Ncwabeni: Off-Channel Storage Dam

NEAS Ref No: DEA/EIA/0000586/2011; DEA Ref. No: 12/12/20/2468

DRAFT SOCIAL IMPACT ASSESSMENT REPORT
May 2012

Prepared by:

Dr. Neville Bews & Associates
Social Impact Assessors
PO Box 145412
Bracken Gardens
1452

Submitted to:

NEMAI Consulting
Environmental & Social Consultants
147 Bram Fischer Drive
Ferndale
2194

Table of Contents

List of Bar Charts

List of Figures

List of Tables

List of Acronyms

AIDS	Acquired immunodeficiency syndrome
BID	Background Information Document
DAEARD	Department of Agriculture, Environmental Affairs and Rural Development
DEA	Department of Environmental Affairs
DC21	Ugu District Municipality
DEAT	Department of Environmental Affairs and Tourism (National)
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
ha	Hectare
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
kW	Kilowatt
KZN213	Umzumbe Local Municipality
KZN216	Hibiscus Coast Local Municipality
km	Kilometre
KZN	KwaZulu-Natal
l	Litres
l/s	Litres per second
m	Metre
m.a.m.s.l.	Meters above mean sea level
m/s	Metres per second
m3	Cubic metre
MAR	Mean Annual Runoff
Ml	Mega litre
mm	Millimetre
Mm3	Million cubic metres
MWSS	Mzimkhulu Water Supply System
NBA	Dr. Neville Bews & Associates
NGO	Non-Governmental Organisation
PA	Per Annum (Yearly)
RAP	Resettlement Action Plan
OCS	Off-Channel Storage
OCSS	Off-Channel Storage Scheme

SDF	Spatial Development Framework
SIA	Social Impact Assessment
SLA	SLA Sustainable Livelihood Approach
SMME	Small Medium and Micro Enterprises
Stats SA	Statistics South Africa
STDs	Sexually Transmitted Diseases
ToR	Terms of Reference
WC/WDM	Water Conservation / Water Demand Management
WESSA	WESSA Wildlife and Environmental Society of South Africa
WMA	Water Management Area
WRC	Water Research Commission
WRYM	Water Resources Yield Model
WSA	Water Services Authority
WTW	Water Treatment Works
WTP	Water Treatment Plant
WULA	Water Use Licence Application
WHO	World Health Organisation

Details and Experience of Independent Consultant

Consultant:	Dr Neville Bews & Associates
Contact person:	Neville Bews
Physical address:	84 Hennie Alberts Street, Brackenhurst Alberton
Postal address:	P O Box 145412, Bracken Gardens, Alberton, 1452
Telephone:	+27 11 867-0462
Mobile:	+27 82 557-3489
Fax:	+27 86 621-8345
Email:	bewsco@netactive.co.za
Website:	www.socialassessment.co.za

Qualifications:

University of South Africa: B.A. (Honours) – 1984

Henley Management College, United Kingdom: The Henley Post-Graduate Certificate in Management – 1997

Rand Afrikaans University: M.A. (cum laude) – 1999

Rand Afrikaans University: D. Litt. et Phil. – 2000

Experience:

Over 30 years in the Human Resources (HR) field and 10 years in Social Impact Assessments.

Neville Bews has consulted extensively in the field of Social Impact Assessments. Some of the projects completed by Neville include the Gautrain Rapid Rail Link SIA, Australian – South African sports development programme impact, Kumba Resources Sishen South Project SIA, The United Nations Office on Drugs and Crime Evaluation of a Centre for Violence Against Women, SIAs at Leeuwpan Coal Mine Delmas, Glen Douglas Dolomite Mine Henely-on-Klip, Grootegeluk Open Cast Coal Mine, SANRAL – Social Impact Assessment of tolling the Gauteng Highway System, SANRAL – Social Impact Assessment of the N2 Wild Coast Toll Highway, University of Johannesburg – Research into research outputs of the University, the Social Impact Assessment for Waterfall Wedge housing and business development in Midrand Gauteng, the social impact assessment for the Environmental Management Plan for Sedibeng District Municipality. Exxaro Ltd. – Social and Labour Plan for the Belfast Project, Golder Associates Africa (Pty) Ltd – SIA for the Transnet New Multi-Product Pipeline (Commercial Farmers); Golder Associates Africa (Pty) Ltd – SIA for

the Proposed Vale Moatize Power Plant Project in Mozambique. Kumba Resources Ltd. – SIA for the Proposed Dingleton Resettlement Project at Sishen Iron Ore Mine; EcoPartners – SIA for Gold Fields West Wits Project. Exxaro Resources Ltd. – SIA for the Belfast Project. KV3 Engineers – SIA for Eskom Holdings Ltd's Proposed Ubertas 88/11kV Substation. Kalahari Survey Solutions – SIA for the Proposed 150MW Photovoltaic Power Plant and Associated Infrastructure, Bronkhorstspruit. Cave Klapwijk and Associates SIA for the N3 Toll Road Route Location Initiative – Tugela Plaza to Warden. NEMAI Consulting – SIA for the Mokolo and Crocodile River (West) Water Augmentation Project. Kalahari Survey Solutions – Proposed Construction of a 10MWp Photovoltaic Power Plant and Associated Infrastructure, Potchefstroom. NEMAI Consulting – SIA for Eskom Holdings Limited's Neptune-Poseidon 400kv Power Line near East London. eThekwini Municipality – SIA for the Proposed Infilling of the Model Yacht Pond at Blue Lagoon, Stiebel Place, Durban.

Neville regularly lectures as a guest lecturer in the Department of Sociology at both the Universities of Johannesburg and Pretoria. At the University of Johannesburg he collaborated with Prof. Henk Becker of Utrecht University, the Netherlands, in a joint lecture to present the Social Impact Assessment Masters course via video link between the Netherlands and South Africa. Neville has also presented papers on Social Impact Assessments at both national and international seminars and has published widely at both a national and international level.

Declaration of Consultant's Independence

I, the undersigned,

Neville Frederick Bews

Id No: 5201085107083

do hereby declare as follows:

- I am employed at Dr. Neville Bews & Associates and have been appointed to undertake a Social Impact Assessment in respect of the following Environmental Authorisation application

Ncwabeni: Off-Channel Storage Dam NEAS Ref No: DEA/EIA/0000586/2011; DEA Ref. No: 12/12/20/2468

- I hereby confirm my independence, as well as that of Dr. Neville Bews & Associates as a specialist;

- Neither I nor Dr. Neville Bews & Associates have any interest, be it business, financial, personal or other, in any proposed activity, other than fair remuneration for work performed;

- I have performed the work relating to the application in an objective manner;

- I have the expertise as required in terms of Sections 17 and 32 of Regulation 543 issued in terms of the National Environmental Management Act 107 of 1998. In this regard refer to the "Details and Experience of the Independent Consultant" above;

- I have complied with the National Environmental Management Act and all applicable legislation.

SIGNED AT ALBERTON ON THIS 17th DAY OF June 2012

Executive Summary

Currently the Mzimkhulu Regional Water Supply Scheme, which forms part of the KwaZulu Natal's Lower South Coast System, sources water from non-regulated river flows in the Mzimkhulu River. This water is abstracted at the St. Helen's Rock abstraction works near Port Shepstone and pumped into the water treatment works before being distributed to the various user nodes.

In order to secure this water supply system and to provide for the water requirements for all user sectors, including the Reserve, the Department of Water Affairs (DWA) has proposed the construction of an off-channel storage (OCS) dam in one of the tributaries to the Mzimkhulu River. With this in mind the following two alternative sites were identified for the OCS dam;

- The Ncwabeni River alternative – Site 2D and
- The Gugamela River alternative – Site D3A.

The project is situated some 20km north-west of Port Shepstone in central KwaZulu-Natal, in the Ugu District Municipality (DC21), within Ward 1 of the Umzumbe Local Municipality (KZ213). The area that the project is in falls under the Nyamande Traditional Authority and the land is registered under the Ngonyama Trust. The land on the opposite bank of the Mzimkhulu River is privately owned commercial farm.

The demographics of the district municipality and both the local municipalities in the area were described. The Umzumbe Local Municipality, has a population of 176 287 people living in 40 579 households, and the Hibiscus Coast Local Municipality a population of 224 281 people within 50 650 households. The area has a high level of unemployment and poverty with low levels of education and a high prevalence of HIV amongst antenatal women. The situation is such that, in 2001, the Ugu District Municipality was identified as one of the poverty areas to be targeted as a priority node for rural development programmes.

The proposed project description includes the following infrastructure;

- Dam sites;
- Dam wall type;
- Abstraction / gauging weir location;

- Borrow areas;
- Power supply.

Based on the demographic and project description and the comments of various Interested and Affected Parties the following impacts identified and assessed;

- Access
- Crime and security
- Disturbance of cultural, spiritual and religious sites
- Economic
- Fire hazard
- Health issues
- Farming operations
- Job creation
- Nuisance factors during construction
- Resettlement
- Safety hazards for people and animals
- Sense of place
- Services and infrastructure
- SMME opportunities
- STDs, HIV and AIDS risk
- Social stability

It was found that on a social basis, no obvious fatal flaw emerged in relation to either site. Site D2 emerges as the socially preferred site on the following basis:

- Access and infrastructure requirements are less affected in respect of site D2 as site D3A requires a significant length of road construction resulting in significant burden for maintenance being placed on the KZN Department of Transport.
- Although there are no areas in any of the alternative dam sits suitable for intensive grazing or cultivation, various subsistence farming activities do occur and have been identified in site D3A.
- At least 12 households have been identified in the dam basin of site D3A, these households will require resettlement and local communities have a very strong attachment to the land.

It is, however, possible that the social preference could be overridden on either technical and/or biodiversity grounds.

With regard to the do nothing option, if the project did not proceed it is likely that;

- Water security in the Mzimkhulu Regional Water Supply Scheme, which forms part of the KwaZulu Natal's Lower South Coast System would be severely compromised;
- An opportunity to enhance the economic development of the region would be lost;
- The impacts as described above would not materialise;

In concluding, the global concerns regarding water security were identified as were the limiting factors that South Africa faces in managing the countries water resources. The need for South Africa to effectively harness and manage its water resources and more evenly distribute water amongst the population is critical to ensure optimal social and economic performance and human security.

1. Introduction

A significant growth in the water requirements for the Mzimkhulu Water Supply System (MWSS), which forms part of the KwaZulu Natal (KZN) Lower South Coast System, has been predicted. The MWSS currently supplies water to all urban coastal towns from Hibberdene to Ramsgate as well as many rural inland settlements such as Fairview, Kwa-Madlala, Louisiana, Bhoboyi, Murchison, KwaNdwalane, Izontsha, Kwa Mavundla and Gamalakhe, amongst others. The total rural population of the area is estimated at 152 450 people and currently water is sourced from non-regulated river flows in the Mzimkhulu River to meet the need of these users. In an effort to supplement this system, to ensure that it will cope with future demands, the Department of Water Affairs (DWA) has proposed the construction of an off-channel shortage (OCS) dam in one of the tributaries to the Mzimkhulu River. This proposal requires environmental authorisation and, as a result, a scoping exercise was undertaken by Nemai Consulting. Following the finalisation of the scoping report in March 2012, Dr. Neville Bews & Associates was appointed to undertake the Social Impact Assessment (SIA) for the proposed Ncwabeni Off-Channel Storage Dam which is describe in greater detail below.

2. Project Description

In total it is anticipated that the project will consist of:

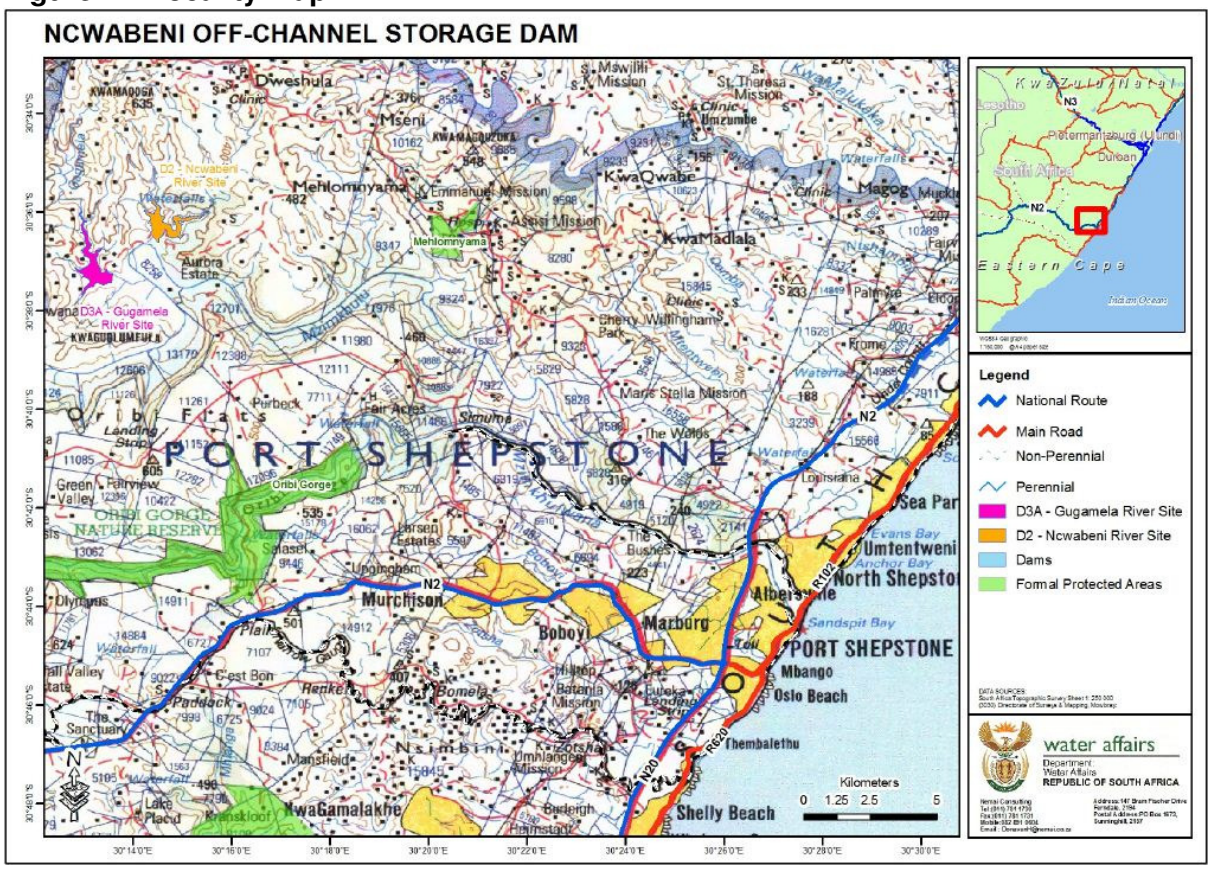
1. An off-channel storage (OCS) dam on one of two site alternatives
    a. Site D2 situated on the Ncwabeni River or
    b. Site D3A located on the Gugamela River;
2. An abstraction / gauging weir on the Mzimkhulu River;
3. An abstraction works with a mechanism to remove silt;
4. A pump station and pipeline to deliver water to the dam; and
5. An outlet infrastructure to make measured releases back to the Mzimkhulu River.

It is envisaged that the proposed reservoir will be filled from its incremental catchment and supplemented by pumping water from the Mzimkhulu River during times of high river flows. Conversely, at times of low flows, water can be released back into the Mzimkhulu River for abstraction downstream at the existing St. Helen's Rock abstraction works.

2.1. Location

The project is situated in the province of KwaZulu-Natal (KZN). It is located under the Ugu District Council (DC21), some 20km north-west of Port Shepstone within Ward 1 of the Umzumbe Local Municipality (KZN213). Much of the land is tribal land under the Nyamande Triditional Authority and is registered under the Ngonyama Trust. The land on the opposite bank of the Mzimkhulu River is a privately owned commercial farm, Gibraltar 8258. The location of the project site is illustrated below in Figure 1.

Figure 1: Locality map



2.2. Site Specific Project Components

The components for the two alternatives being considered for the proposed OCS dam are briefly describe below with the proviso that it is possible that there may be some variations as, at the time of writing, the geotechnical and materials investigations still need to be concluded to determine the preferred dam type.

2.2.1. Site D2 - Ncwabeni River Scheme

It is envisaged that the Ncwabeni River scheme is likely to consist of the following components:

1. A 45 meter high dam from river bed level on the Ncwabeni River, with associated reservoir storage of approximately 15 million m^3. The dam will have a multiple level off-take tower to ensure good quality water is release to the downstream environment.

   Two main dam types are being considered:

   a. A rockfill dam with either a concrete face, asphalt core or a bentonite/sand core. This dam type will have a spillway, weir and chute that is routed directly to the Mzimkhulu River from the left flank of the dam; or
   b. A roller compacted concrete dam with a central spillway.
2. An abstraction weir on the main Mzimkhulu River approximately 2m high from river bed level. Of the various weir positions considered, the lower weir position has been selected as the preferred option. The abstraction weir will also be fitted with a gauging facility in order to monitor flow rates in the Mzimkhulu River.
3. An abstraction works to remove silt and sand from the water diverted by the weir. This reduces the quantity of silt pumped into the dam and extends the dam's lifespan. The abstraction works consists of a gravel trap and a stilling basin. The delivery of water through the abstraction and de-silting works will be between 1 and 2 m^3/s.
4. A pump station located on the left-hand bank (northern bank) of the abstraction weir. Water will be pumped from the abstraction works to the dam via a rising main pipeline. The pump station will deliver up to 1 m^3/s of water.
5. The pipeline will be routed alongside the slipway chute of the dam (should the rockfill dam be constructed) to reduce impacts on the surrounding landscape. The pipeline will be approximately 600m long and 900m in diameter. The pipeline will spill the water into the dam approximately 200m upstream of the dam wall to avoid interfering with the dam wall.
6. A re-alignment of the existing district gravel road. 1000m of new road to divert the existing district road around the downstream side of the dam embankment. An additional 800m of road to provide access to the abstraction works and pump station.
7. Three borrow areas:

   a. A borrow area inside the proposed dam basin (quarry) to provide 800 000m^3 of rock material for a rockfill embankment as well as aggregate and sand for concrete;

b. A borrow area outside of the dam basin to provide sandy material; and
c. A possible borrow area in the Gugamela basin, however, initial indications are that the required material is not available in sufficient quantity for the particular dam type. This site is still under consideration until the geotechnical and materials investigation has been concluded.

8. A new high voltage power line to bring electrical power to the site. The closest existing power line is the Qwabeni 11 kV line approximately 8km away, north east of the dam site. An alternative option of utilising hydropower already being generated at the Camro Estate farm for pumping has been identified and the feasibility of this is being assessed.

2.2.2. Site D3A - Gugamela River Scheme

It is envisaged that the Gugamela River scheme is likely to consist of the following components:

1. A 46 meter high dam from river bed level on the Gugamela River, with associated reservoir storage of approximately 17 million m3. The dam will have a multiple level off-take tower to ensure good quality water is released to the downstream environment. The same dam type options are being considered for the Gugamela dam as for the Ncwabeni Dam. The spillway of an embankment dam would be a side channel spillway delivering water back into the Gugamela River and not directly into the Mzimkhulu River.
2. An abstraction weir on the main Mzimkhulu River approximately 2m high from river bed level. The uppermost abstraction weir (labelled pre-feasibility site) is the preferred site for the Gugamela scheme option. The abstraction weir will also be fitted with a gauging facility in order to monitor flow rates in the Mzimkhulu.
3. An abstraction works to remove silt and sand from the water diverted by the weir. This reduces the quantity of silt pumped into the dam and extends the dam's lifespan. The abstraction works consists of a gavel trap and a stilling basin. The delivery of water through the abstraction and de-silting works will be between 1 and 2 m^3/s.
4. A pump station located on the left-hand bank (northern bank) of the abstraction weir. Water will be pumped from the abstraction works to the dam via a rising main pipeline. The pump station will deliver up to 1 m^3/s of water.
5. The pipeline will be approximately 1600m long and 900m in diameter. The pipeline will spill the water into the dam approximately 1500m upstream of the dam wall to avoid interfering with the dam wall.

6. A re-alignment of the existing district gravel road. 5000m of new road to divert the existing district road around the downstream side of the dam embankment. A further additional 400m of road to provide access to the abstraction works and pump station.
7. Three borrow areas: one inside the proposed dam basin to provide semi-permeable and impermeable material and two outside of the basin to provide 800 000m^3 of rock material for a rock-fill embankment as well as aggregate and sand for concrete, and a second outside of the dam basin to provide sandy material.
8. A new high voltage power line to bring electrical power to the site. The closest existing power line is the Qwabeni 11 kV line approximately 11km away, north east of the dam site. As per the Ncwabeni option, hydropower is being assessed as an option.

A comparison of the salient parameters for the two dam options and abstraction works is provided below in Table 1.

Table 1: Comparison of approximate dam and abstraction works parameters

Parameter	Development Option	
	D2	D3A
River	Ncwabeni	Gugamela
Catchment are	39.8km^2	34.6km^2
Inundation area	0.95km^2	0.98km^2
Gross storage	15 million m^2	17 million m^2
Dam wall height from NOCL to river bed	48 m	49 m
Total length of pipeline 9rise plus gravity main)	600 m	1 600 m
Rising main nominal diameter	900 mm	900 mm
Flow rate	1 m^3/s	1 m^3/s

2.3. Construction Phase

It is likely that the construction of the dam will take between 18 & 30 months from mobilisation to commissioning. The key activities as part of the construction phase include:

1. Site establishment;
2. Relocation of infrastructure;
3. Prepare access road to dam and weir;
4. Establish construction camps;
5. Bulk fuel storage;
6. Storage and handling of material;
7. Construction employment;

8. Site and basin clearing;
9. Excavation;
10. Blasting;
11. River diversion for building of dam wall;
12. Establishment of and operations at crusher;
13. Establishment of and operations at batching plant;
14. Establishment of and operations at materials testing laboratory;
15. Create haul roads;
16. Create quarry and borrow areas;
17. Construction of embankment;
18. Concrete Works;
19. Steel works;
20. Mechanical and Electrical Works;
21. Temporary river diversion for weir;
22. Construction of abstraction weir, pump station and sediment exclusion works;
23. Electrical supply;
24. Construction of rising main;
25. Construction of Break Pressure Tank;
26. Cut and cover activities;
27. Stockpiling (sand, crushed stone, aggregate, etc.);
28. Waste and wastewater management;
29. Relocation of dwellings, graves, protected species; and
30. Reinstatement and rehabilitation of construction domain (outside of inundation area, as necessary).

2.4. Operational Phase

The operation of either OCS dam option as part of the greater supply system will be essentially the same. Water will be abstracted from the Mzimkhulu River at St Helen's Rock for treatment and supply as is currently done. The OCS dam, to be orientated approximately 26 to 28km upstream, will be filled by water abstracted from a new abstraction weir on the Mzimkhulu River during the high flow months. Water will then be released during the low flow months to augment the volume that can be abstracted at St Helens Rock. Water will only be released from the OCS dam for abstraction at St Helen's Rock. Although no direct releases will be made for the downstream ecological water requirements and the estuary of the Mzimkhulu River, they will benefit indirectly from the scheme, and have been taken into account. By supplying water for abstraction at St Helen's Rock, the OCS dam will reduce the reliance on, and abstraction of, run-of-river

flows, particularly during the low flow months. River flows can then firstly be available for the reserve, and the OCS dam will then augment the volume of water to be abstracted at St Helen's Rock if the balance of the flow in the river is insufficient.

During the earlier years after construction of the scheme, the volume that the OCS dam needs to release to augment the abstraction at St Helen's rock will be lower. At this point much of the yield of the dam can be generated by the incremental catchment of the tributary upstream of the OCS dam, with limited pumping from the Mzimkhulu River during the summer months. As the water requirements grow and greater abstractions are needed at St Helen's Rock, more water will need to be released from the OCS dam and greater pumping will be needed to fill the OCS dam during the summer months.

The operational phase of the project is likely to include;

1. Maintenance of infrastructure;
2. Operation of dam; and
3. On-going consultation with directly affected parties.

2.5. Decommissioning Phase

It is estimated that, with appropriate maintenance the lifespan of the dam will exceed 50 years. Depending on water supply demands, the dam could possibly be upgraded or at least be maintained to cater for projected needs. Consequently, decommissioning is not considered to be applicable to the scheme. Notwithstanding this, however, should decommissioning be required the activity will need to comply with the appropriate environmental legislation and best practices at that time.

3. Terms of Reference

The terms of reference of the social study are to:

- Describe the community to be affected by the project. Consider demographic profile, social drivers, social context and network, development plans. A combination of a technocratic and participatory approach is suggested (at discretion of specialist).
- Collect baseline data on the current social environment and historical social trends.
- Identify and collect data on impact assessment variables and social change processes related to the project.
- Undertake a thorough review of the following:
    - Minutes of the landowner meetings.

  - Minutes of public meetings and individual meetings;
  - Database of I&APs; and
  - Comments and Response Report.
- Undertake additional consultation with affected individuals and communities, as deemed necessary.
- Assess the significance of social impacts associated with the project.

Issues excluded from this study and dealt with in other specialist reports are:

- The broader economic impacts associated with the project;
- Potential impacts of the project on property values;

An assumption was made that data provided by Nemai Consulting was a correct reflection of the EIA process to this point.

4. Methodology

A mixed quantitative and qualitative methodological approach, based on data sourced from Statistics South Africa, the comments and response report, various specialist reports and document scans, are used to gather information throughout the study. The impact assessment technique applied to achieve this is described in more detail below.

4.1. Data Collection Methods

Data was gathered through:

- A comprehensive scan of the Draft Comments and Response Report.
- A review of maps and aerial photographs of the routes.
- Interviews and discussions with the Public Participation Consultant.
- Interviews and discussions with the Environmental Impact Assessment Consultants.
- A literature review of various documents such as the relevant municipal Integrated Development Plans (IDPs) and other specialist reports and documents.
- Statistics South Africa, Census 2001; Community Survey 2007; Mid-year population estimates; Quarterly Labour Force Survey.
- Municipal Demarcation Board.
- A broader literature scan.

4.2. Assessment Technique

The assessment criteria used to evaluate the impacts of the various dam scheme alternatives are as follows.

Nature (/Status)

The project could have a positive, negative or neutral impact on the environment.

Extent

- **Local** - extend to the site and its immediate surroundings.
- **Regional** - impact on the region but within the province.
- **National** - impact on an interprovincial scale.
- **International** - impact outside of South Africa.

Magnitude

Degree to which impact may cause irreplaceable loss of resources.

- **Low** - natural and social functions and processes are not affected or minimally affected.
- **Medium** - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.
- **High** - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

Duration

- **Short term** - 0-5 years.
- **Medium term** - 5-11 years.
- **Long term** - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.
- **Permanent** - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability

- **Almost certain** - the event is expected to occur in most circumstances.
- **Likely** - the event will probably occur in most circumstances.
- **Moderate** - the event should occur at some time.
- **Unlikely** - the event could occur at some time.
- Rare/Remote - the event may occur only in exceptional circumstances.

Significance

Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows-

0 – Impact will not affect the environment. No mitigation necessary.

1 – No impact after mitigation.

2 – Residual impact after mitigation.

3 – Impact cannot be mitigated.

Issues concerning the limitations of the study will now be addressed.

4.3. Limitations

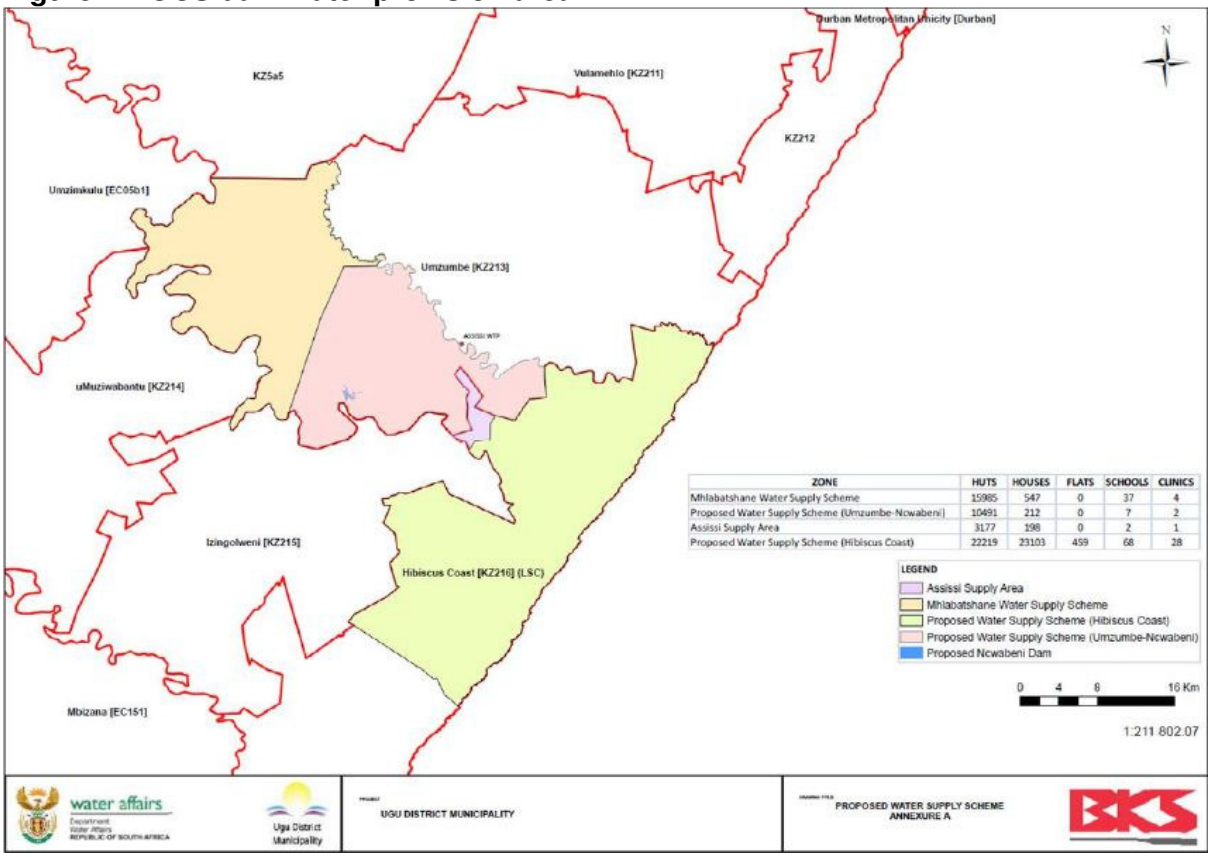
The data currently available from Statistics South Africa carries with it certain limitations that will be reflected in this study. Although updated demographic data is available from Stats SA in the form of the Community Survey 2007 and the Mid-year population estimates, this data does not reach down to the ward level and at that level the only data available from Stats SA was that gathered during Census 2001; this being the most recent Census undertaken in South Africa.

Every attempt was made to gather data from a wide range of sources, however, much of the data in this report was made available by the Environmental Impact Assessment (EIA) consultants, Nemai Consulting, and relies on the accuracy of the data made available by Nemai Consulting. It must also be noted that the results of this study cannot be generalised and applied to the entire population across the whole area and, as is in the nature of social research, is restricted to the specific study area. Attention is now turned towards providing a demographic description of the study area.

5. Demographic Description of the Area

The Ncwabeni Off-Channel Storage Dam is situated within the province of KwaZulu-Natal South Africa, in the Ugu District Municipality (DC21) and Ward 1 of the Umzumbe Local Municipality (KZ213). The recipients of the water include the Hibiscus Coast Local Municipality (KZN216) and the south-eastern region of the Umzumbe Local Municipality as illustrated below Figure 2.

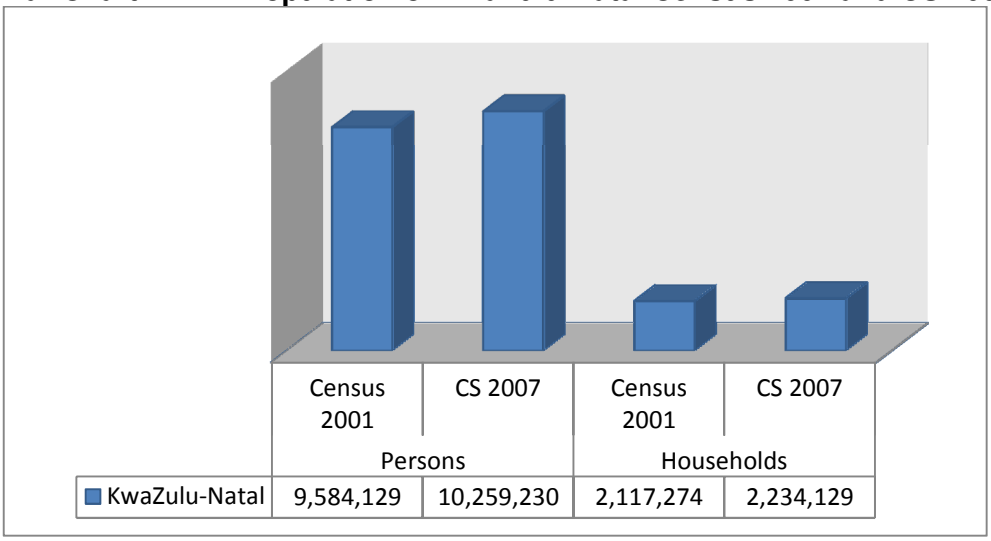
Figure 2: OCS dam water provision area



5.1. Provincial Description

In 2007 the population of KwaZulu-Natal was estimated to be 10,259,230 people living in 2,234,129 households, an increase from the Census 2001 figures as illustrated in Bar Chart 1 below. By 2011 it was estimated that the population of KZN had risen to 10,819,130, accounting for 21.39% of the population of South Africa, with only Gauteng Province having a higher population at 22,39% (Statistics South Africa, 2011, p. 3).

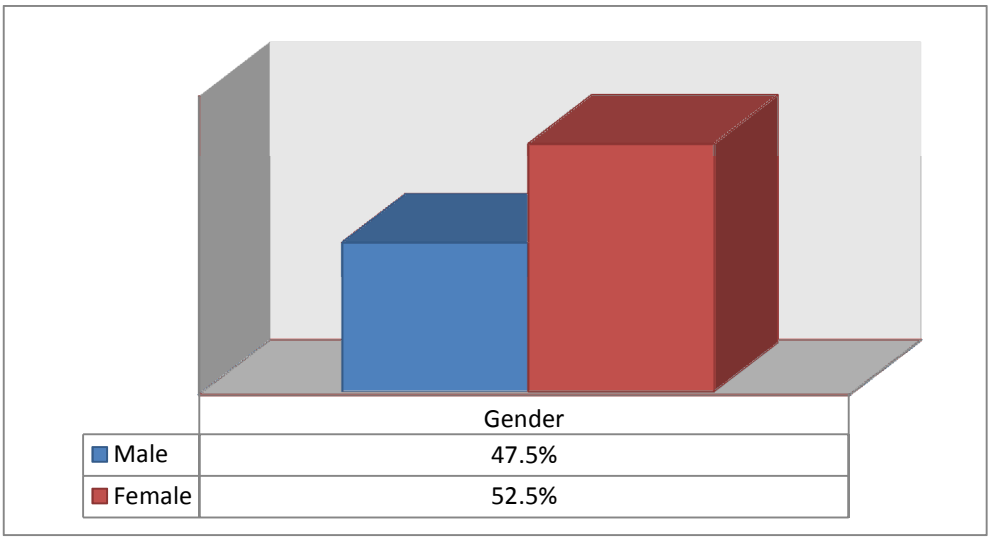
Bar Chart 1: Population of KwaZulu-Natal Census 2001 and CS 2007



Data source: (Statistics South Africa, 2007)

The basic population characteristic of the KwaZulu-Natal indicate that there is a higher proportion of females to males across the province at a ratio 47.5%, to 52.5% as illustrated below in Bar Chart 2.

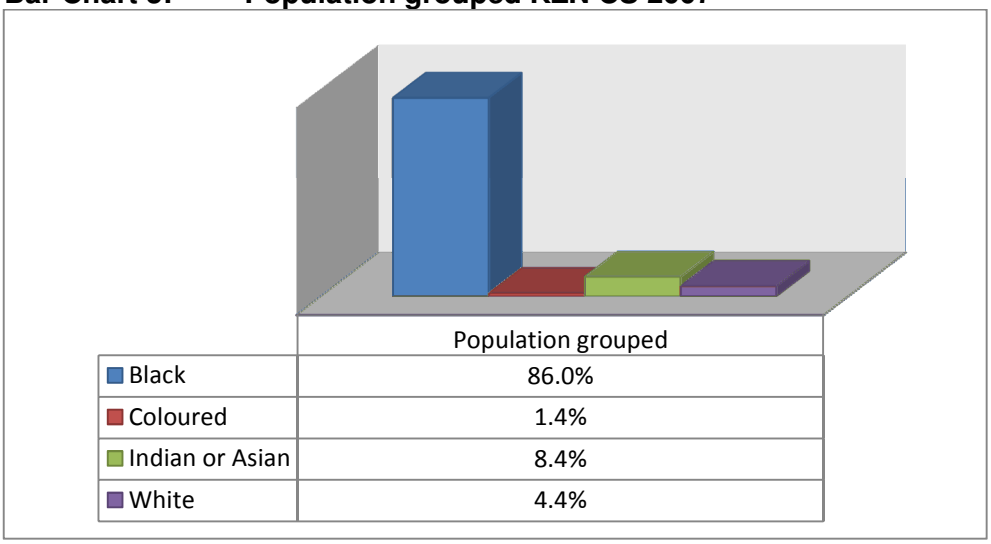
Bar Chart 2: Gender ratio KZN CS 2007



Data source: (Statistics South Africa, 2007)

At 86%, the dominant population group consists of black Africans followed by Indians or Asians at 8.4%. The population groupings across the province are illustrated in Bar Chart 3 below.

Bar Chart 3: Population grouped KZN CS 2007

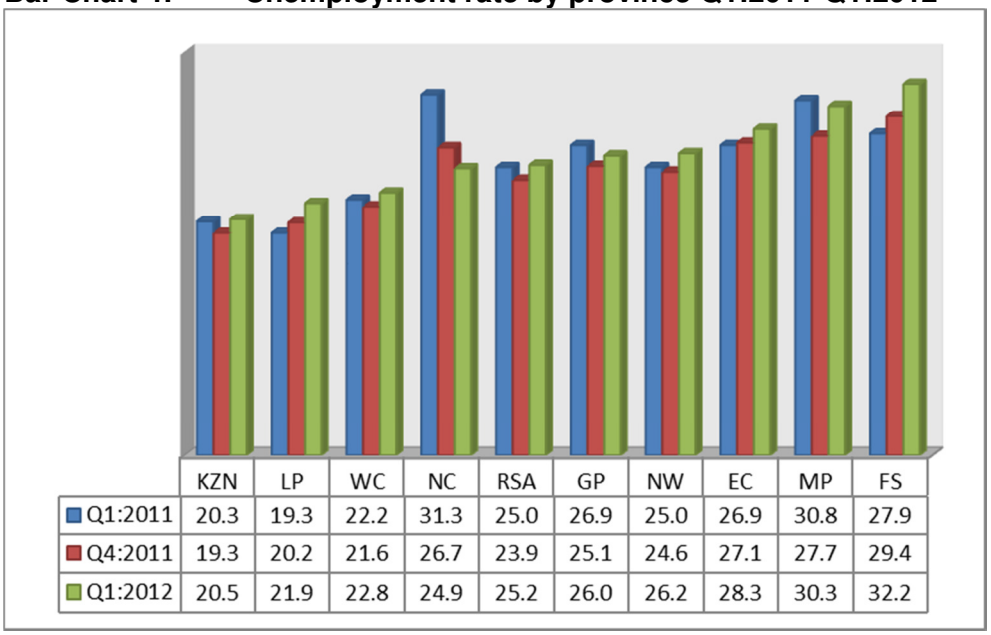


	Population grouped
Black	86.0%
Coloured	1.4%
Indian or Asian	8.4%
White	4.4%

Data source: (Statistics South Africa, 2007)

A comparison of the unemployment figures for KwaZulu-Natal compared to that of the rest of South Africa indicates that KwaZulu-Natal, with an unemployment rate of 20,5% in the 1st Quarter of 2012, had a lower level of unemployment than was the case across South Africa (Statistics South Africa, 2012, p. xvi). This data is represented below for South Africa and KZN across Quarter 1, 2011 and Quarter 1, 2012, through Bar Chart 4.

Bar Chart 4: Unemployment rate by province Q1:2011-Q1:2012



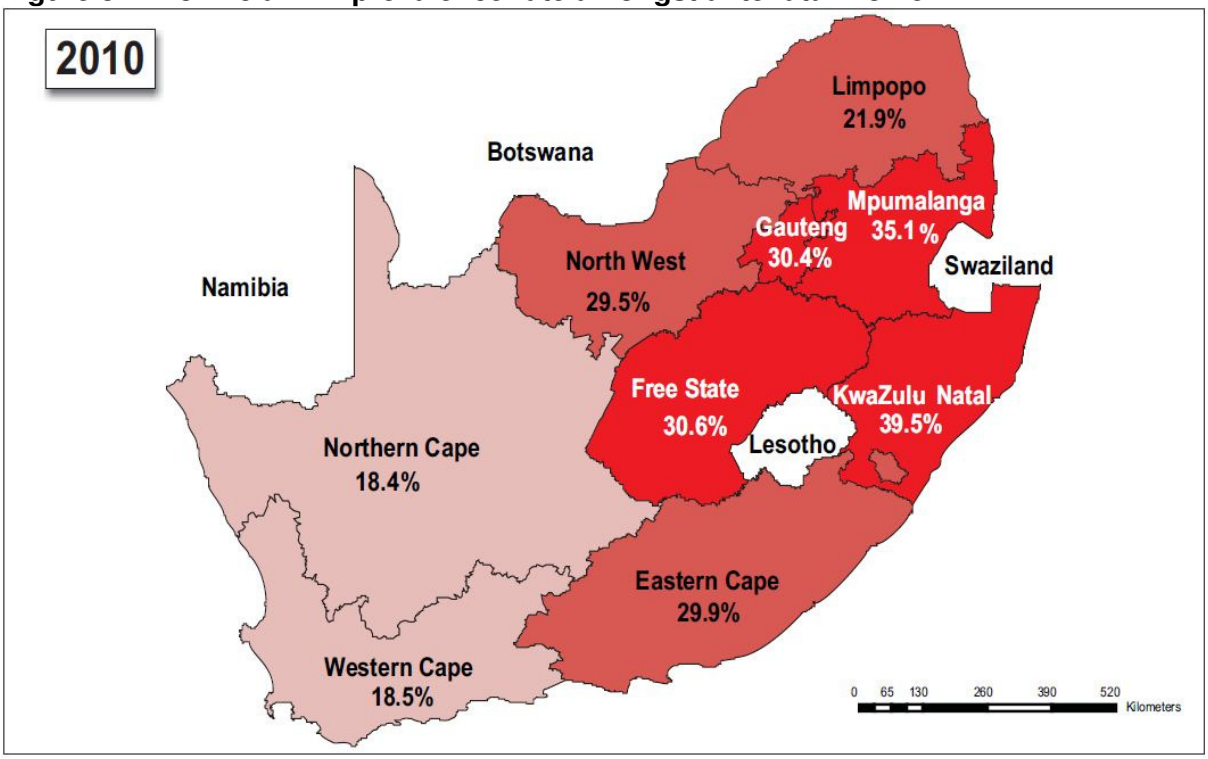
	KZN	LP	WC	NC	RSA	GP	NW	EC	MP	FS
Q1:2011	20.3	19.3	22.2	31.3	25.0	26.9	25.0	26.9	30.8	27.9
Q4:2011	19.3	20.2	21.6	26.7	23.9	25.1	24.6	27.1	27.7	29.4
Q1:2012	20.5	21.9	22.8	24.9	25.2	26.0	26.2	28.3	30.3	32.2

Data source: (Statistics South Africa, 2012, p. xvi)

It must, however, be noted that when considering the unemployment levels discussed above that Statistics South Africa's official definition of unemployment is used. This definition includes amongst the unemployed, those persons between 15 – 64 years who, "[*a]ctively looked for work or tried to start a business in the four weeks preceding the survey interview*" (Statistics South Africa, 2012, p. xxi). This, being the narrow definition of unemployment excludes those discouraged work seekers who may no longer have been actively looking for work but who remained unemployed and disillusioned.

Recent research undertaken by the National Department of Health indicates that KwaZulu-Natal has an HIV prevalence rate amongst antenatal women of 39.5% compared to a national prevalence rate of 30.2% in 2010. In Figure 3 below the prevalence rate of HIV amongst antenatal women is compared across all provinces.

Figure 3: Provincial HIV prevalence rate amongst antenatal women



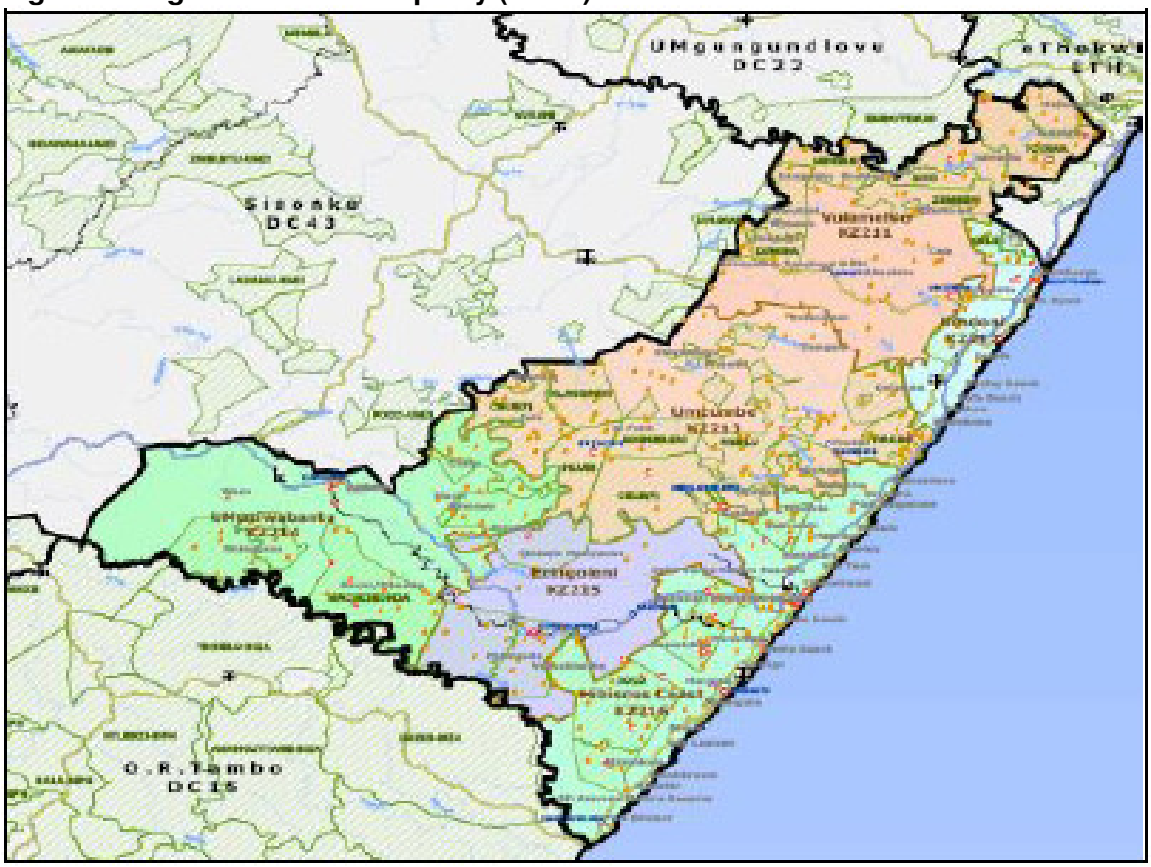
Source: (National Department of Health, 2011, p. 40)

On an economic basis, although on the whole the KwaZulu-Natal Province has a mixed economy the coast line, which stretches between Port Edward and Mozambique, is somewhat reliant on the tourist industry. Attention will now be turned towards a description of some of the more significant demographic indicators at the local and municipal levels.

5.2. Municipal Description

The Ugu District Municipality (DC21), illustrated in Figure 4 below, covers a geographical area of 5 866 km^2 and is located along the south coast of KwaZulu-Natal.

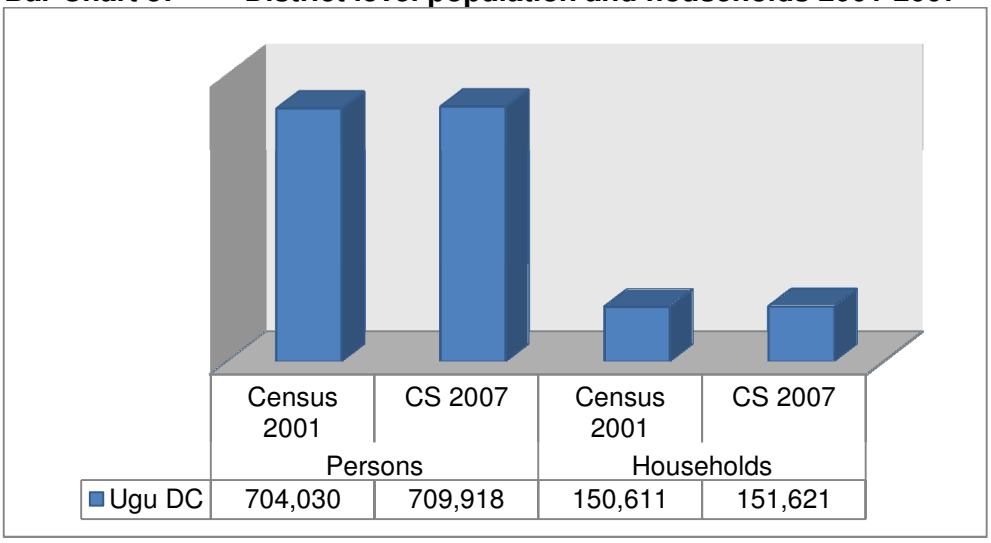
Figure 4: Ugu District Municipality (DC21)



Source: (Ugu District Municipality, 2011/12, p. 15)

The district consists of six local municipalities and, in 2007, it is estimated that the province had a population of 709 918 people living in 151 621 households (Statistics South Africa, 2007, p. 11). The Census 2001 data for the district is compared to that of the 2007 estimates in Bar Chart 5 below

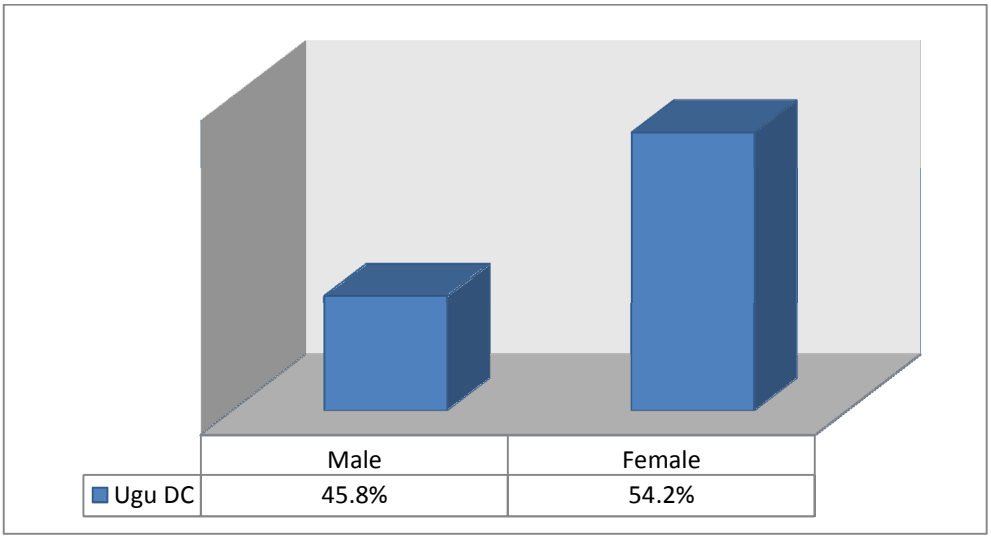
Bar Chart 5: District level population and households 2001-2007



Data source: (Statistics South Africa, 2007)

There are 325 349 males and 384 568 females in the district resulting in a higher female to male ratio illustrated in Bar Chart 6 below.

Bar Chart 6: Female to male ratio

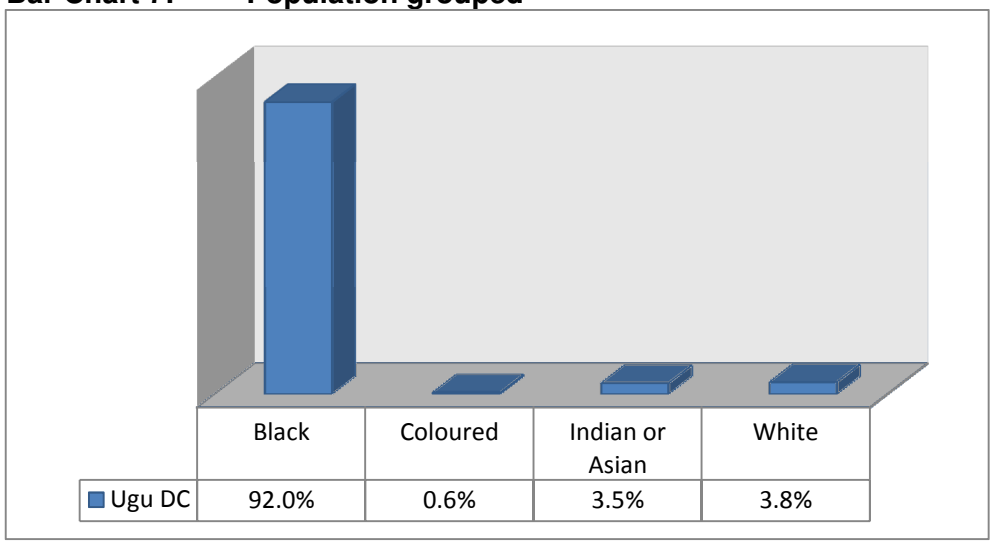


Data source: (Statistics South Africa, 2007)

The vast majority of the population, 653 308, comprises of black people with the next largest population group being white (27 259) followed by Indian or Asian (25 023) and coloured people at 4 327. A comparison of the population groups is provided below in

Bar Chart 7.

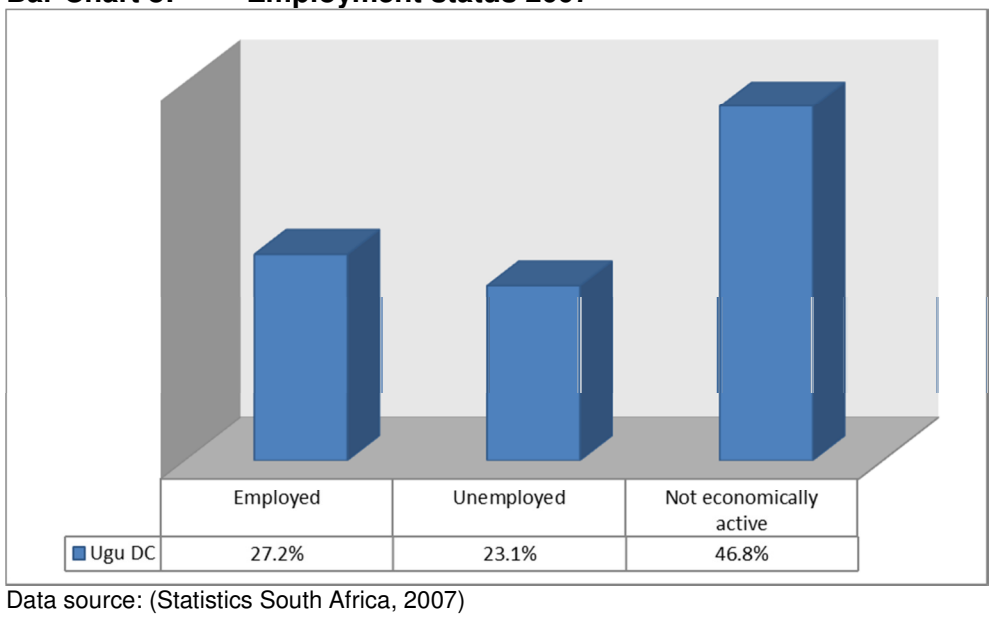
Bar Chart 7: Population grouped



Data source: (Statistics South Africa, 2007)

According to the Community Survey 2007, 112,670 people in the Ugu district were employed while 95,782 were unemployed and 193,728 were economically inactive. An indication of the employment status across the population of the Ugu district is provided in Bar Chart 8 below.

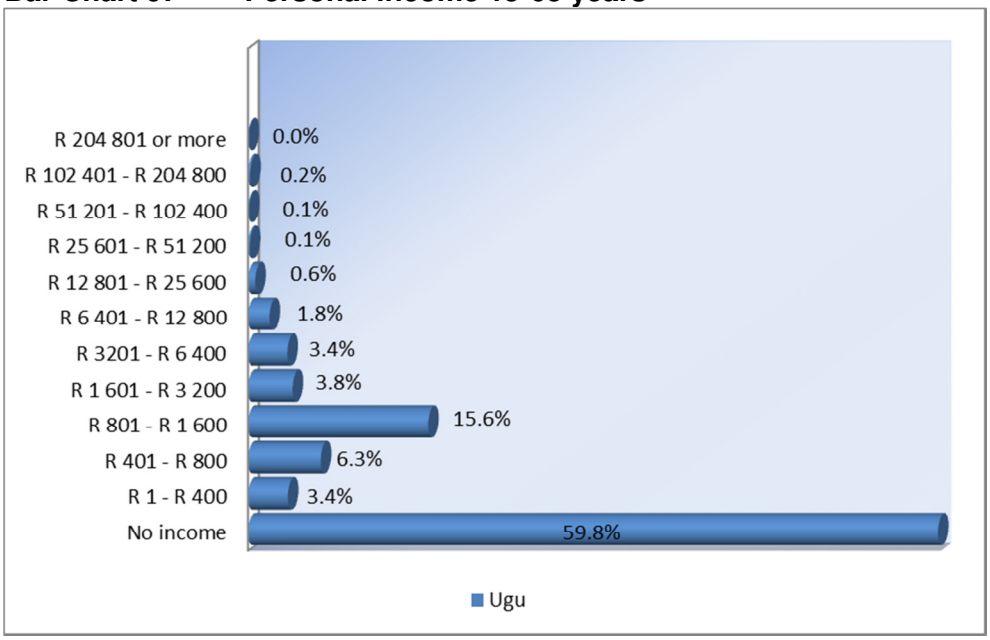
Bar Chart 8: Employment status 2007



Data source: (Statistics South Africa, 2007)

With regard to personal income 59.8% of people, between the ages of 15 and 65, had no income while 91.7%, had an income of less than R4 401 per month. The distribution of income throughout the district is illustrated through Bar Chart 9 below.

Bar Chart 9: Personal income 15-65 years



Data source: (Statistics South Africa, 2007)

A breakdown of the more salient demographics data, including details of industry employed in and educational institution attended are also presented below in Table 2. In this regard it is evident that apart from the community, social and personal services industry at 4,4%, the Agriculture, hunting, forestry and fishing industry at 4% is the largest employer in the region followed by manufacturing and the wholesale and retail industry both at 3.9%. With regard to educational institution attended most people in the district have not progressed past primary school level.

Table 2: Demographic data personal level – Ugu DC21

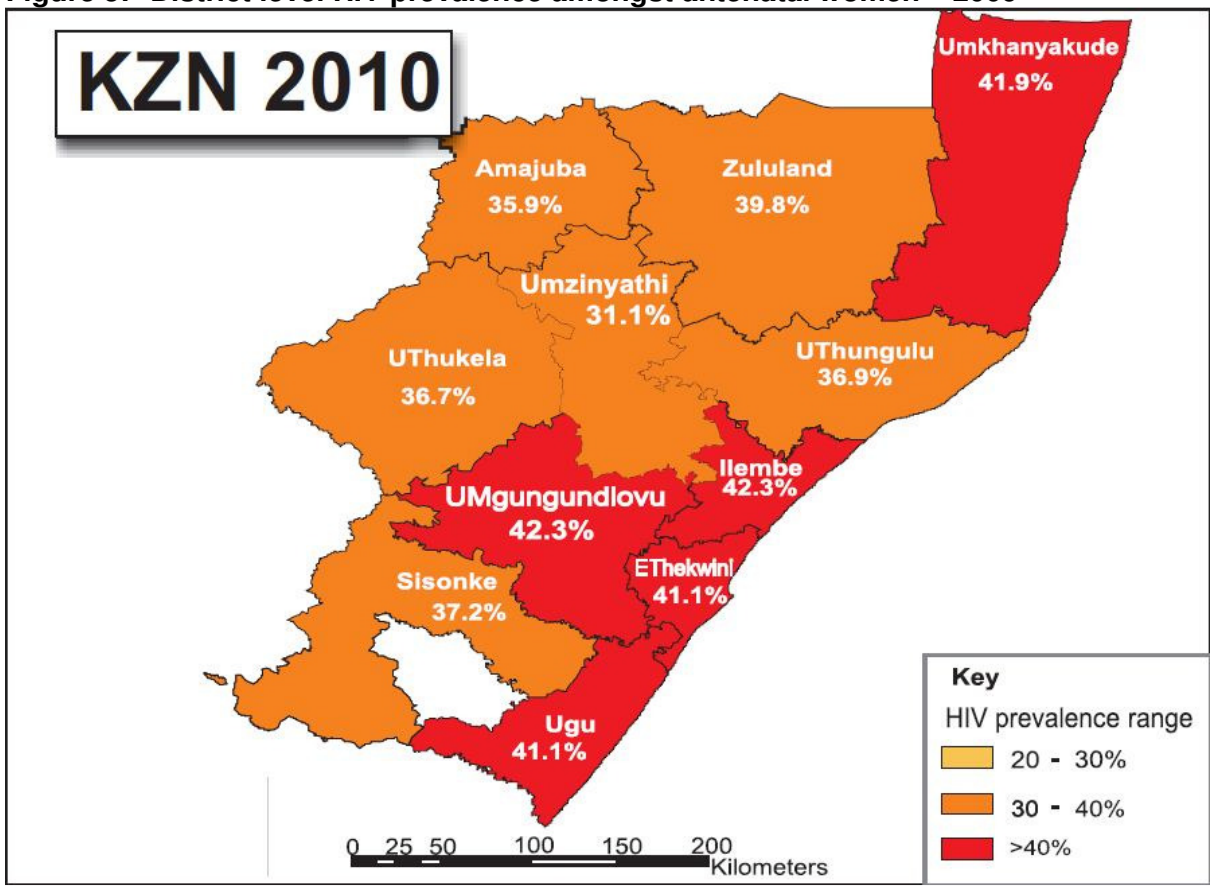
	Ugu DC21	
Population Group		
Black	653,308	92.0%
Coloured	4,327	0.6%
Indian or Asian	25,023	3.5%
White	27,259	3.8%
Gender		
Male	325,349	45.8%
Female	384,568	54.2%
Income - 15-65 years		
No income	247,497	59.8%
R 1 - R 400	14,219	3.4%
R 401 - R 800	26,023	6.3%
R 801 - R 1 600	64,566	15.6%
R 1 601 - R 3 200	15,932	3.8%
R 3201 - R 6 400	14,058	3.4%

Industry		
Agriculture; hunting; forestry and fishing	16,432	4.0%
Mining and quarrying	277	0.1%
Manufacturing	16,196	3.9%
Electricity; gas and water supply	763	0.2%
Construction	7,508	1.8%
Wholesale and retail trade	16,151	3.9%
Transport; storage and communication	3,789	0.9%
Financial; insurance; real estate and business services	9,237	2.2%
Community; social and personal services	18,053	4.4%
Institution attended 5-24 Years		
Pre-school	7,785	2.4%
Primary school	120,674	36.9%
Secondary school	109,075	33.3%
College	2,035	0.6%
University/University of technology/Technikon	2,052	0.6%
Adult basic education and training	0	0.0%
Other	2,137	0.7%
Employment		
Employed	112,670	27.2%
Unemployed	95,782	23.1%
Not economically active	193,728	46.8%
Unspecified	8,130	2.0%
Institutions	3,837	0.9%

There is a high level of poverty throughout the area and the district was identified in President Thabo Mbeki's 2001 State of the Nation address as a priority nodal area to be targeted for rural development programs.

With regard to HIV prevalence amongst antenatal women, the Ugu District Municipality has a HIV prevalence rate of 41.1% marginally higher than that of KZN which stood at 39.5% in 2010. At this level, KZN has the highest HIV prevalence rate amongst antenatal women when compared to all other provinces in South Africa. The HIV prevalence rate amongst antenatal women across all district municipalities in KwaZulu-Natal is illustrated through the map in Figure 5 below.

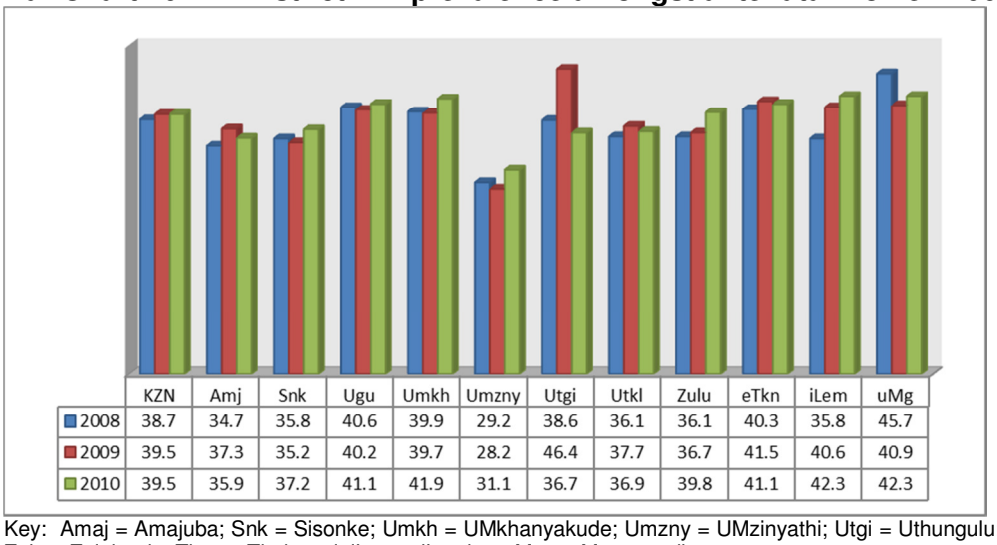
Figure 5: District level HIV prevalence amongst antenatal women – 2009



Source: (National Department of Health, 2011, p. 68)

The National Department of Health study also indicates a fluctuation in the HIV prevalence rates in the Province over the three year period between 2008 and 2010 as is illustrated through Bar Chart 10 below. In 2008 at 40.6%, Ugu District Municipality had the second highest HIV prevalence in the province and, although this rate had marginally increased by 2010, the district was surpassed by two other district municipalities and at 41.1% was on a par with the eThekwini Metropolitan Municipality.

Bar Chart 10: District HIV prevalence amongst antenatal women 2007-2009



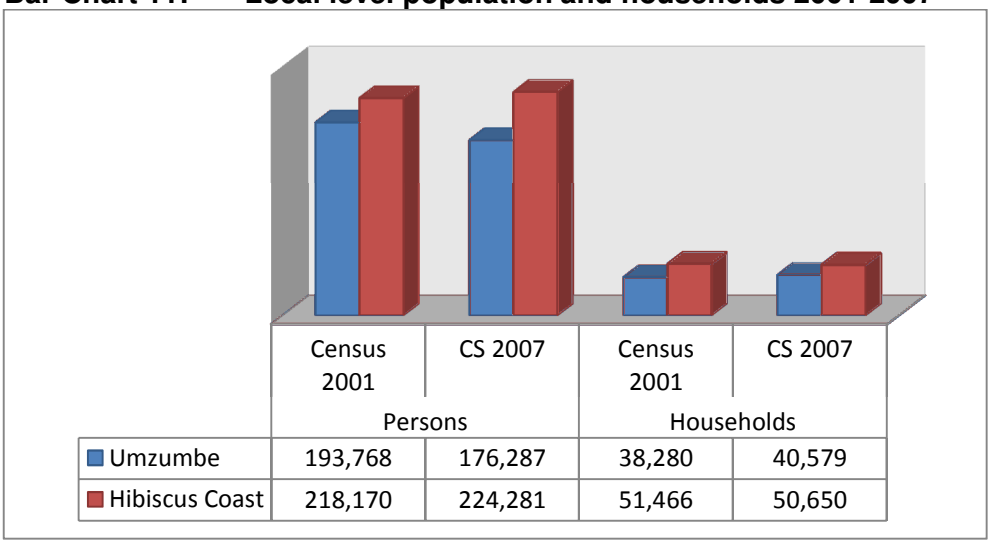
	KZN	Amj	Snk	Ugu	Umkh	Umzny	Utgi	Utkl	Zulu	eTkn	iLem	uMg
2008	38.7	34.7	35.8	40.6	39.9	29.2	38.6	36.1	36.1	40.3	35.8	45.7
2009	39.5	37.3	35.2	40.2	39.7	28.2	46.4	37.7	36.7	41.5	40.6	40.9
2010	39.5	35.9	37.2	41.1	41.9	31.1	36.7	36.9	39.8	41.1	42.3	42.3

Key: Amaj = Amajuba; Snk = Sisonke; Umkh = UMkhanyakude; Umzny = UMzinyathi; Utgi = Uthungulu; Utkl = Uthukela; Zulu = Zululand; eTkn = eThekweni; iLem = iLembe; uMg = uMgungundlovu.
Source: (National Department of Health, 2011, p. 65)

The local municipal area in which the project is located and the areas that will benefit from the project will now be described. The demographic data available from Statistics South African in respect of Ward 1 of the Umzumbe Local Municipality is rather out-dated as it was collected during Census 2001. However, at the local municipal level, there is a somewhat more recent set of data collected during the Community Survey 2007, which will be used on a comparative basis in respect of the two local municipalities affected by the project.

The project is located in Ward 1 of the Umzumbe Local Municipality and will benefit the south easterly portion of this municipality. Umzumbe LM consists of 19 wards and covers a geographical area of 1 258.87 km^2. With an estimated population of 176 287 people living in 40 579 households in 2007 the population density of the area is estimated at 140/km^2. The Hibiscus Coast Local Municipality is a beneficiary of the project, consists of 29 wards and covers a geographical area of 839 km^2. Hibiscus Coast has an estimated population of 224 281 people living in 50 650 households with an estimated population density of 267.3/km^2. A comparison of the population and households across these two local municipalities is provided below in Bar Chart 11.

Bar Chart 11: Local level population and households 2001-2007

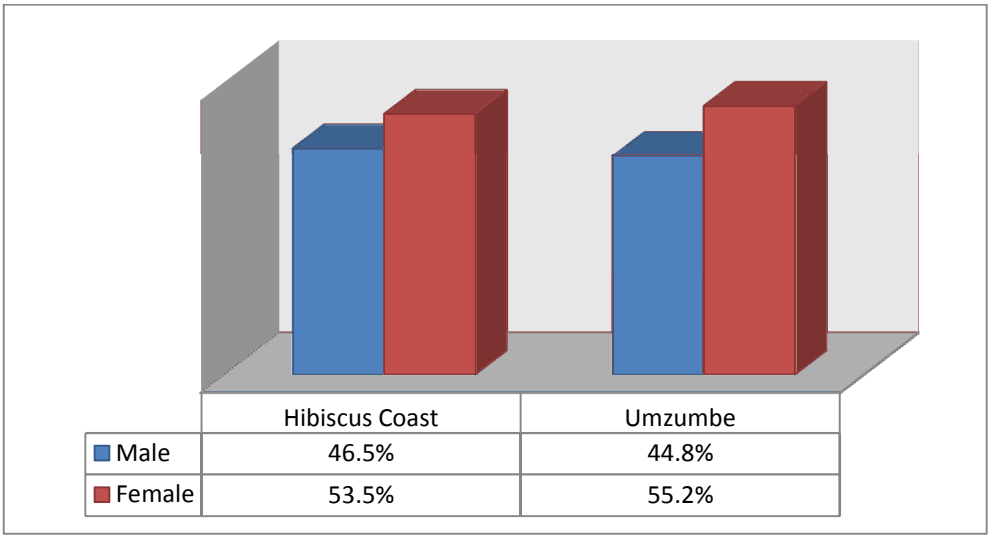


	Persons		Households	
	Census 2001	CS 2007	Census 2001	CS 2007
Umzumbe	193,768	176,287	38,280	40,579
Hibiscus Coast	218,170	224,281	51,466	50,650

Data source: (Statistics South Africa, 2007)

In both municipalities there is a higher female to male ratio illustrated in Bar Chart 12 below.

Bar Chart 12: Gender distribution

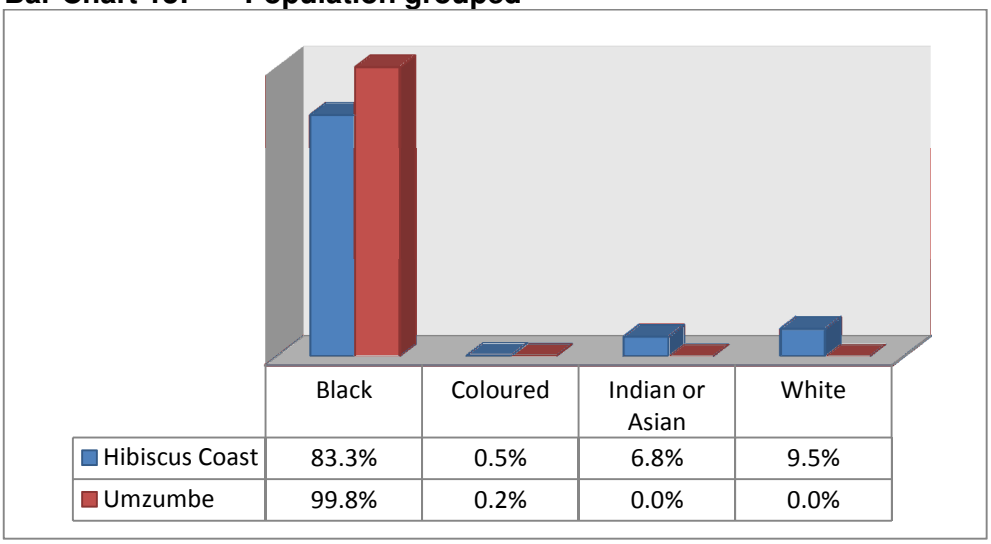


	Hibiscus Coast	Umzumbe
Male	46.5%	44.8%
Female	53.5%	55.2%

Data source: (Statistics South Africa, 2007)

There are a higher percentage of black people across both local municipalities with a higher percentage of white and Indian or Asian people living in Hibiscus Coast than there are in Umzumbe. Only nine white and no Indian and Asian people were recorded in Umzumbe during the 2007 Community Survey. This data is illustrated below in Bar Chart 13.

Bar Chart 13: Population grouped

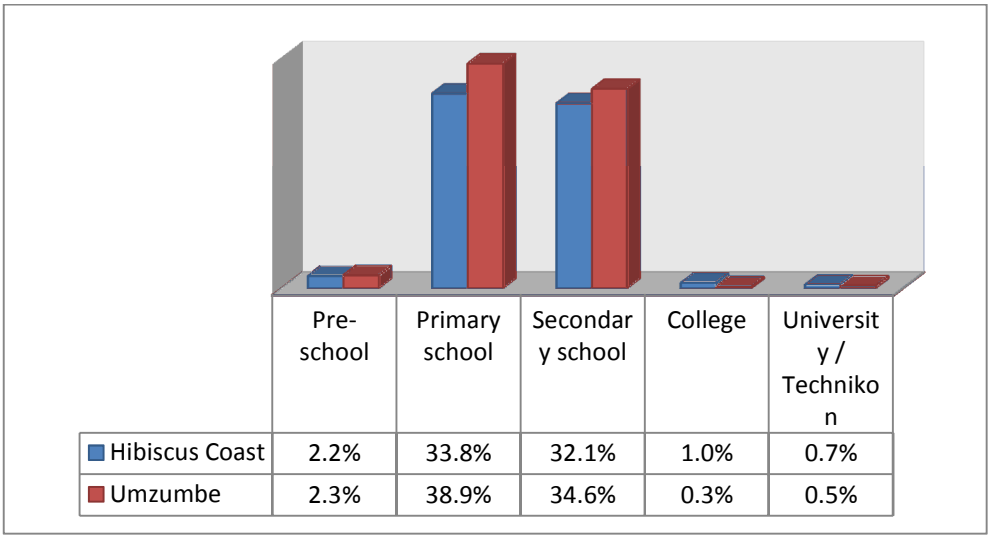


	Black	Coloured	Indian or Asian	White
Hibiscus Coast	83.3%	0.5%	6.8%	9.5%
Umzumbe	99.8%	0.2%	0.0%	0.0%

Data source: (Statistics South Africa, 2007)

With respect to educational institutions attended, most people across both local municipalities have at least a primary school level of education with 32.1% in Hibiscus Coast and 34.6% in Umzumbe have attended secondary school. This is illustrated in Bar Chart 14 below.

Bar Chart 14: Educational institution attended

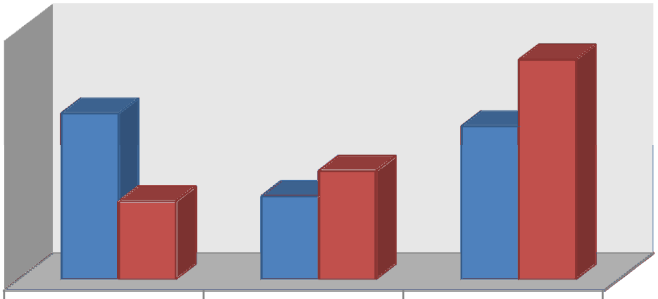


	Pre-school	Primary school	Secondary school	College	University / Technikon
Hibiscus Coast	2.2%	33.8%	32.1%	1.0%	0.7%
Umzumbe	2.3%	38.9%	34.6%	0.3%	0.5%

Data source: (Statistics South Africa, 2007)

There are a greater percentage of people who are employed in the Hibiscus Coast municipality than there are in Umzumbe, accordingly the unemployment level is higher in Umzumbe. The employment status across both local municipal areas is illustrated in Bar Chart 15 below.

Bar Chart 15: Employment status

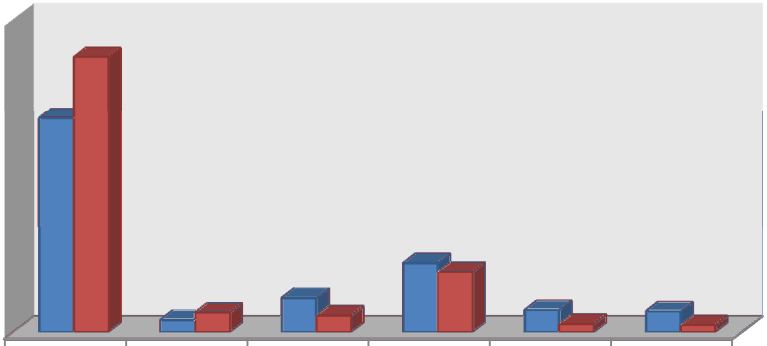


	Employed	Unemployed	Not economically active
Hibiscus Coast	39.9%	19.9%	36.9%
Umzumbe	18.7%	25.9%	52.8%

Data source: (Statistics South Africa, 2007)

A higher percentage of people, 70.4%, have no personal income in Umzumbe compared to Hibiscus Coast where 54.7% of the population have no personal income. The personal income of people earning less than R6 401 per month across both municipalities is illustrated in Bar Chart 16 below.

Bar Chart 16: Personal income <R6 4001 pm



	No income	R 1 - R 400	R 401 - R 800	R 801 - R 1 600	R 1 601 - R 3 200	R 3201 - R 6 400
Hibiscus Coast	54.7%	3.2%	8.7%	17.6%	5.6%	5.3%
Umzumbe	70.4%	5.0%	4.3%	15.3%	2.1%	1.8%

Data source: (Statistics South Africa, 2007)

A numerical comparison of the demographics discussed above is presented in Table 3 below with a more comprehensive version provided in Appendix 1.

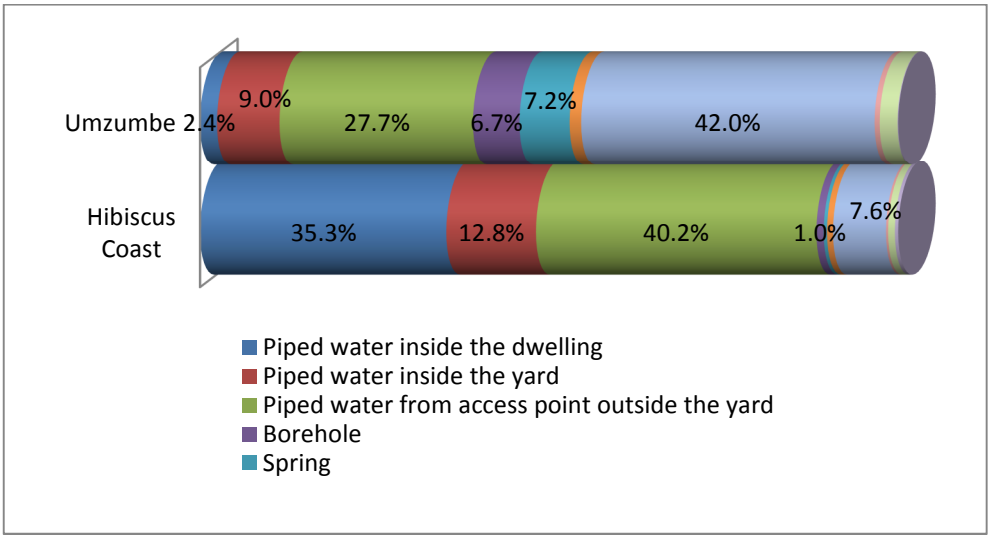
Table 3: Demographic data local municipal levels

	Umzumbe KZN213		Hibiscus Coast KZN216	
Population Group				
Black	175,917	99.8%	186,881	83.3%
Coloured	366	0.2%	1,013	0.5%
Indian or Asian	0	0.0%	15,182	6.8%
White	9	0.0%	21,196	9.5%
Gender				
Male	79,031	44.8%	104,219	46.5%
Female	97,252	55.2%	120,053	53.5%
Income - 15-65 years				
No income	65,572	70.4%	71,160	54.7%
R 1 - R 400	4,659	5.0%	4,100	3.2%
R 401 - R 800	3,992	4.3%	11,384	8.7%
R 801 - R 1 600	14,276	15.3%	22,876	17.6%
R 1 601 - R 3 200	1,988	2.1%	7,349	5.6%
R 3201 - R 6 400	1,681	1.8%	6,951	5.3%
Industry				
Agriculture; hunting; forestry and fishing	5,246	5.5%	5,916	4.2%
Mining and quarrying	34	0.0%	41	0.0%
Manufacturing	1,932	2.0%	8,580	6.1%
Electricity; gas and water supply	64	0.1%	549	0.4%
Construction	1,275	1.3%	3,745	2.7%
Wholesale and retail trade	2,167	2.3%	8,772	6.2%
Transport; storage and communication	330	0.3%	1,934	1.4%
Financial; insurance; real estate and business services	1,489	1.6%	4,772	3.4%
Community; social and personal services	2,979	3.1%	8,181	5.8%
Institution attended 5-24 Years				
Pre-school	1,974	2.3%	2,085	2.2%
Primary school	33,856	38.9%	32,513	33.8%
Secondary school	30,062	34.6%	30,875	32.1%
College	295	0.3%	949	1.0%
University/University of technology/Technikon	435	0.5%	645	0.7%
Adult basic education and training	0	0.0%	0	0.0%
Other	789	0.9%	551	0.6%
Employment				
Employed	17,876	18.7%	56,277	39.9%
Unemployed	24,789	25.9%	28,039	19.9%
Not economically active	50,571	52.8%	51,927	36.9%
Unspecified	1,897	2.0%	3,027	2.1%
Institutions	592	0.6%	1,628	1.2%

Data source: (Statistics South Africa, 2007)

With reference to service delivery indicators across the study area, at 35.3% of households, the Hibiscus Coast has the highest percentage of piped water inside the dwelling compared to the 2.4% of households in Umzumbe. Most households in Umzumbe, 42%, source their water from rivers or streams compared to 7.6% in the Hibiscus Coast municipal area. Most households in Hibiscus Coast, 40.2% have access to water through a point outside the yard compared to 27.7% in Umzumbe. This data is graphically illustrated in Bar Chart 17 below.

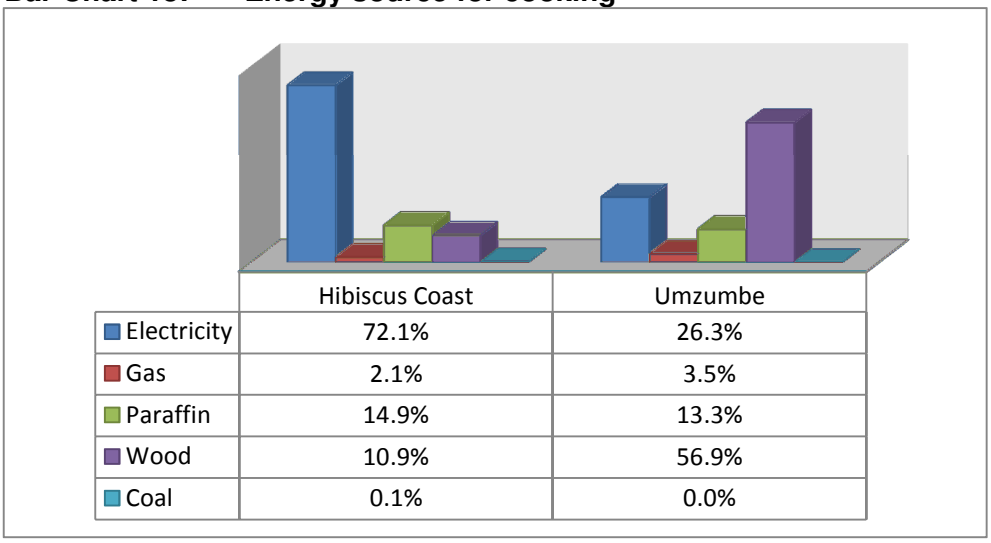
Bar Chart 17: Access to water



Data source: (Statistics South Africa, 2007)

Electricity is the dominant energy used for cooking in Hibiscus Coast with 72.1% of households using electricity compared to the 26.3% who use electricity for cooking in Umzumbe. At 56.9%, wood is the energy source most frequently used for cooking in Umzumbe with only 10.9% of households relying on wood for cooking in the Hibiscus Coast municipality. The energy used for cooking across both municipal areas is illustrated in Bar Chart 18 below.

Bar Chart 18: Energy source for cooking



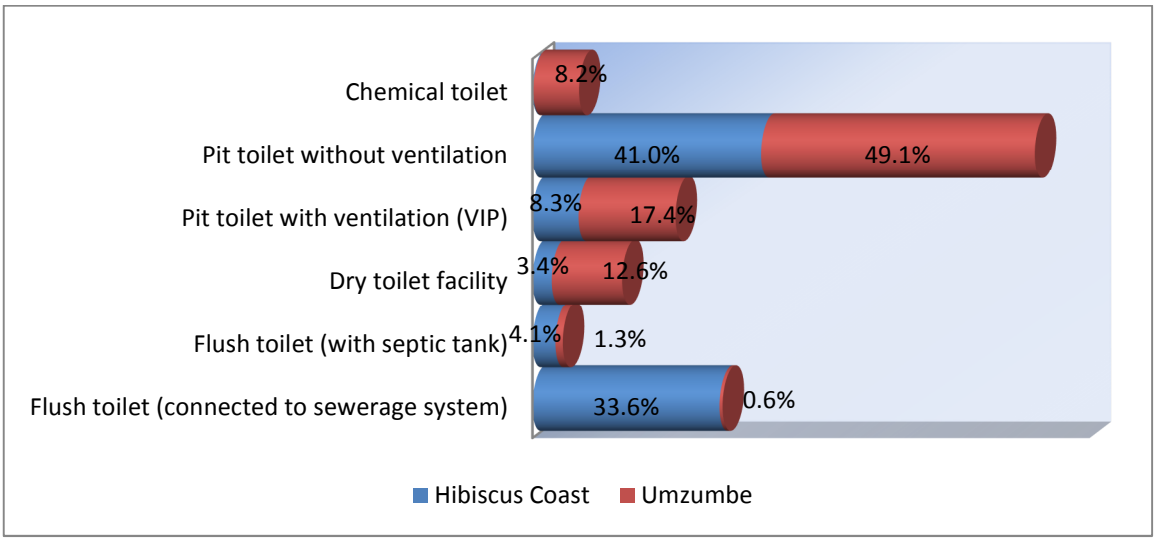
	Hibiscus Coast	Umzumbe
Electricity	72.1%	26.3%
Gas	2.1%	3.5%
Paraffin	14.9%	13.3%
Wood	10.9%	56.9%
Coal	0.1%	0.0%

Data source: (Statistics South Africa, 2007)

Flush toilet facilities are most prominent in the Hibiscus Coast with 33.6% of households having flush toilets connected to the sewerage system. At 49.1% pit toilet facilities without ventilation are most prominent in Umzumbe and only 0.6% of households in

Umzumbe have a flush toilet connected to the sewerage system. This data is represented below in Bar Chart 19.

Bar Chart 19: Toilet facilities



Data source: (Statistics South Africa, 2007)

Hibiscus Coast has a higher percentage of households, at 33.9%, than the Ugu District Municipality at 18.2% and the Umzumbe Local Municipality at 0.1% that have their refuse removed by the local authority or a private company at least once a week. Most dwelling structures, 63.7% in Umzumbe and 46.7% across the Ugu district, are traditional, built with traditional materials. In Hibiscus Coast most dwellings, 67.1%, are brick structures on a separate stand or yard and most dwellings, across all regions are fully paid for. These details are illustrated in Table 4 below. A more comprehensive list of household indicators which includes, amongst those household indicators listed in Table 4, energy for lighting and heating, access to postal facilities, cell phones, computers, internet, radio, refrigerators, telephones and television, is attached in Appendix 1.

Table 4: Household indicators district and local municipal levels

Access to water	Ugu DC21		Hibiscus Coast ZN216		Umzumbe KZN213	
Water						
Piped water inside the dwelling	27,649	18.2%	17,862	35.3%	981	2.4%
Piped water inside the yard	14,339	9.5%	6,507	12.8%	3,633	9.0%
Piped water from access point outside the yard	60,800	40.1%	20,349	40.2%	11,251	27.7%
Borehole	7,897	5.2%	526	1.0%	2,700	6.7%
Spring	3,953	2.6%	242	0.5%	2,915	7.2%
Dam/pool	1,940	1.3%	435	0.9%	669	1.6%
River/stream	31,462	20.8%	3,847	7.6%	17,057	42.0%
Water vendor	717	0.5%	153	0.3%	297	0.7%
Rain water tank	2,340	1.5%	489	1.0%	1,036	2.6%
Piped water inside the dwelling	27,649	18.2%	17,862	35.3%	981	2.4%
Energy for cooking						
Electricity	67,468	44.5%	36,499	72.1%	10,652	26.3%
Gas	4,341	2.9%	1,044	2.1%	1,407	3.5%
Paraffin	25,659	16.9%	7,523	14.9%	5,386	13.3%
Wood	53,837	35.5%	5,522	10.9%	23,081	56.9%
Refuse removal						
Removed at least once a week	27,591	18.2%	17,181	33.9%	59	0.1%
Removed less often	2,005	1.3%	591	1.2%	41	0.1%
Communal refuse dump	1,081	0.7%	253	0.5%	135	0.3%
Own refuse dump	101,118	66.7%	27,330	54.0%	33,847	83.4%
No rubbish disposal	19,632	12.9%	5,188	10.2%	6,498	16.0%
Tenure						
Owned and fully paid off	115,864	76.4%	32,407	64.0%	36,726	90.5%
Owned but not yet paid off	8,719	5.8%	5,651	11.2%	587	1.4%
Rented	15,810	10.4%	8,593	17.0%	1,990	4.9%
Occupied rent-free	10,857	7.2%	3,758	7.4%	1,277	3.1%
Toilet						
Flush toilet (connected to sewerage system)	26,116	17.2%	16,997	33.6%	227	0.6%
Flush toilet (with septic tank)	7,015	4.6%	2,080	4.1%	538	1.3%
Dry toilet facility	11,632	7.7%	1,743	3.4%	5,129	12.6%
Pit toilet with ventilation (VIP)	23,033	15.2%	4,183	8.3%	7,068	17.4%
Pit toilet without ventilation	66,227	43.7%	20,785	41.0%	19,940	49.1%
Chemical toilet	3,903	2.6%	72	0.1%	3,334	8.2%
Bucket toilet system	725	0.5%	58	0.1%	0	0.0%
Type of main dwelling						
House or brick structure on a separate stand or yard	66,114	43.6%	34,000	67.1%	13,114	32.3%
Traditional dwelling/hut/structure of traditional materials	70,861	46.7%	11,513	22.7%	25,830	63.7%
Flat in block of flats	4,589	3.0%	904	1.8%	970	2.4%
Town/cluster/semi-detached house	617	0.4%	280	0.6%	52	0.1%
House/flat/room in back yard	2,773	1.8%	1,891	3.7%	291	0.7%
Informal dwelling/shack in back yard	735	0.5%	206	0.4%	101	0.2%
Informal dwelling NOT in back yard. In informal settlement	1,675	1.1%	90	0.2%	69	0.2%
Room/flatlet not in back yard but on a shared property	2,445	1.6%	720	1.4%	93	0.2%
Caravan or tent	299	0.2%	145	0.3%	0	0.0%
Private ship/boat	159	0.1%	124	0.2%	0	0.0%
Workers' hostel(bed/room)	1,211	0.8%	744	1.5%	0	0.0%

Data source: (Statistics South Africa, 2007)

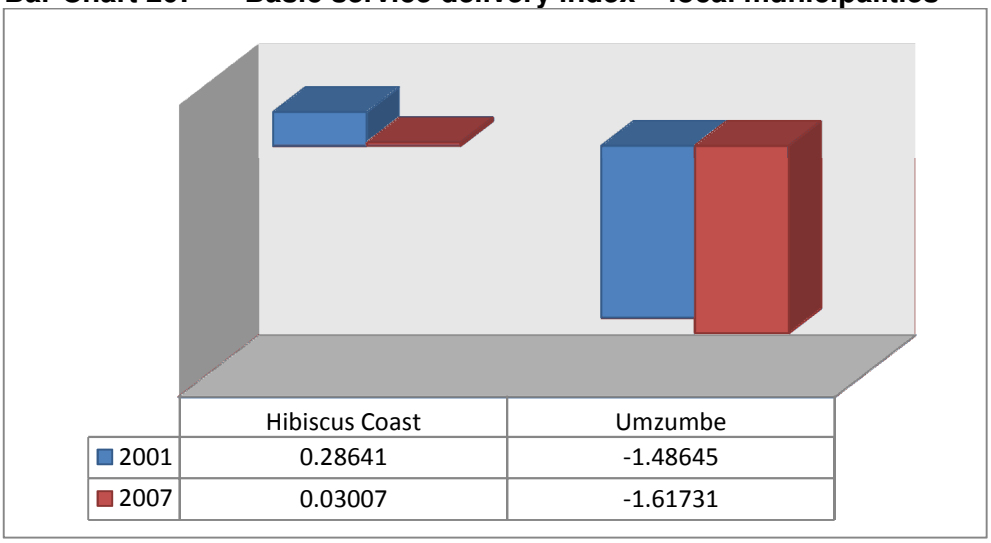
Having described the demographic profile across the region it may be relevant to consider the level of service delivery in the Hibiscus Coast and Umzumbe local municipalities. In 2009, the North-West University undertook a study to assess the performance of service delivery at local municipal level. The results of this study will now be discussed as it applies to the two local municipalities impacted by the proposed Ncwabeni Off-Channel Storage Dam. The aim of the paper produced by the North-West University was " *...to shed more light on delivery at a local level by using data from the 2001 Census and the 2007 Community Survey. The analysis involves the construction of a service delivery index for each municipality and analysis of variance to explain the changes in service delivery over the period 2001 to 2007"* (Krugell, Otto, & van der Merwe, 2009, p. 1).

The service delivery index constructed for the study was based on the percentage of households that;

- Have piped water delivered into the dwelling;
- Use electricity for cooking, heating and lighting;
- Have a flush toilet connected to the sewerage system;
- Have their refuse regularly moved by the authorities;
- Live in brick housing structures.

Bar Chart 20 below illustrates the level of service delivery across the relevant municipalities, with the scores ranging between +2 and 0 on the positive side and 0 to 2 on the negative side. This data shows that, over the period 2001 to 2007, the Umzumbe Local Municipality performed below average in 2001 with its performance dropping even lower in 2007. Although the Hibiscus Coast Local Municipality performed above average in 2001 and 2007 the performance of Hibiscus Coast was closer to average in 2007. It is important to note that the researchers point out that "[p]*ositive index values indicate better aggregate service delivery above the national average* (Krugell, Otto, & van der Merwe, 2009, p. 6)

Bar Chart 20: Basic service delivery index – local municipalities



	Hibiscus Coast	Umzumbe
2001	0.28641	-1.48645
2007	0.03007	-1.61731

Data source: (Krugell, Otto, & van der Merwe, 2009, pp. 15-17)

The vulnerability of the local municipalities affected by this project are described in in the Socio-Economic Report in accordance with the Municipal Spatial Classification System developed by the Department of Co-operative Governance (Nemai Consulting, 2012, pp. 23-24). It is against the background described above that the social impacts of the Ncwabeni: Off-Channel Storage Dam will now be addressed.

6. Social Impacts

Based on the project description, the social baseline study and analysis of the focus groups, open days and various submissions, the following 17 social impacts have been identified.

- Access
- Crime and security
- Disturbance of cultural, spiritual and religious sites
- Economic
- Fire hazard
- Health issues
- Farming operations
- Job creation
- Nuisance factors during construction
- Resettlement
- Safety hazards for people and animals
- Sense of place

- Services and infrastructure
- SMME opportunities
- STDs, HIV and AIDS risk
- Social stability

Each of these impacts will now be described and assessed in respect of both the construction and operational phases of the project.

6.1. Access

Description of impact: The inundation of the dam and construction of project related infrastructure will disrupt access across the site.

Access will be restricted in the area of both sits, however, in respect of site D3A (Gugamela River) the impact will be greater than it will with regard to site D2 (Ncwabeni River). In this respect it has been pointed out by Mr R.B. Lindsay, Chief Engineer: Materials & Pavements of the KZN Department that "*Site D3A (Gugamela river) requires a significant length of road construction and will result in an increased maintenance burden on the Department.*"

Mitigation objective: To limit disruption of access across the selected servitude route.

Mitigation measures:

- Provide strategically distributed crossing points to secure existing routes currently used by both farmers and local communities;
- Consult with property owners, local authorities and communities to ensure that all affected parties are informed of the timing and extent of any disruptions;
- Ensure that service nodes such as schools, clinics, water sources, places of worship, etc. remain easily and safely accessible at all times;

Access across both alternatives is assessed below during both the construction and operational phases of the project and presented in Table 5 below.

Table 5: Access

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	Low	Short term	Almost certain	1
D3A	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Negative	Local	Low	Medium term	Almost certain	1
D3A	Negative	Local	Medium	Medium term	Almost certain	2
Construction Phase with mitigation						
D2	Negative	Local	Low	Short term	Almost certain	1
D3A	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Negative	Local	Low	Medium term	Almost certain	1
D3A	Negative	Local	Medium	Medium term	Almost certain	2

6.2. Crime and security

Description of impact: Increased risk of criminal activity due to an influx of workers and activities during construction.

An assessment of crime rates in the Mehlomnyama Policing Precinct, the precinct under which the project fall are relatively low Compared to South African (Nemai Consulting, 2012, p. 33). It is, however, quite possible that, during the construction phase of the project, an opportunistic criminal element may take advantage of increased activities in some areas around the construction sites. During operation the only activity associated with the project will be maintenance and repair work reducing the risk of crime to some degree.

Mitigation objective: To reduce the risk of criminal activity associated with the project.

Mitigation measures:

- Where appropriate establish liaison structures with local police and communities to monitor changes during the construction phase;
- Where necessary additional security should be provided;
- Workers should be provided with identity cards and should wear identifiable clothing;

The impacts of crime and security across the routes, during both the construction and operational phases of the project, are assessed in Table 1 below.

Table 6: Crime and security

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	Medium	Short term	Almost certain	2
D3A	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Negative	Local	Low	Medium term	Almost certain	2
D3A	Negative	Local	Low	Medium term	Almost certain	2
Construction Phase with mitigation						
D2	Negative	Local	Low	Short term	Almost certain	2
D3A	Negative	Local	Low	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Negative	Local	Low	Medium term	Almost certain	2
D3A	Negative	Local	Low	Medium term	Almost certain	2

6.3. Disturbance of cultural, spiritual and religious sites

Description of impact: The possibility that the project could have an impact on areas of cultural, spiritual or religious significance.

Although this impact is mentioned here it is the subject of a separate specialist heritage study and is assessed in accordance with that study. It must however be noted that there remains the possibility that a culturally sensitive site may be discovered during construction. In the event of this occurring it would be important to have an archaeologist on stand-by over the construction period to address any such incidences.

It is also important to note that, at the Landowners Meeting – Nyamande Tribal Authority held on 16 November, 2011, a concern was raised about the existence of graves within the dam basin. At the same meeting, assurances were given that all graves would be identified through the Heritage Impact Assessment, working closely with the Tribal Authority, and that appropriate legal protocols will be followed in dealing with this issue.

6.4. Economic

Description of impact: The economic effects of the project.

The project is likely to have significant positive effects on the regional economy. For a more in-depth indication of this consult the Socio-Economic Report (Nemai Consulting, 2012)

6.5. Fire hazard

Description of impact: An increase in the risk of fires due to construction and maintenance activities.

Due to workers smoking and cooking food within the vicinity of the construction sites the risk of veld fires is likely to increase. Although this risk may be somewhat less during the operation phase it would still exist to some degree during maintenance and repair work.

Mitigation objective: To lessen any risk of fires caused by construction, repair and maintenance activities.

Mitigation measures:

- Ensure that both construction and maintenance personnel are made aware of the risks and dangers of veld fires and that they behave in a manner so as to reduce the risk of fire.
- Consider the viability of close co-operation between landowners and construction and maintenance teams to ensure an effective fire management strategy.

The risk of fire is assessed in below **Table 7**.

Table 7: Fire hazard

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	High	Short term	Almost certain	2
D3A	Negative	Local	High	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Negative	Local	Medium	Long term	Almost certain	2
D3A	Negative	Local	Medium	Long term	Almost certain	2
Construction Phase with mitigation						
D2	Negative	Local	Medium	Short term	Almost certain	2
D3A	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Negative	Local	Medium	Long term	Almost certain	2
D3A	Negative	Local	Medium	Long term	Almost certain	2

6.6. Health issues

Description of impact: The effect that the project is likely to have with regard to the health of communities living and working in the vicinity of the dam.

Bradley and Bos point out that; "*Water storage not only has benefits, it may also bring disease to the users or to others nearby, and since human action is involved anyway, it may be possible for interventions to prevent or reduce these health hazards*" (Bradley & Bos, 2010, p. 90). They continue to indicate that it is possible that, if the reservoir is not

monitored, it could become a breeding ground for various water-related diseases and water-related insect vectors such as snails and mosquitoes.

Mitigation objective: To manage project related health risks.

Mitigation measures:

- Follow mitigation measures recommended in the appropriate specialist report/s;
- Put in place a system to monitor health risks throughout the life of the project;
- Ensure that there is broad based representation, capable of serving all interests, in respect of the monitoring facility referred to above.

Health related issues are assessed below in Table 8.

Table 8: Health issues

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Operational Phase without mitigation						
D2	Negative	Local	Low	Long term	Moderate	1
D3A	Negative	Local	Low	Long term	Moderate	1
Operational Phase with						
D2	Negative	Local	Low	Long term	Moderate	1
D3A	Negative	Local	Low	Long term	Moderate	1

6.7. Farming operations

Description of impact: The construction of the dam and the flooding of the reservoir are likely to disrupt routine farming operations.

Both alternative sites are located on land registered under the Ngonyama Trust with site D2 being more pristine. There is, however, evidence of subsistence farming on parts of site D3A, as illustrated below in Figure 6 and Figure 7.

Figure 6: Subsistence farming in reservoir area of site D3A

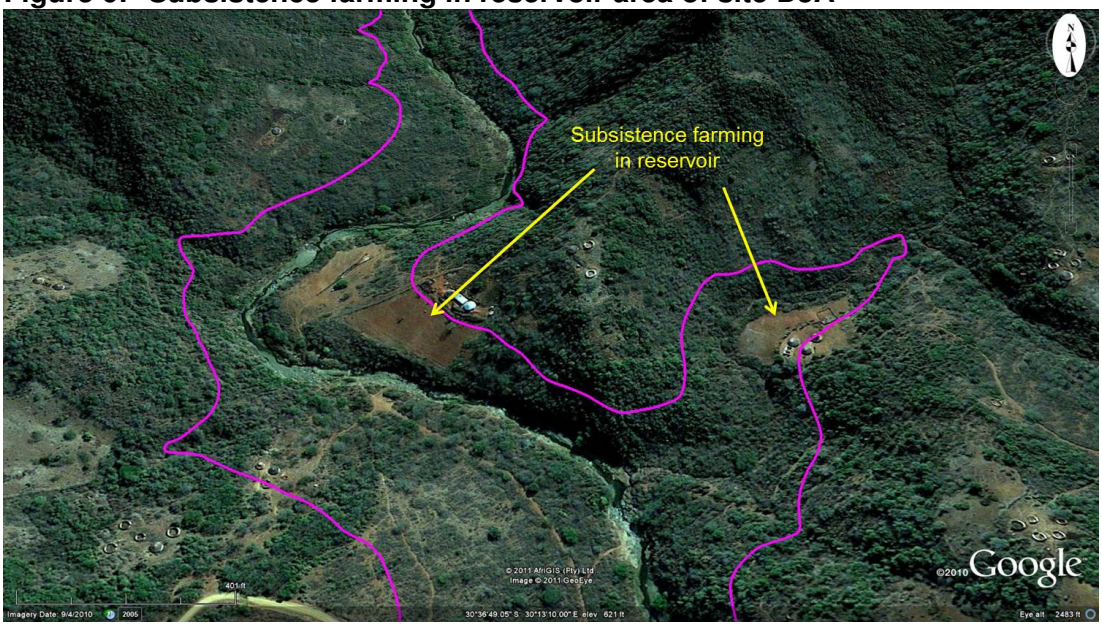


Figure 7: Typical dwelling and subsistence farming

Apart from tribal land, a privately owned commercial farm (Gibraltar 8258) named Camro Estates part, of which is illustrated in Figure 8 below, will also be affected by the proposed project. This property is located on the southern banks of the Mzimkhulu River where the river forms a meander and is situated south of site D2 and east of site D3A. In regard to this land it was pointed out, during a Landowner Meeting on 16 November, 2011 that; "*Temporary and localised water shortages in terms of irrigation water for Camro Estates could be caused by the new impoundment, depending on the water level in the Mzimkhulu River at the time of abstraction into the off-channel storage (OCS) dam. If this abstraction only takes places during peak or high flow periods then this should not adversely impact on downstream water users.*"

Figure 8: Agricultural activity on Camro Estate

Mitigation objective: To reduce disruptions to farming operations that may be caused by the construction of the dam

Mitigation measures:

- Liaise with the tribal authority, farmers and, if appropriate, farmer associations with the aim of finding solutions to any disruptions that may threaten farming activities;

- The introduction of measures to manage water quality during the construction phase;

The impacts associated with farming operations are presented below in Table 9.

Table 9: Farming operations

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	Low	Short term	Almost certain	1
D3A	Negative	Local	Medium	Short term	Almost certain	2
Construction Phase with mitigation						
D2	Negative	Local	Low	Short term	Almost certain	1
D3A	Negative	Local	Medium	Short term	Almost certain	2

6.8. Job creation

Description of impact: The construction of the dam and associated infrastructure is likely to result in the creation of jobs during both the construction and operational phases.

The entire Ugu District Municipality is plagued by high levels of unemployment and poverty and was identified in 2001 by the then President Thabo Mbeki as one of the priority rural nodal development areas. In this regard the dam project will contribute to the creation of temporary jobs during construction and, although significantly less, to more permanent jobs during operation.

Optimisation objective: To enhance the benefits of job creation.

Optimisation measures:

- Use local labour as far as possible;
- Create opportunities for the employment of women;
- Where possible use labour-intensive methods of construction;
- Where feasible introduce a programme to transfer skills particularly during the construction phase of the project.

The impact of the project in respect of the creation of jobs is assessed and presented in Table 10 below.

Table 10: Job creation

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Positive	Local	Low	Short term	Almost certain	2
D3A	Positive	Local	Low	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Positive	Regional	Low	Medium term	Almost certain	2
D3A	Positive	Regional	Low	Medium term	Almost certain	2
Construction Phase with mitigation						
D2	Positive	Local	Medium	Short term	Almost certain	2
D3A	Positive	Local	Medium	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Positive	Regional	Low	Medium term	Almost certain	2
D3A	Positive	Regional	Low	Medium term	Almost certain	2

6.9. Nuisance factors during construction

Description of impact: The construction of the dam and associated infrastructure could result in an increase in noise and dust levels.

The environment immediately surrounding the project is rural and, particularly with regard to site D2, is pristine. Due to this noise and dust levels are currently low and any increase in noise due to construction will have a noticeable effect on the environment. It is, however, questionable as to whether there will be any noticeable difference between site D2 and D3A. Although dust levels will also increase during construction it is not clear as to what the effects of these dust levels will be as this is dependent on identifying the prevailing winds in the area over the period of construction and this data was not available at the time of writing. Nevertheless, what can be assumed at this point is that construction will result in a significant increase in both noise and dust and that this will have some nuisance effect for communities in close proximity of the project.

Mitigation objective: To reduce the nuisance factors that may be generated during construction and operation.

Mitigation measures:

- Construction activities and vehicle movement should be restricted to daylight hours;
- All vehicles and construction machinery should be maintained to a standard that minimises noise levels and vehicle emissions that may cause any unnecessary and avoidable nuisance to the workforce and local communities;

- When blasting occurs this must be done in a manner to minimise the noise and dust generated by this activity.

The nuisance factors associated with the construction of the dam and associated infrastructure are assessed below in Table 11.

Table 11: Nuisance factors during construction

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	Medium	Short term	Almost certain	2
D3A	Negative	Local	Medium	Short term	Almost certain	2
Construction Phase with mitigation						
D2	Negative	Local	Medium	Short term	Almost certain	2
D3A	Negative	Local	Medium	Short term	Almost certain	2

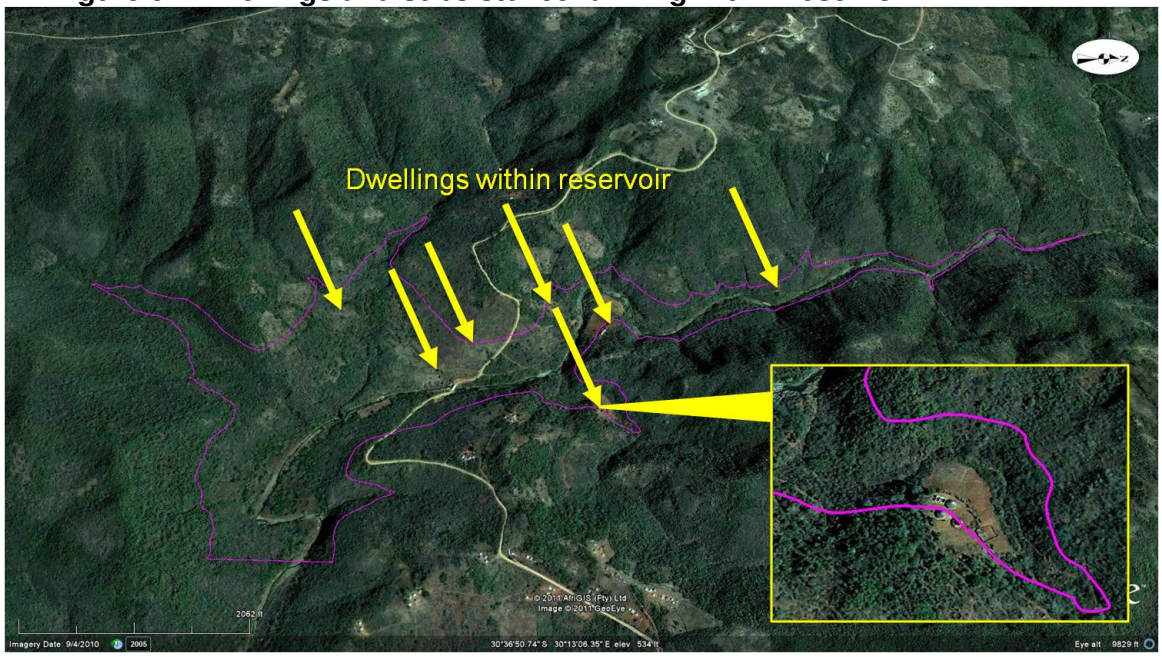
6.10. Resettlement

Description of impact: The need to resettle households due to the construction of the dam and infrastructure.

Although it appears that there is no need to relocate any households from site D2, there are at least 12 households under threat in the area of site D3A. These households also rely on subsistence farming as illustrated above in Figure 7 and below in Figure 9. It is also clear that these households have a very strong attachment to the land and are reluctant to be moved (Department of Water Affairs and Forestry, 2007a). This may require some incentive being offered to compensate for the inconvenience caused by relocation. Three households located within the dam basin or within 100 meters of the dam basin have been identified on site D3A. These households, which need to be relocated, have been documented in the Socio-Economic Report (Nemai Consulting, 2012, pp. 35-39). In addition there are a number of unoccupied homesteads and associated graves which will need to be relocated. These graves will need to be relocated in accordance with the requirements of the National Heritage Resources Act, Number 25 of 1999.

A further consideration is that, in respect of site D2 and site D3A, as well as the infrastructure and appurtenant works, the Traditional Authority and the Ngonyama Trust Board would need to be consulted and agreement would need to be reached as to fair compensation in respect of the loss of this land.

Figure 9: Dwellings and subsistence farming within reservoir



Resettlement should be undertaken in accordance with recognised acceptable relocation practices. In this regard international experience has shown that, unless the best practice benchmarks are achieved, resettlement exposes affected people to a range of risks such as:

- landlessness
- homelessness
- joblessness
- economic and social marginalisation
- increased morbidity and mortality
- food insecurity
- loss of access to common property resources
- social and cultural disarticulation/disruption

In this regard poorer households are particularly vulnerable (Cernea, 1997) and need to be protected against being subjected to such conditions. Accordingly, if the need for resettlement does arise it must be conducted in terms of international best practice and accompanied by a comprehensive resettlement action plan. This goes further than merely fulfilling the legislative requirements of compensation.

According to the World Bank's Revised Policy on Involuntary Resettlement (OP/BP 4.12) (2006), best practices must ensure that:

- Involuntary resettlement should be avoided, or minimised where unavoidable.
- Where resettlement is unavoidable, resettlement plans and activities should be seen and executed as development programmes.
- Resettled persons should be provided with sufficient investment resources and opportunities to share in project benefits.
- Displaced persons should be meaningfully consulted, and should participate in the planning and implementation of resettlement programmes.
- Displaced persons should be compensated, prior to the move, for their losses at full replacement cost.
- Resettled persons should be assisted with the move and provided with support during the transition period.
- Resettled persons should be assisted with their efforts to improve, or at least restore, their former living standards, income earning capacity and production levels – whichever is higher.

Mitigation objective: To reduce the effect of resettlement on local communities.

Mitigation measures:

- Consider the viability of engaging a specialist resettlement consultant to oversee the process;
- Follow a recognised and acceptable relocation protocol;
- Involve the affected communities and appropriate tribal authorities in the resettlement plan from commencement.

As resettlement will need to be finalised prior to the construction phase of the project it is assessed in Table 12 below as such.

Table 12: Resettlement

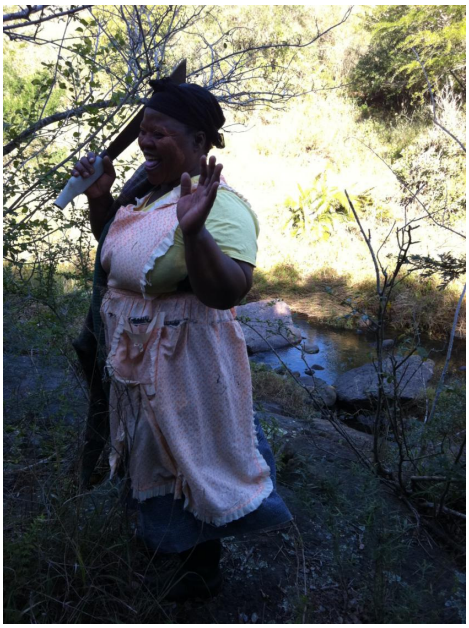
Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	Low	Short term	Almost certain	1
D3A	Negative	Local	High	Short term	Almost certain	3
Construction Phase with mitigation						
D2	Negative	Local	Low	Short term	Almost certain	1
D3A	Negative	Local	Medium	Short term	Almost certain	2

6.11. Safety hazards for people and animals

Description of impact: The safety of people and animals may be at risk during construction and operation.

During the construction phase of the project there will be heavy duty machinery and vehicles on site as well as blasting activities. This will increase the safety hazards that both people and animals will face. These risks will extend beyond the project to the access roads leading to the project as heavy duty traffic will increase along the route. Figure 10 below illustrates people and animals photographed during a site visit to the area who may be at risk.

Figure 10: People and animals in the immediate area of the proposed project



During the operational phase of the project, once inundation has taken place, the increase in the water surface area will heighten the risk of drowning. The ideal mitigation against drowning is to fence the area off, however, it is probably impractical to fence the entire dam area off and this would interfere with the access local people may have to the dam for watering cattle or collecting water or fish.

Mitigation objective: To reduce the risk of accidents and/or fatalities associated with the project.

Mitigation measures:

- Ensure that all equipment is maintained to the required safety standards;
- Ensure that the appropriate safety procedures are in place and followed at all times during both construction and maintenance;
- Fence off all construction sites to prevent people and animals from straying onto the site;
- Install adequate warning signs warning of any imminent dangers.
- Where feasible and in places of high risk consideration should be given to fencing these areas to prevent drowning;
- Consider the viability of educating the population, especially children, in the vicinity of the dam as to the risk of drowning.

The impact of the safety of people and animals is assessed prior to the application of mitigation measures and presented in Table 13 below.

Table 13: Safety hazards for people and animals

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	Medium	Short term	Almost certain	2
D3A	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Negative	Local	Low	Permanent	Almost certain	2
D3A	Negative	Local	Low	Permanent	Almost certain	2
Construction Phase with mitigation						
D2	Negative	Local	Low	Short term	Almost certain	2
D3A	Negative	Local	Low	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Negative	Local	Low	Permanent	Almost certain	2
D3A	Negative	Local	Low	Permanent	Almost certain	2

6.1. Sense of place

Description of impact: The effect that the project may have on the vista, atmosphere and lifestyle of the region through which it passes.

The construction of a dam within what is largely a rural area is likely to change the rural atmosphere and lifestyle of the region and consequently, may have a negative effect on the sense of place for some residents and tourists to the area. In this regard it was stressed by Mr Paddy Norman of WESSA, at the Environmental Authorities Meeting on the 15th November, 2011 " …*that the visual impact as a result of the borrow areas outside of the basin need to be assessed from a tourism perspective. KZN Tourism Authority to be included in database*." At the same meeting Mr Dominic Wieners of Ezemvelo KZN Wildlife, pointed out that the site falls within a Critical Biodiversity Area.

What must also be considered is that over the longer term there is also the possibility that the dam will eventually develop its own distinct sense of place and, if used as a recreational facility, may even eventually become a tourist attraction in the area. At this point, however, there are no clear recreational plans for the recreational use of the dam as the remoteness of the site is likely to restrict such practice. It is for this reason that it is assessed below as having a neutral status over the operational phase of the project.

Mitigation objective: To limit the negative impact that the project may have on the environment and to retain the sense of place as best as possible.

Mitigation measures:

- Consult with affected communities in an effort to identify and address issues relating to the visual impact and sense of place;
- Reinstate the natural environment as swiftly as possible;
- Where feasible, follow the recommendations of the biodiversity, conservation and visual impact specialist;
- Consider the viability of the dam becoming a recreational facility.

The disturbance of a sense of place is presented below in Table 14.

Table 14: Sense of place

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	High	Short term	Almost certain	2
D3A	Negative	Local	High	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Neutral	Local	Low	Long term	Almost certain	2
D3A	Neutral	Local	Low	Long term	Almost certain	2
Construction Phase with mitigation						
D2	Negative	Local	Medium	Short term	Almost certain	2
D3A	Negative	Local	Medium	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Neutral	Local	Low	Long term	Almost certain	2
D3A	Neutral	Local	Low	Long term	Almost certain	2

6.2. Services and infrastructure

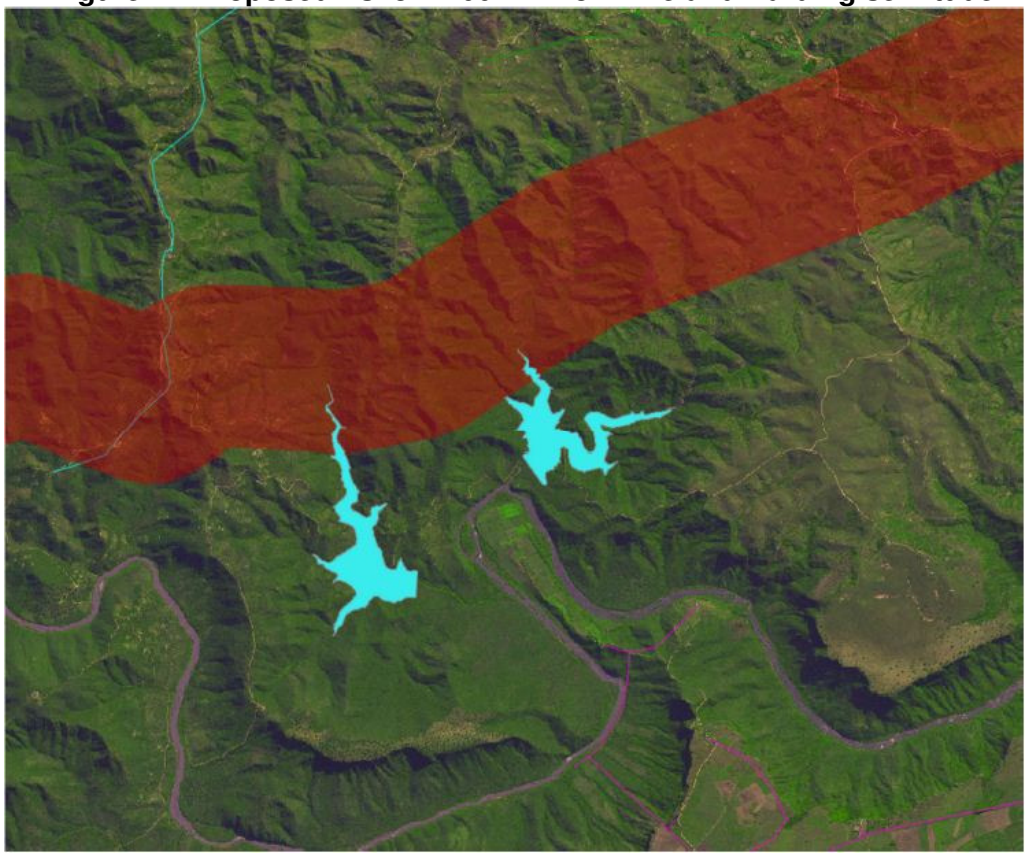
Description of impact: Interference with service and existing and proposed infrastructure and provision in the vicinity of the project sites.

It was pointed out by Mr R B Lindsay of the KZN Department of Transport in an email dated 06 February, 2012 that, while site D2 "…*has the least impact on the Provincial road network. Site D3A … requires a significant length of road construction and will result in an increased maintenance burden on the Department. Any work carried out on our road network will require our written approval.*"

In an email date 23 February, 2012, Mr E. van Heerden of Eskom indicated that, "*There is currently no Eskom infrastructure in the area".* Mr van Heerden does, however, indicate that there are plans for a 400kV corridor between Thornville and Harding which encroaches on both dam sites as illustrated by the red band in Figure 11 below. This corridor is broad and should provide ample scope for adjustment in the vicinity of both site alternatives.

Although it is not apparent that any other infrastructure will be affected by the dam this would need to be confirmed with both the Umzumbe local and Ugu district municipalities. In respect of water quality, at the Environmental Authorities Meeting on 15 September, 2011 Mr Paddy Norman of WESSA pointed out " …that existing downstream water users include a quarry and mill. While in correspondence to NEMAI Consulting dated 23 January, 2012, Mr Rakesh Ramthol the Plant Manager at Idwala Carbonates points out that "*Idwala Carbonates is a downstream user of water from the Umzimkulu River. We need to be included in the assessment process as we are abstracting water and Idwala Carbonates has to make sure that the volume we abstract is not going to be impacted on negatively*".

Figure 11: Proposed Eskom 400kV Thornville and Harding servitude



Mitigation objective: To minimize any negative effect that the construction of the dam may have on existing infrastructure.

Mitigation measures:

- Liaise with all relevant service providers such as local and district municipalities to ensure that any disruption to existing infrastructure is limited.
- Liaise with property owners to ensure that existing infrastructure is recorded and any damage repaired or compensated for.

The impact of the project on existing and proposed future services and infrastructure is assessed and presented below in Table 15.

Table 15: Services and infrastructure

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Positive	Regional	Medium	Short term	Almost certain	2
D3A	Positive	Regional	Medium	Short term	Almost certain	2
Construction Phase with mitigation						
D2	Positive	Regional	Low	Short term	Almost certain	1
D3A	Positive	Regional	Low	Short term	Almost certain	1

6.3. SMME opportunities

Description of impact: Direct opportunities for Small Medium and Micro Enterprise (SMMEs) will possibly occur during both the construction and operational phases of the project.

A number of opportunities for small businesses and entrepreneurs will possibly be generated through the project. The importance of this was stressed at the Landowners Meeting – Nyamande Tribal Authority, held at the Tribal Court, Ncane on 16 November, 2012. At this meeting it was asked if local goods and services would be used during the project and it was indicated that local goods and services would be advocated through the EIA process. These opportunities will be both directly and indirectly associated with the project with a number being related to the upgrading of the water supply scheme in the area. In this regard see the economic report.

Mitigation objective: To optimise the local level impact of opening and sustaining SMMEs.

Optimisation measures:

- Establish a local SMME recruitment preference policy;
- Implement a monitoring system to ensure that the local SMME recruitment preference policy is followed.

The impact of the project on SMMEs is assessed and presented below in Table 16.

Table 16: SMME opportunities

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Positive	Local	Low	Short term	Almost certain	2
D3A	Positive	Local	Low	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Positive	Local	Low	Long term	Almost certain	2
D3A	Positive	Local	Low	Long term	Almost certain	2
Construction Phase with mitigation						
D2	Positive	Local	Medium	Short term	Almost certain	2
D3A	Positive	Local	Medium	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Positive	Local	Medium	Long term	Almost certain	2
D3A	Positive	Local	Medium	Long term	Almost certain	2

6.4. STDs, HIV and AIDS risk

Description of impact: The risk of STDs, HIV and AIDS infection due to an influx of workers and work seekers during construction.

At 39.5% in 2010, the province of KwaZulu-Natal has the highest HIV prevalence rate amongst antenatal women in South Africa. The Eastern Cape, which borders on KZN in the vicinity of the proposed project, also has a relatively high HIV antenatal prevalence rate at 29.9%. At the district level the prevalence of HIV amongst antenatal women in the Ugu District Municipality was at 41.1% in 2010 (National Department of Health, 2011, pp. 54-57). With such a high HIV prevalence already in the area and considering the limited number of jobs created, it is unlikely that there will be any significant increased risk of STDs, HIV and AIDS due to the influx of workers and work seekers.

What is of more concern is the risk of HIV infection to workers coming into the area. With the district having a high level of poverty it is likely that the workforce will attract prostitution which, considered together with the high prevalence of HIV in the district, will place the workforce at a high risk of HIV infection.

Mitigation objective: To reduce the risk of the spread of STDs, HIV and AIDS.

Mitigation measures:

- The contractor/operator should, in consultation with local HIV/AIDS organisations and government structures, design and implement an STD, HIV and AIDS awareness and prevention campaign for employees. This campaign should use

various common practice methodologies in order to ensure social and cultural sensitivity.

- The contractor/operator should make STD, HIV and AIDS awareness and prevention programmes a condition of contract for all suppliers and sub-contractors.
- The contractor/operator should provide an adequate supply of free condoms to all workers. Condoms should be located in the bathrooms and other communal areas on the construction site and at the construction camps.
- If viable, a voluntary counselling and testing programme should be introduced during the construction phase and continued during operations. This should be undertaken in conjunction with the existing VCT programmes within the region.

During the operational phase:

- The operator should, in association with HIV/AIDS organisations and government structures, implement an STD, HIV and AIDS awareness and prevention campaign directed at employees.

The risk of STDs, HIV and AIDS is assessed and presented below in Table 17.

Table 17: STDs, HIV and AIDS risk

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	National	Medium	Short term	Almost certain	2
D3A	Negative	National	Medium	Short term	Almost certain	2
Operational Phase without mitigation						
D2	Negative	Local	Low	Medium term	Almost certain	1
D3A	Negative	Local	Low	Medium term	Almost certain	1
Construction Phase with mitigation						
D2	Negative	National	Medium	Short term	Almost certain	2
D3A	Negative	National	Medium	Short term	Almost certain	2
Operational Phase with mitigation						
D2	Negative	Local	Low	Medium term	Almost certain	1
D3A	Negative	Local	Low	Medium term	Almost certain	1

6.5. Social stability

Description of impact: The effect that an influx of job seekers and workers may have on existing family networks and social structures.

An increase of workers and job seekers can create a number of negative influences within the host community in respect of;

- Increase in prostitution;
- Unplanned and unwanted pregnancies;
- Increase in alcohol and drug related incidents;
- Pressure on local services, such as housing, clinics, schools, water supplies;
- Increase in local prices and the cost of living;
- Tension and conflict within the community and impact on family networks and relationships; and
- Competition for available jobs and resources.

It is estimated that during construction the work force will peak between 300 and 350 workers and that these workers will be contract workers. With this influx of contract workers and the establishment of a labour camp in the area there is likely to be a significant impact on the local communities as the population of these communities are relatively small. For instance the villages of Ncane, Nyamande and Sunduza have respective population of 311, 840 and 3 146 (Nemai Consulting, 2012, p. 24).

During the operational phase of the project the number of workers required will be far less and most unskilled and semi-skilled labour will be locally recruited, thus there is unlikely to be any impact during the operational phase of the project.

Mitigation objective: To reduce the impact of an influx of workers and job seekers on existing family networks and social structures.

Mitigation measures:

- Communication channels must be maintained between the contractor and local community structures in an effort to maximise the employment of local labour.
- Make condoms readily accessible to workers.
- Liaise with the South African Police Services and community structures to ensure that the workforce is controlled.
- Where appropriate, workers from other area should be provided with adequate on-site temporary accommodation and amenities.
- On completion of the work all temporary accommodation must be dismantled and removed to prevent the development of informal settlements.

The impact of social instability is assessed and presented below in Table 18.

Table 18: Social stability

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Construction Phase without mitigation						
D2	Negative	Local	High	Short term	Almost certain	3
D3A	Negative	Local	High	Short term	Almost certain	3
Construction Phase with mitigation						
D2	Negative	Local	High	Short term	Almost certain	2
D3A	Negative	Local	High	Short term	Almost certain	2

6.6. Assessment of alternatives

Having considered both site D2 and site D3A it is clear that, on a social basis, no obvious fatal flaw exists relating to either site. It is, however, also clear that site D2 emerges as the socially preferred site on the following basis:

- Access and infrastructure requirements are less affected in respect of site D2 as site D3A requires a significant length of road construction resulting in significant burden for maintenance being placed on the KZN Department of Transport (see email dated 06 February, 2012 from Mr R. B. Lindsay, Chief Engineer: Materials & Paving, KZN Department of Transport).
- Although there are no areas in any of the alternative dam sites suitable for intensive grazing or cultivation, various subsistence farming activities do occur and have been identified in site D3A.
- At least 12 households have been identified in the dam basin of site D3A, these households will require resettlement. The Department of Water Affairs and Forestry (2007a) has also identified a very strong attachment to the land by local communities.

Notwithstanding this, however, it is quite possible that the social preference could be overridden by either technical and/or biodiversity requirements.

6.7. Do nothing alternative

Description of impact: To not construct the Ncwabeni Off-Channel Storage Dam leaving the status quo in place.

If the project did not proceed then it is most likely that;

- Water security in the Mzimkhulu Regional Water Supply Scheme, which forms part of the KwaZulu Natal's Lower South Coast System would be severely compromised;
- An opportunity to enhance the economic development of the region would be lost;
- The impacts as described above would not materialise;

Table 6 - 1: Do nothing alternative

Site	Nature/status	Extent	Magnitude	Duration	Probability	Significance
Operational Phase						
D2	Negative	Regional	High	Long term	Almost certain	3
D3A	Negative	Regional	High	Long term	Almost certain	3

A short discussion with concluding remarks will now follow.

7. Discussion and concluding remarks

It is abundantly clear that the issue of water security is a global concern (Global Water Partnership, 2010; The Royal Academy of Engineering, 2010) with a lot of attention being placed on Africa and South Africa in particular (Muller, M. et al., 2009; Institute for Security Studies, 2011; Molobela & Sinha, 2011; Muller, 2012). In this regard a study undertaken by the Development Bank of Southern Africa found that:

> "*Although South Africa uses a relatively high proportion of its available water, studies have shown that there is enough water to meet all the country's needs until 2025 and beyond. Present problems and future challenges are related mainly to limited financial resources and institutional capabilities, rather than to limitations of the resource. Thus, water crises may arise if the right investments, innovations and management decisions are not made at the right time. This could see jobs and livelihoods being affected, taps running dry and diseases spreading unnecessarily.*
>
> *The key message is, therefore, that South Africa's challenges relating to water need not constrain national growth and development if they are properly understood and responded to. However, effective water management is essential if the country is to achieve optimal social and economic performance in a sustainable manner*" (Muller, M. et al., 2009, p. 5)

The importance of investing in infrastructure to harness water in South Africa is also stressed in an Engineering News article (Smit, 2010) which indicates that the Water Institute of South Africa (Wisa) reports that only 35% to 40% of South Africa's river run off is being harnessed. While the need to manage water at the level of river basins and to distribute it more evenly amongst the population, ensuring that the poorer rural communities are given access to water, is also critical for human security (Molobela & Sinha, 2011).

Considering all these issues and the needs identified in the study area (Department of Water Affairs and Forestry, 2007b; BKS, 2011; Nemai Consulting, 2012) it becomes apparent that it is essential to make the right management decisions at the right time and to build more infrastructure to ensure a more reliable supply of water in the region. A reliable water supply is directly proportional to more investment and greater productivity (Muller, 2012) and, as such, to assist in reducing poverty in the region (Quibell, Stein, Seetal, & Ncapayi, 2011) something sorely required throughout the study area and consistent with the district having been identified by former president Mbeki as a priority node for development.

8. List of works cited

BKS. (2011). Ncwabeni: Off-Channel Storage Dam Feasibility Study: Module 1: Technical Study:.

Bradley, D. J., & Bos, R. (2010). Water storage: health risks at different scales. In J. Lundqvist (Ed.), On the Water Front World: Selections from the 2009 World Water Week in Stockholm (pp. 90-99). Stockholm: Stockholm International Water Institute (SIWI).

Cernea, M. (1997). The risks and reconstruction model for resettling displaced populations. World Development. Volume 25, Issue 10, October 1997, 1569-1587.

Department of Water Affairs and Forestry. (2007a). Mzimkhulu River Off-Channel Storage Dam Pre-Feasibility Study: Assessment of environmental issues associated with the proposed development of an off-channel storage dam along the Mzimkhulu River, Report No. P WMA 11/000/00/1507. Prepared by ILISO Consulting (Pty) Ltd.

Department of Water Affairs and Forestry. (2007b). Mzimkhulu River Off-Channel Storage Prefeasibility Study: Prefeasibility Main Report, Report No P WMA 11/000/00/1307. UWP Consulting (Pty) Ltd.

Global Water Partnership. (2010). Water Security for Development: Insights from African Partnerships in Action. Stockholm: Global Water Partnership (GWP).

Institute for Security Studies. (2011, May 11). Rethinking South Africa's Water security. Retrieved May 28, 2012, from www.polity.org: http://www.polity.org.za/article/rethinking-south-africas-water-security-2011-05-11

Krugell, W., Otto, H., & van der Merwe, J. (2009, February 17). Local Municipalities and Progress with the Delivery of Basic. Retrieved February 21, 2010, from www.econrsa.org: http://www.econrsa.org/papers/w_papers/wp116.pdf

Molobela, I. P., & Sinha, P. (2011). Management of water resources in South Africa: A review. African Journal of Environmental Science and Technology Vol. 5(12), 993-1002.

Muller, M. (2012). Africa's path to water security rocks, hard places, road blocks. Water Security, Risk and Society Conference April 16-18th 2012, (p. Plenary: Water security and the global development challenge). University of Oxford.

Muller, M. et al. (2009). Water security in South Africa. Development Planning Division. Working Paper Series No.12,. Midrand: Development Bank of Southern Africa.

National Department of Health. (2011). National Antenatal Sentinel HIV and Syphilis Prevalence Survey in South Africa, 2010. Pretoria: National Department of Health.

Nemai Consulting. (2012). Final Scoping Report – Ncwabeni Off-Chanel Storage Dam. Johannesburg: Nemai Consulting.

Nemai Consulting. (2012). Ncwabeni: Off-Channel Storage Dam. Final Socio-Economic Report. Randburg: Memai Consulting.

Quibell, G., Stein, R., Seetal, A., & Ncapayi, N. (2011). Transforming Legal Access to Water to Redress Social Inequality and Economic Inefficiency. Transforming Water Management in South Africa Global Issues in Water Policy, 2011, Volume 2, , 97-118.

Smit, P. (2010, March 12). Water security still SA's top challenge. Retrieved May 28, 2012, from Engineering News: http://www.engineeringnews.co.za/article/investment-needed-to-secure-scarce-water-resources-2010-03-12

Statistics South Africa. (2007). Community Survey 2007. Statistic Release P0301. Pretoria: Statistics South Africa.

Statistics South Africa. (2007). Community Survey 2007. Statistic Release P0301.1. Pretoria: Statistics South Africa.

Statistics South Africa. (2011). Mid-year population estimates 2011. Statistical Resease P0302. Pretoria: Statistics South Africa.

Statistics South Africa. (2012). Quarterly Labour Force Survey, Quarter 1, 2012. Statistics Release P0211. Pretoria: Statistics South Africa.

The Royal Academy of Engineering. (2010). Global Water Security – an engineering perspective. London: The Royal Academy of Engineering.

Ugu District Municipality. (2011/12). Ugu District Municipality Intergrated Development Plan 2007/08 to 2011/12 as revised in the 2011/12 IDP Review. Port Shepstone: Ugu District Municipality.