5.5.2 Status Quo and Limitations

Figures 5.56 and **5.64** (schematically) illustrate the North Coast System in its current configuration and the current demands being placed on the network. These schematics should be referred to when reading this Section.

The primary source of potable water supplied to the North Coast Supply System (NCSS) is from the 45 Ml/day Hazelmere WTP. Over the last 12 months the average demand placed on the Hazelmere WTP was 39 Ml/day with peaks as high as 46Ml/day. With the demand nearing and regularly exceeding the capacity of the plant, the operation of the plant is difficult and routine maintenance on components of the plant is near impossible.

The historical demand placed on Hazelmere WTP is presented in **Figure 5.60**. It is evident from **Figure 5.60** that the current demand (40 Ml/day) placed on the WTP is near the capacity of the plant. The comparatively high supply from the WTP when compared to the plant capacity and the expected increase in future demand has necessitated the upgrading the WTP from 45 Ml/day to 75 Ml/day (98% assured yield of the raised Hazelmere Dam).

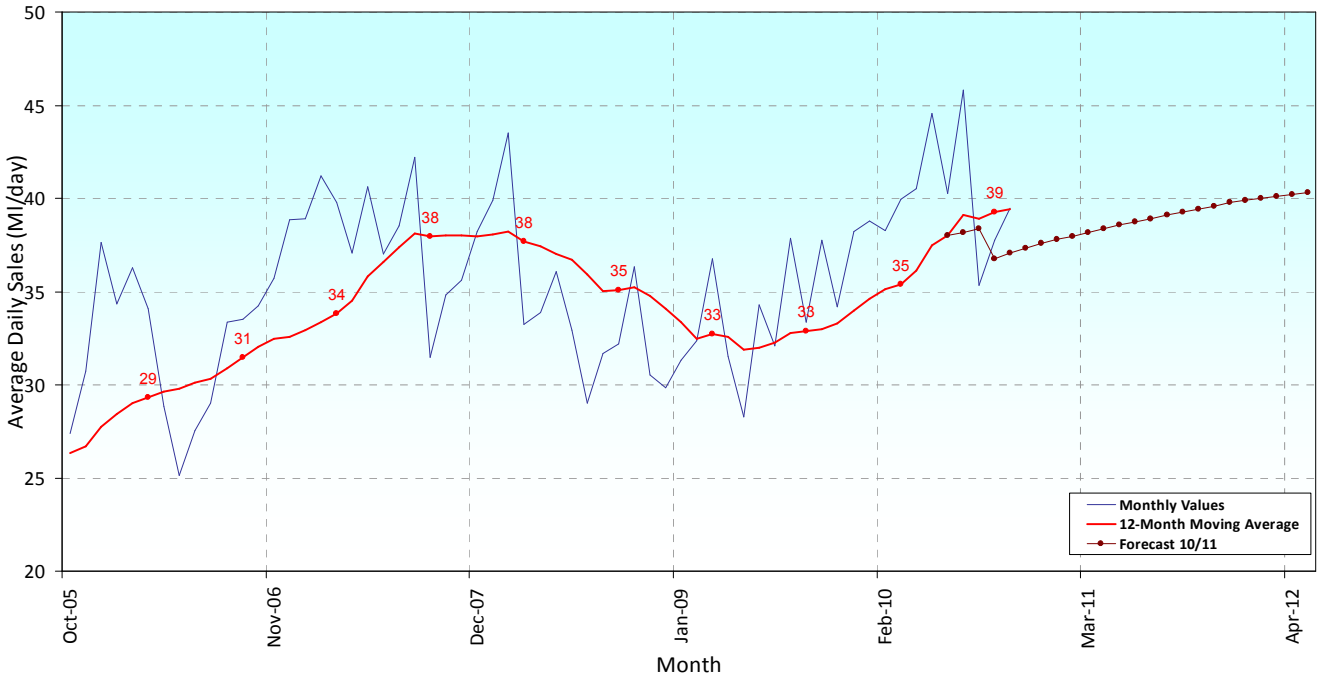

Figure 5.60 Water demand from Hazelmere WTP.

An analysis of daily historical production for the Hazelmere WTP over the past year is presented in **Figure 5.61**, and shows that for 89% of the time the WTP was being operated above the optimal operating capacity (80% of design capacity) and for 32% of the time the WTP was operated at above design capacity.

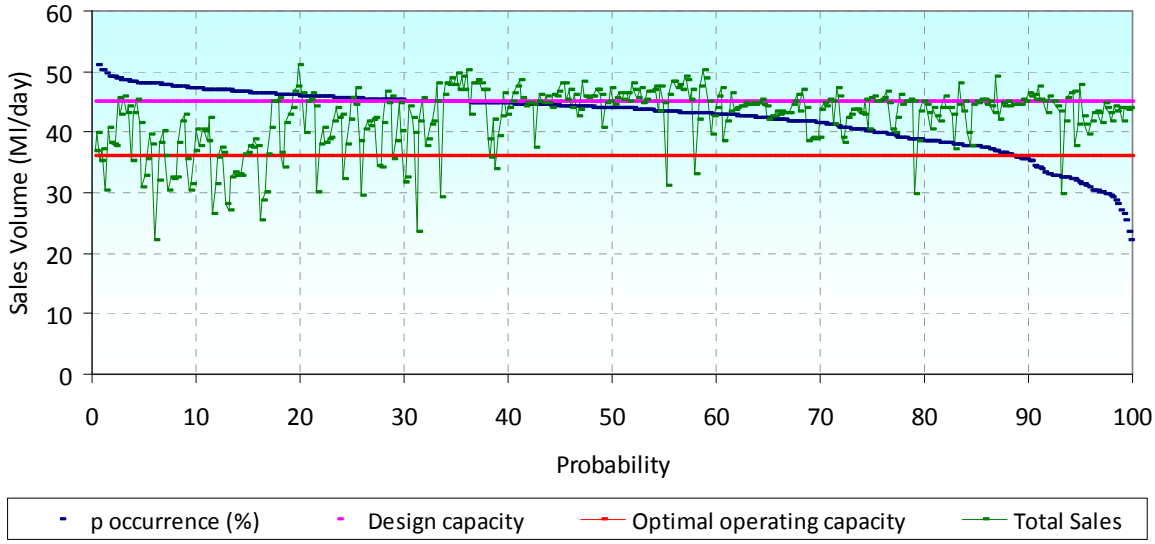

Figure 5.61 Analysis of historical production at Hazelmere WTP (October 2009 to October 2010).

The town of KwaDukuza is supplied from the Mvoti WTP via the Mvoti Balancing Reservoirs. The average demand placed on the WTP over the past year was 16.95 Ml/day. The design capacity of the WTP is 12.5 Ml/day. Four additional pressure filters have recently been installed and these have increased the capacity of the filters to 15.5 Ml/day, however, the 12.5Ml/d capacity of the clarifiers still limits the plant capacity to 12.5Ml/d. This is well below the demand and the system is difficult to manage and to maintain acceptable water quality standards.

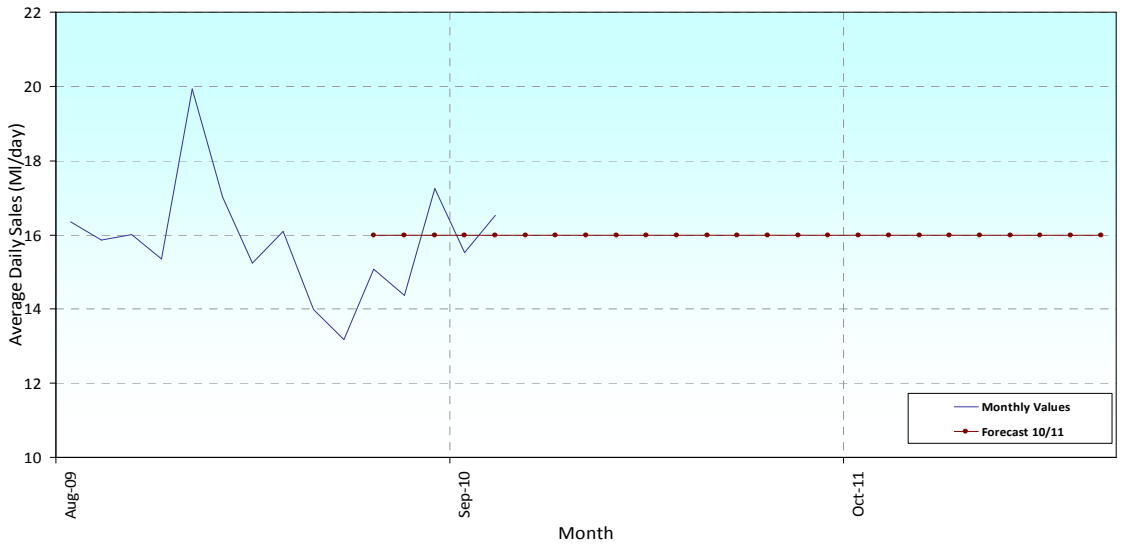

Figure 5.62 Water demand from Mvoti WTP.

An analysis of daily historical production for the Mvoti WTP over the past year is presented in **Figure 5.63**, and shows that for 99.5% of the time the WTP was being operated above the optimal operating capacity and for 98.7% of the time the WTP was operated at above design capacity. Supply from this plant can be augmented to a limited extent from the Hazelmere WTP when required.

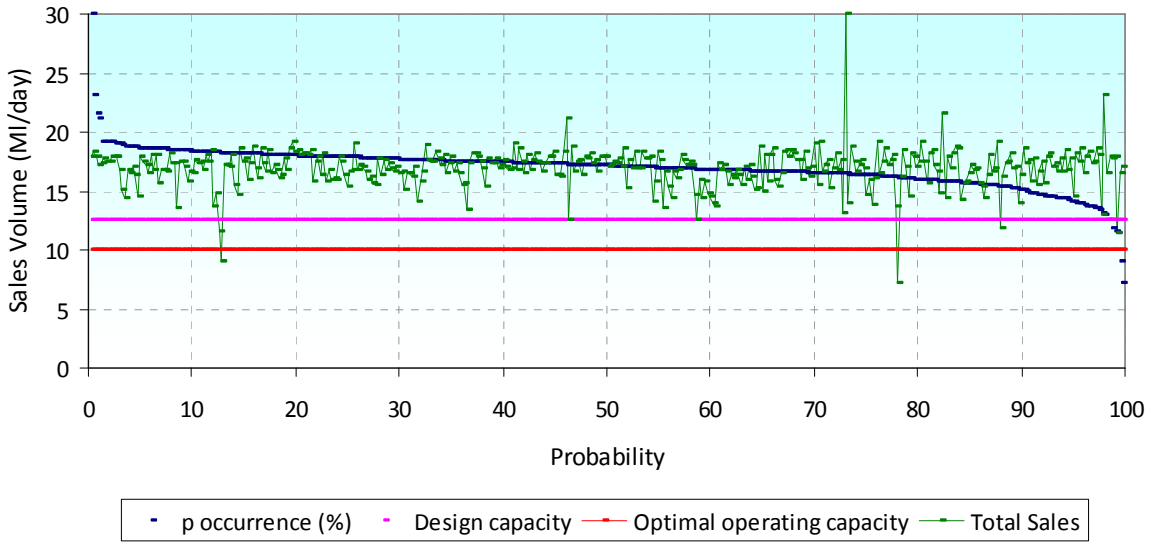

Figure 5.63 Analysis of historical production at Mvoti WTP (October 2009 to October 2010).

The total current demand, together with a breakdown of sales throughout the NCSS, is presented in **Figure 5.64**. There is potential for growth in the demand for water in the area currently supplied by the NCSS. Identified development nodes include:

- The Phase 1 of the Cornubia Housing Development, planned by eThekwini Municipality near Verulam, has already commenced. This project has a projected growth over the next 30 years to 60000 residential housing units and industrial and commercial sites.
- The King Shaka International Airport, which became operational on the 1st May 2010. Demand from the airport, associated Dube Trade Port and other developments surrounding the area is expected to grow to greater than 20 Ml/day over the next five to ten years.
- More than 70 development projects are proposed within the area covered by the NCSS. These include up market housing developments such as Blythedale and Royal Palm Estates, low cost housing developments such as the Etete Low Cost Housing Projects and the Nonoti Land Restitution Project and commercial and industrial developments.

The current economic climate has resulted in a slowdown in the housing development sector. However, many of the developments are still likely to be implemented although the timing of them is expected to be delayed or extended.

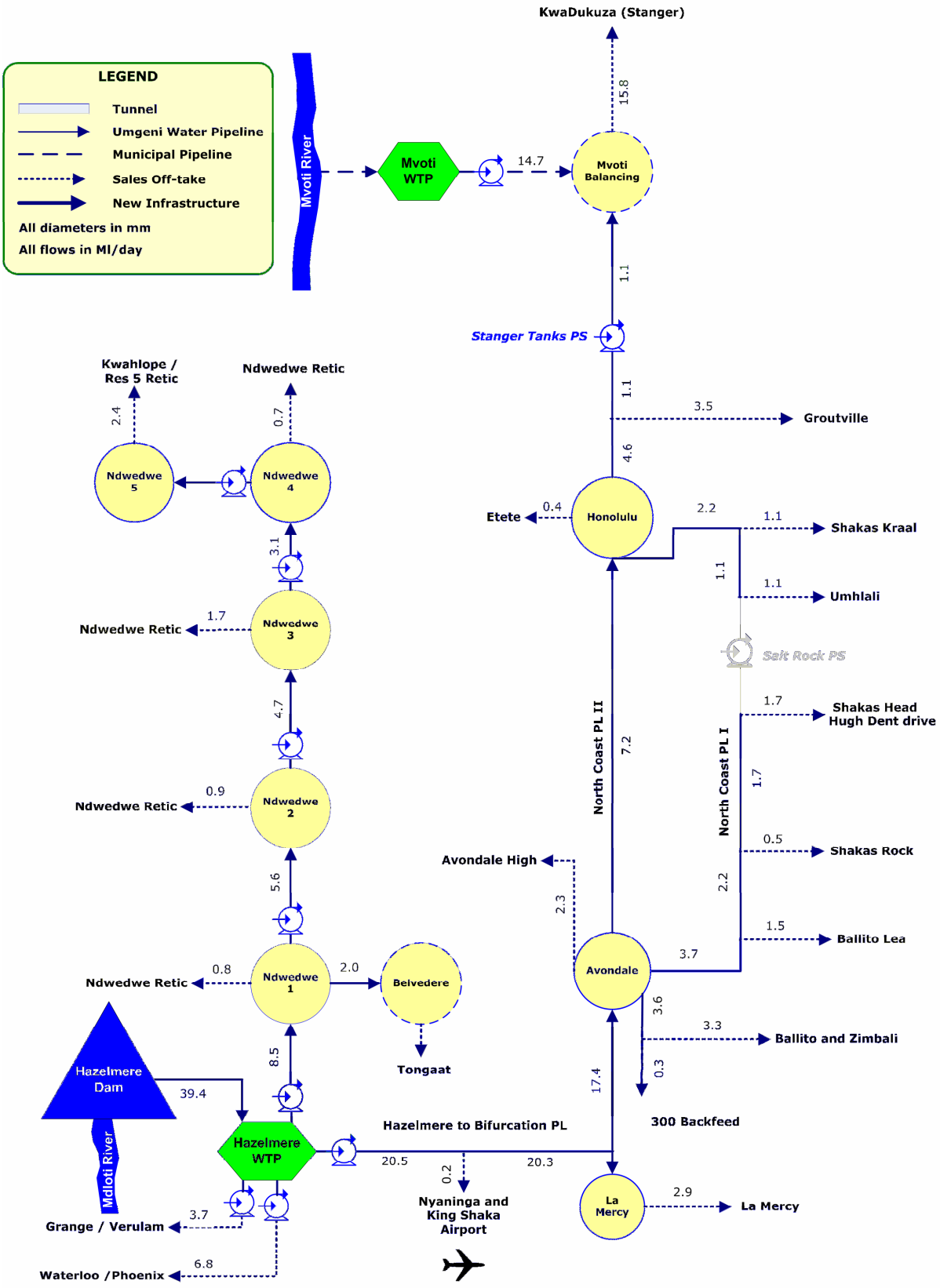

Figure 5.64 Demand on the North Coast Supply System as at October 2010.

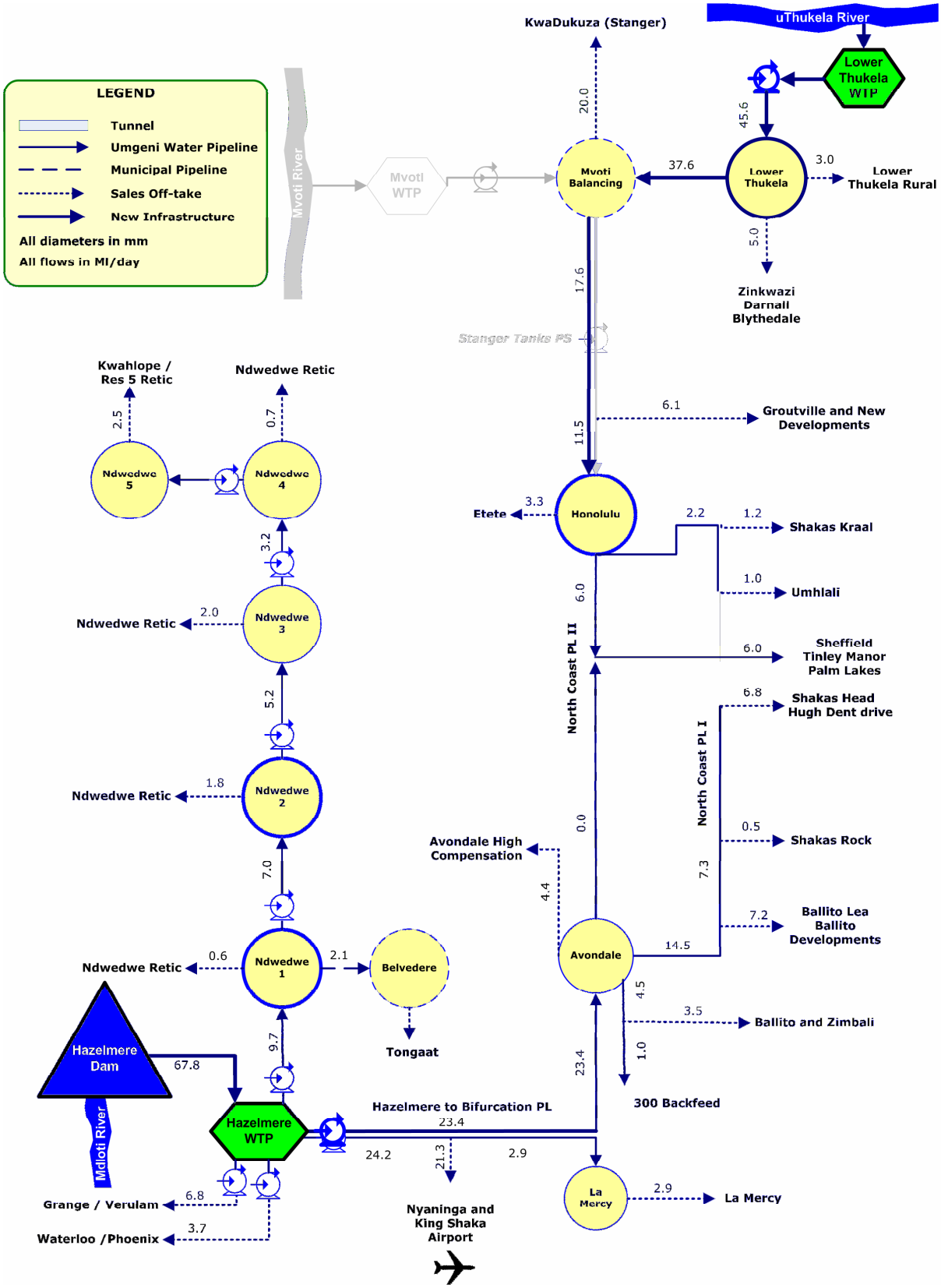

Figure 5.65 Five year demand forecast for the North Coast Supply System.

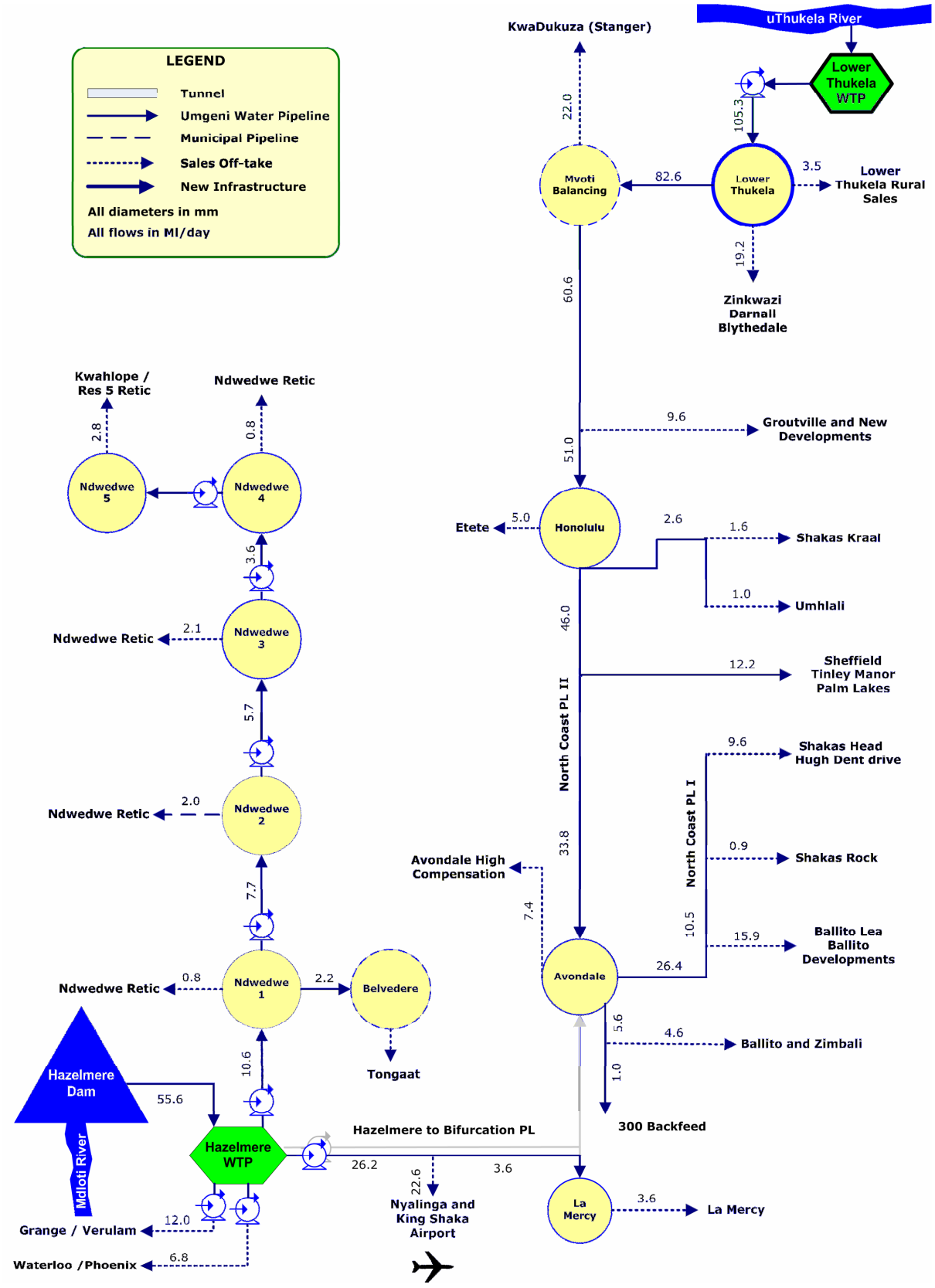

Figure 5.66 Ten year demand forecast for the North Coast Supply System.

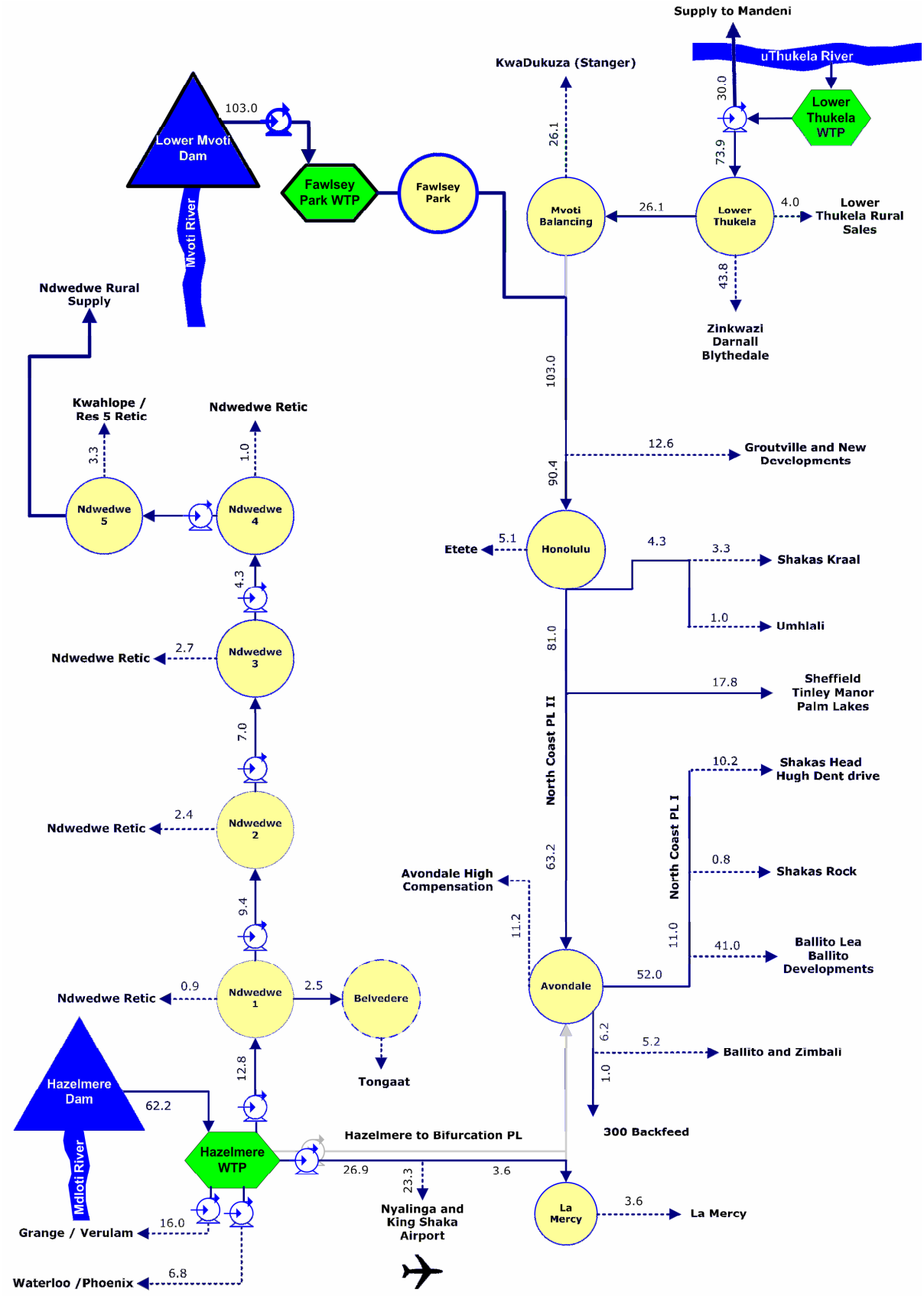

Figure 5.67 Twenty year demand forecast for the North Coast Supply System.

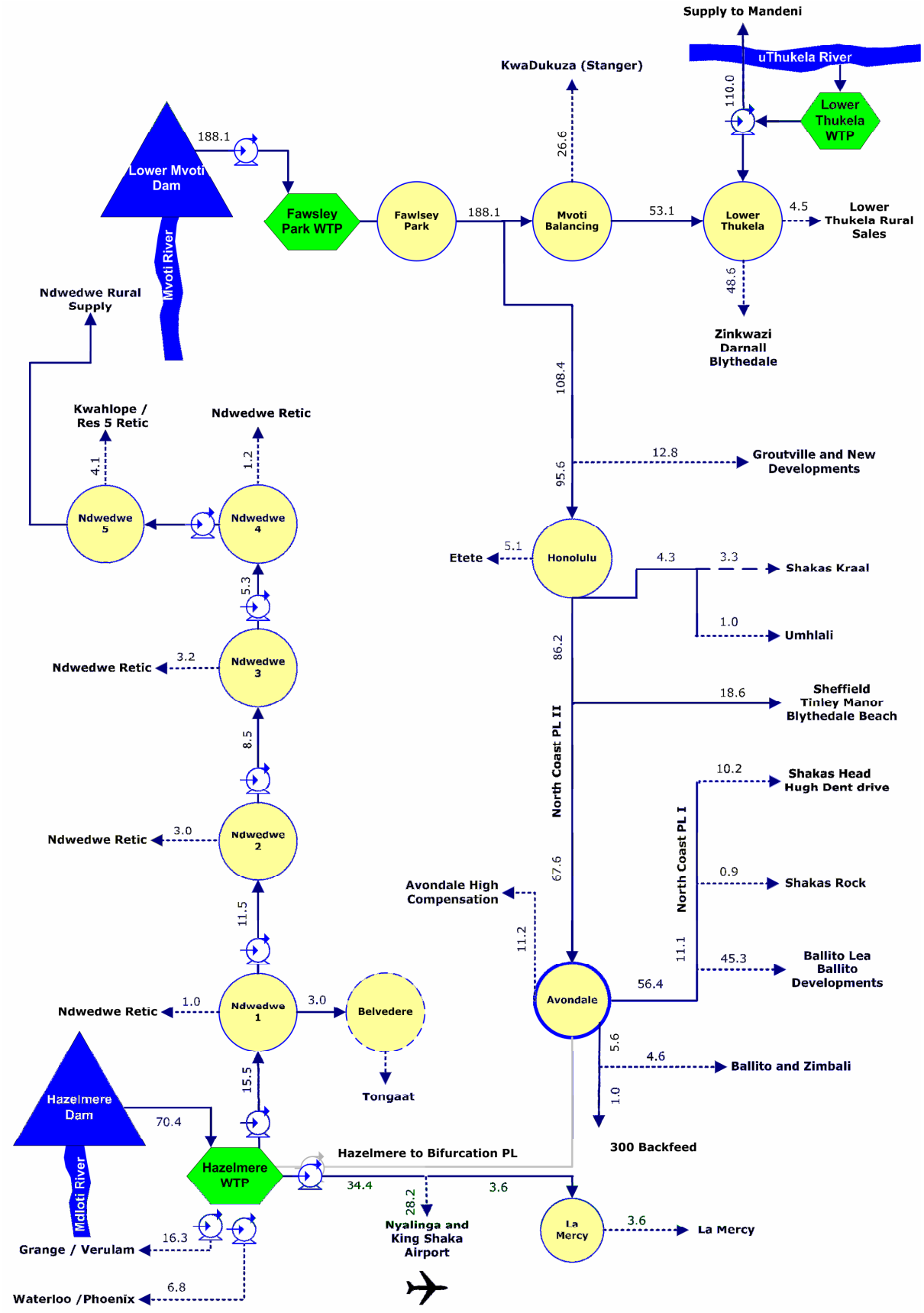

Figure 5.68 Thirty year demand forecast for the North Coast Supply System.

5.5.3 RECOMMENDATIONS

Figures 5.65 - 5.68 depict the potential for growth in the NCSS 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. The following section provides the details of how each subsystem of the NCSS 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 Water Reconciliation Strategy Study for the KwaZulu-Natal Coastal Metropolitan Areas (**Section 2.8.1**), inter alia, looked at a strategy in which the water resources of the KwaZulu-Natal North Coast could be augmented in the future. The scenarios considered as future augmentation options included the following:

- Raising of Hazelmere Dam and upgrade of the Hazelmere WTP (**Section 7.7.1**).
- The Lower Thukela Bulk Water Supply Scheme (**Section 7.7.4**).
- A new dam on the Mvoti River (e.g. the Welverdient or Isithundu Dam) with an associated regional WTP.

Results from this study show that the raising of the full supply level of Hazelmere Dam is the most cost effective and quickest means of augmenting the water resources on the North Coast. Following this, the Lower Thukela Bulk Water Supply Scheme (BWSS) would be the most practical scheme (and next quickest) to implement to supply additional water to the coastal region of the North Coast. This scheme would be required to augment the water supplies of the Hazelmere Supply System as the Hazelmere Dam raising on its own does not have sufficient resource to supply the demand in five to ten years time. It is anticipated that the conveyances of the Lower Thukela BWSS would be able to take water from the uThukela River down to the Ballito area via the North Coast Pipeline II (**Figures 5.65 – 5.68**).

DWA has confirmed that there is initially 20 million m^3/annum (approximately 55 Ml/day), and up to a maximum of 40 million m^3/annum (approximately 110 Ml/day) of firm yield available from the uThukela River close to its mouth. DWA's Directorate National Water Resource Planning has agreed that this yield is available for abstraction, treatment and supply to the KwaDukuza and Mandini areas. This available yield is a combination of natural flows in the uThukela River and unused yield in dams in the upper uThukela catchment.

The scheme that would take the longest to implement, and is most likely to be the most expensive, would be to develop a dam on the Mvoti River, at either Welverdient or Isithundu. This scheme would feed into the NCSS to augment the water supplies of the Hazelmere Supply System.

The strategic development plan for the region, that would utilise the available resources from the Mdloti, Thukela and Mvoti systems in the most sustainable and cost effective manner, is presented below. Details are provided in the paragraphs that follow.

- Initially supply the NCSS from Hazelmere Dam via the Hazelmere WTP.
- Raise the full supply level of Hazelmere Dam to increase its firm yield and upgrade the Hazelmere WTP to supply up to 75 Ml/day to the NCSS. In addition to the upgrade of the WTP, pump stations and pipelines within the NCSS will have to be augmented to ensure the demand placed on the system does not exceed the capacity of the infrastructure. Pipelines that are constructed as part of this augmentation process will be built with the ability to allow for bi-directional flow to ensure that in the future water can be brought south from a WTP situated at the uThukela River or the Mvoti River.

- Construct an abstraction works on the uThukela River with a regional WTP and associated infrastructure to supply water south to KwaDukuza Local Municipality and north to Mandini Local Municipality. This system would link into the NCSS. The WTP would be constructed to initially serve 55 Ml/day and when demands dictate it would be upgraded to 110 Ml/day.
- Develop water resource infrastructure on the Mvoti River, either at Welverdient or Isithundu with a regional WTP and associated supply infrastructure to further augment the NCSS. At some stage in the future, the long-term water demands to the north of the uThukela River may require the full (or majority of) allocation from the Lower Thukela WTP. In this scenario potable water may need to be supplied northwards from the NCSS (i.e. towards the Lower Thukela WTP) to meet the demands on the southern side of the uThukela River.
- Develop a desalination plant to link into the NCSS as a long-term strategy that would be implemented as and when demands are predicted to exceed supply from the other systems.

The infrastructure to be constructed, as detailed above, would incur high capital cost and as such the philosophy is to only develop the schemes as and when demand dictates. With the long lead time in feasibility and design of projects of this size and nature, the intention is to undertake the feasibility investigations and design of the schemes as early as possible and then to implement the schemes as and when demand dictates.

The following sections detail the recommendations for development within each subsystem.

Hazelmere Water Treatment Plant

Growth in water demand at the Hazelmere WTP is expected to rise over the next five years to an amount greater than the capacity of the plant (**Figure 5.65**). The Mdloti system is constrained by the amount of water available from Hazelmere Dam. The current 98 % assured yield of the dam is 55 Ml/day. DWA are in the process of raising the height of the Hazelmere Dam wall through the installation of radial gates. This project is expected to be completed in March 2013 and will increase the 98% assured yield of the dam to 75 Ml/day. In order to meet the projected growth in demand in the region, and to make use of the additional yield that will soon become available, it is necessary to upgrade the Hazelmere WTP. The intention is to initially upgrade the Hazelmere WTP to 75 Ml/day (**Section 7.25**) with the possibility of increasing the size of the works to 90Ml/day (95% assurance of supply) at a later date if needed. The raw water pipeline between the dam and the WTP also needs to be augmented to match the upgraded capacity of the WTP (**Section 7.7.1**).

The increase in yield that will be available once the dam has been raised is reliant on the ecological reserve of the Mdloti River below the dam not being implemented immediately. The ecological reserve is to be implemented in a phased manner according to a DWA developed strategy.

Since the growth in demand is expected to increase to greater than the 75 Ml/day assured supply from Hazelmere Dam, an additional source of water for supply to the NCSS will be required in the medium to long-term. The uThukela River has an available yield of 110 Ml/day and is considered to be the most feasible additional source of water to the system. Umgeni Water is in the process of undertaking a feasibility study on the Lower Thukela Bulk Water Supply Scheme (**Section 7.7.4**) with the intention of constructing this scheme within the next five to ten years.

Figures 5.65 – 5.60 show the interlinking of the Lower Thukela Bulk Water Supply Scheme into the NCSS. This scheme has the potential to provide water as far south as Ballito or even La Mercy if required.

An alternative option is to develop a scheme on the Mvoti River to augment the NCSS. Various Mvoti options were assessed by DWA in conjunction with Umgeni Water and are discussed in **Section 4.4.2**. Factors influencing these assessments have changed subsequent to the study. It is now necessary to review the findings of the selection process in order to confirm the preferred development option before any planning investigations can be concluded. DWA plans to undertake a review of the previous study and to undertake any further detailed water resource development investigations that are required. Lagging slightly behind these investigations, Umgeni Water intends undertaking its own detailed investigations into the associated WTP and supply infrastructure to the NCSS. **Figures 5.67 – 5.69** show the interlinking of the Lower Mvoti Bulk Water Supply Scheme into the NCSS. This scheme will also have the potential to provide water as far south as Ballito or even La Mercy if required.

Hazelmere/Verulam Sub-System

The demand at Verulam (Grange) is expected to increase over the next 30 years as shown in **Figures 5.65 – 5.68**. This growth is attributed to the development of Cornumbia and the requirement to shed the Verulam demand back to Hazelmere WTP. This would reduce the impact that this demand has on the Durban Heights WTP and in particular eThekwini Municipality's Northern Aqueduct. The sales point for this subsystem is at the Hazelmere WTP and hence the only infrastructure that is affected by the growth in demand is the WTP itself and the Verulam Pump Station.

Hazelmere/Phoenix Sub-System

Natural growth in demand in Phoenix (Waterloo) is predicted as per **Figures 5.65 – 5.68**. The sales point for this subsystem is at the Hazelmere WTP and hence the only infrastructure that is affected by the growth in demand is the WTP itself and the Waterloo Pump Station.

Hazelmere/Ndwedwe Sub-System

The comparatively high demand placed on the Ndwedwe Reservoirs 1 and 2, when compared with the size of the reservoirs, has made the management of the pumping systems in the Ndwedwe Sub-system difficult. The intention is to upgrade the storage at both Ndwedwe Reservoir 1 and Ndwedwe Reservoir 2 by constructing a further 2 Ml reservoir at each site. Further information relating to this project is presented in **Section 7.7.2**. The pipeline infrastructure for this subsystem has sufficient capacity to supply the required demand over the next thirty years. It is not expected that the pump stations within this subsystem will need to be upgraded within the next ten years.

Long-term plans are to extend the Ndwedwe system into the rural backlog areas of northern Ndwedwe Local Municipality.

Hazelmere/La Mercy/Avondale Sub-System

Supply to the Avondale Reservoir and the areas north of Ballito will increase to greater than 20 Ml/day over the next five years. This coupled with an increase in demand expected from the new KSIA will mean that the demand on the Hazelmere to Bifurcation Pipeline will be greater than the available capacity of the pipeline. Hence, the intention is to augment the Hazelmere to Bifurcation pipeline through the construction of a new bi-directional 700 mm diameter pipeline (**Section 7.7.1**) together with a new pump station at the Hazelmere WTP. This line will be linked to the existing 700 mm diameter pipeline from Bifurcation to Avondale and will become a dedicated supply to Avondale Reservoir. This line can be reversed to supply water from Avondale Reservoir to the northern suburbs of eThekwini Municipality if necessary. After the construction of the 700 mm Hazelmere to

Bifurcation Pipeline, the existing 450 mm diameter Hazelmere to Bifurcation Pipeline will be dedicated to supply the Airport and La Mercy Reservoir.

Avondale/Honolulu Sub-System

Umgeni Water has recently completed the augmentation of the North Coast Pipeline. The 1 000 mm to 800 mm diameter North Coast Pipeline II (NCP-2) provides sufficient capacity between Avondale and Honolulu for supply over the next 30 years. This pipeline has been constructed to transport water in both a northerly and southerly direction. In **Figure 5.55** the pipeline supplies water from the Hazelmere System north as far as KwaDukuza. In **Figures 5.65 – 5.68** the pipeline is reversed to supply water from the Lower Thukela BWSS to Avondale Reservoir and the southern areas of the NCSS. The North Coast Pipeline I (NCP-1) is now used to supply users along the pipeline from Avondale to Salt Rock in a northerly direction and is also used to supply south from Honolulu Reservoir to off-takes along the pipeline route including Shakas Kraal. The Salt Rock Pump Station will now only be used in emergency situations.

Honolulu/KwaDukuza Sub-System

The current supply to the Mvoti Balancing Reservoirs from the Hazelmere System is constrained to 2.6 Ml/day by the capacity of the Honolulu to KwaDukuza Pipeline and the Stanger Tanks Pump Station. An 800 mm diameter pipeline and new pump station are being constructed to augment the supply from Honolulu Reservoir to the Mvoti Balancing Reservoirs (**Section 7.7.3**). The pipeline and pump station will supply water from Honolulu to KwaDukuza until the commissioning of the Lower Thukela BWSS. Thereafter the supply to Mvoti Balancing Reservoirs will be from the Lower Thukela BWSS and the flow in the Honolulu to Mvoti Balancing Reservoirs Pipeline will be reversed to bring water from the northern areas of the NCSS to the south (**Figures 5.65 – 5.68**).

Mvoti Water Treatment Plant and Supply System

After commissioning the North Coast Pipeline II it is possible to augment the supply of water to KwaDukuza through the Honolulu to Mvoti Balancing Reservoirs Pipeline by 2.6 Ml/day. This is sufficient to relieve the immediate pressure on the Mvoti WTP, however, the plant is still running at a level greater than its design capacity and maintenance on filters and clarifiers is near impossible. The supply to the Mvoti Balancing Reservoirs will be increased once the Honolulu to Mvoti Balancing Reservoirs Pipeline is constructed. This will allow a reduction in supply from the Mvoti WTP such that the plant can be managed and maintained correctly. The intention is for the Mvoti WTP to be decommissioned once the Lower Thukela BWSS is able to provide water to the Mvoti Balancing Reservoirs.

5.6 Upper Mvoti System

5.6.1 Description

There are currently no large bulk water supply schemes that draw water from the upper reaches of the Mvoti River to supply the inland regions of both the Umzinyathi and Ilembe District Municipalities. Where it exists, water supply is generally provided through small stand-alone reticulation schemes.

In July 2007 Umgeni Water became the bulk potable water provider to Ilembe District Municipality (excluding the Mandini Local Municipality) and as such has the responsibility of assessing all areas within the municipality for bulk water provision. The local municipalities of Ndwedwe and Maphumulo are positioned inland within the Ilembe District Municipality. These local municipalities are recognised as having a high percentage of backlogs (**Sections 2.6 and 2.7**) and Umgeni Water has initiated a number of feasibility investigations to assess the options of serving bulk potable water to areas within Ndwedwe and Maphumulo in the short, medium and long-term.

In addition, the WTP at Ngcebo has been upgraded and both a 19.9 km 150 mm diameter pipeline and a 1.9 km 80 mm diameter pipeline have been constructed to serve the backlog areas of Ngcebo. This scheme will ultimately serve a 155 km^2 rural area.

5.6.2 Recommendations

Short to medium-term bulk water supply schemes have been investigated to supply potable water to communities within the Maphumulo Local Municipality. This includes the Maphumulo Bulk Water Supply Scheme (**Section 7.7.5**). Construction of the Maphumulo Bulk Water Supply Scheme Phase 1 commenced in May 2010 and the first supply of water to the town of Maphumulo, through this scheme is expected in September 2011.

As a long-term solution to provide a sustainable regional water supply to the region, DWA intend investigating the feasibility of constructing the Mvoti-Poort Dam in the upper reaches of the Mvoti River near Greytown. This would provide the raw water source for the proposed Upper Mvoti BWSS, a regional scheme to supply both the Umvoti Local Municipality (within the Umzinyati District Municipality) as well as Maphumulo Local Municipality within the Ilembe District Municipality. This scheme would link into both the Ngcebo and Maphumulo schemes under gravity thereby either augmenting or replacing their water sources.

The short to medium-term strategy to supply bulk potable water to the Ozwathini area, situated in the inland portion of the Ndwedwe Local Municipality, is to develop the Ozwathini Bulk Water Supply Scheme (**Section 7.7.6**).

The long-term strategy will be to construct Phase 3 of the Wartburg Pipeline, which comprises an extension of the existing Wartburg Pipeline from Dalton, where it currently terminates, through to Ozwathini. The Wartburg Pipeline is supplied with potable water from the D.V. Harris WTP on the Mgeni System. This supply of water will either supplement or replace the supply to the area from the Ozwathini BWSS. An extension of this bulk supply system could also provide water to the northern backlog areas of the Ndwedwe Local Municipality that are not served from the existing Ndwedwe Supply System.