Lower South Coast Sub-Region

The Lower South Coast sub-region is supplied with bulk treated water from the Bhobhoyi WTP (54 Ml/day), located 8 km inland of Port Shepstone and from the Mtamvuma WTP (20 Ml/day), located 25km inland of Port Edward. The Bhobhoyi and Mtamvuna WTPs receive water from the Mzimkhulu and Mtamvuna rivers respectively (Section 4.4.9). Both WTPs are owned and operated by Ugu District Municipality. In addition there are a number of smaller WTPs in the area, such as those supplying Harding and Dududu. Umgeni Water does not operate any WTPs in the Lower South Coast area.

5.4.2 Status Quo and Limitations

Figure 5.48 illustrates schematically the South Coast System in its current configuration and the current demands being placed on the network. This schematic should be referred to when reading this Section

The SCP-1, starts at Amanzimtoti WTP and terminates at the off-take to Scottburgh South Reservoir. It serves as the primary conduit for the distribution of bulk treated water for a significant portion of the Upper and Middle South Coast sub-regions. Fifteen metered off-takes have been installed along the SCP-1, twelve for eThekwini Municipality and three for Ugu District Municipality. Umgeni Water owns the SCP-1, and will be responsible for the operation and maintenance of the pipeline, pump stations and reservoirs. The construction of link pipelines from the metered off-takes on the SCP-1 to the bulk distribution reservoirs is the responsibility of the relevant WSAs, and the up-take of water from the SCP-1 will be dependant on the timing of such linkages and consumer demands.

Table 5.40 shows the reservoirs within the different sub-systems that will be supplied off the SCP-1 that will be used either partially or wholly for reticulation purposes. Within the Amanzimtoti Sub-System, a number of reservoirs will continue to be supplied directly off the SCA Pipeline and the Amanzimtoti WTP.

Table 5.51 Reservoirs to be supplied off the South Coast Pipeline Phase 1.

<table>
<thead>
<tr>
<th>Sub-System</th>
<th>Reservoirs that will be Supplied</th>
</tr>
</thead>
</table>
| Amanzimtoti  | Almond Road  
|              | Lower Illovu 2  
|              | Lower Illovu 1  
|              | Panorama Park  
|              | Mgobhozini (with two off-takes, one for Ugu District Municipality and one for eThekwini Municipality)  
|              | Amaggcino  
|              | Sappi Saiccor (on an interim basis only)                                                      |
| Craigieburn  | Umnini  
|              | Magabeni 1  
|              | Magabeni 2  
|              | Craigieburn (this reservoir will be supplied via the Singh’s off-take point)  
|              | Singh’s  
|              | Umkomaas (using the same off-take point as Singh’s)  
|              | Clansthal 1  
|              | Clansthal 2  
| Umzinto      | Freeland Park  
|              | Scottburgh South  
|              | Park Rynie  
| Mtwalume     | None  |
Sappi Saiccor abstract water directly from the Mkomazi River for use at their plant. They plan to construct the Ngwadini Dam, an off-channel storage dam, to provide them with an assured supply of water during the dry winter months. However, due to the extremely low flows experienced in the Mkomazi River during the winter months of 2010 and the fact that the Ngwadini Dam has yet to be constructed, Sappi Saiccor requested an off-take from the SCP-1 to be used as an interim measure. This off-take was agreed to based on a number of conditions, including the fact that they could only draw the balance of water in the pipeline after the demands of eThekwini and Ugu municipalities had been satisfied, and that this balance would decrease over time as new off-takes were added to the SCP-1 and these demands grew. This balance was estimated at 20Ml/day initially, which could increase to 30Ml/day once the South Coast Augmentation Booster Pump Station was commissioned. The off-take was installed a short distance upstream of Quarry Reservoir and Sappi Saiccor began drawing water from the SCP-1 in September 2010.

At a macro level, the main issue that needs to be addressed is the continued reliance on the already stressed Lower Mgeni System as the primary water source for this region, supplied from Inanda Dam via the Wiggins WTP along the SCA Pipeline to the Amanzimtoti WTP.

Currently, only 60 Ml/day is available for all the demand nodes along the SCA Pipeline, due to the constraints of the existing Umlazi Pump Station. This limits the inflow to Amanzimtoti WTP to 23 Ml/day. However, eThekwini Municipality has implemented a control system on their reservoirs to ensure a sustainable supply of 30 Ml/day to Amanzimtoti WTP. It has also been noted that, during high demand periods, the current demand at Amanzimtoti WTP can peak at 41 Ml/day. Umgeni Water is currently busy constructing a new in-line booster pump station along the SCA Pipeline to increase the flow rate so as to sustain the projected demands. The SCA Pipeline is expected to reach its design capacity of 97 Ml/day, due to increasing demands, by 2020. At this stage no more than 65 Ml/day will be available at the Amanzimtoti WTP to supply areas downstream of it. This volume is based on the increased capacity of the line that will be achieved once the booster pump station is operational.

In October 2010, the SCA Pipeline augmented the South Coast Supply System by 38.48 Ml/day as the draw-off from the Nungwane Dam yielded 17.46 Ml/day to sustain the AADD of 55.94 Ml/day. Augmentation from Wiggins WTP via the SCA Pipeline is expected to increase to 45 Ml/day by June 2011. At present, the situation is such that water supplied to reservoirs directly from the SCA Pipeline has to be curtailed in order to ensure that sufficient water is available to supply the demands that are required from the Amanzimtoti WTP.

The Amanzimtoti WTP, with a design capacity of 22 Ml/day, will need to continue to operate together with the SCA Pipeline until a long-term solution is in place. Its operating level is constrained by the yield of the Nungwane Dam and the connecting raw water pipeline. The 98% assured yield from Nungwane Dam is 9.04 Ml/day, and it is not practical or economically feasible to raise the dam wall to increase the yield from this source. The 14.7 km raw water gravity main from the dam to Amanzimtoti WTP has a nominal capacity of 20 Ml/day. This pipeline is in a poor condition due to corrosive action from sulphur-reducing bacteria and the wall thickness has been reduced in places resulting in occasional pipe bursts.

An analysis of historical production for the Amanzimtoti WTP (October 2009 to October 2010) is presented in Figure 5.42 and shows that the demand far exceeds the design capacity of the WTP. Hence the supply is being supplemented via the SCA Pipeline.

In September 2010, Sappi Saiccor started drawing approximately 30 Ml/day from their off-take point as seen in Figure 5.49. This has placed greater stress on available storage capacity, resulting in rapid
fluctuations of the reservoirs. This draw-off by Sappi Saiccor is only an interim arrangement estimated to continue only in the dry season over the next three years.

The Amanzimtoti WTP is considered as both a WTP and a bulk distribution node for the Upper and Middle South Coast sub-regions. For this reason, an additional 15 Ml storage reservoir was recently constructed as part of the SCP-1.

The treatment facility at Craigieburn WTP has been “mothballed” and supply to this demand node is now off the SCP-1. The average daily demand, as at October 2010, was 7.9 Ml/day. This demand zone currently has a year-on-year growth rate of 25.4%, partly due to the drought relief supply to the Umzinto WTP supply area. eThekwini Municipality is in the process of installing an off-take on the SCP-1 downstream of Quarry Reservoir (Singh’s Off-Take Link) to supply the Craigieburn area (Figure 5.45). This off-take will be commissioned towards the end of 2011 and will allow the Craigieburn WTP to be completely decommissioned.

Umzinto WTP has experienced significant changes in its year-on-year growth rates over the past four years, reaching its lowest level in July 2006 (-26%). The growth rates seen in the past year since October 2009 have been unprecedented, with the year-on-year growth rate in June 2010 in excess of 12.3% and then dropping to 1.3% by October 2010. This was attributed to the Middle South Coast Sub-Region experiencing very little rainfall. The prevailing dry weather conditions throughout the area had a major impact on the storage levels of the Umzinto and the E J Smith dams.

The 12-month moving average of sales from the Umzinto WTP decreased from 9.875 Ml/day in August 2010 to 9.473 Ml/day in October 2010 (Figure 5.43).
An analysis of daily historical production of the Umzinto WTP (October 2009 to October 2010) is presented in Figure 5.44, and shows that for 30% of the time the WTP was being operated above the optimal operating capacity (80% of design capacity) and for 3% of the time the WTP was operated at above design capacity.

Projected demands from the WTP, at the current growth rate of 5.7%, are expected to exceed the water resource (10 ML/day at a 98% level of assurance) and treatment capacity (13.6 ML/day) of the WTP by June 2011. Furthermore, the water quality of the E.J. Smith Dam is rapidly deteriorating due
to the inflow of raw sewage, which places a strain on the water treatment process. If this situation continues without intervention, it will result in major operating costs of the WTP in order to maintain acceptable potable water quality standards.

Umgeni Water is currently in the process of implementing Phase 2a of the South Coast Pipeline (SCP-2a) (**Figure 5.45**), which will relieve the demand off Umzinto WTP by approximately 4.5 Ml/day. This will allow the relieved capacity to be utilised for growth further inland.

In addition, Umgeni Water is also implementing a new link (a combination of the Ellingham Link and Umzinto Link) from Scottburgh South Reservoir, via Ellingham Reservoir, to Umzinto WTP. This will mitigate the risk of non-supply during dry periods and to meet future increases in water demand from the Umzinto WTP. This project will provide an additional 4.5ML/day to augment the supply from the Umzinto WTP (**Figure 5.45**).

**Figure 5.45** Augmentation of Umzinto WTP from the SCP-1.
There has been a significant increase in the demand in the area immediately south of Mtwalume, under the jurisdiction of Ugu District Municipality (Figure 5.46). This has placed excessive stress on the Mtwalume WTP and subsequently on the Umzinto WTP, which supplements the Mtwalume WTP via the pipeline linking the Bazley Reservoir to the Elysium Reservoir supply zone.

The 98% assured run-of-river yield of the Mtwalume River at the abstraction point is 13 Ml/day. This exceeds the treatment capacity of the WTP. Ugu District Municipality upgraded the Mtwalume WTP in 2009 from 4.5 Ml/day to a design capacity of 7.5 Ml/day. The year-on-year growth rate in March 2010 was 85.3% and decreased to 40.8% in October 2010 due to the below-average rainfall in the area.

![Figure 5.46 Water demand from Mtwalume WTP.](image)

An analysis of the daily historical production of the Mtwalume WTP (October 2009 to October 2010) against the upgraded capacity is presented in Figure 5.47. It shows that for 97% of the time the WTP was operated above the optimal operating capacity (80% of design capacity) and for 92% of the time the WTP was operated at above design capacity.

Water demands are expected to increase by approximately 16.8% per annum over the next 24 months. An analysis of the daily historical production of the Mtwalume WTP (October 2009 to October 2010) against the upgraded capacity is presented in Figure 5.47. It shows that for 97% of the time the WTP was operated above the optimal operating capacity (80% of design capacity) and for 92% of the time the WTP was operated at above design capacity.
The increase in demand of the Mtwalume WTP Supply System results in the existing infrastructure having to be operated at its maximum capacity. Hydraulic analyses indicate the following:

- The pump sets supplying Elysium Reservoir are running inefficiently to the right of their curve. This is due to the 225 mm diameter pipeline operating at a velocity of 1.87 m/s, resulting in high friction losses and subsequently a high system resistance.
- Both pumps supplying the Mnafu Reservoir have to be operated to meet the current demand. This is not good operating practice as there is no standby capacity.
- The total storage capacity of Mathulini Reservoir is currently 8 hours and is inadequate to meet the current demand. This places strain on the supply pipe from Mnafu Reservoir to maintain the level of Mathulini Reservoir as shown in Figure 5.48.

Figure 5.47 Analysis of historical production at Mtwalume WTP (October 2009 to October 2010).
Figure 5.48  Levels of Mnafu and Mathulini Reservoirs.

It is clear that the system needs to be viewed holistically as the inadequacy of one section of the infrastructure places strain on upstream sections.

The limited capacity of the Mtwalume WTP Supply System means that both current and future demands cannot be supplied. Recommendations on how this situation will be addressed are discussed in the following Section.
Figure 5.49  Demand on the South Coast System as at October 2010.
Figure 5.50 Five year demand projection for the South Coast System.
Figure 5.51  Ten year demand projection for the South Coast System.
Figure 5.52  Twenty year demand projection for the South Coast System.
Figure 5.53  Thirty year demand projection for the South Coast System.
5.4.3 Recommendations

Figures 5.49 – 5.53 depict the potential for growth in the South Coast System over the next five, ten, twenty and thirty years respectively. Also shown in these figures is the configuration of the system that is planned to supply this demand. This section provides the details of how each subsystem will be affected by the growth in demand over the next thirty years and how the configuration of the system will have to be altered, and projects implemented, to supply the demand.

The strategic development plan for the Upper and Middle South Coast regions is presented below. This plan utilises the available resources from the Lower Mgeni, Nungwane, Mkomazi, Mzimayi, Mzinto and Mtwalume systems in the most sustainable and cost effective manner.

- The commissioning of the SCP-1 has caused a stepped-increase in the demand to be supplied from Wiggins WTP via the SCA Pipeline. Water from the SCA Pipeline is expected to be available at the Amanzimtoti WTP, in ever reducing amounts, until 2020. Therefore, the Amanzimtoti WTP will need to remain operational in the short to medium-term.
- Complete the construction and commissioning of the SCA Booster Pump Station to ensure that the maximum capacity is achievable through the SCA Pipeline (Section 7.6.1).
- Rehabilitation and/or replacement of the pipeline from Nungwane Dam to the Amanzimtoti WTP will need to be undertaken (Section 7.6.2).
- The long-term strategy is to develop a regional bulk water supply scheme in the Hull Valley area close to Sappi Saiccor. This scheme will receive raw water from the lower Mkomazi River (Section 4.4.6) for treatment and distribution into the SCP. Potable water would be fed northwards to the Upper South Coast region and Amanzimtoti, and southwards to the Middle South Coast region. This would then allow the Amanzimtoti and Craigieburn WTPs to be fully decommissioned.
- The South Coast Pipeline is to be extended southwards in two phases. The South Coast Pipeline Phase 2a project (SCP-2a), which is to be implemented towards the end of 2011, will run between Park Rynie and Kelso (Figure 5.50). This project will provide some relief for the Umzinto and Mtwalume WTPs (Section 7.6.3). Some of their demands will be picked up by the SCP-1 from Amanzimtoti. The South Coast Phase 2b project will tie into the end of SCP-2a and will complete the section between the Scottburgh South Reservoir off-take and the Park Rynie off-take. This project will link to the Ugu District Municipality supply system from the Bhobhoyi WTP (near Port Shepstone) to add a measure of flexibility and a contingency for drought situations in either system (Figure 5.52). The timing of SCP-2b is dependant on the development of the regional BWS on the Mkomazi River.
- Quarry Reservoir will need to be upgraded in line with the increased demands off the SCP.
- Once the SCP-2 has been commissioned in its entirety, then the Mtwalume WTP can be decommissioned.
- The Umzinto WTP will continue to supply potable water to communities in the adjacent inland areas of Ugu District Municipality.
- To augment the supply from Umzinto WTP, especially during low rainfall periods as experienced during the period from March 2010 to October 2010, the supply to Umzinto WTP must be supplemented from the SCP-1 via Scottburgh South and Ellingham reservoirs (Figure 5.45).
South Coast Pipeline Phase 2a

The South Coast Pipeline Phase 2a project (SCP-2a) is currently being designed and is due for completion towards the end of August 2011 (Section 7.6.3). Upon commissioning, the SCP-2a will relieve in the order of 7 Ml/day from the Umzinto and Mtwalume WTPs (Section 5.4.2).

Once the SCP-2a has been commissioned, the immediate demand off Quarry Reservoir is expected to be:

- 8.5 Ml/day – Singh’s and Clansthal
- 2 Ml/day – Scottburgh South Reservoir (currently supplied from the SCP-1)
- 4.5 Ml/day – Kelso – Pennington supply off the SCP-2a
- 4.5 Ml/d – Supplement to the Umzinto WTP

This relates to an AADD of 19.5 Ml/day. At a peak day factor of 1.25, the immediate peak demand will be 24.4 Ml/day. The current 7.5 Ml Quarry Reservoir equates to 9.23 hours of storage on average demand and 7.38 hours of storage at peak demand.

The intention is to link the SCP-2a to the existing supply system of Ugu District Municipality.

Once connected, the SCP-2a will relieve the Umzinto WTP by supplying the coastal areas, notably the towns of Scottburgh and Park Rynie. The Umzinto WTP will continue to supply the town of Umzinto and the hinterland areas. The Umzinto WTP will also continue to supplement the Mtwalume sub-system if required. It is not known at this stage how all these changes will impact on the production requirements of the Umzinto WTP, and for this reason careful monitoring and analysis of the demands within the sub-system will be of vital importance.

The Mtwalume WTP will indirectly benefit from the SCP-2a, as a result of the benefit that will be received by the Umzinto WTP. A new pipeline linking the two sub-systems has been implemented by Ugu District Municipality.

The uptake and growth in water demands from the SCP-1 and SCP-2a pipelines will need to be monitored carefully over the next few years. Factors that will influence the demands off the SCP-1 and SCP-2a include:

- The timing of the connections between the off-takes and the distribution reservoirs (Ugu District Municipality’s responsibility);
- The nature and extent of the demand areas to be supplied from the distribution reservoirs; and
- The nature and extent of the increase in new developments that may have been delayed as a result of previous capacity constraints within the water supply system (either by virtue of water resource or infrastructure capacity constraints).

South Coast Pipeline Phase 2b

The South Coast Pipeline Phase 2b (SCP-2b) will consist of two sections. The first will join the end of the SCP-1 at the Scottburgh South Reservoir off-take to the start of the SCP-2a at the Park Rynie off-take. The second section will tie into the end of SCP-2a and run southwards to link into the Ugu District Municipality supply system from the Bhobhoyi WTP (near Port Shepstone) in the vicinity of Hibberdene. Connecting the two systems together provides a measure of operational flexibility and is a contingency for drought situations in either system. The timing of SCP-2b is dependant on the development of the regional water resource in the Lower Mkomazi System. The Lower Mkomazi System...
scheme will provide an assured supply of water to the area without being reliant on the Lower Mgeni System.

The SCP-2b will alleviate the need for any upgrade of this supply system and the Mtwalume WTP can be decommissioned once the SCP-2b is commissioned.

The existing Quarry Reservoir will serve as the central storage facility for the Lower Mkomazi WTP. The storage capacity will have to be augmented by 2012 to sustain the demand once the WSA’s connect their off-takes.

**Ellingham and Umzinto Links**

The infrastructure requirements for the Ellingham Link comprises a new pump station at the Scottburgh South Reservoir Complex. This will feed into a new 350mm diameter NB Steel pipeline to the Ellingham Reservoir. The Umzinto Link consists of a new pump station at Ellingham Reservoir, and a new 250mm diameter NB steel pipeline to the Number 1 clearwell at the Umzinto WTP (refer to Figure 5.45).

Through the implementation of this infrastructure it will initially be possible to augment the Umzinto WTP with 4.5 Ml/day from the SCP-1. Once the proposed SCP-2a has been commissioned, a further 4.5 Ml/day can be shed off the Umzinto WTP, by supplying through this link via Ellingham Reservoir.

**Singh’s Off-Take Link**

The installation of this link can assist in relieving a portion of the demand off of the Umzinto WTP. The infrastructure required for this project comprises the implementation of a new pump station at the off-take point from the SCP-1. This will feed potable water along a new 400mm diameter NB steel pipeline to the existing Craigieburn Reservoir Complex. The Singh’s Reservoir will be supplied from an off-take point along this new pipeline as shown in Figure 5.45.

Potable water can then be gravity-fed along the existing 200mm diameter Asbestos Cement (AC) pipeline to the Midnite Café and the Willowglen pump stations. The Midnite Café Pump Station supplies the Midnite Café Reservoir along a 100mm diameter AC Pipeline. The Willowglen Pump Station supplies the KwaCele and Amahlongwa reservoirs along a 150mm diameter AC Pipeline and, during emergencies, supplies the Nkonko and Hazelwood reservoirs.

The supply via the Willowglen Pump Station can support the Umzinto WTP by 3.5 Ml/day depending on the level of the Craigieburn Reservoir Complex. The implementation of this project will ensure a sustainable supply of water to maintain the Craigieburn Reservoir at acceptable levels.

**Mhlabatshane Bulk Water Supply Scheme**

Umgeni Water is currently implementing a bulk water supply scheme as part of a larger regional scheme development by Ugu District Municipality. This scheme is aimed at reducing water services backlogs in certain rural areas in the Umzumbe and Hibiscus Coast Local Municipalities. This scheme is situated within the Lower South Coast Sub-Region. Ugu District Municipality is responsible for the reticulation component of the scheme, which in its entirety, is planned to serve an estimated 101 000 people (about 15 300 households). Of this about half are currently classified as having a ‘water service backlog’.

The bulk component of the scheme will initially comprise of a dam on the Mhlabatshane River (a tributary of the Mzumbe River), from where water will be pumped to a WTP situated in close
proximity to the command reservoir. Potable water will then be sold to Ugu District Municipality from the command reservoir for reticulation through an extensive gravity-fed network to the various communities in the area. Some of the reticulation component currently exists as stand-alone schemes, with the remainder still to be installed.

When water demands from this scheme exceed the firm yield of the dam, then the intention is to develop the second phase of the project. Water will be abstracted directly from the Mzimkhulu River, pumped to the existing WTP (which will need to be upgraded) and then fed into the reticulation system via the command reservoir.

This project is described in more detail in Section 7.6.6.