/day
Filter Type:	Constant Rate Rapid Gravity Filters
Number of Filters:	8 (2 Old and 6 New)
Filter Floor Type	Laterals with Nozzles
Total Filtration Area of all Filters	83.64 m ²
Total Filtration Design Capacity of all Filters:	12.5 Mℓ/day
Total Capacity of Backwash Water Tanks:	0m ³
Total Capacity of Sludge Treatment Plant:	None
Capacity of Used Washwater System:	0 Mℓ/day
Primary Post Disinfection Type:	Sodium Hypochloride
Disinfection Dosing Capacity:	13 ℓ NaOCl/hr
Disinfectant Storage Capacity:	
Total Treated Water Storage Capacity:	0.5 Mℓ

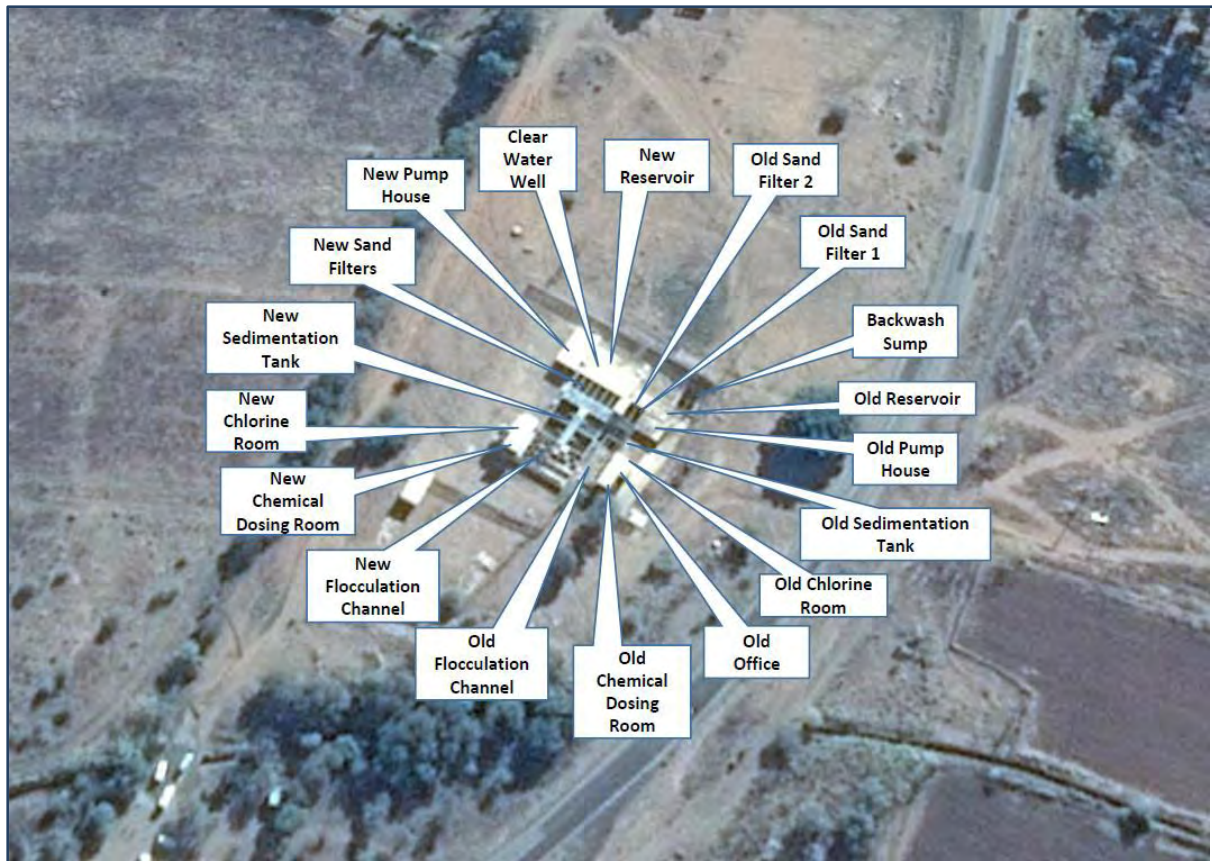


Figure 7.83 Aerial view of the Mudén WTP (Google Earth 2018).

Table 7.67 Pump details: Mudén Supply System.

System	Pump Station Name	Number of Pumps		Pump Description	Supply From	Supply To	Static Head (m)	Duty Head (m)	Duty Capacity (Mℓ/day)
		Number of Duty Pumps	Number of Standby Pumps						
Muden	PS 1	2	1	KSB WKLn 80/2	Muden WTP	Res 1	95	110	2.8
Muden	PS 2	1	1	KSB WKLn 40/6	Res 3	Res 4	124	144	0.5
Muden	PS 3	2	1	KSB NTC 65/50	Res 1	Res 2	216	250	1.7
Muden	PS 5	1	1	KSB WKLn 40/4	Res 5	Res 6	95	128	0.432
Muden	PS 7	1	1	KSB WKLn 65/10	Res 17	Res 16	51	115	0.5
Muden	PS 8	1	1	KSB WKLn 40/4	Res 6	Steel header tank	166	O/C*	O/C*

* PS 8 is out of commission as it cannot deliver the required head.

Table 7.68 Reservoir details: Mudén Supply System.

System	Reservoir Site	Reservoir Name	Capacity (M_l)	Function	TWL (aMSL)	FL (aMSL)
Muden	Muden	Res 3	0.350	Distribution	917	913
Muden	Muden	Res 4	0.100	Terminal	1041	1038
Muden	Muden	Res 5	0.250	Distribution	919	916
Muden	Muden	Res 6	0.250	Distribution	1014	1011
Muden	Muden	Res 7	0.250	Distribution	820	817
Muden	Muden	Res 8	0.450	Terminal	1104	1101
Muden	Muden	Res 1	0.250	Distribution	921	917
Muden	Muden	Res 2	0.450	Distribution	1136	1132
Muden	Muden	Res 9	0.300	Terminal	1257	1254
Muden	Muden	Res 12	0.150	Terminal	917	913
Muden	Muden	Res 13	0.150	Terminal	1135	1132
Muden	Muden	Res 14	0.150	Terminal	852	849
Muden	Muden	Res 18	0.100	Terminal	1246	1243
Muden	Muden	Res 16	0.100	Terminal	876	872
Muden	Muden	Res 17	0.150	Distribution	825	822

Table 7.69 Pipeline details: Mudén Supply System.

System	Pipeline Name	From	To	Length (km)	Nominal Diameter (mm)	Material	Capacity (M _l /day)	Age (years)
Mudén	Raw water pipeline	Irrigation canal	Mudén WTP	0.3	315	uPVC	13.46*	4
Mudén	Potable pipeline water	Mudén WTP	Res 3	1.477	250	uPVC	6.36**	57#
Mudén	Potable pipeline water	Res 3	Res 4	9.6	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Mudén PS	Res 1	4.37	250	uPVC	6.36**	57#
Mudén	Potable pipeline water	Res 1	Res 2	3.05	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Res 1	Res 8	3.936	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Res 8	Res 9	2.7	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Mudén PS	Res 5	5.179	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Mudén PS	Res 7	8.2	160	uPVC	2.6**	57#
Mudén	Potable pipeline water	Res 5	Res 6	2.215	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Res 6	Steel Header Tank	4.99	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Res 7	Res 17	3.29	110	uPVC	1.23**	57#
Mudén	Potable pipeline water	Res 17	Res 16	6.55	110	uPVC	1.23**	57#

* Based on a velocity of 2 m/s

** Based on a velocity of 1.5 m/s

Age need to be verified

b) Status Quo and Limitations of the Mudén Supply System

The primary water source for the regional scheme is the Mooi River. Abstraction from the Mooi River takes place at several locations, however, the ideal abstraction position is at an existing irrigation canal in Mudén. The canal's supply is from a weir constructed on the Mooi River, located approximately 7km from the existing Mudén WTP. The irrigation canal feeds water to the existing treatment plant via gravity and from there it is distributed to the Mudén and Opathe areas. The Craigieburn Dam, which is situated between Mooi River and Greytown augments the above mentioned weir as and when required through downstream releases.

The irrigation channel is fed from the Mooi River and supplies irrigation water to the farms in the area. The design capacity of the channel is sufficient to supply irrigation and domestic water for Mudén, Ophate and Keate's Drift. The channel is, however, an earthen channel and is prone to silting and damage. The channel is cleaned of silt and plant growth on a regular basis and this has increased the capacity of the channel significantly although further rehabilitation would be required to restore the channel to full design capacity. The supply is supported by the Craigieburn Dam which has sufficient capacity according to DWS. In March 2021, there has been a dispute relating to the raw water resource, between the farmers and uMzinyathi DM, which resulted in a total supply of only 1.567 Mℓ/day. The use of the canal as the primary raw water resource does pose a significant risk to the sustainability of supply and an alternative will have to be considered.

The current water sources at Keate's Drift and Ndaya schemes are inadequate and unsustainable to meet the water demand for the area. The community of Ndaya currently obtains water supplies from streams, rivers and springs in the area for domestic purposes. In most instances these rivers and streams are located more than two kilometres from households and water quality is considered poor.

An upgrade has been planned for the Mudén WTP to extend the supply to the Keate's Drift and Ndaya areas. The extension of the supply to these areas is currently in the design/construction stage.

The pump stations and pipelines would have to deliver 5100 kℓ to Keate's Drift / Ndaya per day. The water would be delivered to a service reservoir from where it will be fed to the distribution networks and/or supply areas.

7.8 Recommendations for the uMzinyathi Water Treatment Plants

The projected total daily demand of 6.9 Mℓ/day, by 2025, for the Muden BWSS (which includes the daily demand for Muden and Opathe) was discussed with DWS, in order to establish whether the Craigieburn Dam would be a sustainable supplementary source and it was confirmed.

To meet current and future demand, the Muden Bulk Water Supply Scheme has been planned and designed by Ilifa Consulting Engineers appointed by uMzinyathi DM and comprises of the following infrastructure:

- The expansion of the existing Muden Water Treatment Plant from a capacity of 2.4 Mℓ/day to a capacity of 6.9 Mℓ/day.
- The relocation of the portable 1 Mℓ/day Water Treatment Plant, located near Keate's Drift abstraction works to Muden to augment supply.
- The construction of approximately 150 km of bulk water pipelines ranging in diameter from 90 mm to 315 mm.
- The construction of several bulk water reservoirs totalling approximately 15 Mℓ of storage, and distribution reservoirs totalling 0.3 Mℓ of storage.
- The construction of six bulk water pump stations and two booster pump stations to carry water to the high lying areas of the project area.
- The construction of approximately 77 km of distribution water pipelines (including reticulation), ranging in diameter from 63 mm to 90 mm.
- The construction of approximately 410 standpipes to provide water to the entire project area.

In order to mitigate the constraints of the water supply to Keate's Drift, it is recommended to supply this area from Muden WTP and the preferred option is:

- A pump station at the plant pumping directly to the service reservoir over a distance of ± 17.3 km. The advantage of this option is that only one pump station at the plant is required. The disadvantage is that the pumping head is such that expensive pipes (ductile iron vs uPVC) or larger pipes (i.e. 400 mm v 315 mm) would be required. The total pumping head at the plant is ± 95 m requiring 75 kW motors for three pumps running in parallel.
- The centre line levels vary between 815 m at the purification plant and ± 700 m at the proposed service reservoir in Keate's Drift. The proposed Keate's Drift service reservoir top water level is slightly higher than the level at the plant. The water supply from the service reservoir to Keates Drift would require a pressure reducing installation. The supply scheme capacity up to the service reservoir is 90 ℓ/s and ± 150 ℓ/s downstream of the service reservoirs.

The aim of the Muden Bulk Water Supply Scheme is to:

- Consolidate water supply sources to achieve economies of scale.

- Provide a safe and reliable source of potable water to promote health and hygiene and reduce the incidence of waterborne diseases for a population of 59 880 (7485 households) in the project area.
- Create employment opportunities for the community for the duration of the construction programme.
- Promote community awareness in terms of general health and hygiene issues.

In summary, the project is recommended for the following reasons:

- It is a cost effective solution.
- It makes use of existing infrastructure most effectively.
- Operation and Maintenance activities at the Mudén Abstraction Works and Water Treatment Plant are already in place, and therefore pose no new challenge to the operating authority.
- There is a guaranteed assurance of supply from the Mudén irrigation canal which is supplied via the existing Craigieburn Dam.
- Eliminates the operation of multiple Water Treatment Works situated at various places within the Municipal boundaries i.e. economy of scale.

(uMzinyathi DM 2015)

7.8.1 Projects

a) Mudén BWSS

Planning No.	
Project No.	
Project Status	Detailed design and construction

i) Project Description

The current water sources at Keate's Drift and Ndaya schemes are inadequate and unsustainable to meet the water demand for the area. The community of Ndaya currently obtains water supplies from streams, rivers and springs in the area for domestic purposes. In most instances, these rivers and streams are located more than two kilometres from households and water quality is considered poor.

An upgrade has been planned for the Mudén WTP (**Figure 7.84**) to extend the supply to the Keate's Drift and Ndaya areas. The extension of the supply to these areas is currently in the Design/construction stage

Key information on this project is summarised in **Table 7.57**.

ii) Beneficiaries

The upgrade to the BWSS will benefit consumers within the Muden, Opathe, Keate's Drift and Ndaya areas with an estimated population of 59880.

iii) Implementation

The construction duration of this project is anticipated to be six years. The total cost is estimated to be R142 million at 2020 prices.

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