uMKHANYAKUDE DISTRICT MUNICIPALITY

JOZINI REGIONAL WATER SUPPLY SCHEME

PROJECT BUSINESS PLAN

2.2 (4604

DRAFT

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EXECUTIVE SUMMARY

The Jozini Community Water Supply Scheme could ultimately cover a large part of the district municipal area of supply due to the reliable water resources available from the Jozini Dam. Apart from the Phongola River, the local water resources in the region, both surface and groundwater, are restricted. There are a number of existing water supply schemes in the area but not all of the over 300 000 people in the area receive a reliable water supply due to resources, infrastructure and operational issues. Four scenarios of developing the proposed scheme are foreseen:

1. Initial scheme: Upgrading of the existing Jozini Water Treatment Works, the pump equipment, rising main, high level storage and gravity supply in the area below and east of the Lebombo Mountain and extensions thereto to improve the existing supply and extend to new areas not served from this source as part of Phase 1A.

2. Phase 1 scheme: Extension of above components to cover the whole of the identified Phase 1 region with allowance for a connection to Phase 3, the Hluhluwe Phase 3 scheme.

3. Phase 1, 2 and 3 scheme: Extension of above components to supply Phases 3, and 2 (Byala).

4. Ultimate scheme: Further extensions to the south to cover existing schemes with limited water resources.

The treatment works, pumping capacity and storage will be modular and extended as the developments proceed over time based on additional demands. The rising main from the treatment works and the gravity main to the south are foreseen to be duplicate parallel pipeline systems for the same reason. The existing pipeline from storage near Jozini to Nshongwe is too small to supply Phase 1 of the region and will be duplicated but with a larger diameter main.

The proposed Jozini Regional Water Supply Scheme is to be situated in the Northern KwaZulu-Natal downstream (north and east) and south of the Jozini Dam. Whilst there is a large number of independent urban and rural water supply schemes in the region, many of these do not obtain a reliable potable water supply at all times. There are also areas not served by these schemes and there is a backlog on both water supply and sanitation measured against the basic level of service. Except for the Lebombo Mountain range, which ends south of Jozini, the region is mostly flat and situated below 100 m amsl.

The project is located within the Jozini, Umhlabuyalingana and Big 5 False Bay Local Municipalities. Much of the area falls within the following tribal areas: Myeni/Ngwenya,

Mankuza/Jobe, Myeni/Ntsinde, Mashabane, Mabaso and Zikhali/Mbila. In addition, the proposed link to the Hluhluwe Phase 3 community water supply scheme will provide water to the Mnqobokazi, Qwabe/Makhasa and Nibela Tribal Areas. There have previously been tensions and capacity issues in the area, therefore an independent social consultant is being appointed to work on the project team.

The scheme supply area is home to approximately 312 000 people, and the predicted population growth rates indicate that this will increase to 374 000 people by the year 2032.

The scheme aims to supply water from the Phongolo River, stored in the existing Jozini (Pongolapoort) dam, the capacity of which is currently not fully utilised.

The proposed scheme would be implemented in multiple phases. The first phase would be to utilize raw water from the dam and, if practical, double the capacity of the Jozini Water Treatment Works (WTW) from 5 to 10 Mℓ/day. A new site adjacent to the existing works may need to be developed for future phases to coincide with the development of the scheme into the region. The supply areas in order of priority are as follows:

1. Improve and link the existing bulk components of the Jozini and downstream schemes situated to the east thereof. This would be achieved by supplying treated water from the plant to existing reservoirs and tanks serving the settlements to the east, north east and south east (priority and Phase 1).

2. Serve the communities to the south of Jozini up to Msimbane (Phase 2)

3. Serve the communities of Mnqobokazi, Qwabe/Makhasa and Nibela to the south-east, which are currently served by the Hluhluwe CWSS Phase 3 (Phase 3).

Population and other data for each phase are given in the table below. If practical, as a longer term objective, supply may also be extended further south to the additional areas listed in the table.

Phase / Priority	Areas included (refer to Drawing)	Number of		Average number of people per household 2008	2008 Total population	2032 Projected total population
		Settlements	Households 2008		Beneficiaries	
1A	1.26 & 1.27	5	1 777	5,2	9 281	14 928
1B	1.10 to 1.20, 1.24, 1.25, 1.28 & 1.29	37	12 095	5,5	66 902	74 680
1C	1.05 to 1.09 & 1.21 to 1.23	16	7 217	6,1	44 271	50 138
2	3.01 to 3.04	11	2 757	5,2	14 431	16 184
3	Hluhluwe Phase 3 CWSS	12	6 008	5,3	31 563	34 127

Phase / Priority	Areas included (refer to Drawing)	Number of		Average number of people per household 2008	2008 Total population	2032 Projected total population
		Settlements	Households 2008		Beneficiaries	
Total		**81**	**29 854**	**5,6**	**166 448**	**190 057**
Possible Future Supply Areas not included in this business plan						
4	Hlabisa & villages up to Koqhoqho in the north east		10 426	5,1	53 633	60 867
5	Hluhluwe Town		757	5,3	3 984	6 408
6	Mphukonyoni CWSS		17 686	4,7	82 957	108 141
7	Mtubatuba		1 353	4,0	5 440	8 750
Total			**60 076**	**5,2**	**312 462**	**374 323**

The total all inclusive estimated capital cost is R1,3 billion, but an initial phase of R185 million is envisaged. It is hoped that the capital cost will be covered by the Municipal Infrastructure Grant.

RECOMMENDATION

It is recommended that Phase 1A of the project as described be studied in more detail to be implemented to provide water services to the communities of uMkhanyakude District Municipality at a total capital cost of R 185 million, starting in the 2012/13 financial year for completion in the 2015/16 financial year.

PROJECT APPROVAL

WSA Management Support

The recommendation in section 9 above is:	
SUPPORTED AND SUBMITTED TO COUNCIL FOR CONSIDERATION	NOT SUPPORTED
Municipal Manager	Municipal Manager
Date:	Date:

WSA EXCO Approval

The recommendation in section 9 above was:	
APPROVED BY EXCO	NOT APPROVED BY EXCO
EXCO Resolution: _____ of _____ 20 _____	
EXCO Secretariat	EXCO Secretariat
Date:	Date:

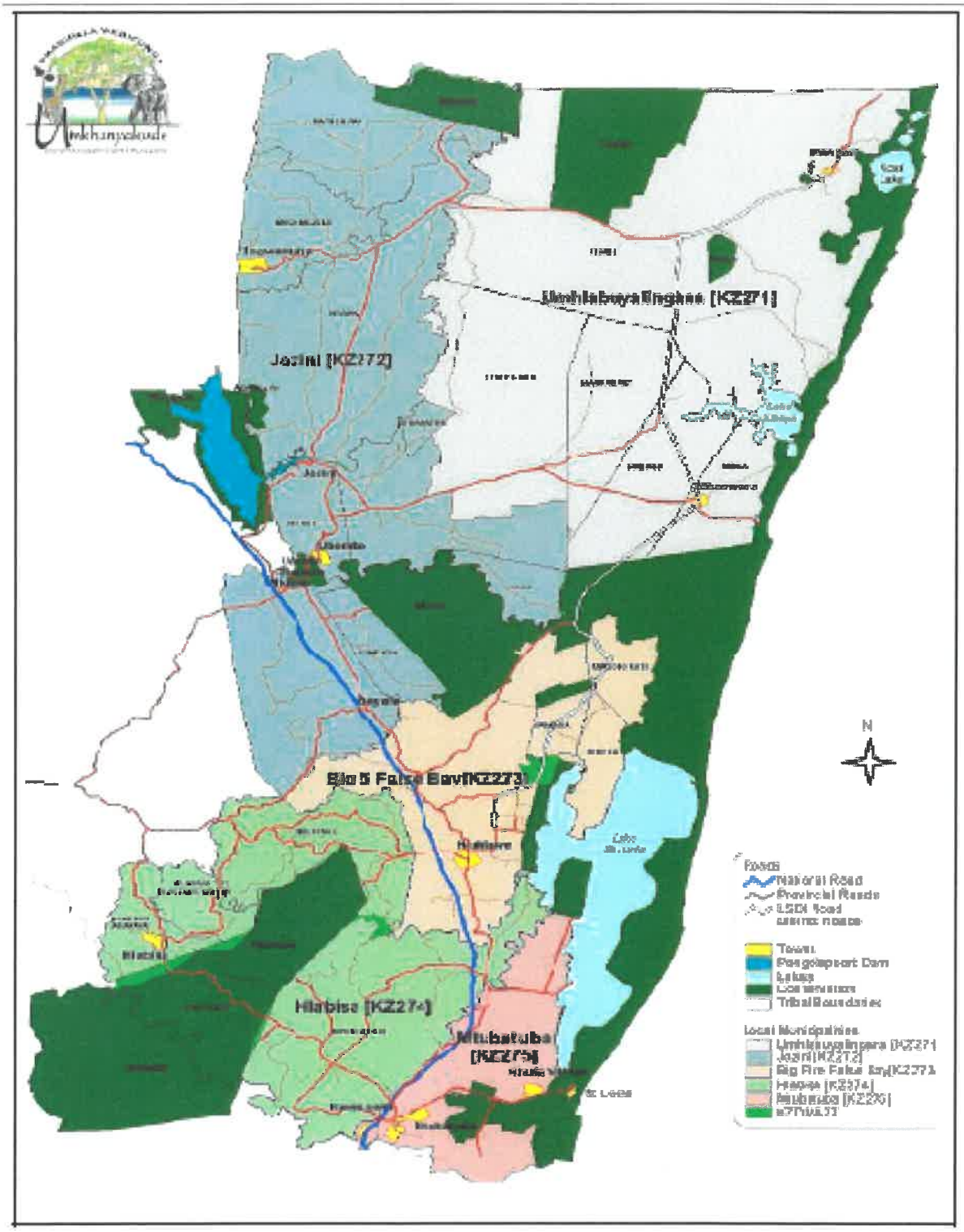


Figure A: DC 27 Map

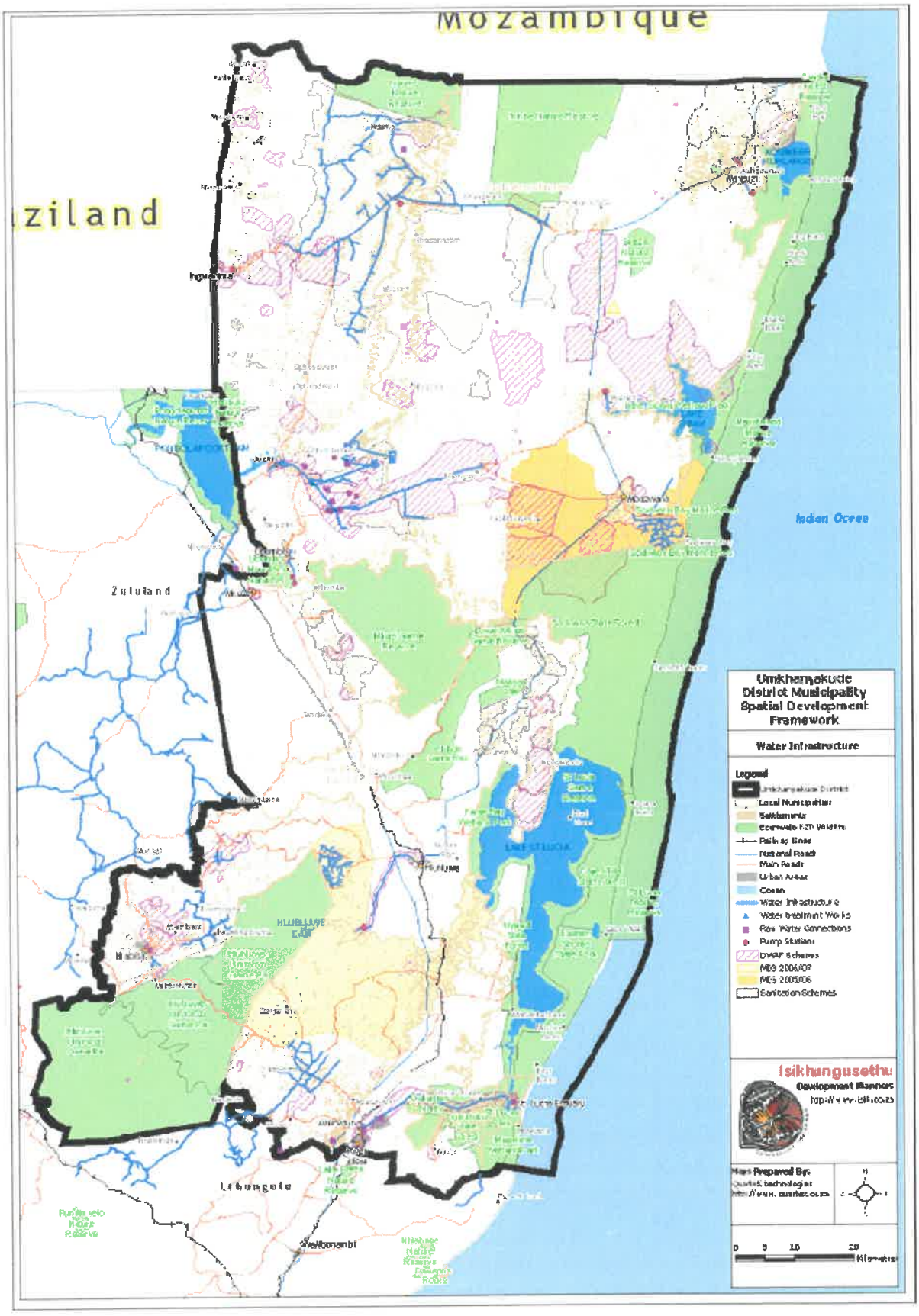
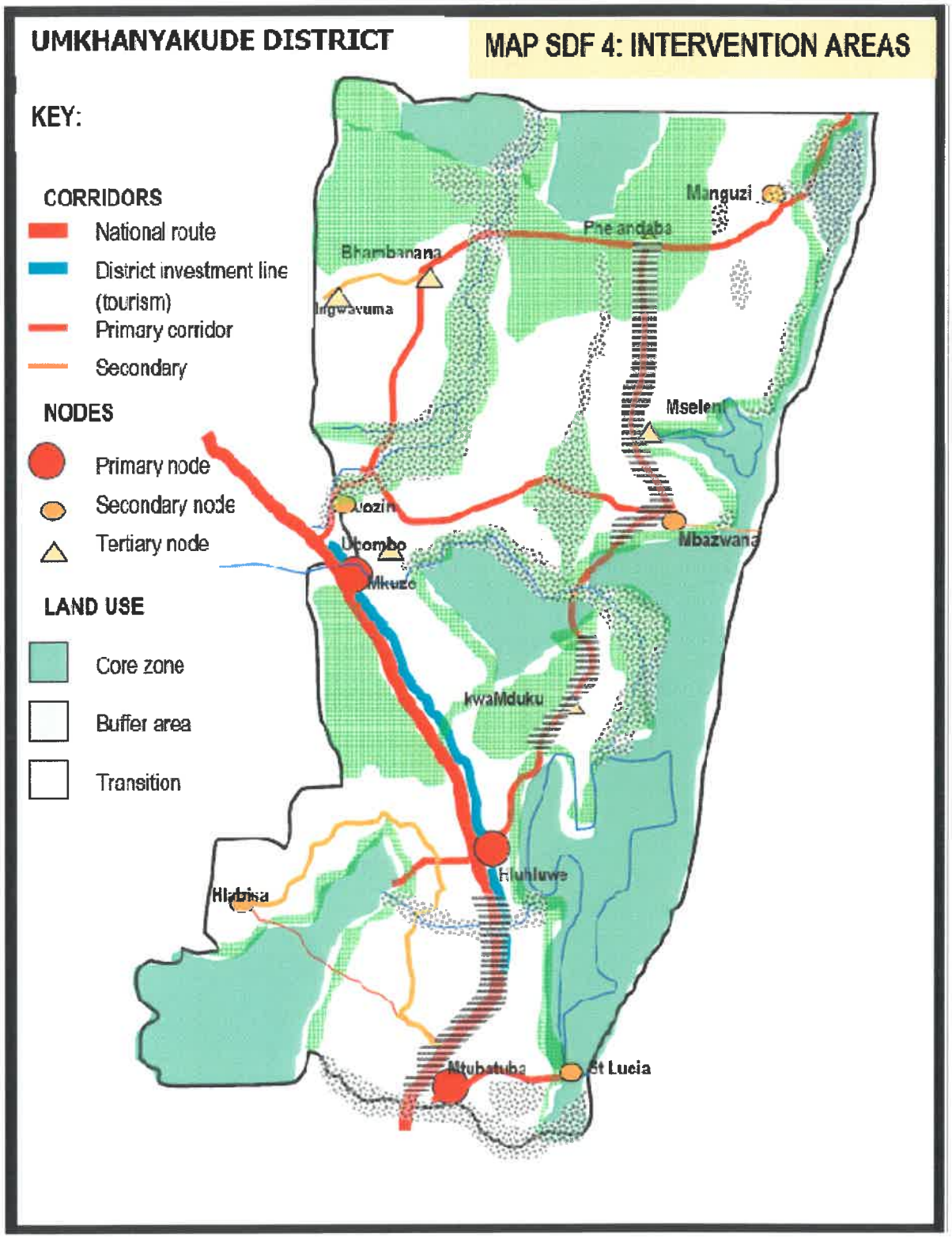


Figure B: Water Infrastructure at DC 27



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ABBREVIATIONS

amsl	Above mean sea level
BA	Basic assessment
CIDB	Construction Industry Development Board
CWSS	Community water supply scheme
DWA	Department of Water Affairs
DWQ	Drinking water quality
EIA	Environmental impact assessment
EMP	Environmental management plan
EPWP	Extended Public Works Programme
IDP	Integrated Development Plan
ISD	Institutional and social development
KZN	KwaZulu-Natal
LIC	Labour intensive construction
LM	Local municipality
MDG	Millennium Development Goals
MTSF	Medium Term Strategic Framework
O&M	Operation and maintenance
PGDS	Provincial Growth and Development Strategy
PRS	Proposed regional scheme
SDP	Spatial development plant
SMME	Small micro and medium enterprise
UKDM	uMkhanyakude District Municipality
WSA	Water services authority
WSP	Water services provider

1. INTRODUCTION

1.1 Project Title

Jozini Regional Community Water Supply Scheme: Upgrading and extensions

1.2 Project Name

The project name and location are given below.

Table 1: Project details

Project Number	Project Name	Project Type	Position of Jozini		Local Municipalities
			Latitude	Longitude	
	Jozini Regional Water Supply Scheme	Community water supply	27° 25' 25 "S	32° 4 ' 51.8 "E	Jozini LM
					uMhlabuyalingana LM

The project proposed consists of the extension of the treatment works capacity of the "New" Jozini Water Treatment Works (WTW, built in early 2000s) and the extension and upgrading of the bulk water distribution system to the supply area east and south of Jozini with associated distribution networks to meet the water needs in the region over time.

1.3 Location of and Need for Scheme

The uMkhanyakude District Municipality (UKDM) Integrated Development Plan (IDP) for 2011/12 provides the following data for the two affected local municipalities under the scheme:

Table 2: IDP data for UKDM

Data component	Local Municipality			District Municipality
	Jozini	uMhlabuyalingana	Total	
Number	KZ 272	KZ 271	-	KZDFMA 27
Households (2007)	38 530	27 006	65 536	114 976
People (2007)	207 250	163 694	370 944	614 046
People per household	5,38	6,06	5,66	5,34
People (2001)	184 052	140 958	325 010	573 341
Growth 2001-2007	23 198	22 736	45 934	40 705
Growth rate	2,0%/a	2,5%/a	2,25%/a	1,1%/a
Households with access to:				
- water (number/%)	20 992 (54,5%)	17 457 (64,6%)	38 449 (58,7%)	57 071 (49,6%)
- sanitation (number/%)	22 761 (59,1%)	20 992 (77,7%)	43 753 (66,8%)	60 345 (52,5%)
Water supply service levels:	207 250 (100%)	163 694 (100%)	370 944 (100%)	614 046 (100%)
- RDP & above	71 398 (34,5%)	45 130 (27,6%)	116 528 (31,4%)	195 619 (31,9%)
- Dys functional scheme	14 362 (6,9%)	7 890 (4,8%)	22 252 (6,0%)	35 802 (5,8%)
- Unreliable source	20 518 (9,9%)	37 437 (22,9%)	57 955 (15,6%)	75 648 (12,3%)
- Below RDP	100 972 (48,7%)	73 237 (44,7%)	174 209 (47,0%)	306 977 (50,0%)
Sanitation service levels:	38 529 (100%)	27 005 (100%)	65 534 (100%)	114 976 (100%)

Data component	Local Municipality			District Municipality
	Jozini	uMhlabuyalingana	Total	
Number	KZ 272	KZ 271	-	KZDFMA 27
- Access to - Backlog	15 540 (40,3%) 22 989 (59,7%)	12 795 (47,4%) 14 210 (52,6%)	28 335 (43,2%) 37 199 (56,8%)	50 372 (43,8%) 64 604 (56,2%)
Land ownership by Traditional Councils	70%	87%	75%	± 50%

The IDP points out that operation and maintenance (O&M) aspects are the main hindrance to the municipality leading to regular failure of equipment and infrastructure. The municipality does not have a full staff complement or service equipment needed and a full-time electrician and fitter need to be employed as a matter of urgency. The result thereof and the unreliable sources lead to only 31,4% of the population being at or above RDP level of water supply and 68,6% below. The situation on basic sanitation shows a backlog of 56,8% in the 2 LMs covered by the proposed scheme. These figures point out the need for a reliable water source, a regional scheme to distribute the treated water, upgrading of the existing distribution systems and extensions thereto to cover all people in the region but also a reliable and effective O&M system based on sufficient financial and human resources. These need to be supported by a practical cost recovery system, and possibly a water services provider on contract.

The IDP points out that there is stiff competition between the various water users such as agriculture and domestic use. The DM area is characterized by low rainfall and droughts leading to regular water shortages and local water sources often running dry. A number of borehole water schemes are scattered across the region in various stages of development. The various water supply schemes are well defined and the service area boundaries well established but major upgrading and refurbishments are needed at most schemes. The reasons for the water supply to be mostly below RDP levels are given as shortages of pipeline reticulations within villages, scattered settlements resulting in difficult and expensive infrastructure to install and to maintain, and social aspects. The latter include vandalism of water schemes infrastructure and illegal water connections. Communities hardly pay for water as most are indigent, due to a bungling billing system and non-existence of water meters. To address the backlogs, the DM has stated the water supply to be the first priority and identified Jozini Dam as the main source thereof.

The proposed scheme is located in the far northern part of KwaZulu-Natal (KZN) between the Swaziland and Mozambique borders, and further bordered by the Indian Ocean and a number of nature and game reserves, Pongolapoort, Ndumo, Tembe Elephant, Kosi Bay, iSimangoliso (Greater St Lucia), Mkuze and Zululand Rhino Reserves. The region is divided from Swaziland by the Lebombo Mountains forming the local high elevations and is drained by the Phongola River and tributaries thereof forming the lowest elevations. This river flows from south west to north east across the region with a large dam, Jozini Dam, situated directly south of Swaziland on the western border of the region.

The N2 coastal highway crosses in a north south direction along the western side of the study area, with a number of surfaced and non-surfaced roads connecting the numerous rural communities in the Maputaland-Elephant Coast region to each other and the highway. The larger settlements in the area are Mbazwana in the east and Jozini and Mkhuze in the west. Smaller settlements include Ingwavuma, Phelandaba, Mselani, Otobotini, Ntshongwe,

Ubombo and Bayala. Mtubatuba and St Lucia are located south of the region, and Sodwana Bay and the marine reserve are situated to the east of these settlements. The Mkhuze/Msunduzi River crosses the area at the town with the same name draining into Lake St Lucia, with the Hluhluwe River also flowing into the lake further south near that town. The Black and White Mfolozi drain near Mtubatuba into the Indian Ocean.

The topography, existing infrastructure, mining activities, conservation areas, settlements and existing and proposed schemes are shown on the attached maps as follows (divided into a set of northern Map A and southern Map B):

- Map 01: Satellite image of land uses with rivers and dams, political and tribal boundaries, conservation areas, mining reserves or activities (coal and iron in the southern part of the study area), existing scattered settlements, rivers, railways and roads shown. The mining reserves have and may further affect the settlements as these may have to be relocated away from the mining areas. The map also shows some of the social facilities (clinics and schools) as these provide an indication of the densities and services available.

- Map 02: As for Map 01 but with the various existing schemes added and some of the water supply infrastructure (treatment works and bulk mains) shown. These schemes are based on data from Mhlathuze Water and the Department of Water Affairs (DWA) shown separately and situated between the numerous conservation areas in the region.

- Map 03: As for Map 02 (but with some of the previous data deleted for clarity) and with the proposed regional scheme (PRS) footprint and possible phasing thereof in order of priority and development stages (Phases 1 to 3). Possible additional future supply areas are also shown as stages (Phases 4 to 7). In creating the proposed boundaries, the existing infrastructure and position relative to the new regional potable water source, the WTW at Jozini, were taken into account. Where the existing schemes were relatively close to Jozini and it would be beneficial to connect these to a regional works rather than retain the existing supply source, these are likely to be included in the PRS. However, where the distances to convey potable water were to become too long, and the costs thus too high, these schemes and settlements were not included. The Shemula Scheme is excluded from the PRS as this has been developed over time as an independent infrastructure supplied from its own source. Based on the costs and development requirements, the boundary of the PRS is thus not fixed but seen as a practical first order of the ultimate scheme.

- Map 04: The topography of the region is dominated by the Lebombo Mountains in the northern and central parts. The overall fall of the region is, however, from west to the east with the whole study area below 800 m and mostly below 400 m amsl. The N2 highway follows the "valley" between the higher areas in the west and the last parts of the Lebombo Mountains while the latter forms a boundary for the west east flowing rivers. East of the mountains and N2 highway, the land is very flat and mainly below 100 m amsl. The settlements are mainly on these lowlands around the Phongola River and lakes in the area, Lake St Lucia, Lake Sibayi and the Kosi Estuary. From a water supply view point, water will be pumped from the water treatment works to a high point near Jozini and gravitate from there to eastern (Phase 1) and some sections of the

southern areas (Phases 2 & 3) following the N2 route or east of the Lebombo Mountains. The Hlabisa area is, however, at too high an elevation and boosting will be required at around Hluhluwe if that area (Phase 5) was to be served from the Jozini works. The same boosting of water pressure is likely to be required to serve the phases to the south of Hluhluwe due more to the long distances from Jozini than the elevation of these parts (Phases 5 to 7).

- Map 05: Quaternary catchment boundaries colour coded to reflect average rainfall in each, ranging between 400 mm/annum in the far north to 700 mm in the far south.

Comparing Maps 02 and 03, shows that the PRS overlaps a large number of settlements and existing schemes some of which are not operational, but also settlements not yet covered.

Development of the scheme would have to start from the potable water source (Jozini WTW) and extend from there into the region to the various settlements along the mains. Extensions to other settlements (at existing reservoirs where possible) would take place over time. Three main systems are identified; the eastern (Phase 1), southern (Phase 2) and south-eastern mains (Phase 3). Each of these can be developed in stages extending progressively further away from the source to suit funds available and priorities. The eastern main through Qondile Gujini, for instance, has sub mains to Manukuza/Jobe, Mbazawana & Mbila, and Khiphimbazo & Phelandaba respectively.

The southern main would be the longest if all stages and phases identified were to be implemented. The main spine would be towards Myeni/Ngwenya and Esibayeni. Sub-mains from there could be implemented to Hlabisa South, Hluhluwe & Mdletshe (as phase/priorities 4 and 5 respectively), and from the latter to the independent schemes of Mtubatuba and Mpukonyoni (Phases 6 and 7 respectively). Due to distance of pipework and pumping costs involved, these areas are likely to be a relatively low priority to be included in the PRS, if at all. The latter areas are included as possible future phases due to the serious concerns related to the existing water resources and their ability to supply their supply zones in future.

It is clear that the footprint of the PRS as defined on the maps is a view of a possible ultimate scheme for the future with the identified areas included therein, or not, over time.

It is foreseen that the Jozini WTW supply area ultimately includes the major portion of the area between the Phongolo River in the north and the Mkhuze River in the south. This covers the area from the Lebombo Mountains in the west towards the eastern coastline, and also includes the town of Mkhuze and the Ngwenya tribal ward south of the Mkhuze River, on the western side of the Lebombo. In addition, the planned supply to the area on the Lebombo and north of the Phongolo River, to just south of Ingwavuma, is also to be considered. The attached locality plans (Annexure B) show the location of the project area on a provincial and local scale.

Note that the far northern areas along the Mozambican border and the coast (up to Mbazwana), are supplied from the Shemula WTW and local sources.

Villages / Communities	Nearest town and distance to the village
For settlements, see Annexure A	Jozini, varies from 0 to 120 km

1.4 Project Objectives

The objective of this project is to establish a sub-regional bulk potable water source at Jozini and to provide the bulk conveyance infrastructure to convey this water to as large a proportion of the sub-region as is feasible. As such, the project boundaries or footprint is quite flexible. As some of the existing schemes in the region are not reliable and the reticulations do not serve all populations, these aspects will be addressed and extended where needed.

With the "region" identified as the uMkhanyakude District Municipality, the "sub-region" would be a significant portion of the region, and potentially one of 4 or 5 "sub-regions" in total. Each of these would be served by a large scale bulk source.

The sub-regional bulk source is to provide at least a basic level of potable water in sufficient quantity and of acceptable quality to the population of the supply area. A secondary objective is to improve the security of water supply to neighbouring water supply schemes, where feasible, by linking to them at certain points thereby integrating the use of water from these sources and where practical minimising the number of WTW. Ultimately, the consolidation of the numerous small treatment works and schemes should translate into the optimisation of operational efforts and costs.

The initial task is to establish the feasibility of meeting these objectives by the modular extension of the water treatment capacity of the New 5 Mℓ/day Jozini WTW and the concurrent extension and/or upgrading of the existing bulk water distribution system to its supply area. Additional objectives include:

- Review and upgrade the existing scheme;
- Reinstate the functionality of the existing schemes where necessary;
- Ensure optimal use of the available water resources;
- Provide guidelines on the operation and maintenance of the system;
- Community upliftment through the creation of job opportunities during the construction phases;
- Build capacity in the community by participation in the management and decision making aspects of the project, as well as providing skills training;
- Create awareness of the importance of protecting the water resource and the water supply system.

1.5 Purpose of the Study

The purpose of the study is to identify the existing and potential water treatment and water supply options available in the target area, and to evaluate them in terms of:

- Meeting the demand for water (and eradicating water supply backlogs);

- Reviewing high water uses where applicable, address unaccounted for water and provide mitigating measures;
- Assessing demand growth projections;
- Identifying differentiated demand areas with potentially different service levels;
- Initial and follow-up environmental assessments as required;
- Engineering and other implementation of the proposed scheme and phasing thereof;
- Operation and maintenance issues with institutional profile at municipal and scheme levels;
- Order of magnitude costs of implementation and operation, and funding requirements and options available;
- Project implementation programme and time schedule for various phases;
- Project management plan (scope statement).

The resulting report would provide the basis to apply for further funding to proceed with the project.

1.6 Overview of Regional Planning / Studies

1.6.1 Background

The Pongolopoort Dam (so-called "Jozini Dam"), constructed in the early 1970s, has the potential to meet the water needs (at least, "domestic consumption" needs, potable water needs) of the entire uMkhanyakude District Municipality, and particularly those of the Jozini and uMhlabuyalingana Local Municipal areas. Water supply schemes supplied by the dam can also relieve some of the stress on neighbouring water supply schemes, which do not have the high level of assured yield that could be provided by the dam. In certain areas, security of supply is already a major issue during drought periods, or even during the annual dry season.

There are two water treatment works at Jozini (both on the right bank of the river); an Old Jozini Works of about 4 Mℓ/day capacity located in the town and the New Jozini Works of a reported 5 Mℓ/day which is located adjacent to the Phongolo River and downstream of the dam wall. Both works are supplied with raw water abstracted from the irrigation canal originating at the dam.

There are in excess of 20 stand-alone water supply schemes in the Jozini and uMhlabuyalingana LM areas. The O&M of these widely scattered schemes is problematic and only a few have a reliable and assured supply of acceptable quality water throughout the year. The consolidation of these schemes and incorporation of existing infrastructure into new infrastructure supplied from one or more regional WTW has been mooted previously and is again seen as a priority by the DM. The area around the New Jozini WTW is seen as a priority to be extended in future.

Figure 1: Aerial view of Jozini showing dam wall and existing treatment works

The linking of the Jozini WTW supply area to Ubombo, Jozini town, villages to the east, Ntshongwe and Mbazwana is the initial priority. Extensions to the Hluhluwe Phase 3 Community Water Supply Scheme (CWSS) in the south, Mbazwana would be a secondary priority and to the Shemula WTW supply area to the north and north-east, will be assessed and co-ordinated on a regional basis but over a longer implementation time. This would involve all stakeholders and water supply role-players in the region.

Taking into account the spatial development framework and the integrated development plan objectives of the district municipality, including poverty alleviation, job creation, skills development, health, financial viability and spatial integration, it is clear that consolidated and improved water supplies can have a major positive impact.

There are about 20 independed schemes identified which could be served by or integrated within the proposed regional scheme and study area. These range from very small local boreholes, to the large Shemula scheme along the Phongola River downstream of the Jozini Dam serving an estimated about 100 000 people as per the table below.

1.6.2 Regional Planning

1.6.2.1 Authority and providers

The uMkhanyakude DM is the water services authority and provider (WSA and WSP) in the region, and is responsible for the provision of water services in terms of the National Water Act (Act No.36 of 1998). Mhlathuze Water, based in Richards Bay, is also a role player in the provision of water services and capacity in the district municipality. Mhlathuze Water is currently involved as water service provider at the Hluhluwe WTW (north of Mpukonyoni)

and at the Shemula Scheme and WTW. Other role players are the local municipalities, tribal authorities, and the agricultural, industrial, mining and commercial sectors.

Although there is fairly high rainfall near to the coast, the majority of rivers and streams have large seasonal variations in flow, and many of the region's raw water sources are stressed or inadequate during the dry season and droughts. Therefore, there is a need for co-ordination and co-operation between all role players on a regional scale, to ensure water supply security and sustainable utilisation of the available water resources.

1.6.2.2 Conceptual master planning

A conceptual master planning study compiled by Bigen Africa (2006), identified the need to consolidate the numerous small schemes, and particularly their water treatment works, into larger regional infrastructure that is easier to manage, operate and maintain. The recommended scenario included the option of conveying sufficient treated water southwards from Jozini (with the Jozini Dam as the raw water source) to the Hlabisa, Hluhluwe and Mtubatuba areas, to meet the long term demands.

1.6.2.3 Mtubatuba regional study

A regional scheme study for the southern areas of the uMkhanyakude DM has been proposed, and will be carried out shortly if the funding application is successful. This study would include the investigation of the overall raw water supply to the Mtubatuba area and the neighbouring areas and schemes (ie. St Lucia, Mpukunyoni CWSS, Hluhluwe Phase 4 and Uthungulu DM northern areas).

1.6.3 Summary of Existing Schemes in or near Study Area

Table 3: Existing schemes in or near study area (*as shown on Mhlathuze Water/ Terratest mapping)

Name of existing scheme (from north to south)	Population estimate		Position relative to Jozini and proposed regional scheme (PRS) and inclusion therein
	Mhlathuze Water*	2008 DWA database	
1. Manyiseni	15 000	20 555	North and outside PRS
2. Shemula	90 000	114 487	North and outside PRS with possible small inclusion in Phase 1
3. Phelandaba	56 600	13 112	North east and outside PRS with possible small inclusion in Phase 3
4. Enkhanyezini	25 000	15 492	North east and outside PRS
5. Kwangwanase	38 000	29 547	North and outside PRS
6. Kwazibi	9 275	5 869	North and outside PRS
Sub-total outside PRS	**233 875**	**199 062**	
7. Izihlangwini	5 500	5 860	North and included in PRS Phase 3
8. Mtonjeni	3 000	1 975	North and included in PRS Phase 3
9. Nondubuyo	13 000	10 961	North and included in PRS Phase 3

Name of existing scheme (from north to south)	Population estimate		Position relative to Jozini and proposed regional scheme (PRS) and inclusion therein
	Mhlathuze Water*	2008 DWA database	
10. Jozini North	27 000	31 428	North and included in PRS Phase 3
Sub-total Phase 3	**48 500**	**50 224**	
11. Jozini South	47 000	36 019	South east and included in PRS Phase 1
12. Qondile Gujini	21 000	22 460	East and included in PRS Phase 1
13. Khiphimbazo	1 000	1 552	North east and included in PRS Phase 1
14. Mseleni & Mpophomeni	56 000	18 232	North east and included in PRS Phase 1
15. Mbazwana	32 500	4 569	East and included in PRS Phase 1
16. Mbila	20 000	20 117	East and included in PRS Phase 1
Sub-total Phase 1	**177 500**	102 949	
17. Myeni/Ngwenya	?	?	South and included in the PRS Phase 2
Sub-total Phase 2	**?**	?	
18. Hluhluwe Phase 3	32 500	31 411	South-east and not included in the PRS
Sub-total	**32 500**	**31 411**	
19. Hluhluwe Phase 1	17 000	5 387	South and included in PRS Phase 4?
20. Ezibaveni	37 000	18 303	South and included in PRS Phase 4?
21. Mdletshe	6 500	5 398	South and included in PRS Phase 4?
22. Hlabisa South	30 000	27 095	South west and included in PRS Phase 4?
Sub-total Phase 4	**90 500**	**60 167**	
23. Hluhluwe	930	3 984	South and included in the PRS Phase 5?
Sub-total Phase 5	**930**	**3 984**	
24. Mtubatuba	?	?	South and included in the PRS Phase 6?
Sub-total Phase 6	**?**	**?**	
25. Hluhluwe Phase 2	44 000	26 840	South and included in the PRS Phase 7?
26. Hluhluwe Phase 4	30 000	25 553	South and included in the PRS Phase 7?
27. Mpukonyoni	62 000	63 681	South and included in the PRS Phase 7?
Sub-total Phase 7	**136 000**	**116 074**	
Total	**719 800**	**559 887**	

* The above figures obtained from a mapping prepared by Terratest/Mhlathuze Water provides populations which appear to be far too high as these exceed the census and DWA figures for the whole district municipality and were thus not used for this report.

The DWA figures are seen as more reliable and were used for this project.

The Mpukongoni CWSS and Hluhluwe CWSS (Phases 1, 2 and 4) may only be linked in the far future, if ever. The Mpukongoni CWSS is covered by a separate business plan for short to medium term interventions. The Mtubatuba, Hluhluwe (various phases) and Hlabisa areas are also seen as possible longer term phases, if ever, mostly due to practical issues related to distance from Jozini and thus associated implementation and operational costs.

One other water supply in the region is the Charl Senekal scheme. During the late '90s, a farmer, Mr Senekal, purchased the irrigation farms of Mondi at Mkhuze. He also received permission to abstract water for irrigation purposes from the Jozini Dam. At that stage, the water supply to Mkhuze was managed by Mhlathuze Water and the scheme comprised a link from a weir on the Mkhuze River via an irrigation dam to the Mkhuze WTW. The necessary approvals were eventually obtained and Mr Senekal constructed his installations, using the Jozini Dam as source – including the supply to the water treatment plant at Mkhuze. Subsequently, the then Zululand District Council linked the Mandlakazi Water Supply Scheme to Mr Senekal's scheme, serving Nongoma and communities en route.

The operation of the Mkhuze water supply has been taken over in recent years by the uMkhanyakude DM, which has expressed a desire to establish its own water supply source to Mkhuze and environs, supplying it from the Jozini WTP and disconnecting from Mr Senekal's supply.

2 NEED DETERMINATION

2.1 Demographics

2.1.1 Current Population

The latest available data from the WSDP, IDP, available reports, and the DWA, and StatsSA (Census & Community Survey data), was used in determining current and future population, growth nodes and growth patterns. The information in the table below provides the estimates of the DM population, and households which forms the basis of water demands in the target areas.

Table 4: Population and number of housings for 2001 and 2007 in the district municipality

Local Municipality	Wards 2001	Census 2001	Houses 2001	CS2007*	Houses CS2007*	DWA (2008)	Average growth
uMhlabuyalingana	140 957	138 515	25 959	163 692	27 006	153 053	2,6%
Jozini	184 091	180 579	33 534	205 845	38 530	187 814	1,9%
Big 5 False Bay	31 305	29 810	6 183	34 475	6 657	62 394	1,7%
Hlabisa	176 871	175 277	26 876	149 926	29 260	33 706 ?	-2,5%
Mtubatuba	35 210	31 573	7 472	45 608	11 340	162 738 ?	4,9%
Total	**568 434**	**555 754**	**100 024**	**599 546**	**112 793**	**599 705**	**0,9%**

*Community Survey 2007 (Stats SA)

The PRS has a large target area, as described in paragraph 1.3, comprising more than half of the population of the Jozini and uMhlabuyalingana LMs. It is estimated that approximately 40% of the population is without a basic level water supply (DWA, less than RDP standard). This, together with the fact that the security of water supply in the wider region can be greatly enhanced, indicates that the extension of the existing Jozini WTW, and its bulk supply system, should be considered.

- Scenario 2: Medium growth 0% average, 2%pa in urban/peri urban centres (Jozini, Hluhluwe, Mtubatuba, etc.)

- Scenario 3: Low growth 0,5%, 1% in urban/peri urban centres

It is proposed that the medium growth scenario, Scenario 2, be adopted for this report. Nodes listed in the uMkhanyakude spatial development plan (SDP, as quoted in the 2011/2012 IDP) and their surrounding areas were considered as urban/peri urban centres for the purpose of estimating population growth. Areas which were listed as nodes within the local municipalities' SDP's but not in the district municipality SDP were not considered as growth centres. Within the scheme, these included the primary node Mkhuze, the secondary nodes Mbazwana and Jozini and the tertiary nodes Ubombo, Mseleni and Kwa-Duku. It also includes the proposed new tertiary node (Ophansi). Note that the proposed Madonela tertiary node is in any case located in the peri-urban area surrounding Jozini. Note that Ntshongwe is not considered as a growth area, since it is listed neither as a node nor as an area of densification.

Projected populations to year 2032 are included in Table 5.

2.2 Demand / Need Parameters

2.2.1 Service Levels

2.2.1.1 Existing services levels and water use

As mentioned, the project aims to refurbish, upgrade and extend the existing schemes both bulk and reticulation and improve the reliability of supply to all people in the proposed regional scheme. The level of service will be changed over time (not under this project) from the minimum basic level (RDP standard of stand pipes within 200 m) to a yard tap level of supply. Most of the population reside in rural settlements or the small towns. The towns of Jozini, Ubombo, Ntshongwe, Mtubatuba and Hluhluwe have a high level of service with house connections and wastewater collected and conveyed via sewers to the local treatment works before discharge to the streams/rivers. The remainder of the region of the PRS, however, has no waterborne sanitation systems and use on-site systems, mostly ventilated improved pit latrines (VIP) and in some cases unimproved pit latrines or less which are part of the regional backlogs. The existing water supply to the rural population varies across the area but is generally not reliable and often not available at times. Due to this and the fact that water has to be carted from the sources to the dwellings, rural people in general are using water more sparingly than urban residents who only have to open taps inside their housing. There are also some backlogs related to the level of water supply compared with the minimum or basic level of service. As these backlogs are scattered across the region, a general figure of water use per capita is elected for the PRS.

2.2.1.2 Water demands

As mentioned previously, there is an old and "new" existing treatment works at Jozini. Monthly flow records for these plants are available, and are summarised in Table 6. These plants supply water mainly to Jozini town, and the Ntshongwe-Malobeni scheme, which supplies water to Ntoshongwe and surrounding villages. The combined population for these

schemes is estimated to be approximately 27 500, based on the DWA (2008) population figures, and the DWA scheme footprints (see Table 8.). As noted above, Jozini has a high level of service, and this is evident in the high current demand. This may also be partly due business and institutional use, as well as losses.

Table 6: Production record for existing Jozini works

Water Treatment Works		Mℓ/day		
		Jozini Old	Jozini New	Total
Design capacity		4,0	5,0	9,0
Production Jan - Sept 2011	Average	3,06	4,88	7,94
	Maximum monthly average	4,2	5,2	9,3
	Minimum monthly average	1,3	4,2	6,4

The present water use in most of the remaining parts of the region is not monitored and no data could be obtained. It is, however, known that with a reliable source of potable water, the per capita water use increases, although to a level well below that of urban users. History has proved that the provision of sustainable potable water schemes draws people from other rural developments to the supply area. After a few years in operation, the demand often outstrips the supply and the demand per capita often exceeds RDP norms, due to higher living standards. This is particularly true for demand patterns in and around urban and peri-urban centres.

To this end, the DM has requested that the study also differentiates between the various growth areas and investigate realistic demand projections for each, even though this could lead to challenges in obtaining grant funding for the scheme development (due to demands exceeding minimum level of service).

The parameters such as population growth rates, peak factors, storage capacities, and water losses, etc., adopted for calculating water demands, were discussed and agreed with the UKDM (and/or project steering committee). The future water demands on a regional scheme with a reliable supply are therefore assumed to be as given in Table 7. Although 60ℓ per person per day plus 15% for losses is slightly above the norm, it allows a small safety factor in the system for repairs or maintenance work and for a percentage of the population to be provided with a higher level of service at a future stage.

Comparing Table 7 with Table 8, it is clear that the proposed demands are considerably lower than the current demands in the Jozini-Ntshongwe area. In order to make this water available for supply to additional areas, it is proposed that this demand could be gradually reduced through a variety of institutional, social and engineering interventions.

As indicated in Table 8, it is proposed to reduce the demand to the same levels as for the scheme as a whole. However, the reduction will be a gradual process, and for the first phase (1A), slightly greater demands (78 and 130 ℓ/person/day including losses for rural and urban areas respectively) will be assumed in the areas covered by the existing schemes.

Table 7: Projected water demands

Design consumption per capita	60 ℓ/c/day For rural areas; 100 ℓ/c/day for urban areas with (some of which have yard connections and waterborne sewers. The same growth nodes identified in section for population projections are also considered as urban areas for design consumption.
Demands for institutions and businesses	Minimum requirement but deemed included above
Allowances for water losses	15% Additional to demands above
Current unaccounted for water trends, causes and solutions	TBA
Agricultural and other uses	Provided from Jozini Dam, but not within the scope of this scheme
Storage capacity	Ideally, 48 hours of average annual daily demand and not less than 36 hours due to O&M weaknesses and reliance on pumping equipment.

Table 8: Estimated population and demands for existing supply and proposed reduction

Scheme	Total population Dec 08	Estimated portion in Jozini and surrounds	Estimated portion in Rural Areas
Estimated population currently supplied by Jozini Old and New WTW	27 478	7 290	20 188
Average demand Jan - Sept 2011	7 945	kℓ/day	
Current average per capita demand	289	ℓ/person/day	
Proposed reduced demand (ℓ/person/day)		100	60
Plus losses at 15%		15	9
Total reduced demand (kℓ/day)	2 231	838	1 393
Possible saving to be made available to other areas	5 713	kℓ/day	
Proposed interim demand (including losses)		130	78
Overall interim demand (kℓ/day)	2 522	948	1 575

The above criteria will be utilised in determining the design capacity of the WTW and pipeline upgrade(s).

Whilst consideration has been given to alternative sources, these cannot compare to the Jozini Dam in terms of accessibility and assurance of yield. One such source is Lake Sibaya. Although a relatively large volume of water is impounded in the lake, seasonal variations in water level and its location to the far-east of the project area detract substantially from its viability as a source.

3.1.1.1 Hydrological / geohydrological analysis

No groundwater will be used in the proposed scheme and no hydrological analysis has been done or licence application is yet available.

3.1.1.2 Water balance

The Jozini Dam was built to supply irrigation water to the downstream areas along the river. As the agricultural developments have not fully materialised to date, there is surplus irrigation water available from the dam.

3.1.1.3 Medium / long-term sustainability

The Jozini Dam can supply the water use that will be required in the PRS although the irrigation allocation may have to be changed to municipal use.

3.1.2 Infrastructure

Due to the unreliable alternative and existing water sources, only a bulk supply from Jozini Dam is seen as a reliable and sustainable regional scheme. In order to meet the water demands in the region under gravity, the storage needs to be at a sufficiently high elevation to do so. Only the Lebombo Mountain range near Jozini would meet both criteria of elevation and proximity to the source and no other regional infrastructure to that proposed is identified. The main option of the PRS is to agree on the boundaries of the ultimate scheme and the rate and extent to which it should be developed.

3.1.3 Water Quality

The standard for potable water supply is given in SANS 241-1:2011. All water supplied to consumers should meet these standards, and the consolidation of the water supply schemes and water treatment works, would assist in ensuring compliance with the criteria.

3.2 Engineering Consideration

3.2.1 Planning Norms and Design Parameters

As discussed in paragraph 2.2 above, a major objective of the project is to increase the capacity of the bulk and connector infrastructure from RDP standard (standpipe within 200m) at least to a Basic Level of service (yard tap) over time.

Parameters/criteria to be applied in the planning of this scheme to the required level of service are contained in Table 9.

Table 9: Summary of Design Parameters

Parameter	unit	Project Business Plan 2012	UKDM Preference
Design period	years	20 (2012 to 2032)	
People per household	No	6	
Average daily demand	ℓ/c/d	60	65
Annual growth factor			
Rural area	%	0%	
Mbazwana, Jozini, Ntshongwe, Mkhuze, Hlabisa and Mtubatuba areas due to population influx nearer to town	%	2%	
Summer peak factor on average annual daily demands		1,2	
Water losses	%	15%	15%
Demand peak factor (for reticulation pipelines into standpipes and/or yard connections)		4,5	
Peak factor on pumps, pumping mains and gravity mains		1,5	
Minimum pipe size	mm	50	
Minimum pipe class	PN	10	

3.2.2 Existing Infrastructure

No details of the various existing schemes, either reticulation or bulk, position, capacities, layouts or conditions could be obtained from the DM but the footprint of existing schemes only was obtained from DWA.

Details were obtained only for the Jozini New WTW and the layout of the pipeline to Ntshongwe, see annexure to this report. This shortcoming needs to be addressed and an extensive data register and data base of the existing water supply assets including conditions and capacities need to be determined soonest. As the scheme is proposed to be developed over time, say 20 years, this data base must be updated regularly and kept live.

3.2.3 Proposed Infrastructure

3.2.3.1 Physical design considerations

The project-specific design considerations (parameters) are listed in Section 3.2.1. Based on these considerations and the options considered under Section 3.1, the various components of the proposed scheme are described in the following sections. The lack of reliable data on the existing infrastructure, both position/sizing and condition is a concern and needs to be addressed for the proposed system to be finalised.

3.2.3.2 Bulk source and water treatment works

Raw water from the Jozini Dam is considered the only viable source of water for a WTW on a regional/sub-regional scale. The existing (ie. "New") 5 Mℓ/day WTW abstract raw water from the south bank canal (downstream of the dam wall).

The current arrangement at the 5 Mℓ/day WTW is considered a suitable arrangement, and should (as required) be upgraded to suit the ultimate capacity of the long-term WTW. As such, an opening in the canal would be provided, from where water could discharge to a gravity fed pipe to the WTW. A sluice needs to be provided as a control at this point.

The site on which the existing 5 Mℓ/day WTW are located would be suitable for expansion to 10 Mℓ/day but would be too small for the proposed ultimate capacity of 25 Mℓ/day, or greater. Adjoining land (ie. adjacent to the existing WTW) could be made available for this purpose. This land acquisition should be prioritised to take place during (or even prior to) the initial project phases. It would be necessary to ensure that access to the canal servitude (for DWA) is retained. With an existing 5 Mℓ/day capacity works, and a possibly ultimate 25 Mℓ/day to allow for extensions into other areas with limited water resources, the development of 5 Mℓ/day modules seems a practical scenario but needs to be confirmed.

The old WTW (located in Jozini town) also obtains raw water from the dam. In view of the requirement to consolidate the large number of water treatment works, it is proposed to mothball or abandon the "old" WTW once extensions to the "new" WTW have been commissioned.

As the WTW are located adjacent to the Phongola River, it will be necessary to give proper consideration to the risk of flooding. If no flood lines have been determined, this should be done in order to ensure that the WTW are located above the 1:100 year flood line (with proper consideration for dam releases, etc.).

The WTW should be planned as conventional works with rapid gravity filtration. No special measures for the removal of algae (ie. dissolved air flotation) are considered necessary at this stage but allowance could be made for these to be introduced in future if and when required. The initial water demand does not require the WTW to be developed to the 'final' capacity, but for master planning and water use application, it makes sense to take a longer term view and plan for the 25 Mℓ/day capacity at this stage. Development of treatment modules would be in-line with new phases to be built.

3.2.3.3 Pumping stations

Although pumping facilities are provided at the existing WTW, these are unlikely to prove adequate once the initial upgrades and extensions are in place. It will therefore be necessary to upgrade and/or augment the existing pumping infrastructure.

As the scheme will ultimately consist of two or possibly three major "limbs", it is likely that a pumping system will be required with pump sets for each of these "limbs" (ie. to suit specific duties). The possibility of incorporating the existing pumping station into this system should be investigated. The following pumping stations are likely to be required:

- Feeder pumping station for all demands on the eastern limb (towards Mbazwane);
- Feeder pumping station for all demands to the south, and including Jozini town - it may prove feasible to provide two stations for this purpose, one to Jozini only and another for all demands further south (Mkuze and possibly onwards);
- Booster pumping stations on the gravity mains where required.

All feeder (ie. main) pumping stations would all be located at the WTW supplying main reservoirs on the high point near the town. Care should, where possible, be taken not to place booster pumping stations in far outlying areas where maintenance (and indeed the provision of power) could be problematic. Similarly, care should be taken in the placement of booster pumping stations to ensure effectiveness (ie. not allow that a large volume is

pumped when increased pressure is only required for a small portion of the volume). Positions and operating duty points for pumping stations and pumps have not been determined under the current scope of work. The pumpstation buildings could be sized for the ultimate number of pumps required but installed only with the equipment required to meet the initial demands and phases developed, possibly in-line with the WTW modules, or lower.

3.2.3.4 Bulk storage/reservoirs

Bulk storage will be required in order to ensure supply continuity (ie. during service interruptions) and balancing in the network (ie. to balance demand over a full day with treatment/pumping over a shorter period). Reservoir and tanks to be constructed for this purpose should provide storage of between 36 hours and 48 hours (or 1,5 to 2 times average daily demand).

As a minimum requirement, reservoirs are to be required on each of the two limbs (east and south) but it is possible that (additional) dedicated storage would also be required for Jozini. As the topography east of Jozini is very flat, many (if not most) of the existing and future supply to schemes make use of elevated tanks. It is therefore foreseen that much of the bulk storage capacity for this limb of the network would have to be provided in the higher lying areas surrounding Jozini if practical and cost effective.

A few local high lying areas for the location of reservoirs are available to the east as well as south of Jozini. Access to suitable sites to the south may, however, prove difficult due to lack of (suitable) existing road infrastructure and topography. No reservoir sites have been identified for the purpose of this report.

The development of storage is foreseen to be done modularly for the main reservoir site at the high point near the WTW. Both the size of the storage modules and pump equipment would be selected to suit the demands per phases to be developed, possibly in equal capacity units and in-line with the construction of WTW modules.

3.2.3.5 Bulk conveyance and distribution pipelines

The purpose of the bulk conveyance and distribution pipelines will be to convey potable water from the WTW and to create a link(s) between the WTW and the existing schemes. These pipelines will include a combination of rising mains and gravity fed pipelines as shown in the schematic layout in Figure 3.

Although some bulk pipelines exist and are in use (ie. the rising main from the "new" WTW to Jozini and the existing 150 mm, 200 mm and 250 mm diameter pipes of the Ntshongwe-Malobeni scheme), these are already fully utilised and do not provide adequate capacity for the eventual final project phases. In order to meet demands, it would be necessary to reinforce these lines (ie. provide parallel capacity), and possibly replace them for operational reasons some time in future. Where feasible, pipelines reinforced or replaced by new bulk likes will be incorporated into the greater networks (either as distribution or reticulation pipes).

For the bulk infrastructure to be provided, only bulk off-takes will be allowed for, ie. connections will be to existing or new reservoirs/tanks and not directly into the reticulation.

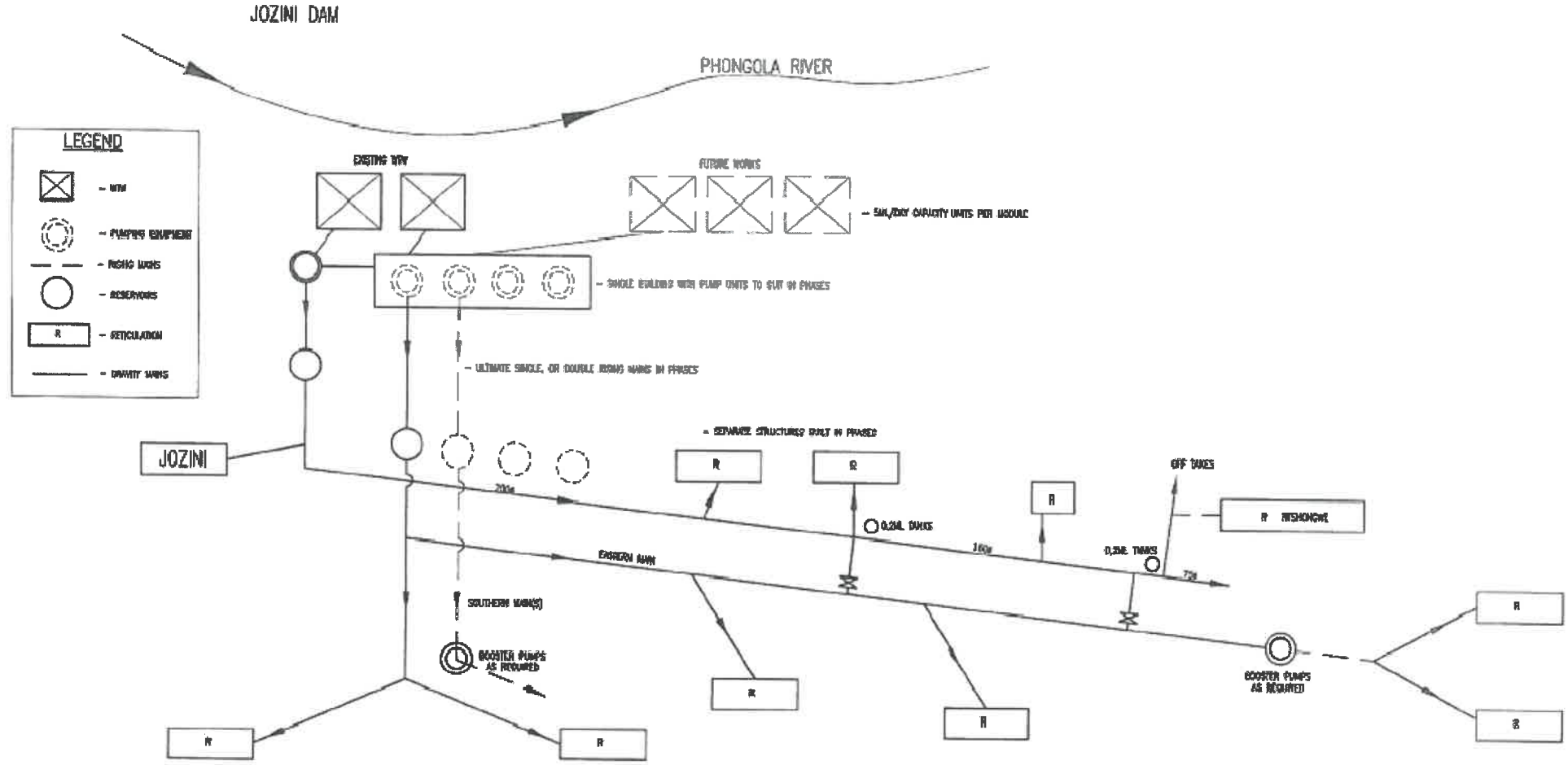


Figure 3: Possible development scenarios shown schematically

3.2.3.6 Reticulation networks

The bulk supply and reticulation networks need to be kept separated to reduce the peak demands on the former. Reservoirs would provide the daily peaks and form the link between the two. The existing reticulation would be retained where available but refurbished, reinforced and extended to suit the present and future population projected. The bulk system is to allow for rural yard connections and urban house connections but standpipes are the minimum service levels on the reticulation.

3.3 Bill of Quantities

The cost estimates and related details are provided below for the three identified scenarios: a) partly developed ultimate scheme (Phases 1, 2 and 3), but also for b) Phase 1 only, and c) for the first sub-phase (1A) which is proposed as the initial development. The concept to retain all existing infrastructure, unless economically not feasible, requires a better understanding of these components, capacities, limitations and shortcomings, both physical and operational. Without this information available, it is difficult to determine the additional costs. The exception is the New Jozini WTW which will be retained as is with possible minor upgrading only. The existing Jozini bulk supply and storage also require upgrading and extension but are likely to be integrated into the new proposed regional scheme once this is found to be practical and cost effective. For costing purposes on the future scenarios, these components are included as if these are to be provided under the scheme which is very conservative. The reason is that the relatively small pumps, rising main and reservoir will be parallel to the much larger but new similar components which, from an operational and capital view point, may be practical to be abandoned at some stage in the future and only retained as 'standby'.

It is assumed that most of the existing bulk supply components require some form of refurbishments/repairs which will, to some extent, cancel the conservative costs assuming all bulk components to be required for the full demand set out above.

The remaining scenario of showing the cost of a fully developed ultimate scheme (with supply to all the possible additional areas) is not included as this option is far into the future and may not be implemented at all. The total population is, however, shown earlier in this report and used to determine the overall water demand for this option.

Scenario a): Phase 1A (Areas 1.26 and 1.27 on Map 03 includes:

- 5Mℓ/day Extension to the existing "New" 5Mℓ/day plant & associated pumping & bulk storage. (This may be used to replace the existing "Old" 4Mℓ/day plant, thus allowing both new and proposed plants to be consolidated on a single site.) This component could possibly be delayed if WDM measures are successful.
- Construct the 1st 7,5km length of the new eastern main, with two main branches (to areas 1,27 and 1,26)
- Refurbish distribution within Jozini as required and extend to the southern parts of Jozini, which do not appear to be included in the current scheme (Areas 1.27 and 1.26). These areas also include parts of Gedleza, Gobandlovu, Makhonyeni and Qondile immediately

adjacent to Jozini. This phase also includes an allowance for additional distribution storage.
- Demand and loss management within the existing scheme to reduce water losses and high water uses per capita (and possibly for livestock).

Scenario b) Total combined Phase 1 covers:

- Supply to the eastern region (1.05 to 1.29), including bulk mains and branches and refurbishment of distribution storage and distribution networks, or new distribution storage and networks where required.
- 5Mℓ Extension to existing WTW plus additional 10Mℓ/day new adjacent plant and associated pumping and bulk storage capacity.

Please note that the Phase 1A is included as part of this phase

Scenario a) Combined Phases 1, 2 and 3 supplies (bulk and distribution) to the eastern area (Phase 1) and the area south up to Msunduze and including Mkhuze (Phase 2) and a connection to the existing Hluhluwe Phase 3 scheme (Phase 3). Note that Phase 1 is included in this scenario. Also note that there is no additional treatment or bulk storage beyond that included Phase 1.

In all of the above scenarios, both the bulk supply and the reticulation systems need to be allowed for as instructed by the WSA. Due to the lack of real data on the existing water reticulation networks, and the fact that these are likely to vary widely across the region and the phases due to age, condition, type of systems developed and maintenance given since original construction, it is not possible to provide a realistic cost for each village, town or settlement. The costs associated with upgrading or extending on existing reticulation or to provide a new, will also vary widely and could range from R0 for a new network in good condition, to say R6 000/capita for a widely scattered low density settlement, and anything in between. For the purpose of this report, and subject to confirmation in the next reports, it is assumed that all settlements require R2 000/capita for refurbishment, upgrading and/or extension as a blanket cost across the region.

The largest cost item for the bulk supply system is for pipelines. The main pipelines required are indicated on Map 03. A branch pipeline was assumed to each area (1.05 to 1.29 and 3.01 to 3.04 on Map 03). An initial estimate of pipeline sizes was made by assuming that the velocity in each pipeline is limited to a maximum of 1,3m/s (except for the pumping mains from the WTW to the reservoir, where 2m/s was assumed.) Lengths were based on assumed reservoir positions and an allowance of 10% for route deviations from a straight line. Unit costs for each pipe size were derived from those previously used for a water master plant escalated for price increases. It is noted that these rates compared well with the tendered rates for a recent project. A 2% allowance was added for road and river crossings, 18% for P&Gs, 15% professional fees (including environmental studies) and 10% for contingencies. Each branch pipeline to a reservoir was assumed to have an isolating valve, a check valve, a control valve and a flow meter. Rates for these components were derived from the same source as the pipes.

Pumpstation costs were also based on those given in the master plan. The total cost for a 640kW pumpstation given was escalated and converted to a cost per kW. To estimate the

required power, the total head loss in the pipe work to the furthest point on the bulk supply for Phase 1 was estimated as approximately 320m, to which would be added distribution losses and the required pressure at the supply point. However, as stated previously, local boosting would be used to supply the furthest points on the network. An average total pumping head of 300m was therefore assumed. Pumping power was based on 12 hour pumping per day and 50% standby capacity.

Unit rates for water treatment works and the associated bulk and distribution storage were based on SSI's experience with the construction of conventional treatment works.

Table 10: Details of proposed infrastructure: Scenario c) - Phase 1A

Item	Description	Unit	Qty	Rate	Cost
Water source storage	*Jozini Dam*	Mm^3	*2267*	*Existing*	
Water source abstraction	*Existing canal*	kW	*None*		
Water treatment	*Conventional plant - extension to existing 5Mℓ/day plant to replace old 4Mℓ/day plant*	Mℓ/day	*5*	*R 5 000 000*	*R 25 000 000*
Supply pumping capacity (including existing which may be replaced)	*Conventional pump station*	kW	*681*	*R 24 173*	*R 16 461 800*
Bulk storage (excluding existing)	*Circular concrete reservoirs and tanks*	Mℓ	*10*	*R 1 772 000*	*R 17 720 000*
Distribution network	*Pipes 50mm to 550mm dia.*	km	*20*	*Varies*	*R 51 077 300*
	Valves and flow meters	No	*8*	*Varies*	*R 576 000*
Distribution storage (50% of total requirement, assumed that remainder is existing)	*Steel tank*	Mℓ	*1,72*	*R 2 564 000*	*R 4 410 000*
Reticulation network and dispensing / consumer supply		*per capita*	*14 928*	*R 2 000*	*R 29 856 000*
Contingencies			*%*	*10%*	*Included*
Planning, design and supervision (12%), P&Gs (18%), EIAs (3%) and crossings			*%*	*36%*	*Included*
Institutional and socio-economic costs			*%*	*Sum*	*R 12 300 000*
Environmental costs (mitigation, relocation, etc.)			*Sum*		*R 5 000 000*
TOTAL PROJECT COST (excluding VAT)					***R 162 401 100***

Item	Description	Unit	Qty	Rate	Cost
VAT			%	14%	R 22 736 150
TOTAL PROJECT COST (VAT inclusive)					R 185 137 250
PROJECTED POPULATION SERVED AND COST PER CAPITA			No	14 928	R 12 400

Table 11: Details of proposed infrastructure: Scenario b) - Combined Phase 1 (1A, 1B &1C)

Item	Description	Unit	Qty	Rate	Cost
Water source storage	Jozini Dam	Mm³	2267	Existing	
Water source abstraction	Existing canal	kW	None		
Water treatment	Conventional plant - extension to existing 5Mℓ/day plant to replace old 4Mℓ/day plant	Mℓ/day	5	R 5 000 000	R 25 000 000
	New conventional plant	Mℓ/day	10	R 6 000 000	R 60 000 000
Supply pumping capacity (including existing to be replaced)	Conventional pump station	kW	2044	R 24 173	R 49 409 600
Bulk storage (excluding existing)	Circular concrete reservoirs and tanks	Mℓ	20	R 1 772 000	R 35 440 000
Distribution network	Pipes 50mm to 550mm dia	km	271	Varies	R 426 784 600
	Valves and flow meters	No	116	Varies	R 6 454 000
Distribution storage (50% of total requirement, assumed that remainder is existing)	Steel tank	Mℓ	15	R 2 564 000	R 38 460 000
Reticulation network and dispensing / consumer supply		per capita	139 746	R 2 000	R 279 492 000
Contingencies			%	10%	Included
Planning, design and supervision (12%), P&Gs (18%), EIAs (3%) and crossings			%	36%	Included
Institutional and socio-economic costs			Sum		R 65 000 000

Item	Description	Unit	Qty	Rate	Cost
TOTAL PROJECT COST (excluding VAT)					*R 1 150 511 900*
VAT			*%*	*14%*	*R 161 071 670*
TOTAL PROJECT COST (VAT inclusive)					*R 1 311 583 570*
PROJECTED POPULATION SERVED AND COST PER CAPITA			*No*	*190 057*	*R 6 900*

4 INSTITUTIONAL SUSTAINABILITY

4.1 Community Structures

4.1.1 Organisations and Leadership Profiles

The project is located within the Jozini, Umhlabuyalingana and Big 5 False Bay Local Municipalities, and representatives of each municipality will be consulted. Much of the area falls within the following tribal areas: Myeni/Ngwenya, Mankuza/Jobe, Myeni/Ntsinde, Mashabane, Mabaso and Zikhali/Mbila. In addition, the proposed link to the Hluhluwe Phase 3 Community Water Supply Scheme will provide water to the Mnqobokazi, Qwabe/Makhasa and Nibela Tribal Areas.

There have previously been tensions and capacity issues in the area, particularly relating to the dysfunctional water supply scheme. Therefore, an independent social consultant is being appointed to work on the project team.

Objectives of engagement with various community structures

The project will ensure that the involvement of the local population is continually sought, particularly for the purposes of drawing them into the project consultation and decision-making processes. The manners in which the stakeholder engagement processes and conflict management processes are undertaken form a critically important basis for later phases of the project roll-out. It is recommended that the following activities be undertaken:

- Identify water users and interested and affected parties;
- Inform water users and interested and affected parties (IAPs) of the project process;
- Create channels of communication to encourage co-operation during the process and gather information required for the process;
- Share information (which also include that related to project labour needs);
- Verify that information is correct; and
- Create an atmosphere that will enable decision making.

PSC project steering committee

An important aspect of the project will be the interface between the community structures and the UKDM water scheme operating personnel. The responsibility for the maintenance and repairs of the reticulation network, and the management of the water use at village level, including cost recovery, are issues that must be dealt with in this process.

The final design of the technical solutions, including the methods of dispensing metering, billing, restricting losses, and ensuring security of supply to all areas, will also be informed by the institutional and social development (ISD) process.

Monthly tribal council meetings, project steering committee meetings (which will include the technical project representatives), ward committee and councillor briefing sessions, public meetings, as well as ward public meetings will be hosted for the duration of the project. It will be the social consultant's responsibility to co-ordinate such meetings with the relevant participating groups.

A community liaison officer (CLO) will be recruited by the social consultant to provide the added link between the project and the people. It is strongly recommended that both the social consultant and the community liaison officer are members of the local community.

The rural communities of the area follow a largely traditional way of life, particularly in terms of the division of male/female roles and responsibilities in the home and community. The involvement and role of women in the project will be discussed when the social consultant meets with the traditional council leadership at the start of the project. At that point it would be useful to present to the traditional councils the possible roles that women can fulfil on such a project. Women will be major beneficiaries of the water scheme as they will have access to safe water which will be more easily accessible.

4.1.2 Level of Community Awareness and Development

There is a low level of community awareness of the project details at this stage, and this aspect will be dealt with by the ISD consultant (social consultant). Training and skills development will be carried out on the construction phase of the project. Similarly, the training and development of water committee's and water managers in the community must also take place to ensure continuity and that sustainable options to community management of water supply systems, are advocated. Community awareness and education in the correct and sustainable use of water will be undertaken as part of the social development / facilitation aspect of the project.

4.1.3 Income Level and Sources of Income

The proposed project footprint covers a large portion of the uMkhanyakude District Municipality, so income figures for the municipality as a whole are presented, based on the data contained in the uMkhanyakude District Municipality Integrated Development Plan Annual Review for 2011/12. "*25.7% of households have no formal income, which suggest a high dependency on subsistence activities for survival. A key contributor to the low-income levels is the high rate of unemployment and the low wages paid in specifically the agricultural sector. The majority of households live below the poverty line. ... 69% of the households earn an income of below R9 600 per annum.*"

Sources of income are subsistence and, for relatively few people, formal employment. "*About 12.7% of the total population is formally employed.*" "*Sources of employment for most of the people in the uMkhanyakude District Municipality include farming, trade, government, transport and tourism.*" "*4381 (13.3%) of the total labour force, works in the craft and trade related industries.*"

4.1.4 Community Involvement

It is envisaged that the various impacted communities will, through the communication structures set up at the commencement of the project, fully participate in the project planning and lend insight into community expectations related to project implementation.

Public participation forms an integral part of the validation and verification process. The objective of public participation is to inform the stakeholders in a defined study area of the intended project and the reasons why the project is necessary. The engagement with

stakeholders is required to take place in a way that provides them with an opportunity to meaningfully participate in the project.

The project will formulate a specific public participation (PP) strategy that will ensure community involvement throughout the life of the project. The social consultant will be tasked to execute the PP strategy, with the assistance of the CLO.

4.2 Water Service Authority

4.2.1 Responsibility

UMkhanyakude District Municipality is the authorised water services authority (WSA) for the five LMs in their area of jurisdiction.

General legislative framework: A basic distinction is made between the role of a municipality as service authority and the arrangements pertaining to the approach for service provision. The service authority status of a municipality is defined in the Act and does not allow any discretion by a municipality. The service authority establishes the authority to budget, raise revenue in terms of tariff policies, set by-laws and determine the service provider arrangements in relation to specific powers and functions. The service authority status of a water services authority is therefore fixed and well defined.

The district municipality was designated as the WSA for its entire area of jurisdiction, urban and rural. In terms of the Water Services Act, Act 108 of 1997, 'Water services' means water supply services and sanitation services. With the transfer to the WSA status, the UKDM:

- was made responsible for the provision of water services
- took ownership of all the water services assets
- took transfer of the water services liabilities for four local municipalities
- took transfer of rights and obligations relating to water services provision
- took transfer of local municipal staff dedicated to water provision, and
- was required to conduct a Section 78 investigation in order to determine the optimal water service delivery mechanism.

This implies that the UKDM has executive and legislative authority to administer and provide water services in terms of:

- Making by-laws and regulating compliance with the by-laws (within the framework of any national legislation, norms and standards that apply to the service)
- Developing and implementing policies
- Deciding tariffs and determining the allocation of equitable share to the service
- Planning for the service across its area of jurisdiction (deciding what levels of service will be provided, how the service will be provided, which areas will receive priority, etc.)
- Identifying and prioritising infrastructure development requirements (capital projects)
- Deciding water service provider arrangements (actually providing the service itself

or contracting another service provider to provide the service)

The Water Services Act, 1997 (Act No 108 of 1997) also requires that the WSA and water services provider (WSP) functions be institutionally separated in order to provide the best service delivery arrangement. Section 78 of the Local Government Municipal Systems Act, Act 32 of 2000 as amended, requires that a municipality embarks on a legislative process to assess current and potential service delivery mechanisms for the provision of a municipal service. The purpose of the assessment for water services is to select the most appropriate service delivery mechanism(s) that will ensure access to efficient, affordable, economical and sustainable water services.

Water quality management: Access to safe drinking water is essential to health and is a basic human right. Improving access to safe drinking water can thus result in tangible benefits to public health and every effort should be made to achieve a drinking water quality (DWQ) that complies with national safety standards. The National Water Act (Act No. 36 of 1998) and the National Water Resource Strategy (2004) have incorporated a holistic, integrated perspective on water quality management. Initial efforts in DWQ management, however, focused on the monitoring of DWQ to manage water quality and ensure a safe water supply. There is increasing international recognition that monitoring of potable water for compliance with numerical health limits is not sufficient to guarantee the quality and safety of our water supplies (NHMRC/ARMCANZ Coordinating Group, 2001, World Health Organisation, 2004).

A DWQ Management and Regulation Framework for South Africa has been drafted by DWA around the primary desired outcomes of treated/potable water. The DWQ framework document has been prepared to enable water services authorities to address effective management to protect public health. The framework presents an integrated system of approaches and procedures to address the key factors that govern DWQ protection.

While the primary objective of the DWQ framework is the protection of public health and to improve the quality of life, the 2010 Soccer World Cup Tournament was used as a stimulus for improving general DWQ management levels in all areas of South Africa. As sector regulator, DWA has set systems in place to enhance the steady and sustainable improvement of DWQ by monitoring that:

- WSAs are fulfilling their obligatory drinking water quality monitoring and information management functions;
- the public has access to DWQ information at reasonable frequencies;
- water safety and security plans are in place and being implemented;
- measures/mechanisms are implemented such that consumers trust the quality of drinking water in their areas of supply, and
- all DWQ failures are dealt with according to legislative requirements.

4.2.2 Status and Proficiency

The uMkhanyakude DM has a project management unit and operational team which can address the planning and management of the scheme. Where required, professional service

providers are brought in to assist. Regional co-operation and planning is also taking place, with all role players in the water supply sector.

4.2.3 Water Service Provider

4.3.1 Section 78 Determination

4.3.2 Status and Proficiency of the Selected WSP

4.3.3 Consumer / Customer Relationship

4.4.1 Water Use Registration (DWA)

4.4.2 Project Registration (DAEA)

Linkage between South Africa's national development planning and the MDGs		
	MTSF STRATEGIC ELEMENTS	**RELEVANT MDGS**
1.	Strategic Priority 1: Speeding up growth and transforming the economy to create decent work and sustainable livelihoods	MDG 1, MDG 2, MDG 3, MDG 8
2.	Strategic Priority 2: Massive programme to build economic and social infrastructure	MDG 1, MDG 3, MDG 8
3.	Strategic Priority 3: Comprehensive rural development strategy linked to land and agrarian reform and food security	MDG 1, MDG 2, MDG 7
4.	Strategic Priority 4: Strengthen the skills and human resource base	MDG 2
5.	Strategic Priority 5: Improve the health profile of all South Africans	MDG 4, MDG 5, MDG 6
6.	Strategic Priority 6: Intensify the fight against crime and corruption	MDG 2, MDG 3
7.	Strategic Priority 7: Build cohesive, caring and sustainable communities	MDG 2, MDG 3, MDG 7
8.	Strategic Priority 8: Pursuing African advancement and enhanced international cooperation	MDG 8
9.	Strategic Priority 9: Sustainable resource management and use	MDG 2, MDG 3, MDG 7
10.	Strategic Priority 10: Building a developmental state, including improvement of public services and strengthening democratic institutions	MDG 1, MDG 2, MDG 3, MDG 8

Figure 4: Linkage between MTSF and MDGs

Source: UNDP Country Report 2010

The Provincial (KZN) Growth and Development Strategy (PGDS) shows an inclusive sustainability approach (as encompassed in Figure below). The provision of water supply is outlined under infrastructure development, and along with other components, feed into the environmental, social and economic pillars of sustainability. This intrinsically shows the great dependence on infrastructure, particularly water, to support the pillars.

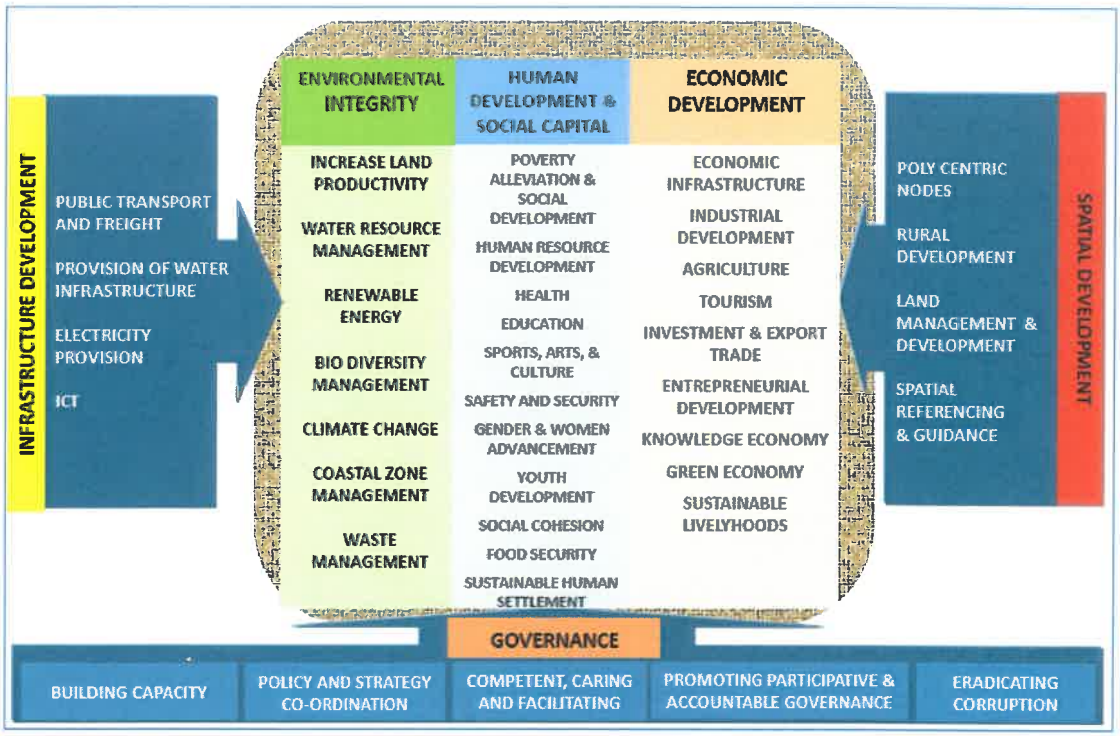


Figure 5: Provincial (KZN) Growth and Development Strategy

Source : KZN Provincial Growth and Development Strategy (Presentation, Sept 2011)

5.3 Training, Facilitation and Capacity Building Scope of Work

As part of the public participation initiative, hygiene and water use awareness will be rolled out in local schools and clinics by the CLO. The CLO will receive the necessary training and tools required to deliver such training.

While these (the social consultant and the CLO) are definite positions that will be created for the benefit of the project, other labour-intensive work related to the construction and transportation aspects, will also demand local labour. The CLO and social consultant will play a key role in the recruitment of such individuals, once the need is identified by the project team. The key areas that the social consultant and CLO will be involved in, are outlined in Table 13 below.

Table 13: ISD key areas of responsibility

Capacity	Task
Social consultant to aid in the development of the CLO	• Obtain recruitment nominations from councillor/s and /or community organisers; • Set up and conduct interviews with candidates (for local labour recruitment); • Review candidates and make recommendations; • Prepare labour /SMME instruction manual;

Capacity	Task
	• Train CLO/s on use of labour / SMME databases; • Monitor and manage CLO/s; and • Assist with and check on labour and SMME utilisation by the CLO/s
Social consultant and CLO	• Assist with the employment of CLO/s local labour and SMMEs by identifying the procedures to be followed in their employment though the utilisation of the SMME databases compiled; • Assist contractor/s by facilitating problems with local stakeholders; • Prepare template letter for contractor/s to inform adjacent properties of impending construction; and • Assist with labour related issues
Social consultant and CLO	• The Social Consultant, with the assistance of the CLO, must act as channel for information dissemination between the project team, contractor/s ward councillor/s ward committee/s, and stakeholders; • Assist with resolving conflicts and problems between various stakeholders; and • Implement proactive strategies and measures to deal with and mitigate potential impacts of construction activities on communities/groups

5.4 Labour-Based Construction

Opportunities to use labour-based construction will be considered during all project planning phases. During the concept and viability stage, job creation and labour intensive construction (LIC) will form one of the criteria for evaluation of alternative concepts. During the design phase, design for labour intensive construction will be considered where appropriate.

As pipework is the major component of the works, the selection of pipe materials involving a high labour component in their manufacture, as well as manual excavation and pipe laying will be considered where appropriate. For example, according to the Construction Industry Development Board (CIDB) best practice guideline (2002), 30 person hours are required for the manufacture of each 100m length of 160mm diameter uPVC pipe. Furthermore, the construction of concrete reservoirs is relatively labour intensive and will also contribute to the employment potential of the project.

The project team will at the inception phase, and during the meeting with the relevant role players, including traditional leaders, set up a system and guidelines for the employment of local labour. Agreement should be reached and recorded on matters such as the number of people that will be employed from each community.

5.5 Cost Estimates

The capital costs are included in the bills of quantities in Table 10, Table 11 and Table 12. A summary in presented in Table 14.

Table 14: Summary of Capital and Annual Recurring Costs (Excluding VAT)

	Phase 1A	Phase 1	Phases 1 to 3
Infrastructure cost	R85,3 m	R 593 m	R 664 m
Contingencies	R8,5 m	R 59 m	R66 m
Planning, design and supervision P&Gs	R 33,8 m	R 235 m	R 263 m
Institutional and socio-economic costs	R 30 m	R 100 m	R 120 m
Environmental costs	R 5 m	R 30 m	R 40 m
TOTAL CAPITAL COST	R 162 m	R 1 016 m	R 1151 m
Refurbishment / Replacement cost	Included	Included	Included
Annual Recurring Cost (assume 1% O&M)	R16 m	R102 m	R115 m

5.6 Net Present Value / Socio-Economic Quantification

Tabulate results of Economic Analysis for comparison:

Table 15:

	Option 1	Option 2	Option 3
TOTAL CAPITAL COST			
Refurbishment / Replacement Cost			
Annual Recurring Cost			
Net Present Value (__ %, 20 years)			
Socio-economic Opportunities			

6 FINANCIAL VIABILITY

6.1 Funding Sources

The funding source envisaged for the capital component is the Municipal Infrastructure Grant. The Vat rebate, which is returned to the municipality, will also be used as a source of funds.

Operation and Maintenance is currently, and will in future continue to be funded from the operational budget of uMkhanyakude District Municipality. Limited cost recovery is expected, mainly in urban areas. The proposed scheme will reduce operation and maintenance costs from current levels, because the number of treatment and pumping facilities will be reduced.

6.1.1 Capital Investment

Tabulate funding sources for capital investment:

Table 16:

Funding Source	Basic Level of Services	Higher Level of Service
Conditional Government Grant / Subsidy	R	R
Conditional Donor Grant	R	R
Municipal Budget Grant	R	R
Municipal Loans	R	R
TOTAL		**R**

6.1.2 Long Term Operation and Maintenance

6.1.2.1 Cost Recovery

Table 17:

Operation & Maintenance Cost	Rand per Annum					
	Year 1	*Year 2*	*Year 3*	*Year 4*	*Year 5*	*Year 10*
Estimated O&M Cost	R	R	R	R	R	R
Anticipated Cost Recovery	R	R	R	R	R	R
Annual Deficit	R	R	R	R	R	R

6.1.2.2 Deficit Funding

Tabulate funding sources for O&M deficit:

Table 18:

Funding Source	Basic Level of Services	Higher Level of Service
Municipal Budget	R	R
Municipal Loans	R	R
TOTAL		**R**

6.2 Cash Flow Forecast

6.3 Milestone Schedule for the Project

7 ENVIRONMENTAL ACCEPTABILITY

7.1 Natural Environment Impact Assessment Scoping Exercise

Prior to the undertaking of the EIA process, it is recommended that a preliminary screening exercise be undertaken of the social and biophysical environment to identify and flag possible environmental concerns and sensitivities associated with different project alternatives / options.

During the EIA process (of which the scoping phase is seen as the first stage), a ranking system will be developed to identify the significance of the impacts associated with the proposed development to take cognisance of the requirements of Regulation 32(2)(k) of Environmental Impact Assessment Regulations promulgated under the National Environmental Management Act, (Act 107 of 1998, NEMA) and the requirements of ISO 14001. According to the NEMA, an EIA report must include "an assessment of the **nature, extent, duration, probability** and **significance** of the identified potential environmental, social and cultural impact of the proposed development including the cumulative environmental impacts" of effects on the environment, whether such effects are positive (beneficial) or negative (detrimental).

Each issue/impact is also assessed according to the project stages from planning, through operational phase to the decommissioning phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted. A brief discussion of the impact and the rationale behind the assessment of its significance is included below.

The consequence of an impact resulting from an aspect is expressed as a combination of:

- **Nature** of impact: An indication of the extent of the damage (negative impacts) or benefit (positive impacts) the impact inflicts on natural, cultural, and/or social functions (environment).
- **Extent** of impact: A spatial indication of the area impacted (ie., how far from activity the impact is realised).
- **Duration** of impact: A temporal indication of the how long the effects of the impact will persist, assuming the activity creating the impact ceases.
- **Frequency** of the impact occurring: An indication of how often an aspect, as a result of a particular activity, is likely to occur. Note that this does not assess how often the ***impact*** occurs. It applies only to the ***aspect***.
- **Probability** of impact occurring: An estimated indication of the potential for an impact to occur.
- **Significance** of an impact: Considering Consequence and Probably Frequency (defined above), Significance is an indication of how serious a negative impact is anticipated to be and how beneficial a positive impact may be. Significance is considered to be High, Medium-High, Medium, Low-Medium or Low.

In addition, **cumulative impacts** must also be provided for and assessed during the EIA process

7.2 Social Environment

7.2.1 Relocation Considerations

If a resettlement process is deemed necessary, the following internationally recognised principles for resettlement are recommended:

A Resettlement Action Plan (RAP) should be compiled in accordance with international standards, and especially those laid out in the Performance Standards of the International Finance Corporation (IFC) (PS 5: Land Acquisition and Involuntary Resettlement). Amongst the IFC's objectives, are: to mitigate adverse social and economic impacts from land acquisition or restriction on affected persons' use of land by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected.

The RAP will set out consultation processes around resettlement, and in the case of this proposed project, specifically for grave relocations The process will also clarify compensation entitlement, types and levels of compensation, process of compensation, land replacement and the process of replacement. A detailed census and asset inventory will identify the households[1] and community groups to be compensated (or that have been compensated) under the RAP. Compensation should constitute a once-off payment to

[1] 'Households' refers to housing units, rather than individual residents

households and/or landowners that are directly affected by the project's activities, even if only for the relocation of graves. For those households being resettled, structures (and lost assets) should be compensated at full replacement costs. This must be undertaken prior to the Project's construction phase. Lessees of property/houses will be compensated for economic loss only. The owners of the property/houses should be compensated for assets.

To facilitate a Resettlement Action Plan p for those affected by the project activity (within the directly affected area/s), a consultation and negotiation process is necessary. A compensation committee with extensive knowledge and understanding of the background of potential claimants and an objective view on fair and equitable compensation, should be established as the decision-making body for compensation issues. Compensation should be provided in cases of economic displacement stemming from the clearance of land that has been acquired for the project's purposes. It should take place before construction begins with once-off payments. As such, the cut off date for compensation claims should occur well before construction and resettlement/ grave relocation takes place.

Ideally, should there be both *physical* (household/ relocation of graves) and *economic* displacement (loss of livelihood) there should be robust structures put in place to deal with such an intensive process. In this case, there are two levels of resettlement and compensation committees (R&CC), one at Government level, and the other at local/ household level (referred to as the Community Resettlement and Compensation Committee).

7.2.2 Socio-Economic Opportunity Maximisation

7.2.3 Environmental Management Plan/Programme

An Environmental Management Programme (EMPr) – *previously referred to as an EMP (Plan) in the EIA Regulations (2006)*, will need to be compiled as part of the environmental authorisation for the proposed project. The EMPr will include mitigation measures and plans for the control of residual impacts and emergency situations during construction, operation and decommissioning of the project. The EMPr will be compiled in order to ensure that all the measures required in achieving the environmental management objectives as identified through the environmental studies are implemented throughout all phases of the project.

The implementation of the provisions of the EMPr will assist in minimising the impacts associated with the project through appropriate environmental mitigation measures and procedures and compliance with appropriate environmental legislation, guidelines and standards. The EMPr will be based on the outcomes of the EIA/BA and will include the following:

- An environmental policy and Code of Conduct;
- Roles and responsibilities of the various responsible parties involved with the various phases of the project;
- Standards, guidelines and legal requirements (including any environmental permits required and the processes to be followed in obtaining these permits);
- Environmental specifications for design;

- Environmental specifications for construction; and
- Environmental specifications for operation.

The EMPr will also contain plans relating to, inter alia, 'clean' and contaminated topsoil and spoil management, 'clean' and polluted water management, removal of vegetation, erosion and slope stabilisation, noise management, uncontaminated solid waste management, hazardous material and waste management, fuel off-loading and storage, air quality management, related health and safety issues, risk management and emergency response, public consultation and ongoing liaison. The EMPr will set out any monitoring programmes required to ensure that all aspects of construction comply with the agreed environmental management objectives.

8 CONCLUSION

- Water need:
  Domestic: 29 854 households
  Institutional: Deemed included
  Agriculture: None
- Water Source: Phongolo River
- Raw water Storage: Jozini (Pongolapoort) Dam
- Treatment: Conventional plant – extension to existing and new plant adjacent
- Dispensing:
- Total Capital Cost: R 1 311 583 569
- Capital Cost Phase 1A R 185 137 334

  Funding:

  Conditional Government Grant R 185_____ million
  Conditional Donor Grant R _____ million
  Council Budget Grant R _____ million
  Council Capital Loan R _____ million
- Estimated O&M Cost: R _____ per annum

  Funding:

  Council Budget R _____ per annum
  Council Loan R _____ per annum

9 RECOMMENDATION

It is recommended that the phase 1A of the project as described in section 8 above be implemented to provide water services to the communities of uMkhanyakude District Municipality at a total capital cost of R 185 million, starting in the 2012/13 financial year for completion in the 2015/16 financial year.

10 PROJECT APPROVAL

10.1 WSA Management Support

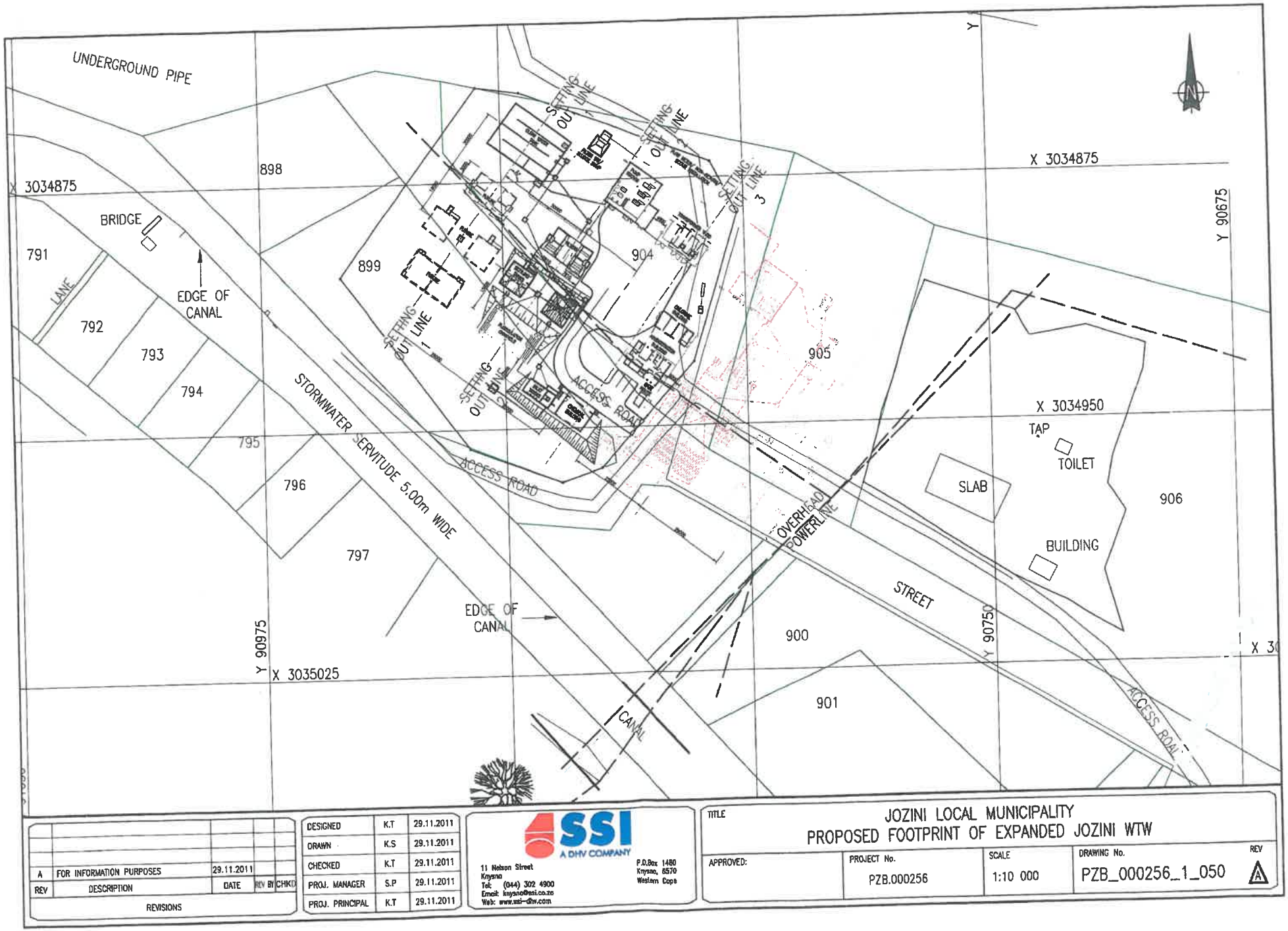
Table 19:

The recommendation in section 9 above is:	
SUPPORTED AND SUBMITTED TO COUNCIL FOR CONSIDERATION	NOT SUPPORTED
Municipal Manager	Municipal Manager
Date:	Date:

10.2 WSA EXCO Approval

Table 20:

The recommendation in section 9 above was:	
APPROVED BY EXCO	NOT APPROVED BY EXCO
EXCO Resolution: _____ of _____ 20 _____	
EXCO Secretariat	EXCO Secretariat
Date:	Date:



REV	DESCRIPTION	DATE	REV BY	CHKD
A	FOR INFORMATION PURPOSES	29.11.2011		

REVISIONS

DESIGNED	K.T	29.11.2011
DRAWN	K.S	29.11.2011
CHECKED	K.T	29.11.2011
PROJ. MANAGER	S.P	29.11.2011
PROJ. PRINCIPAL	K.T	29.11.2011

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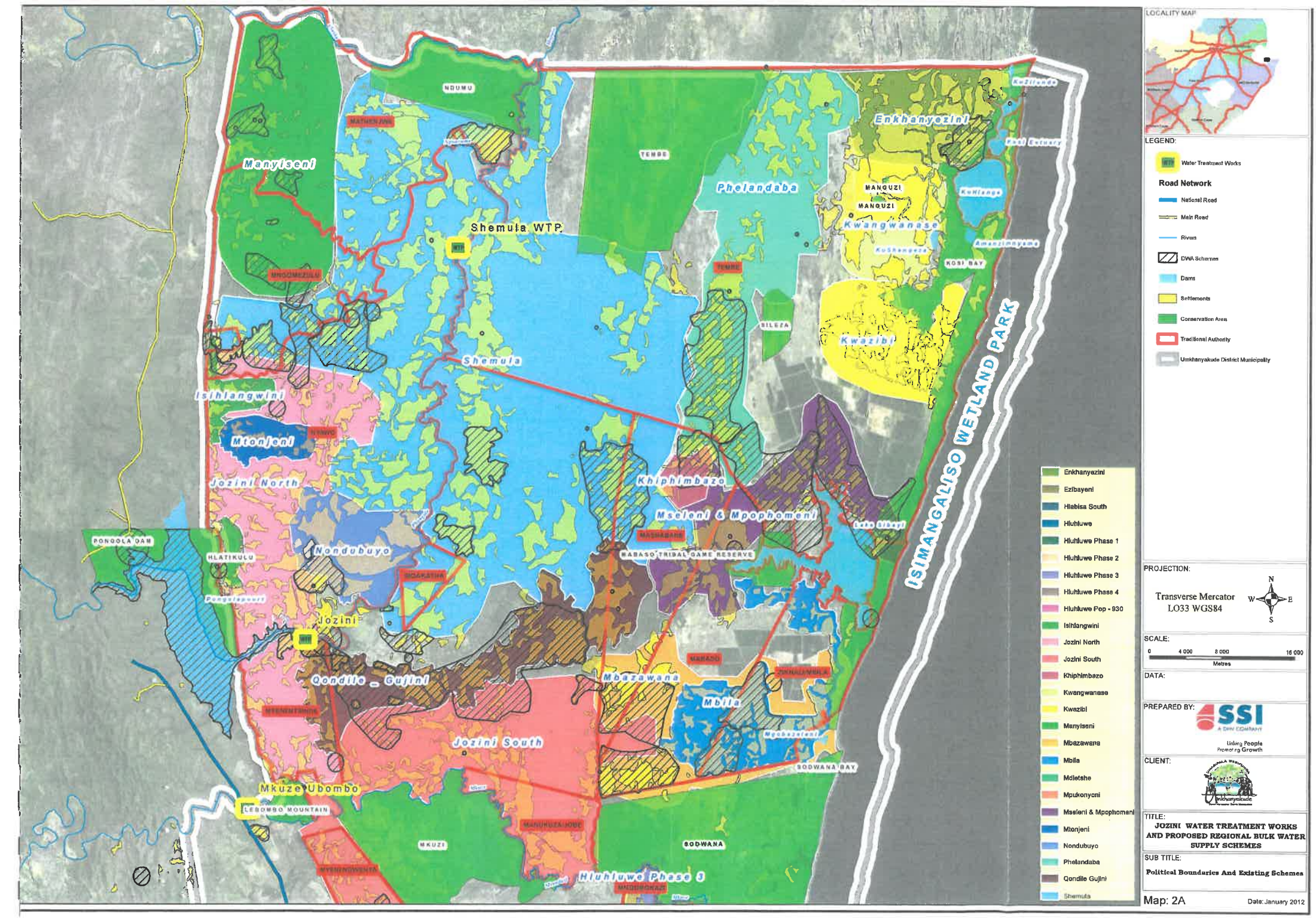
Knysna, 6570
Western Cape

TITLE

JOZINI LOCAL MUNICIPALITY
PROPOSED FOOTPRINT OF EXPANDED JOZINI WTW

APPROVED:	PROJECT No.	SCALE	DRAWING No.	REV
	PZB.000256	1:10 000	PZB_000256_1_050	A

MAPS



LOCALITY MAP

LEGEND:

- Water Treatment Works
- **Road Network**
- National Road
- Main Road
- Rivers
- DWA Schemes
- Dams
- Settlements
- Conservation Area
- Traditional Authority
- Umkhanyakude District Municipality

PROJECTION:

Transverse Mercator
LO33 WGS84

N
W E
S

SCALE:

0 4 000 8 000 16 000
Metres

DATA:

PREPARED BY:

SSI
A Tetra Tech Company
Uniting People Promoting Growth

CLIENT:

Umkhanyakude

TITLE:

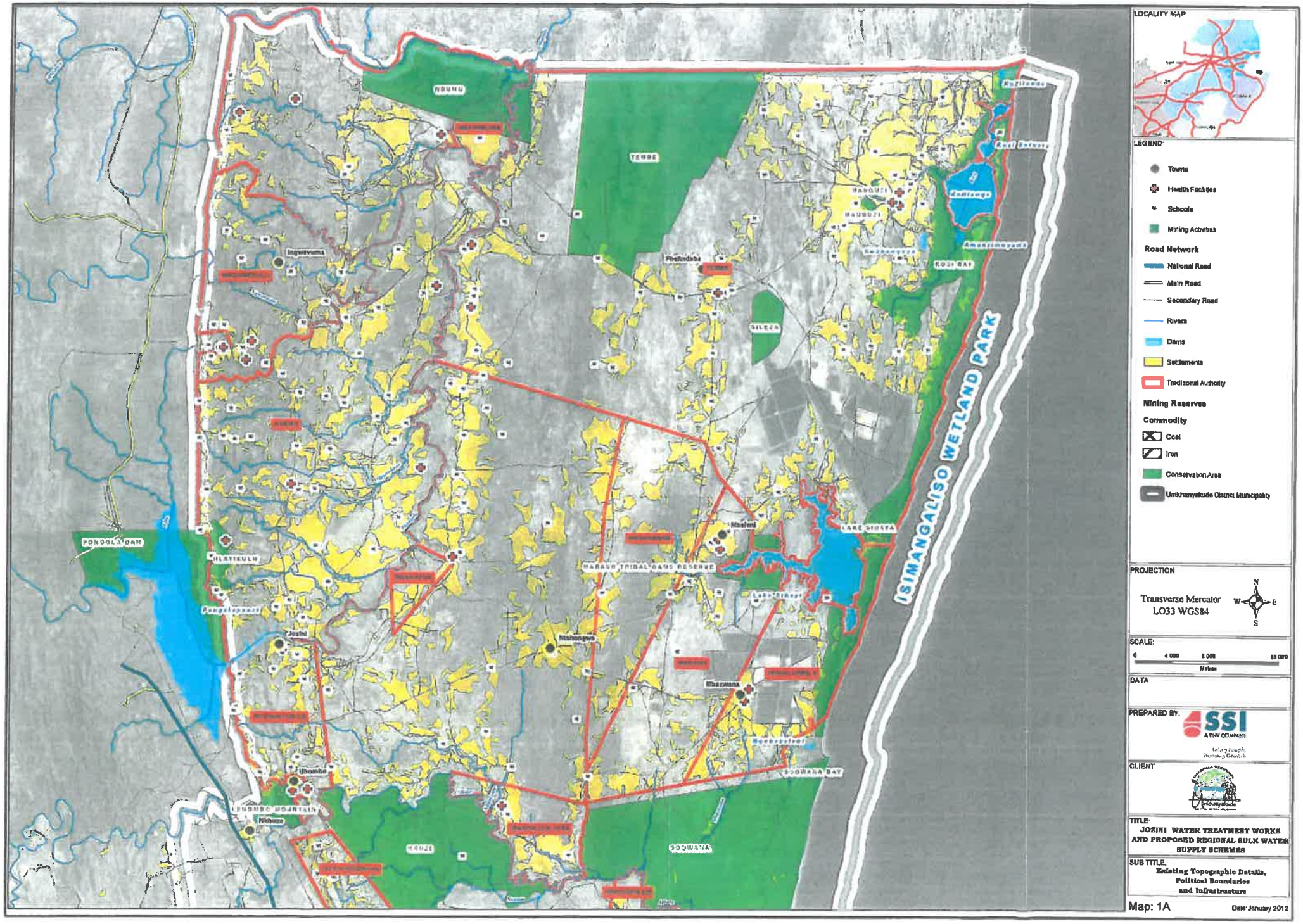
JOZINI WATER TREATMENT WORKS AND PROPOSED REGIONAL BULK WATER SUPPLY SCHEMES

SUB TITLE:

Political Boundaries And Existing Schemes

Map: 2A

Date: January 2012



LOCALITY MAP

LEGEND

- Towns
- Health Facilities
- Schools
- Mining Activities

Road Network

- National Road
- Main Road
- Secondary Road
- Rivers
- Dams
- Settlements
- Traditional Authority

Mining Reserves

Commodity

- Coal
- Iron
- Conservation Area
- Umkhanyakude District Municipality

PROJECTION

Transverse Mercator
LO33 WGS84

SCALE:

0 4 000 8 000 16 000
Metres

DATA

PREPARED BY: SSI A WSP COMPANY

CLIENT

TITLE:
JOZINI WATER TREATMENT WORKS AND PROPOSED REGIONAL BULK WATER SUPPLY SCHEMES

SUB TITLE:
Existing Topographic Details, Political Boundaries and Infrastructure

Map: 1A

Date: January 2012

LOCALITY MAP

LEGEND:

- Towns
- Possible Secondary Pipeline
- **Road Network**
- National Road
- Main Road
- Possible Bulk Pipelines For Regional Scheme
- Rivers
- Su Phase
- Dams
- Settlements
- Traditional Authority
- Phases
- Conservation Area
- Umkhanyakude District Municipality

PROJECTION:

Transverse Mercator
LO33 WGS84

N E S W

SCALE:

0 4 000 8 000 16 000
Metres

DATA:

PREPARED BY:

SSI
Linking People
Promoting Growth

CLIENT:

Umkhanyakude

TITLE:

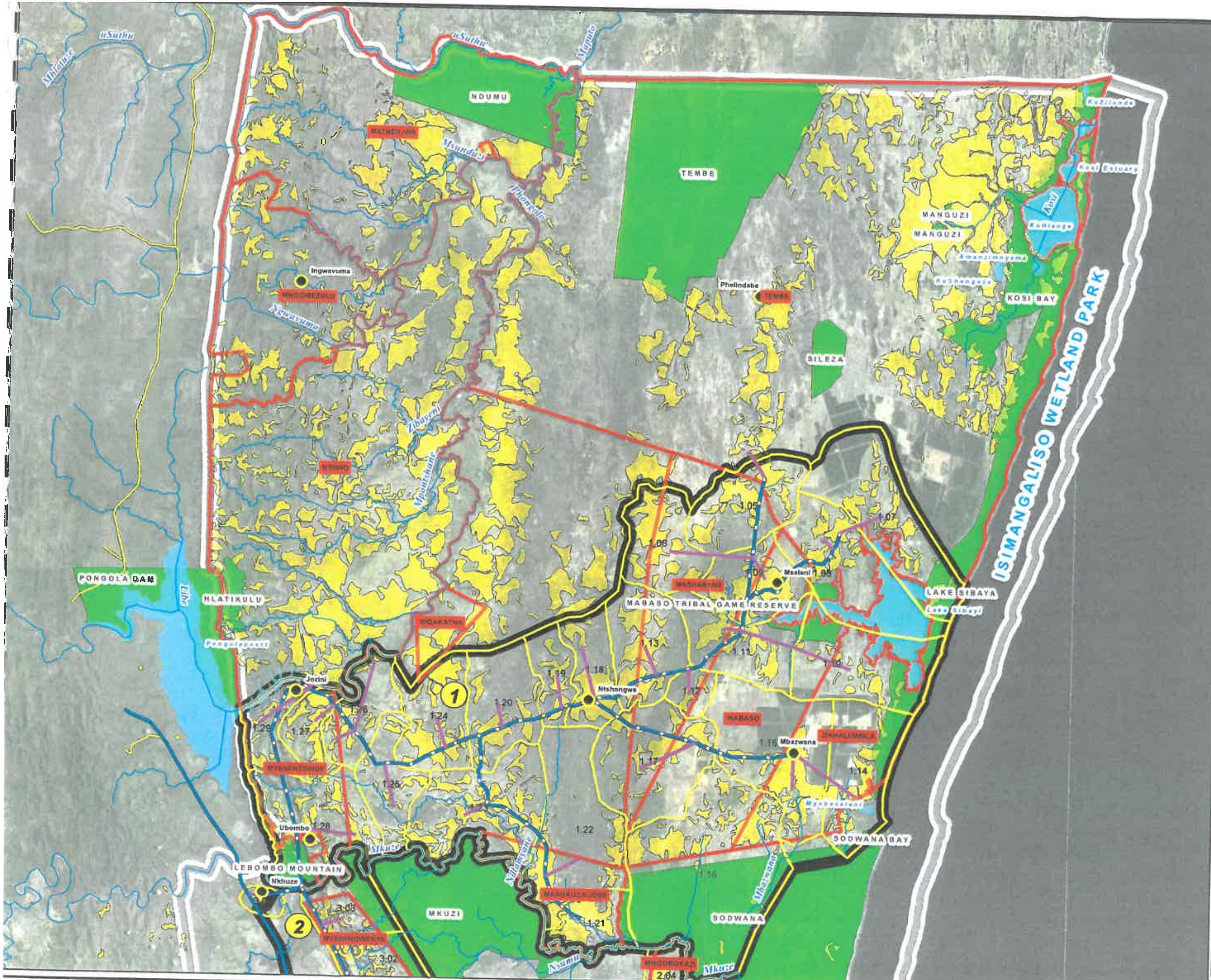
JOZINI WATER TREATMENT WORKS AND PROPOSED REGIONAL BULK WATER SUPPLY SCHEMES

SUB TITLE:

Proposed Regional Scheme And Possible Phasing Thereof

Map:3B

Date: January 2012



PROJECTION:

Transverse Mercator
LO33 WGS84

N E S W

SCALE:

0 4 000 8 000 18 000
Metres

DATA:

PREPARED BY: SSI A DHV COMPANY
Linking People
Promoting Growth

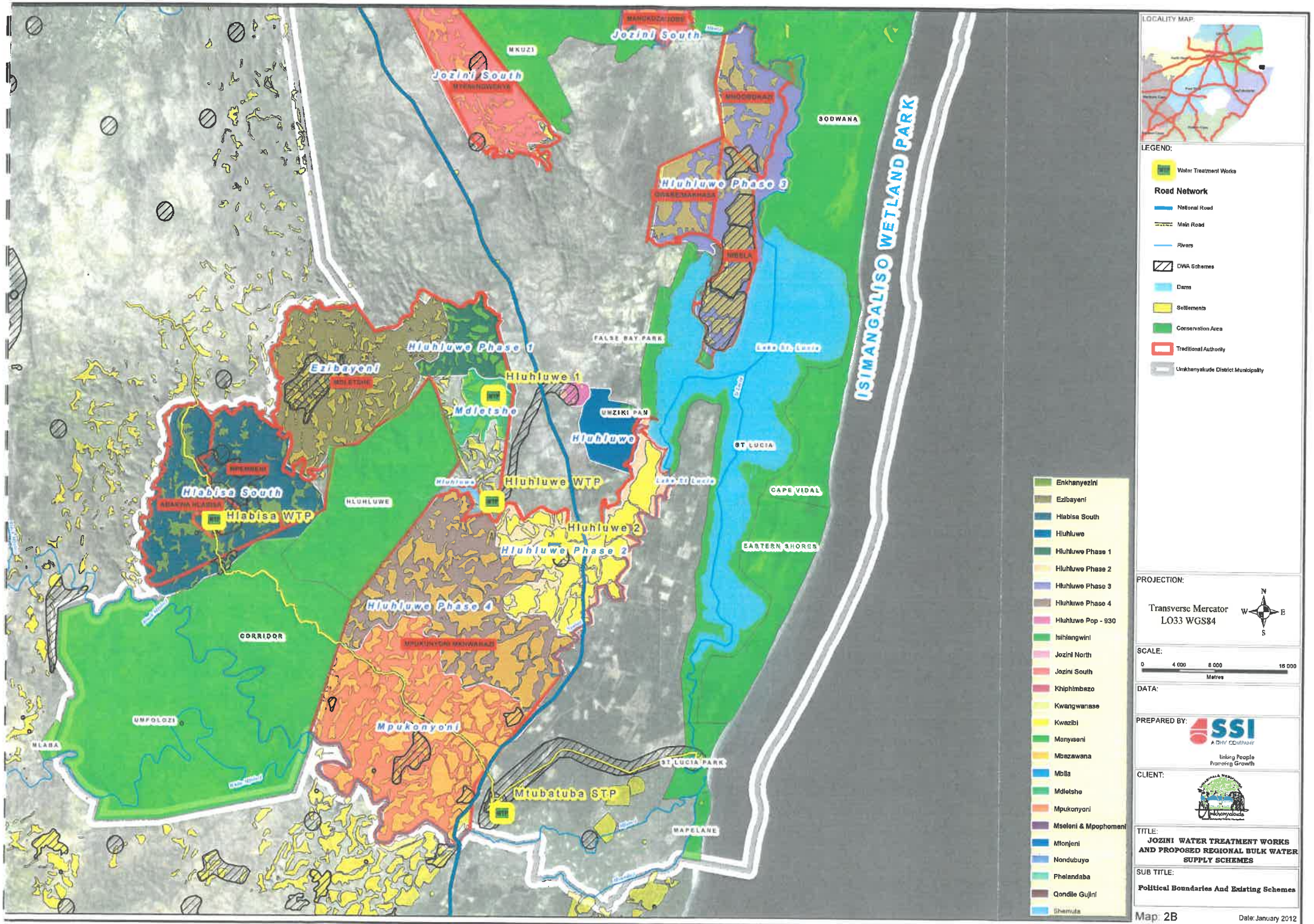
CLIENT: Umkhanyakude

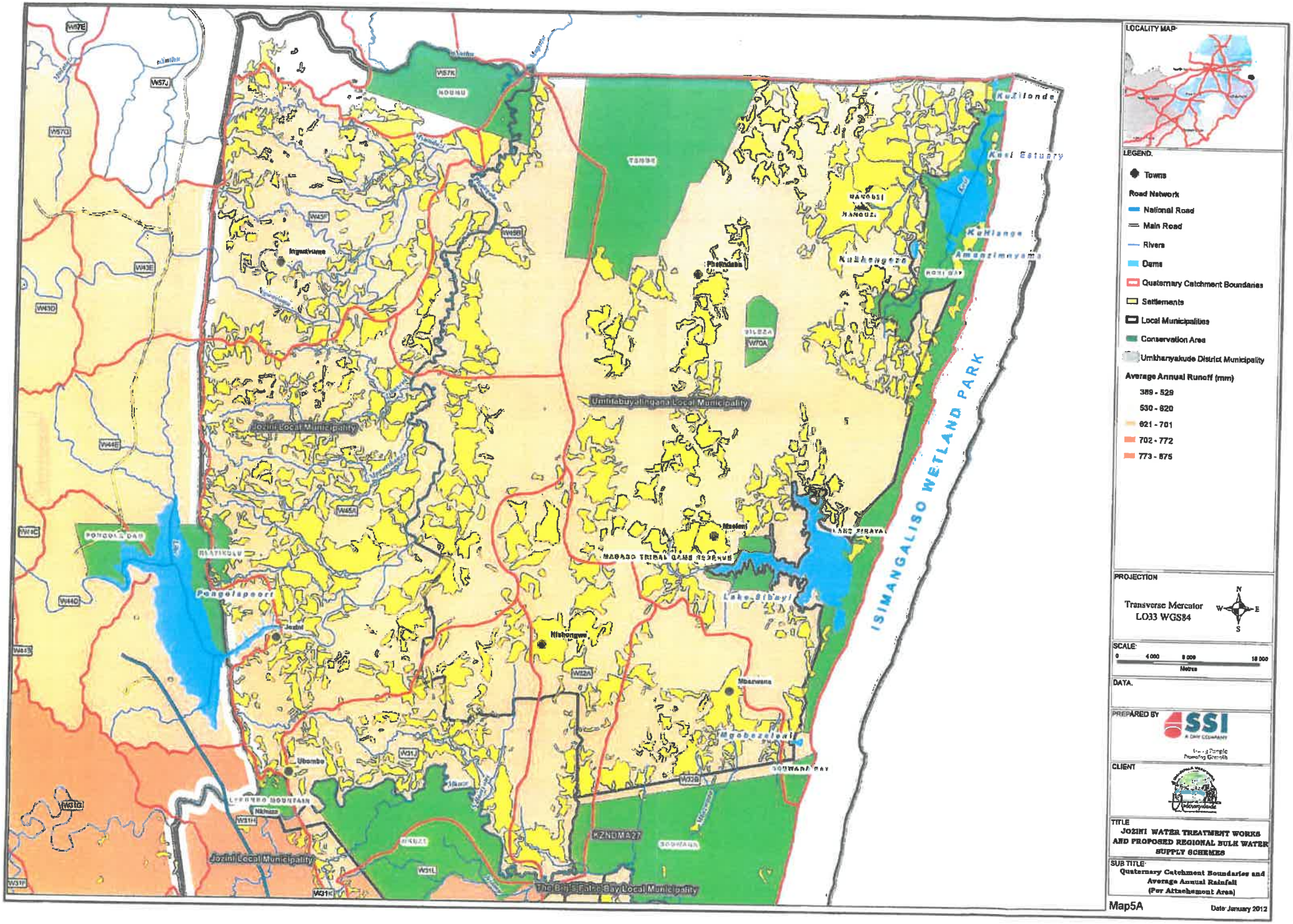
TITLE:
JOZINI WATER TREATMENT WORKS AND PROPOSED REGIONAL BULK WATER SUPPLY SCHEMES

SUB TITLE:
Proposed Regional Scheme And Possible Phasing Thereof

Map 3A

Date: January 2012


Jozini South
Jozini South
MKUZI
SODWANA
Hluhluwe Phase 3
NIBELA
ISIMANGALISO WETLAND PARK
FALSE BAY PARK
Lake St. Lucia
Hluhluwe Phase 1
Ezibayeni
Hluhluwe 1
Mdletsho
UMZIKI PAN
Hluhluwe
ST LUCIA
Hluhluwe WTP
Lake St Lucia
CAPE VIDAL
Hlabisa South
Hlabisa WTP
HLUHLUWE
Hluhluwe 2
Hluhluwe Phase 2
EASTERN SHORES
Hluhluwe Phase 4
CORRIDOR
Mpukonyoni
UMFOLOZI
MLABA
ST LUCIA PARK
Mtubatuba STP
MAPELANE
LOCALITY MAP:
LEGEND:
Water Treatment Works
Road Network
National Road
Main Road
Rivers
DWA Schemes
Dams
Settlements
Conservation Area
Traditional Authority
Umkhanyakude District Municipality
Enkhanyezini
Ezibayeni
Hlabisa South
Hluhluwe
Hluhluwe Phase 1
Hluhluwe Phase 2
Hluhluwe Phase 3
Hluhluwe Phase 4
Hluhluwe Pop - 930
Isihlangwini
Jozini North
Jozini South
Khiphimbazo
Kwangwanase
Kwazibi
Manyiseni
Mbazawana
Mbila
Mdletshe
Mpukonyoni
Mseleni & Mpophomeni
Mtonjeni
Nondubuyo
Phelandaba
Qondile Gujini
Shemula
PROJECTION:
Transverse Mercator
LO33 WGS84
N
W
E
S
SCALE:
0
4 000
8 000
16 000
Metres
DATA:
PREPARED BY:
SSI
A DHV COMPANY
linking People
Promoting Growth
CLIENT:
Umkhanyakude
TITLE:
JOZINI WATER TREATMENT WORKS AND PROPOSED REGIONAL BULK WATER SUPPLY SCHEMES
SUB TITLE:
Political Boundaries And Existing Schemes
Map: 2B
Date: January 2012



LOCALITY MAP:

LEGEND.

- Towns
- Road Network
- National Road
- Main Road
- Rivers
- Dams
- Quaternary Catchment Boundaries
- Settlements
- Local Municipalities
- Conservation Area
- Umkhanyakude District Municipality

Average Annual Runoff (mm)

- 389 - 529
- 530 - 620
- 621 - 701
- 702 - 772
- 773 - 875

PROJECTION

Transverse Mercator
LO33 WGS84

N
W E
S

SCALE:

0 4 000 8 000 16 000
Metres

DATA.

PREPARED BY

SSI
A DHV COMPANY
Growing People
Promoting Growth

CLIENT

TITLE

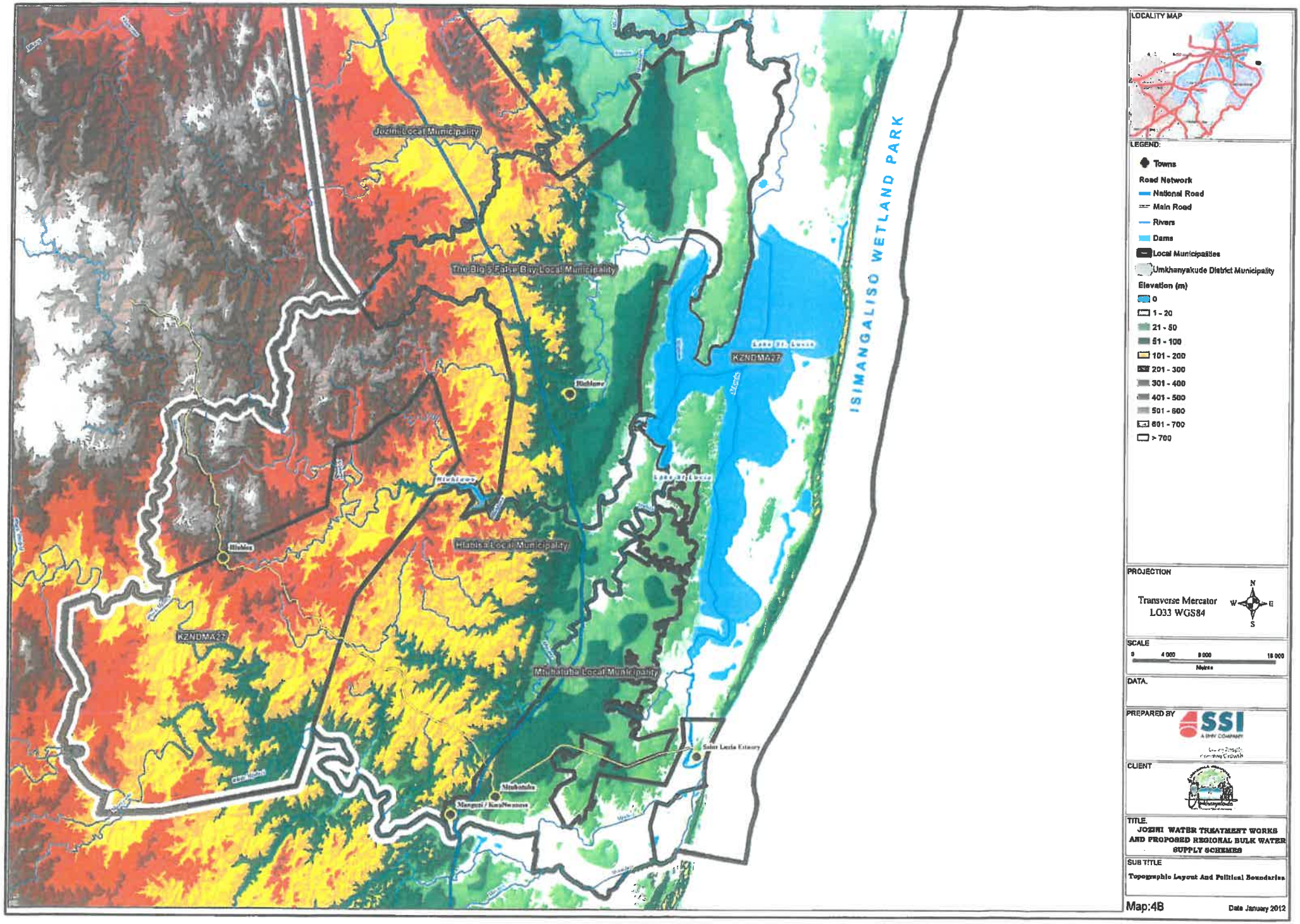
JOZINI WATER TREATMENT WORKS AND PROPOSED REGIONAL BULK WATER SUPPLY SCHEMES

SUB TITLE:

Quaternary Catchment Boundaries and Average Annual Rainfall (Per Attachement Area)

Map5A

Date: January 2012



LOCALITY MAP

LEGEND:

- Towns
- Road Network
- National Road
- Main Road
- Rivers
- Dams
- Local Municipalities
- Umkhanyakude District Municipality

Elevation (m)

- 0
- 1 - 20
- 21 - 50
- 51 - 100
- 101 - 200
- 201 - 300
- 301 - 400
- 401 - 500
- 501 - 600
- 601 - 700
- > 700

PROJECTION

Transverse Mercator
LO33 WGS84

N
W
E
S

SCALE

0 4 000 8 000 16 000
Metres

DATA.

PREPARED BY

SSI
A WHY COMPANY

CLIENT

TITLE

JOZINI WATER TREATMENT WORKS AND PROPOSED REGIONAL BULK WATER SUPPLY SCHEMES

SUB TITLE

Topographic Layout And Political Boundaries

Map:4B

Date January 2012