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Water Requirements Workshop: Background Information Document

1 May 2014

Water Reconciliation Strategy for Richards Bay and Surrounding Towns

Department of Water Affairs

Contents

Appendices (separate document)

1 Introduction

1.1 Background

Richards Bay is the economic centre of the uMhlathuze Local Municipality which comprises Empangeni, Ngwelezane, Nseleni, Esikhaleni and a number of rural villages. Richards Bay is one of the strategic economic hubs of the country. Though the water resources available to uMhlathuze Municipality are currently sufficient to cater for the existing requirement, should the anticipated growth rate and industrial development materialise the current water source may come under stress.

1.2 Objectives of the Study

The objective of the study is to develop a strategy (to 2040) to ensure adequate and sustainable reconciliation of future water requirements within the uMhlathuze Local Municipality with potential supply, especially that of Richards Bay / Empangeni, their significant industries, as well as the smaller towns and potential external users that may be supplied with water from the system in future.

1.3 Study area

Richards Bay is an established city with well-developed industries, commercial areas and business centres. Significant industries include Mondi Richards Bay, Richards Bay Minerals, Tronox, Foskor, Hillside and Bayside Aluminium (BHP Billiton) and the Richards Bay Coal Terminal. Significant development is currently taking place in the town, particularly in the industrial development zone (IDZ), adjacent to the Richards Bay Harbour. The study area includes the Mhlathuze catchment, but focuses on the uMhlathuze Municipality water supply area, and potential future supply areas outside the uMhlathuze Municipality/Mhlathuze catchment.

In the study area, water is sourced from the Mhlathuze River, various natural lakes in the catchment, and augmented by transfers from the Thukela River (via the Middledrift transfer scheme), and the Mfolozi River. Significant growth in water requirements has been experienced in recent years, and this trend is expected to continue, driven primarily anticipated by growth industrial development.

The study area is shown on the following page (Figure 1-1).

1.4 Purpose and scope of this Report

The purpose of this report is to develop a set of scenarios for long-term water requirements for Richards Bay and the surrounding areas. The focus of this evaluation will be on the water requirements of the major industries which utilise about four times the domestic water requirements of the strategy area.

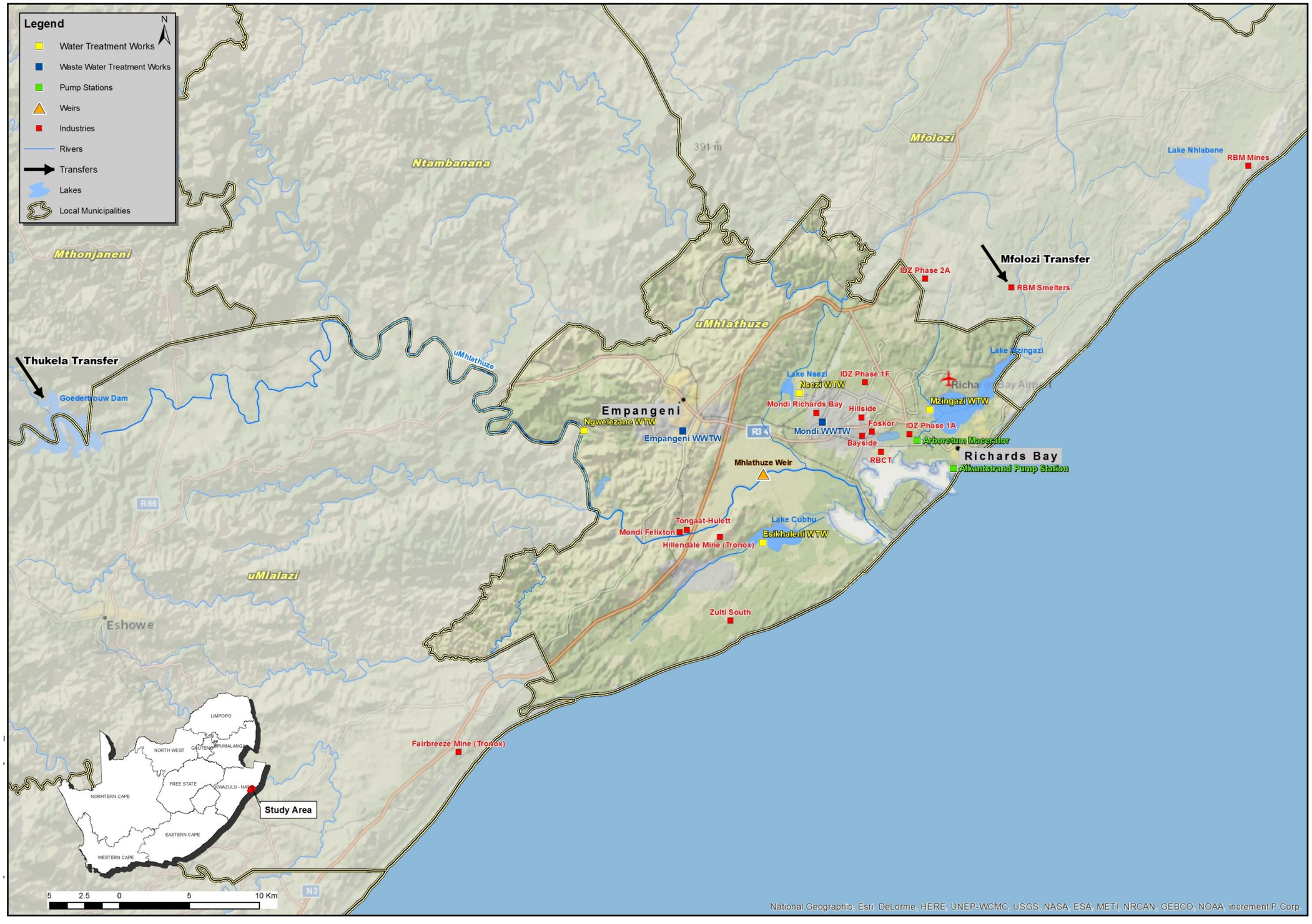

Figure 1-1: Locality Map of the uMhlathuze Local Municipality

1.5 Approach and methodology

Good forecasts are scenario based, and seek to understand the key drivers of demand, and the factors that will affect changes in these drivers over time.

Within an urban context, the most important base drivers of demand are two-fold:

- Economic activity
- Population growth

These two factors are interlinked to some extent, as high levels of growth in economic activity will increase the levels of immigration into the area, whereas depressed economic activity may result in migration away from the area to other centres with higher economic activity, growth and employment opportunities.

Other factors which will affect water requirements include:

- Water use efficiency and technology change
- Climate change
- Pricing
- Management effectiveness
- Ecological requirements (the Reserve)

Therefore it is useful to have some understanding of the dynamics affecting each of these, and on the basis of this understanding, to develop a set of scenarios of future water demand.

With regard to economic activity, the pace at which the Richards Bay key industries and IDZ grows, and the nature of the economic activities within the Richards Bay IDZ will have a very significant effect on future water demand. This is the key driver for future water use.

History is not linear and it is not ideal to extrapolate into the future based on an analysis of the past. Nevertheless, it is important to understand how water demand has grown in the past and what factors have contributed to this growth. What is learnt in the process of understanding water demand is more important than the scenario forecasts. These forecasts should be revised as events unfold.

2 Historical water use

2.1 Background

2.1.1 Introduction

The average increase in raw water abstraction has been nearly 2.5% p.a. since 2006. It is anticipated that water requirements in the Richards Bay area will continue to increase.

2.1.2 Water supply sectors

The water supply sectors in the study area consist of industrial, domestic, irrigation and commercial forestry users.

2.1.2.1 Industry

Industrial water requirements are very significant. Large industrial users in the vicinity of the city include Mondi Richards Bay, Foskor, Hillside and Bayside Aluminium and the Richards Bay Coal Terminal (RBCT). Outside Richards Bay are Richards Bay Minerals (RBM), which is in the Mfolozi local municipality and Tronox, which includes the Hillendale and Fairbreeze Mines (the latter in the uMlalazi local municipality). Other industrial water users include the Tongaat-Hulett sugar mill and Mondi Felixton plant, both in Felixton, and the light-industry in Richards Bay and Empangeni.

2.1.2.2 Domestic

The main urban centres in this area are Richards Bay and Empangeni. These account for approximately half of the non-industrial use of potable water. The remaining potable water supply is distributed to the smaller towns and rural areas. The former include Esikhaleni, Nseleni, Felixton and Ngwelezane, while the latter mostly consist of tribal areas and farming communities. A small transfer is made out of the uMhlathuze Municipality, from the Nseleni treatment works to Ntambanana, but otherwise the water treated in the municipality is consumed within it.

2.1.2.3 Irrigation

The large-scale agricultural activity consists principally of sugar-cane and citrus, both irrigated and dryland, and commercial forestry, owned mostly by Sappi and Mondi. Forestry and dryland agriculture, not requiring irrigation volumes, are not direct water-users, but they do intercept rainfall, reduce runoff and therefore count as stream-flow reduction activities.

Irrigation is a use that has received significant attention previously, in the determination of allocation and legal water-uses. It will not be examined in detail here: the most accurate values that have been determined to date will be used.

2.1.2.4 Plantation forestry

Commercial forests are owned mostly by Sappi and Mondi. Forestry does not directly use water, but they do intercept rainfall and reduce runoff.

2.1.3 Water management

The water resources in this area are managed mostly by the uMhlathuze Local Municipality and Mhlathuze Water. uMhlathuze Municipality controls the Lake Mzingazi and Cubhu supply schemes, as well as abstractions from the Mhlathuze River, excepting those at the Mhlathuze Weir, which are the responsibility of Mhlathuze Water, as is the supply from Lake Nsezi. Some of the Mhlathuze River catchment is part of a Government Water Control Area (GWCA).

2.1.4 Study area delimitation

Although the main focus of this study is the uMhlathuze Local Municipality, some areas outside of it are relevant to the study as well. RBM, in the Mbonambi Municipality, in addition to abstractions from Lake Nhlabane and the Mfolozi River, is supplied with water from the Nsezi treatment works, which is in the uMhlathuze municipality. Also, RBM's Zulti South development, in the vicinity of Esikhaleni, abstracts from the Mhlathuze Weir, and as this mine becomes fully operational, will require more water, which will further impact on the uMhlathuze system. Thus RBM and hence the Mbonambi municipality need to be considered in this study.

Secondly, the Fairbreeze mine, owned by Tronox, is situated in the uMlalazi Local Municipality but is scheduled to be supplied from the Mhlathuze Weir. The other Tronox mine, Hillendale, is both situated in and supplied with water from the uMhlathuze system. This mine is in the process of being decommissioned and will be replaced by the Fairbreeze mine, which will integrate with the existing water supply scheme to Hillendale.

Potable water is also supplied from the Nseleni works to a rural area beyond the municipal boundary (to Ntambanana Local Municipality).

Therefore, although the study area is intended to cover only the uMhlathuze Local Municipality, it is necessary to consider some of the surrounding municipalities as well and their intended use of water resources that also impact on this study area.

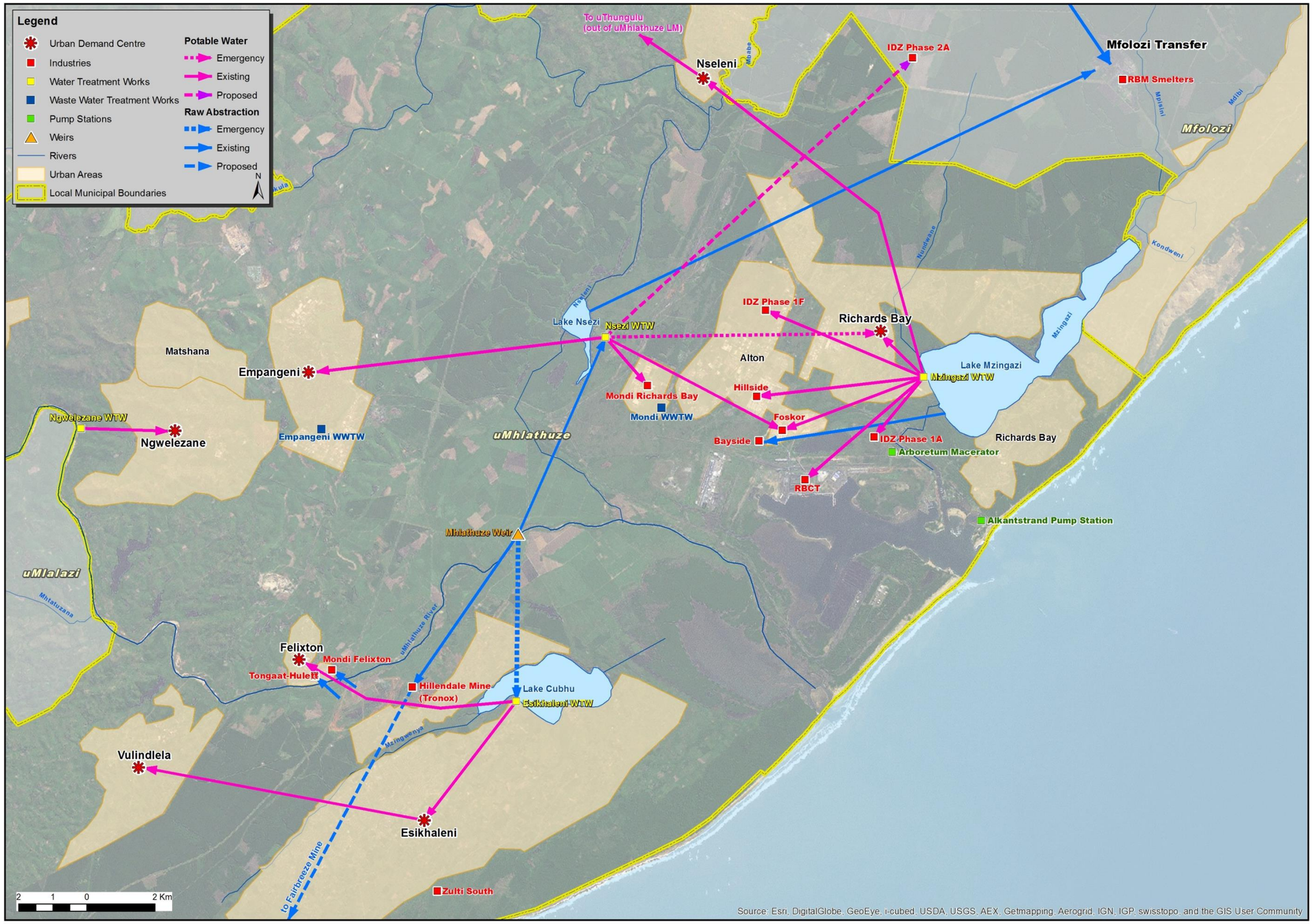

Figure 2-1: Water Supply Systems

2.1.5 Water efficiency

A preliminary assessment of the level of water use efficiency and the level of Non-Revenue Water (NRW) in the City of uMhlathuze water supply area, indicated that the total system losses in the supply area is approximately 31% of the treated water production. The City of uMhlathuze has implemented some water conservation and water demand management measures in Richards Bay. Their 5-year Strategic Management Plan for implementation of WC/WDM is in place and has identified that a target of about 19% Non-Revenue is the minimum practical achievable goal, becoming prohibitively expensive to better that target.

Mhlathuze Water has a Water Resources Management Unit which raises awareness and undertakes education campaigns on water conservation. Mhlathuze Water has been implementing the Working for Water Programme for the Department of Water Affairs (DWA) since 2003.

Many of the large industries reuse stormwater, recycle water and have implemented other water efficiency measures – see **Appendix B**.

2.1.6 Outstanding Information

In a number of the following sections there is information that has not yet been received or verified. In cases where water-use figures could not be verified, the best estimate is presented and justification given.

Where there was more than one data source for water-use amounts, the order of the discrepancy was considered and a decision reached. For example, for both Mondi and Foskor, the volumes supplied by Mhlathuze Water were reported differently by Mhlathuze Water and the users. There may be several reasons for the discrepancy – losses, differences in metering systems etc. – but lacking any further information the larger values were used, so as to give conservative answers.

The legal use for Mondi as recorded in the 2012 document 'Mhlathuze Catchment – Modelling Support for Licensing Scenarios Study' by WRP (ref 16) is 54.75 million m^3/a, as opposed to the 36.5 million m^3/a given by Mhlathuze Water and 32.85 million m^3/a given by Mondi. It is important that this anomaly is resolved.

Figures for the supply of raw water from Lake Nsezi to RBM by Mhlathuze Water were provided by both RBM and Mhlathuze Water – RBM's figures were larger and therefore were adopted.

Historical usage statistics were not available for several industries including Hillside and Bayside Aluminium, RBCT, Mondi Felixton and Tongaat Hulett. Assumptions were made for the historical use, but it is of course preferable to use accurate figures should they become available.

2.2 Major industries

Descriptions of the individual industries are given in **Appendix C**, along with historical water-use and allocations.

Mondi and Richards Bay Minerals are by far the largest water users, with Tronox and Foskor being significant water users. The 2013 industrial water use was 67 million m^3/a.

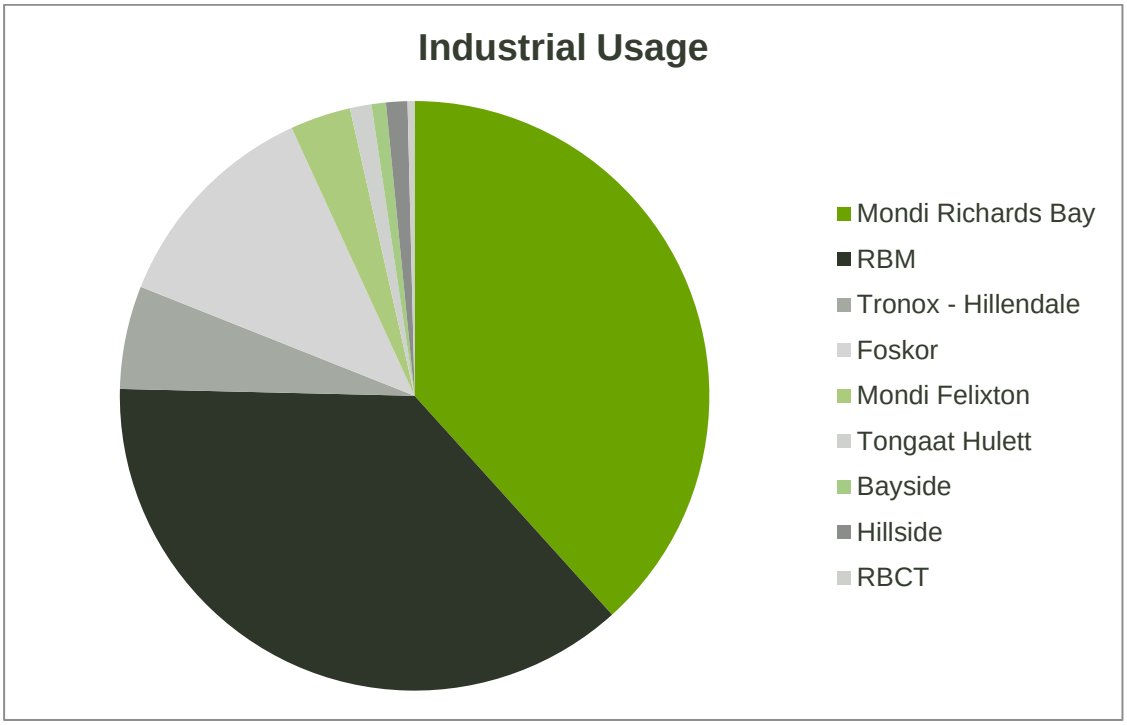

Figure 2-2: Current Industrial Usage

2.3 Urban and domestic water use

Richards Bay, the city, and its industrial section, mostly in the Alton area, where Mondi, Hillside and Bayside Aluminium and Foskor are found; the residential suburbs including Meerensee, Arboretum and Veld en Vlei and the commercial/ light-industrial centre. The heavy industrial users are supplied as discussed above. The remaining parts of the city, both residential and commercial/ light-industrial, are primarily supplied from the Mzingazi treatment works, and supplemented when necessary from the Nsezi treatment works.

Empangeni is an urban centre also containing a large light-industrial and commercial sector, in addition to residential users. There was previously a treatment works on the western shores of Lake Nsezi that serviced Empangeni exclusively, but this was decommissioned and the supply was replaced by Nsezi WTW.

The smaller towns that are supplied by treatment works in this area are Esikhaleni, Ngwelezane, Nseleni, Vulindlela and Felixton. Esikhaleni and Ngwelezane have their own treatment works, abstracting from Lake Cubhu and the Mhlathuze River respectively. Nseleni and Felixton's treatment works are not functional. Vulindlela and Felixton are supplied with treated water from Esikhaleni's WTW, and Nseleni is supplied from Mzingazi's. Also, some villages or rural areas are supplied from these works, including KwaMbonambi, Ntambanana, Khosa, Dube, Mkhwanazi north and south etc.

Water treatment works in the study area include Mzingazi, Ngwelezane and Esikhaleni treatment works, owned by the municipality and operated by Water and Sanitation Services South Africa (WSSA). Nsezi treatment works is owned and operated by Mhlathuze Water. Nsezi WTW abstracts from Lake Nsezi and from the Mhlathuze Weir. Currently the lake is not being abstracted from for the WTW, as the supply is unreliable and there are contamination issues.

The current water supply to urban and residential areas is 31.8 million m^3/a.

Table 2-1: Treatment Volumes (Ml/d)

Treatment Works	Design Capacity	Operating	Abstraction Source
Mzingazi	65	69-70	Lake Mzingazi
Esikhaleni	36	15	Lake Cubhu
Ngwelezane	8	6.3	Mhlathuze River
Nsezi	205	150-180	Lake Nsezi

See **Appendix A** for more information

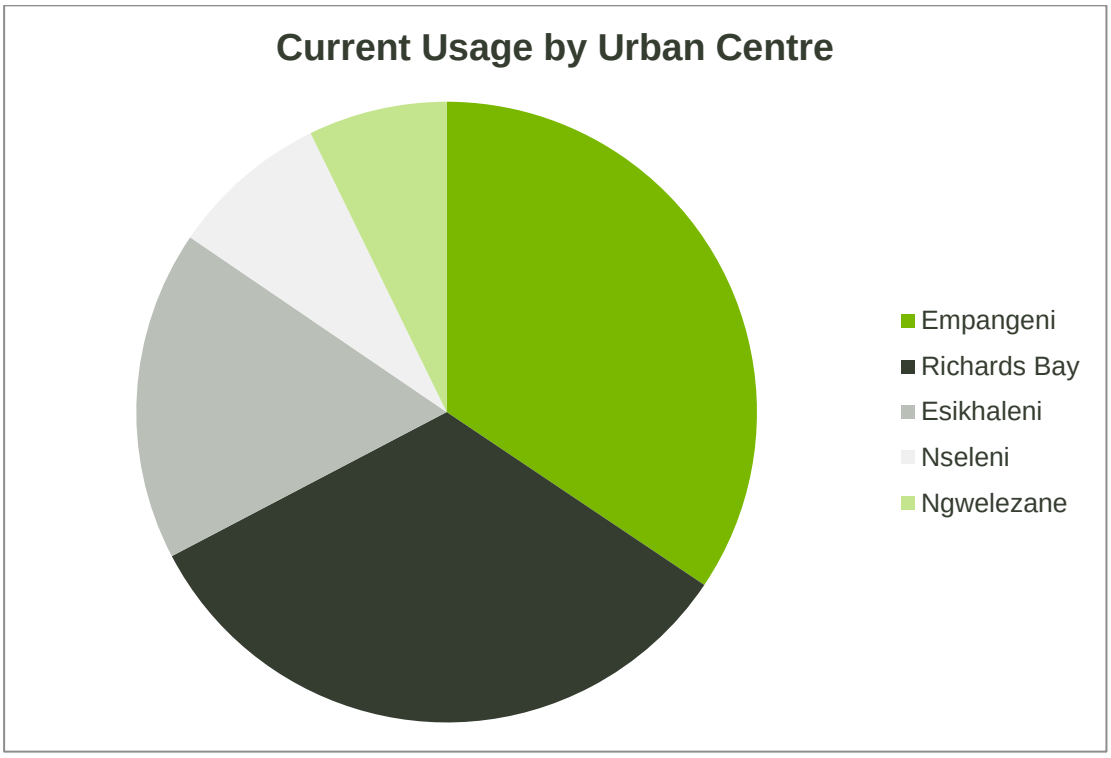

Figure 2-3: Current Domestic Usage

2.4 Irrigation

2.4.1 Background

The Goedertrouw Dam was built by the DWA as a Government Water Scheme and completed in 1983 to make available a reliable water supply for urban and industrial use and for irrigation. In 1994, the irrigation which had developed lawfully was scheduled in terms of section 63 of the 1956 Water Act. This increased the irrigators' assurance of supply, as their supply was now no longer from run of river, but officially from the Government Water Scheme.

The areas scheduled, were as follows:

Table 2-2: Government Water Scheme Irrigation Areas

Locality	Area	Quota	Volume
	(ha)	(m^3/ha/a)	(million m^3/a)
Nkwaleni	6 738	12 600	84.9
Mfule	794	11 800	9.4
Heatonville	5 260	11 800	62.1
Lower Irrigators	1 582	9 000	14.2
Total			**170.6**

Tongaat Hulett completed Heatonville irrigation scheme in 1993 with a total command area of some 4 200 ha.

In terms of the National Water Act, 1998, the Irrigation Boards have been transformed into Water User Associations, Nkwaleni in 2007 and Heatonville, Mfule, the Tongaat Hulett Scheme, the emerging Biyela and Mzimela farmers, becoming the Central Mhlathuze Water User Association in 2010.

2.4.2 Compulsory Licensing

In 2006, the Department commenced with a Validation and Verification exercise in the Mhlathuze catchment, to lay the foundations for Compulsory Licensing. This process is now nearing completion. One of the aims was to free up allocated, but unutilised water. After considerable consultation and negotiation with the irrigators, consensus was reached and the Department has agreed to allocate the irrigators 66% of their quotas on scheduled land or on actual irrigated land, provided certain conditions have been met.

The Department is currently recalculating the final schedules for irrigation use, and indications are that the final volume will be in the order of 120 million m^3 per annum. Once this phase of the Licensing process is complete, there will be a volume of water set aside for future small irrigation development. When this volume has been allocated, it is doubted whether any additional water will be available for irrigation.

Further information is available in Appendix E.

2.5 Other significant catchment water uses

Other significant catchment water uses include Forestry, alien invasive vegetation and dry land sugar can, which all reduce surface water runoff.

There is extensive commercial afforestation in this area. The growth in forestry activities in this area is strictly regulated by the DWA, and it is not intended that significant expansion in this sector be allowed.

There are large areas of alien vegetation in the Mhlathuze catchment, which cause a substantial reduction in runoff. DWA is addressing this issue through the Working for Water initiative.

There is an area of approximately 268km^2 of dryland sugarcane found in the Mhlathuze catchment, some 90km^2 of which is near the coast and therefore in the study area for this project.

Further information is available in Appendix F.

2.6 Current water use

Table 2-3 below shows the current daily water requirement for each user, as well as the legal allocation, where known.

Table 2-3: Summary of Water Use

		Current Usage		Allocation	
Supply Sector	***User***	***Annual (M^3/a)***	***Daily (Ml/day)***	***Annual (M^3/a)***	***Daily (Ml/day)***
Industry	Mondi Richards Bay	25.55	70.00	32.85	90.00
	RBM - Nhlabane	13.69	37.50	max 23.00	63.01
	RBM - uMfolozi	7.12	19.50	max 21.00	57.53
	RBM - Nsezi	3.91	10.70	max 16.43	45.00
	RBM	**24.71**	**67.70**	**total 30.00**	**82.19**
	Tronox - Hillendale	3.77	10.33	11.48	31.46
	Foskor - clarified	4.67	12.80	5.48	15.00
	Foskor - potable	3.41	9.35	4.96	13.60
	Foskor	**8.09**	**22.15**	**10.44**	**28.60**
	Mondi Felixton	2.22	6.07	3.15	8.63
	Tongaat Hulett	0.79	2.16	1.89	5.17
	Bayside - raw	0.34	0.94	0.34	0.94
	Bayside -potable	0.18	0.50	-	-
	Bayside	**0.52**	**1.44**	**0.34**	**0.94**
	Hillside	0.78	2.14	-	-
	RBCT	0.26	0.70	-	-
	Tronox - Fairbreeze	-	-	22.69	62.2
	TOTAL	**66.68**	**182.69**	**112.84**	**309.15**
Domestic	Empangeni	10.95	30.00	13.51	37.00
	Richards Bay	10.48	28.70	9.13	25.00
	Esikhaleni	5.48	15.00	13.14	36.00
	Nseleni	2.63	7.20	-	-
	Ngwelezane	2.30	6.30	2.92	8.00
	TOTAL	**31.83**	**87.20**	**38.69**	**106.00**
	GRAND TOTAL	**98.51**	**269.89**	**151.53**	**415.15**

2.7 Historical Water Use

A summary of the historical water-use is given in Figure 2-4 and further information in Appendix H.

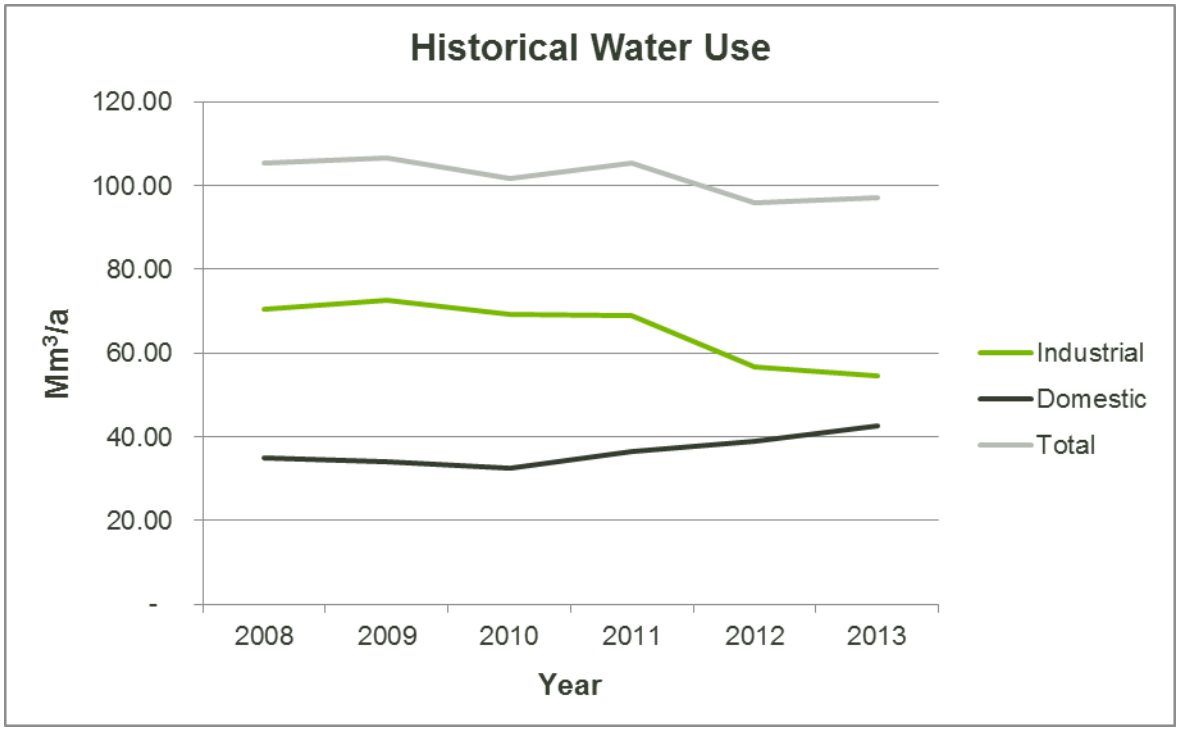

Figure 2-4: Historical Water-Use

3 Future Water Use Scenarios

3.1 Drivers of water use in the Strategy area

The primary infrastructure development which has transformed Richards Bay from a small harbour village into the largest coal export facility in the world was the conversion of the original Richards Bay harbour into a deep water port with railway and an oil/gas pipeline linking the port to Johannesburg. This laid the foundation for large-scale industrial investment and development in the region. The Richards Bay Coal Terminal is currently the largest coal export facility in the world. Richards Bay is (alongside Rustenberg), South Africa's fastest developing city. It is a fast growing industrial centre.

The tourism industry is further a major contributor to the local economy, with Richards Bay seen as a gateway to the Zululand area which is popular with foreign tourists (game parks and wildlife diversity).

Commercial forestry and irrigation (primarily sugar cane) is practised in the study area. Although in a relatively favourable position compared to other parts of South Africa, no significant growth is foreseen for irrigation or for plantation forestry.

There is also a relatively high contribution from the transport sector which can be ascribed to the railways and harbour infrastructure, which support the export of coal, timber, metals, minerals and manufactured goods.

About 2% of the Gross Domestic Product (GDP) of South Africa originates from the Usutu to Mhlathuze Water Management Area. Of this about 50% occurs within the Richards Bay and Empangeni areas. The manufacturing sector employs the majority of the population.

3.1.1 Rainfall

Water requirements are influenced by rainfall. Figure 3-1 below shows the historical variability in the nature of rainfall (MAP) in the area, with a dry period evident in the early 1990s (ref - WR2005). It was in this period that the emergency Thukela transfer scheme from the Middledrift Weir was implemented, to augment the supply from Goedertrouw Dam in drought periods.

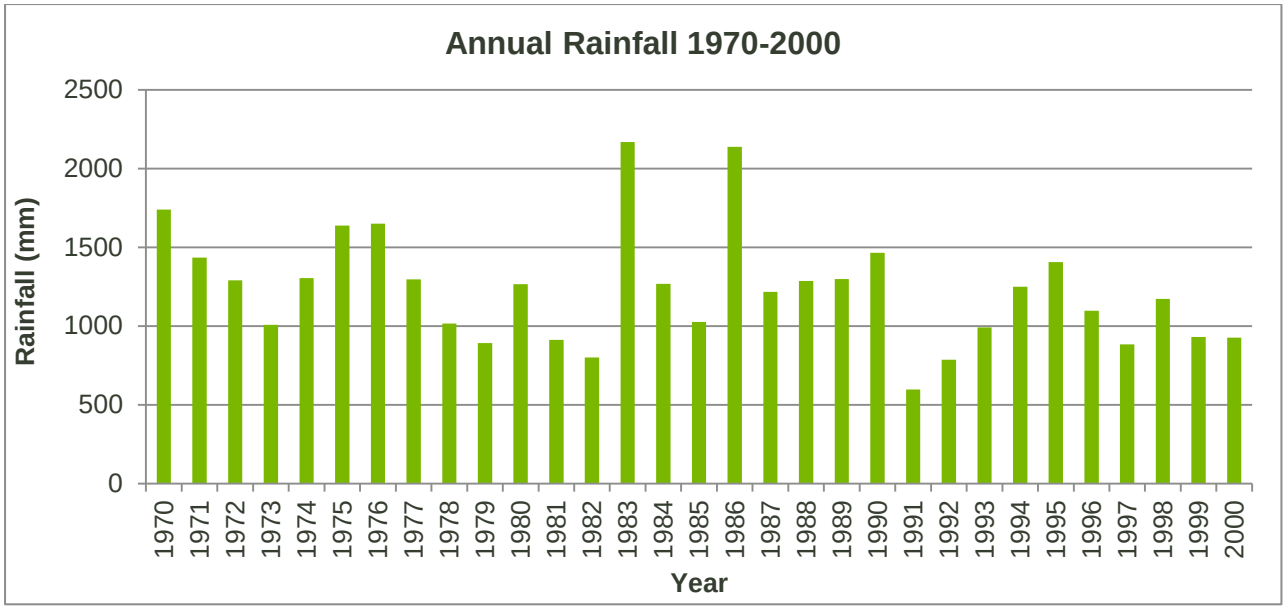

Figure 3-1: Rainfall variability in the Richards Bay area

3.1.2 Population growth

Urban centres include Richards Bay and Empangeni with the inclusion of former KwaZulu government townships of Esikhaleni, Ngwelezane, Vulindela and Nseleni. Another settlement of note is Felixton, situated to the north of Esikhaleni (south east of Empangeni). Development at Felixton includes the industrial premises of Tongaat-Hulett and Mondi, employee residential area, schools and recreational facilities. Rural areas include 5 Traditional Authority areas, 21 rural settlements and 61 farms.

The uMhlathuze Local Municipality has an estimated population growth rate of just over 1, 5% per annum. Table 3-1 below shows the historical population growth within the municipality. The current population is estimated at 378 000.

Table 3-1: Municipality Populations

	uMhlathuze
2011	334459
2001	289190
Population growth	15.65%
Per year	1.57%

Similar to the national demographic trends and mainly attributable to the impacts of HIV/AIDS and of increasing urbanisation, little change and more probably a decline in population in the rural areas is expected. The future demography will also largely be influenced by economic opportunities and potential. Moderate population growth in the uMhlathuze area is probable, influenced by migration from rural areas into Richards Bay in search of employment opportunities.

Domestic per capita water consumption varies between the differing levels of water and sanitation services but is likely to increase in line with actual population growth and improvements in service levels. The current average per capita domestic water requirement is estimated to be 25l/c/d for rural users (this is the DWA minimum level of service for water supply) and 193l/c/d for urban users. This range is the result of the diverse nature and profile of communities in the area.

3.1.3 Socio-economic Considerations

Although about 5% of the national population reside in the Usutu to Mhlathuze Water Management area, less than 2% of the GDP originates from therein. It is therefore evident that socio-economic standards in the Water Management Area are well below the national average. This is attributed to the highly skewed distribution of wealth between the urban and rural areas and as such large differences in the standard of living prevail. Over 40% of the population are subject to living conditions associated with poverty.

Despite the rapid economic growth to date, there remain significant challenges regarding unemployment and poverty. The Municipality is making efforts through implementation of projects aimed at reducing poverty levels.

The unemployment rate in Richards Bay alone is estimated at about 19%, but this increases substantially (to more than 50%) in the surrounding rural areas. The percentage of people with a level of education less than Grade 12 is more than 50%.

It is of concern that the industrial growth witnessed in this region has not translated directly into entry-level job opportunities at an equivalent rate (the majority of the raw material extracted is for the export market). The limited development of integrated downstream business opportunities contributes substantially to this phenomenon.

3.1.4 Economic growth

Attributable to the harbour and transport infrastructure as well as the favourable climate, the economy of the area is relatively more competitive than the remainder of South Africa with respect to manufacturing, transport and agriculture. However due to a small local consumer base together with limited integration of industrial activities in the area (with limited supporting industries), it is expected that future industrial growth will, over the medium term, mainly be driven by further development of large export-orientated industrial developments, rather than through generic growth as would be possible in a more integrated industrial environment.

The projected uptake of subsequent Phases within the IDZ remains subject to market influences, electricity prices and a stable economic environment to encourage further investment.

3.2 Potential expansion of the study area

The study area as it is currently defined primarily consists of the uMhlathuze Municipality, RBM and the Fairbreeze mine which falls outside the municipality but which are included in the water supply system. However, just to the north of the Mfolozi River there are some towns, such as Mtubatuba, which rely on abstractions from the Mfolozi and which would need to be taken into account when considering other future abstractions, such as those of RBM.

Furthermore, significant options for future water-supply are transfers from the Thukela, both the current Middledrift scheme and the possible Mandini scheme. The Thukela River is about 80km south of Richards Bay. When evaluating the available supply from that potential source, other abstractions such as irrigation, and the current Lower Thukela Bulk Water Supply Scheme currently being implemented by Umgeni Water, may need to be taken into account.

It can therefore be seen that the study area is not topographically defined, and could be redefined to take into account other features when exploring water supply options from outside and into outside areas.

3.3 Scenarios

3.3.1 Discrepancy between water allocations and water use

The actual water use and the allocated amount are not always the same. The reason for this is that the allocation has allowed for future growth in actual use, or the permit holder is simply using more than has been allocated to him. In the case of the Mhlathuze catchment, the allocation and actual use differ widely for complex reasons.

3.3.2 Industrial water requirements

It is expected that Richards Bay / Empangeni will remain significant in the national, provincial and districts spatial economy as a result of the bulk-handling facilities of the Richards Bay Harbour that allow for trade links with international economies, even considering the global economic sluggishness.

From a mineralogical viewpoint, numerous other mining lease areas have been identified along the coastal strip from Mhlathuze River Mouth towards Mtunzini. Of significance is the substantial demand for water, created by dune mining. It is therefore anticipated that industrial water requirements in the region will continue to increase.

Current and future industrial water requirements have been updated based on interaction with industries, the Industrial Development Zone (IDZ) and government officials. Some updated information could not be obtained for a few industrial users, and other sources (internet references, previous reports) were used to obtain such information. Some estimations were made and need to be verified.

For the future heavy industries identified by the IDZ, scenarios have been planned for increments of the full identified volumes. It has been assumed that Phase 1A would be implemented from 2014. Phase 1F would be implemented from 2017. Phase 1D would be implemented from 2022. Phase 2i would be implemented from 2022 and Phase 2ii from 2032.

An upper bound of 2% growth (in relation to existing heavy industrial use) has been set for any new future significant industries that have not yet been identified by the IDZ.

3.3.3 Domestic water requirements

The municipal population has increased by, on average, 1.45% per annum from 2001 to 2011. In 2011 the census indicated a population of 334 459, with 86 609 households. The 2014 population is estimated at 378 171. Access to water in June 2013 was 85%. The uMhlathuze municipal area is characterised by a shortage of suitably well-located land for housing development.

The current demand for housing is as follows:

Urban Areas:	8 248
Rural Areas:	6 622
TOTAL	**14 870 dwellings**

Increased domestic water supply is needed to:

- Address the backlog of the households in the area below RDP supply standards
- Improve services provision and upgrade supply

- Provide connections to new households
- Potentially expand supply further beyond municipal boundaries

Future requirements could be calculated from the type and number of dwellings. However, even in instances where a uniform growth rate is applied to all standard dwelling types, there is always (great) uncertainty around such growth rates. Significant changes in domestic water requirements can arise when there is a concerted effort to upgrade services in an area or a significant economic upturn (or downturn) is expected or both.

It was therefore decided to apply growth rates to the 2013 urban/domestic use instead, or introduce significant new supply areas as required. This is regarded as an acceptable way of forecasting domestic water requirements in these circumstances, as forecasting is done for a long period (27 years - up to 2040) and growth is not from a very low base, in which case it may not have been appropriate. Raw water required at treatment plants is forecast, which is inclusive of allowance for daily and seasonal peaks and losses.

Potential new domestic supply schemes outside the municipal area include the Nsezi Supply Scheme that could supply water to Mtubatuba and the Mpukunyoni Tribal Area, the Middledrift (including Vutshini and Nkandla) Supply Scheme and the Lake Phobane Scheme. Such approaches takes into account the Provincial Spatial Economic Development Strategy that addresses the water services backlog on a regional scale and the integration of existing and new distribution links.

The breakdown of water uses as historically and currently supplied from the Mzingazi WTW could not be obtained from the municipality, and had to be deduced. As a result, there is still some uncertainty regarding the historical growth in this component of urban/domestic water supply. This will be updated should the data be obtained. Other estimations were made and need to be verified.

An upper bound of 3.5% growth has been set and a lower bound of 1% growth in municipal water requirements.

3.3.4 Irrigation

The revised allocations for irrigation, following compulsory licensing will be included in the scenarios. No growth in irrigation has been allowed for.

3.3.5 Stream Flow Reduction Activities

No allowance has been made for increased stream flow reduction activities SFRAs, i.e. plantation forestry.

3.3.6 Future water use scenarios

Scenarios for future water supply needs to be differentiated between raw water supply for industries and purified water for urban/domestic supply. Foskor requires clarified water as part of their supply, but as it is partly purified water, this supply has been classed under purified water.

Table 3-2 shows the various uses according to supply sectors and in more detail in Table 3-3. It has been established that some industrial users require fixed water supply over the strategy period, and some a variable supply. It is expected that the need for (purified) urban/domestic water will increase. Allowance has not been made for Irrigation or SFRAs to increase.

Table 3-2: Future water requirements by supply sector

Supply Sector	User	Notes on future water requirements
Current industries	• Mondi R'Bay • Mondi Felixton • RBM • Foskor • Hillside Aluminium • Bayside Aluminium potable • Tongaat Hulett	Fixed identified requirements over strategy period
	• Tronox – Hillendale • Tronox – Fairbreeze • Bayside Aluminium • RBCT and harbour	Variable identified requirements over strategy period
New industries	IDZ identified new industries	Future use according to IDZ planning Phases Scenarios of 25%, 50%, 75% and 100% of IDZ planning
	Further new industries/mines (Jindal mine etc.)	Scenarios of 0%, 1%, 2% cumulative annual growth, based on growth on previous year's full industrial demand
Urban (domestic and light industrial)	Supply from WTWs in City of uMhlathuze	Scenarios of 1%, 2%, 3.5% annual growth
	Increased supply to other areas in or from Mhlathuze catchment	Growth of current supply areas and supply. Scenarios of 1%, 2%, 3.5% annual growth
	Significant expansion outside municipal boundary	Mtubatuba / Mpukunyoni Scheme from Nseleni WTW
Irrigation	Existing irrigation after compulsory licensing	Revised allocations over strategy period
	New irrigation	Increased irrigation - not included in scenarios
SFRAs (forestry)	Existing SFRAs	Possibility for doubling of plantation forestry over evaluation period – not included in scenarios as DWA refuses all licences in the Mhlathuze area

Table 3-3: Future water requirements by supply sectors and users

Supply Sector	User	Allocation (Mm^3/a)	Allocation (Ml/day)	Use 2013 (Mm^3/a)	Use 2013 (Ml/day)	Notes on future water requirements
Industries *fixed requirements*	Mondi R'Bay	32.85	90.00	25.55	70.00	Restrict to 90Ml use for entire period
	Mondi Felixton	3.15	8.63	2.22	6.07	Full allocation over period
	RBM – total *(Mfolozi, Nhlabane, Nsezi)*	30.00	82.19	24.71	67.70	Allow 30 Mm^3/a for full period. *Zulti-South source not final Assume 30% supply from Mfolozi River*
	Foskor - clarified	5.48	15.00	4.67	12.80	Allow allocation over full period
	Foskor - potable	4.96	13.60	3.41	9.35	Allow allocation over full period
	Hillside Aluminium	-	-	0.78	2.14	Current use continues over full period
	Bayside Aluminium potable	-	-	0.18	0.50	Allow 30% of current use over full period
	Tongaat Hulett, Felixton	1.89	5.17	0.79	2.16	Full allocation over period – potential increased use of possibly 1 million m^3/a not yet adequately quantified
Industries *variable requirements*	Tronox - Hillendale	11.48	31.46	3.77	10.33	Mine closing with rehabilitation being done – phase out over 3 yrs.
	Tronox - Fairbreeze	22.69	62.16	-	-	48.8 Ml/d from 2017 to 2027 for Fairbreeze. 55Ml/d thereafter for Port Durnford planned mine
	Bayside Aluminium raw	-	-	0.34	0.93	Raw water/l phase out over 3 yrs, starting with 30% of current use.
	RBCT and harbour	-	-	0.26	0.70	Current use continues until 2020 when it increases by 20%
New industrial users	IDZ planning	-	-	-	-	According to IDZ Phases (incl. Pulp United as part of Phase 1D) Scenarios of 25%, 50%, 75% and 100% of IDZ planning
	Further new (Jindal mine etc.)	-	-	-	-	Scenarios of 0%, 1%, 2% additional growth
Urban (domestic / light industrial)	Supply from WTWs in City of uMhlathuze			31.83	87.21	Scenarios of 1%, 2%, 3.5% growth
	Increased supply to other areas located in or supplied from Mhlathuze catchment	5.02	13.75	5.5	15.07	Scenarios of 1%, 2%, 3% and 4% growth
	Significant expansion outside municipal boundary	-	-	0	0	Planning for Mtubatuba / Mpukunyoni Scheme from Nseleni WTW
Irrigation	Existing irrigation after compulsory licensing	120	328.8			Revised allocations over full period
	New irrigation	-	-	-	-	Increased use not included
SFRAs (forestry, sugar cane)	Existing SFRAs	-	-	-	-	Possibility for doubling of forestry over period – not included Possibility of increased dryland sugar cane – not included

The following future water requirements scenarios have been compiled:

Table 3-4: Future water requirement scenarios

Scenario	Water requirement component							
	Current industries (fixed & variable)	**New identified IDZ industries**	**Further new industries** (% additional growth)	**Municipal Urban/ domestic** (% growth)	**Increased domestic supply in Mhlathuze catchment** (% growth)	**Increased domestic supply: Mtubatuba Scheme**	**Irrigation**	**WC/WDM** (% saving on current use; phased in over 10 yrs.)
Sc 1: Low growth	✓	25%	0%	1%	1%	No	✓	0%
Sc 2: Low-Medium growth	✓	50%	0.5%	1%	2%	No	✓	0%
Sc 3: Medium growth	✓	75%	1%	2%	3%	Yes	✓	0%
Sc 4: High growth	✓	100%	2%	3.5%	4%	Yes	✓	0%
Sc 5: Water Efficient	✓	75%	1%	2%	3%	Yes	✓	Urban: 15% Industrial: 10%

The baseline for projections is the 2013 water use.

3.3.7 Discussion of scenarios findings

The future water requirements for the scenarios are as shown in Figure 3-2.

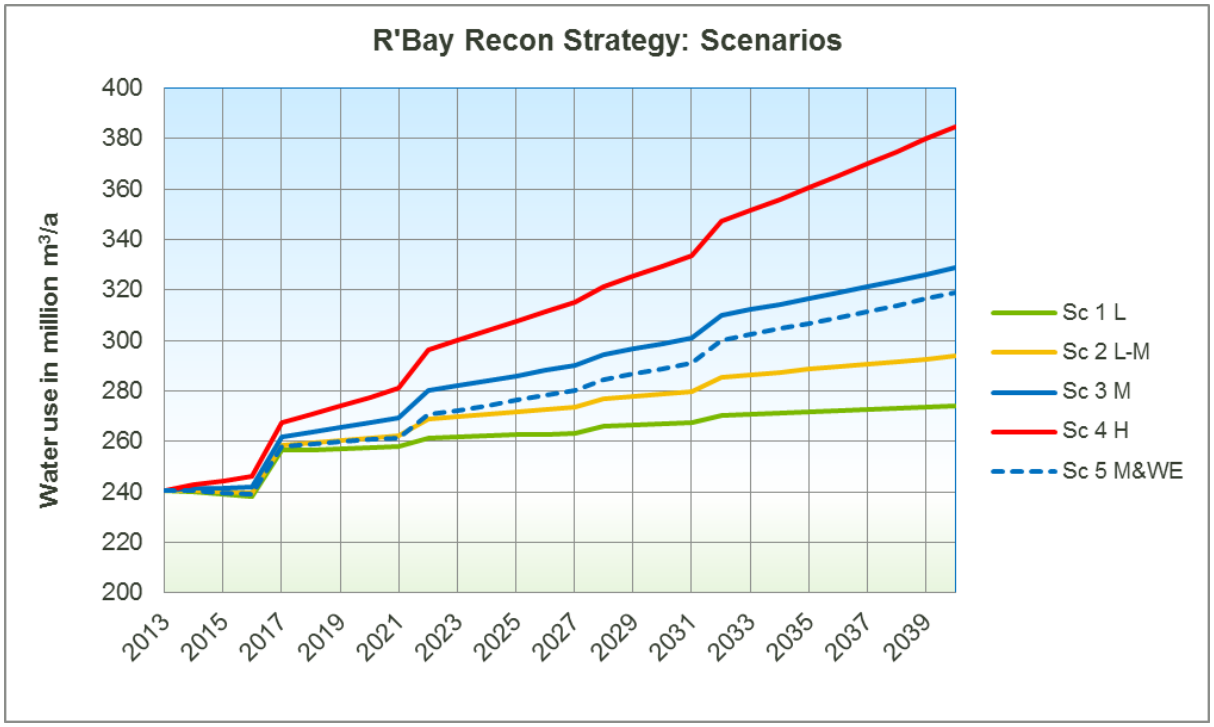

Figure 3-2: Future water use scenarios

The slight decrease in the years 2013 to 2016 is as a result of the Hillendale mine and the Bayside aluminium smelter being closed. In 2016 the sharp increase is as a result of the Fairbreeze mine going into (full) production.

For the **Low** scenario, water requirements increase from 241 million m^3/a in 2014 to 274 million m^3/a in 2040, i.e. an increase of 14% over 27 years.

For the **Medium** scenario, water requirements increase from 241 million m^3/a in 2014 to 339 million m^3/a in 2040, i.e. an increase of 41% over 27 years.

For the **High** scenario, water requirements increase from 241 million m^3/a in 2014 to 385 million m^3/a in 2040, i.e. an increase of 60% over 27 years.