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DWS Report No: P WMA 12/T30/00/5314/9

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

DEA REF. No 14/12/16/3/3/2/677 (Dam Construction)
14/12/16/3/3/2/678 (Electricity Generation)
14/12/16/3/3/1/1169 (Roads)

VISUAL IMPACT ASSESSMENT

FINAL
January 2015

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

Report Title:	***Visual Impact Assessment***
Authors:	*Menno Klapwijk*
Project name:	***Environmental Impact Assessment for the Mzimvubu Water Project***
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CONSULTANT: ILISO CONSULTING (PTY) LTD IN ASSOCIATION WITH BAPELA CAVE KLAPWIJK

Approved for Bapela Cave Klapwijk by:

Menno Klapwijk
Director

Approved for ILISO Consulting (Pty) Ltd by:

Ms Terry Calmeyer
Study Leader

DEPARTMENT OF WATER AND SANITATION
Directorate: Options Analysis

Approved for DWS:

M Mugumo
Chief Engineer: Options Analysis (South)

L S Mabuda
Chief Director: Integrated Water Resource Planning

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

LIST OF REPORTS

REPORT TITLE	DWS REPORT NUMBER
Inception Report	P WMA 12/T30/00/5314/1
Scoping Report	P WMA 12/T30/00/5314/2
Environmental Impact Assessment Report	P WMA 12/T30/00/5314/3
Environmental Management Programme	P WMA 12/T30/00/5314/14
Integrated Water Use License Application for the Mzimvubu Water Project: Technical Report	P WMA 12/T30/00/5314/4
Ntabelanga Dam borrow pits and quarry Environmental Management Plan	P WMA 12/T30/00/5314/5
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Heritage Impact Assessment	P WMA 12/T30/00/5314/12
Water Quality Study	P WMA 12/T30/00/5314/13
Aquatic Ecology Assessment	P WMA 12/T30/00/5314/15
Wetland Assessment	P WMA 12/T30/00/5314/16
Rapid Reserve Determination: Tsitsa River at Lalini	P WMA 12/T30/00/5314/17

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

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DWS Report No: **P WMA 12/T30/00/5314/9**

Prepared for: Directorate – Options Analysis

Prepared by: Bapela Cave Klapwijk P O Box 11651 Hatfield Pretoria 0028
Tel: (012) 3624684, Fax: (012) 3620394
Contact: Menno Klapwijk
Email: menno@bcksa.co.za

DECLARATION OF INDEPENDENCE

I, Menno Klapwijk, as authorised representative of Bapela Cave Klapwijk, & Associates hereby confirm my independence as a specialist and declare that neither I nor Bapela Cave Klapwijk have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Bapela Cave Klapwijk was appointed as visual impact assessment specialists in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for work performed, specifically in connection with the Visual Impact Assessment for the Mzimvubu Water Project Environmental Impact Assessment. I further declare that I am confident in the results of the studies undertaken and conclusions drawn as a result of it – as is described in my attached report.

Signed: Date: January 2015

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

VISUAL IMPACT ASSESSMENT

Executive summary

INTRODUCTION

The Department of Water And Sanitation (DWS) commissioned the Mzimvubu Water Project, an integrated multi-purpose (domestic water supply, agriculture, power generation, transport, tourism, conservation and industry) project, with the intention of providing a socio-economic development opportunity for the region.

As part of this EIA process Bapela Cave Klapwijk (BCK) have been contracted to undertake a Visual Impact Assessment.

The project footprint spreads over three District Municipalities (DMs) namely the Joe Gqabi DM in the north west, the OR Tambo DM in the south west and the Alfred Nzo DM in the east and north east.

The proposed Ntabelanga Dam site is located approximately 25 km east of the town of Maclear and north of the R396 Road. The proposed Lalini Dam site is situated approximately 17 km north east of the small town Tsolo. Both are situated on the Tsitsa River.

The impact assessment was undertaken for only the main components of the project This study addresses the visual impacts associated with the larger components of the project. These include the two dam sites, namely the Ntabelanga and Lalini Dams, the alternative transmission lines from the Lalini Dam hydropower station, the Tsolo Irrigation scheme and the main Tsolo and Maclear access roads.

Other ancillary components construction camps, minor power lines, borrow areas and quarries have not been addressed in this report. The water pipeline reticulation and and associated reservoirs was also not addressed as it was assumed that the rehabilitation specifications would mitigate the construction and operation visual impact

This study evaluated the visual impact of the Mzimvubu Water Project and alternatives with a view to assessing its severity based on the author's experience, expert opinion and accepted techniques.

METHOD

In order to address the objectives of the study the following method has been used:

- *Determine the setting, visual character and land use of the area surrounding the area, and the Genius Loci (sense of place). This was done in terms of:*

  - *Topography*
  - *Vegetation cover*
  - *Land use*
  - *Visibility*
  - *Landscape diversity*
  - *Landscape character*

- *Discussions and meetings with the specialist consultant team to identify specific aspects of the construction and development which would affect the visual quality of a setting;*

- *Define the extent of the affected visual environmental, the viewing distance and the critical views;*

- *An evaluation was made of the landscape characteristics against which impact criteria ratings were applied;*

- *The viewshed, the area within which the proposed project can be visible, was determined using digital 1:50 000 topographic maps with 20 m contour intervals analyzed by the Geographic Information System (GIS), algorithms available in the ArcView Software Suite.*

The assessment is based on the routes, ground-truthed during a field inspection in March 2014.

LIMITATIONS, CONSTRAINTS AND ASSUMPTIONS

The following assumptions and limitations are applicable to this study:

- *The basis for this assessment is that scenic wilderness areas form the core of eco-tourism due to the high positive aesthetic appeal;*

- *The assessment is based on assumed demographic data. No detailed study was done to determine accurate data on potential viewers of the project components. If necessary these studies could be undertaken during the design phase of the project;*

- *Determining a visual resource in absolute terms is not achievable. Evaluating a landscape's visual quality is both complex and problematic. Various approaches have been developed but they all have one problem in common: unlike noise or air pollution, which can be measured in a relatively simple way, for the visual landscape mainly qualitative standards apply. Therefore subjectivity cannot be excluded in the assessment procedure*

(Lange 1994). Individually there is a great variation in the evaluation of the visual landscape based on different experiences, social level and cultural background. Exacerbating the situation is the inherent variability in natural features. Climate, season, atmospheric conditions, region, sub-region all affect the attributes that comprise the landscape. What is considered scenic to one person may not be to another (NLA, 1997);

- *Localized visual perceptions of the economically depressed communities have not been tested as these may be influenced rather by the economic and job opportunities that would exist rather than the direct visual perception of the project;*

- *The viewshed map is computer generated and does not take into account local and minor visual interruptions in the landscape such as trees on the edge of roads, minor landforms, buildings, etc. As a result the visibility on these maps could be overstated.*

- *The assessment does not consider the ancillary project infrastructure and components such as borrow pits, spoil dumps, construction camp sites, reservoirs, etc. These components will be assessed in detail during the design phase should the project be implemented;*

- *Detailed site specific mitigation for each cut and fill slope is not provided. This will be addressed by the landscape architect during the detailed design phase of the project should it go ahead;*

- *The 'Do Nothing' alternative was not specifically addressed as it is likely that the existing landscape will remain in its existing condition;*

If the study, however, determined that the negative visual impact is of such a magnitude and significance that it will seriously influence the decision on whether or not to build, it will then be necessary to test and determine the visual perceptions of neighbouring communities. Such a study is involved, costly and time consuming.

FINDINGS

The impact assessment was undertaken for only the dam sites, transmission lines, roads and irrigation areas. This study evaluated the visual impact of the Mzimvubu Water Scheme with a view to assessing its severity based on the author's experience, expert opinion and accepted techniques.

Based on the field observations and the studies herein and with the implementation of the mitigation measures, the following conclusions are made from a visual point of view:

All the project components will exert a negative influence on the visual environment. This is largely due to:

- *high visibility of components within a relatively visually uniform landscape;*

- *impact on the visual quality and the sense of place;*
- *impact on selected critical views;*
- *the height and scale of the components could be dominant in the landscape;*
- *high visibility of construction and operation activity within large areas of uniform visual pattern;*
- *the low Visual Absorption Capacity of some of the settings which is attributable to:*
  - *undulating topography;*
  - *uniform and monotonous vegetation cover;*
  - *the lack of visual diversity.*

The significance of the visual impact during construction and operation is regarded as:

- *Ntabelanga Dam*

  *The significance of the visual impact is considered **medium-Low** (a rating of 2 on a scale of 1-5) during construction and operation.*

- *Lalini Dam*

  *The significance of the visual impact is considered **medium-Low** (a rating of 2 on a scale of 1-5) during construction and operation.*

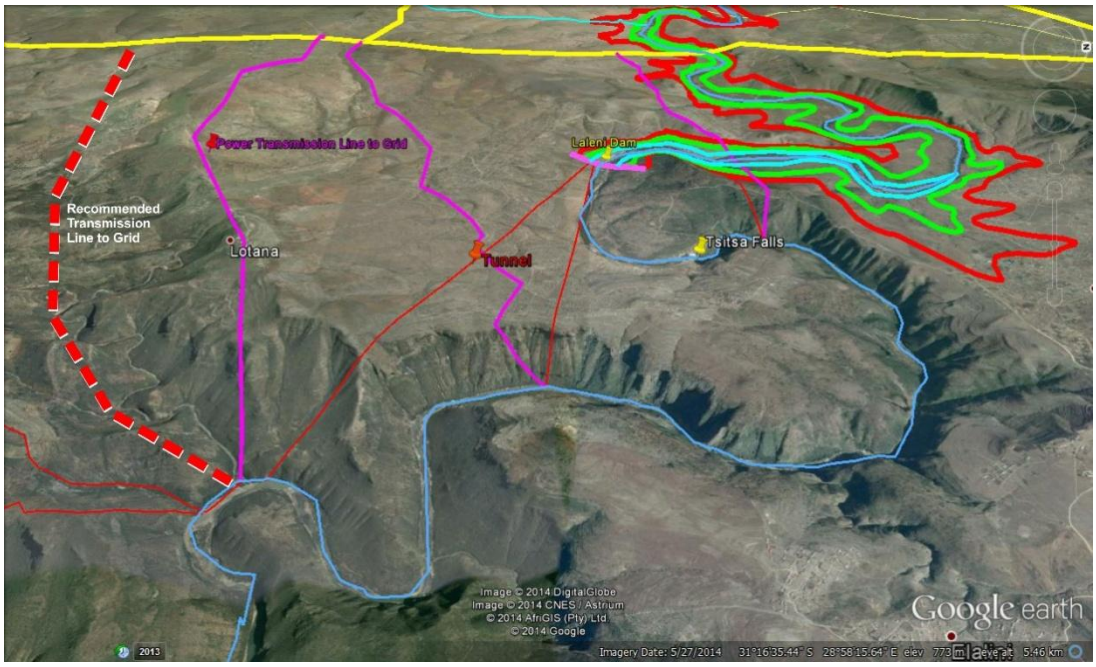
- *Transmission Lines*

  *The significance of the visual impact of Transmission Line 1 is regarded as **Low** (a rating of 1 on a scale of 1-5), for transmission Line 2 is **Medium** (a rating of 3) and for Transmission Line 3 it is regarded as **Very High** (a rating of 5 on a scale of 1-5).*

- *Roads*

  *The impact significance for the Road from Maclear, the Road from Tsolo and the Measures roads is regarded as **Medium-Low** (a rating of **2** on a scale of 1-5).*

  *In conclusion, based on the field observations and the studies herein, from a visual point of view, it is recommended that the alignment of Transmission Line 3 be realigned to avoid the ridge as set out in **Figure (i), Recommended Transmission Line Alignment.***



Red dotted line the recommended alignment

Figure (i): Recommended Transmission Line Alignment

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT –

VISUAL IMPACT ASSESSMENT

DEA REF No. 14/12/16/3/3/2/677 (Dam construction application)
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Acronyms and abbreviations

BID	Background Information Document
BCK	Bapela Cave Klapwijk
DM	District Municipality
DWS	Department of Water And Sanitation
EIA	Environmental Impact Assessment
NEMA	National Environmental Management Act
VIA	Visual Impact Assessment
VAC	Visual Absorption Capacity
GIS	Geographic Information System

List of Units

MW	Mega Watt
m	Metres
km^2	Square Kilometres
ha	Hectare
°C	Degrees Celsius
%	Percentage

1. INTRODUCTION

1.1 BACKGROUND

The Department of Water And Sanitation (DWS) commissioned the Mzimvubu Water Project, an integrated multi-purpose (domestic water supply, agriculture, power generation, transport, tourism, conservation and industry) project, with the intention of providing a socio-economic development opportunity for the region.

Environmental authorisation is required for the infrastructure components of the project. The purpose of the Environmental Impact Assessment (EIA) is to assess the components of the project that are listed activities by the National Environmental Management Act (NEMA) for which the Department of Water And Sanitation (DWS) has the mandate and intention to implement. The EIA process will provide the information that the environmental authorities require to decide whether the project should be authorised or not, and if so then under what conditions.

As part of this EIA process Bapela Cave Klapwijk (BCK) have been contracted to undertake a Visual Impact Assessment.

1.2 PURPOSE OF THIS REPORT

This visual assessment is a specialist study to determine the visual effects of the proposed Mzimvubu Water Project on the surrounding environment.

The primary objective of this specialist study is therefore to describe the potential impact of these structures on the visual character and sense of place of the area. This Specialist Study will have the following objectives:

- Determine the visual character of the areas along the proposed route by evaluating environmental components such as topography, current land use activities, surrounding land use activities, etc.;
- Identify elements of particular visual quality that could be affected by the proposed project;
- Describe and evaluate the specific visual impacts of the preferred individual components of the highway and associated infrastructure from critical viewpoints and view fields;
- Determine the extent of the visibility of the project from surrounding areas;
- Specific consideration should be given to the identification of requirements for further investigation;

- Recommend mitigation measures to reduce the potential visual impacts generated by the proposed project;

- The assessment should assess impacts according to the criteria and terminology as indicated by ILISO.

1.3 DETAILS AND EXPERTISE OF THE SPECIALIST

Menno Klapwijk, a principal member of Bapela Cave Klapwijk, has specialised for 31 years in environmental planning, construction rehabilitation and control, visual impact assessment, and landscape site design. Significant visual impact projects include: Sani Pass Upgrade, Zeerust Solar Park, Aggeneys Solar Park, N3 De Beers Pass Route, Moatize Power Plant (Mozambique), Transnet Multi-purpose Pipeline, Saldanha Steel, Mozal (Alusaf – Mozambique), Letsibogo Dam (Botswana), Blue Circle Cement Factory (East London), Phlogopite Factory (Phalaborwa), Iscor Heavy Minerals Smelter (Empangeni), many VIA's for Eskom transmission lines and substations, Mmamabula 400kV Transmission Line, Mine and Power Plant (Botswana), West Coast Combined Cycle Gas Turbine Power Plant (CCGT), De Hoop Dam and Pipeline (Sekhukuneland), Tugela Water Project (KwaZulu-Natal), Delportshoop Tower Mast (Delportshoop, Northern Cape), N3 Toll Road, Cedara (KwaZulu-Natal) to Heidelberg (Gauteng), Maputo Steel Project (Maputo, Mazambique), Ga-Pila Village (Potgietersrus, Limpopo Province) and Pom Pom Camp (Okavango, Botswana).

He has more than 100 publications and reports dealing mostly with environmental planning, environmental rehabilitations and control specification, environmental impact assessment and visual impact assessment.

1983:	B.Sc (Land Arch), Texas A & M
1986:	Environmental Impact Assessment, Graduate School of Business, UCT
Registered:	South African Council for Landscape Architecture Practitioners (SACLAP)
Member:	Institute of Landscape Architects of South Africa (ILASA)
Member:	American Society of Landscape Architects (ASLA)
Member:	International Association of Impact Assessors (SA)
Council:	Council for the Built Environment (CBE)
Member	

1.4 STRUCTURE OF THIS REPORT

This specialist study is undertaken in compliance with Regulation 32 of GN 543. **Table 1** below indicates how the requirements of Regulation 32 of GN 543 have been fulfilled in this report.

Table 1: Report content requirements in terms of Regulation 32 of GN 543

Regulatory Requirements in terms of Regulation 32 of GN 543	Section of Report
(a) The person who prepared the report; and the expertise of that person to carry out the specialist study or specialised process.	Chapter 1
(b) a declaration that the person is independent	Page iv
(c) an indication of the scope of, and the purpose for which, the report was prepared	Chapters 1 and 3
(d) a description of the methodology adopted in preparing the report or carrying out the specialised process	Chapter 3
(e) a description of any assumptions made and any uncertainties or gaps in knowledge	Chapter 4
(f) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Chapters 6 to 10
(g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority	Chapter 14
(h) a description of any consultation process that was undertaken during the course of carrying out the study	Chapter 11
(i) a summary and copies of any comments that were received during any consultation process	Chapter 11
(j) any other information requested by the competent authority.	Chapter 12

2. PROJECT BACKGROUND

2.1 LOCALITY

The project footprint spreads over three District Municipalities (DMs) namely the Joe Gqabi DM in the north west, the OR Tambo DM in the south west and the Alfred Nzo DM in the east and north east.

The proposed Ntabelanga Dam site is located approximately 25 km east of the town of Maclear and north of the R396 Road. The proposed Lalini Dam site is situated approximately 17 km north east of the small town Tsolo. Both are situated on the Tsitsa River.

2.2 MAIN PROJECT COMPONENTS

Water Resource Infrastructure includes:

- A dam at the Ntabelanga site with a storage capacity of 490 million m^3;
- A dam at the Lalini site with a storage capacity of approximately 150 million m^3;
- A pipeline and tunnel, and a power house at the Lalini Dam site for generating hydropower;
- Five new flow measuring weirs will be required in order to measure the flow that is entering and released from the dams. These flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams.
- Wastewater treatment works at the dam sites;
- Accommodation for operations staff at the dam sites; and
- Two information centres at the dam sites.

The Ntabelanga Dam will supply potable water to 539 000 people, rising to 730 000 people by year 2050. The domestic water supply infrastructure will include:

- A river intake structure and associated works;
- Water treatment works;
- Potable bulk water distribution infrastructure for domestic and industrial water requirements (primary and secondary distribution lines);
- Bulk treated water storage reservoirs strategically located; and
- Pumping stations.

The Ntabelanga Dam will also provide water to irrigate approximately 2 900 ha. This project includes bulk water conveyance infrastructure for raw water supply to edge of field.

About 2 450 ha of the high potential land suitable for irrigated agriculture are in the Tsolo area and the rest near the proposed Ntabelanga Dam and along the river, close to the villages of Machibini, Nxotwe, Culunca, Ntshongweni, Caba, Kwatsha and Luxeni.

There will be a small hydropower plant at the Ntabelanga Dam to generate between 0.75 MW and 5 MW (average 2.1 MW). This will comprise a raw water pipeline from the dam to

a building containing the hydropower turbines and associated equipment, and a discharge pipeline back to the river just below the dam wall. The impact is expected to be similar to that of a pumping station.

Another small hydropower plant will be constructed at the proposed Lalini Dam.

The larger hydropower plant at the Lalini Dam and tunnel (used conjunctively with the Ntabelanga Dam) will generate an average output of 30 MW if operated as a base load power station and up to 150 MW if operated as a peaking power station. The power plant will require a pipeline (approximately 4.6 km) and tunnel (approximately 3.2 km) linking the dam to the power plant downstream of the dam and below the gorge.

The power line to link the Lalini power station to the existing Eskom grid will be approximately 13 km. Power lines will be constructed to supply power for construction at the two dam sites and for operating five pumping and booster stations along the bulk distribution infrastructure.

The area to be inundated by the dams will submerge some roads. Approximately 80 km of local roads will therefore be re-aligned. Additional local roads will also be upgraded to support social and economic development in the area. The road design will be very similar to the existing roads as well as be constructed using similar materials.

The project is expected to cost R 12.45 billion and an annual income of R 5.9 billion is expected to be generated by or as a result of the project during construction and R 1.6 billion per annum during operation. It will create 3 880 new skilled employment opportunities and 2 930 un-skilled employment opportunities during construction.

2.3 ALTERNATIVES

The following project level alternatives will be assessed:

- Three hydro power tunnel positions and associated power lines;
- Peak versus Base load power generation;
- Three different dam sizes for the Lalini Dam; and
- The no project option.

For the construction camps, pipeline routes and new roads, the specialist will identify any sensitive areas and deviations to avoid these will be proposed in consultation with the technical team.

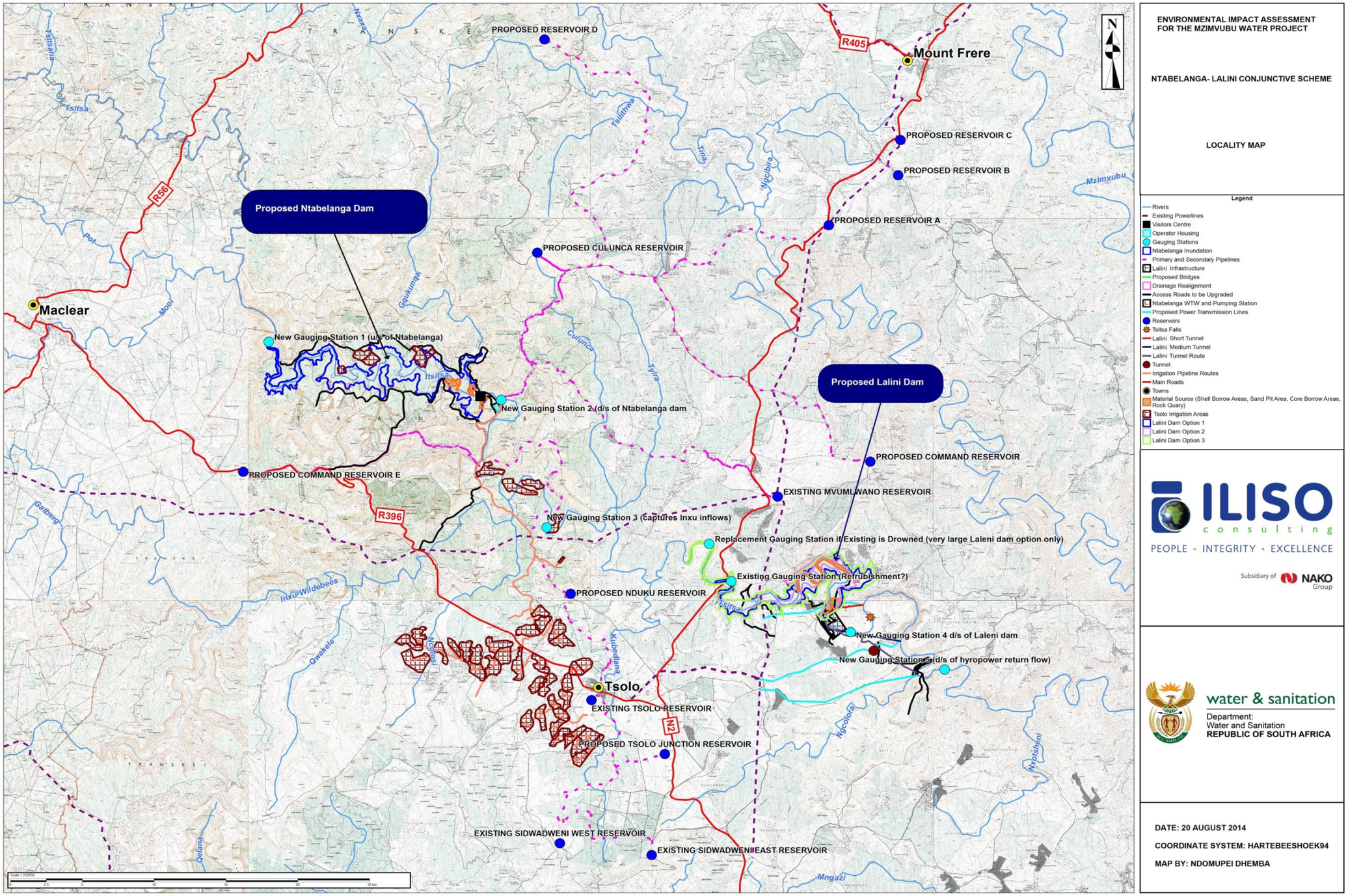

Figure 1: Locality map

3. TERMS OF REFERENCE

3.1 SCOPE OF THE STUDY

This study will address the visual impacts associated with the larger components of the project. These include the two dam sites, namely the Ntabelanga and Lalini Dams, the alternative transmission lines from the Lalini Dam hydropower station, the Tsolo Irrigation scheme and the main Tsolo and Maclear access roads.

Other ancillary components construction camps, minor power lines, borrow areas and quarries have not been addressed in this report. The water pipeline reticulation and and associated reservoirs was also not addressed as it was assumed that the rehabilitation specifications would mitigate the construction and operation visual impact

3.2 METHODOLOGY

Method

In order to address the objectives of the study the following method has been used:

- Determine the setting, visual character and land use of the area surrounding the area, and the Genius Loci (sense of place). This was done in terms of:

  - Topography
  - Vegetation cover
  - Land use
  - Visibility
  - Landscape diversity
  - Landscape character

- Discussions and meetings with the specialist consultant team to identify specific aspects of the construction and development which would affect the visual quality of a setting;

- Define the extent of the affected visual environmental, the viewing distance and the critical views;

- An evaluation was made of the landscape characteristics against which impact criteria ratings were applied;

- The viewshed, the area within which the proposed project can be visible, was determined using digital 1:50 000 topographic maps with 20 m contour intervals analysed by the Geographic Information System (GIS), algorithms available in the ArcView Software Suite.

The assessment is based on the area ground-truthed during a field inspection in March 2014.

3.3 IMPACT CRITERIA AND RATING SCALE

The social impacts are rated in accordance with the Environmental Impact Assessment Regulations, 2010 and the criteria drawn from the IEM Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the (DEAT, 2006) as well as the Guideline Document on Impact Significance (DEAT, 2002) as listed below.

The key issues identified during the Scoping Phase inform the terms of reference of this specialist study. Each issue consists of components that on their own or in combination with each other give rise to potential impacts, either positive or negative, from the project onto the environment or from the environment onto the project. The significance of the potential impacts is considered before and after identified mitigation is implemented, for direct, indirect, and cumulative impacts, in the short and long term.

A description of the nature of the impact, any specific legal requirements and the stage (construction/decommissioning or operation) is given. Impacts are considered to be the same during construction and decommissioning.

The following criteria has been used to evaluate significance:

- **Nature:** This is an appraisal of the type of effect the activity is likely to have on the affected environment. The description includes what is being affected and how. The nature of the impact will be classified as positive or negative, and direct or indirect.

- **Extent and location:** This indicates the spatial area that may be affected (**Table 2**).

Table 2: Geographical extent of impact

Rating	Extent	Description
1	Site	Impacted area is only at the site – the actual extent of the activity.
2	Local	Impacted area is limited to the site and its immediate surrounding area
3	Regional	Impacted area extends to the surrounding area, the immediate and the neighbouring properties.
4	Provincial	Impact considered of provincial importance
5	National	Impact considered of national importance – will affect entire country.

- **Duration:** This measures the lifetime of the impact (**Table 3**).

Table 3: Duration of Impact

Rating	Duration	Description
1	Short term	0 – 3 years, or length of construction period
2	Medium term	3 – 10 years
3	Long term	> 10 years, or entire operational life of project.
4	Permanent – mitigated	Mitigation measures of natural process will reduce impact – impact will remain after operational life of project.
5	Permanent – no mitigation	No mitigation measures of natural process will reduce impact after implementation – impact will remain after operational life of project.

- **Intensity/severity:** This is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts (**Table 4**).

Table 4: Intensity of Impact

Rating	Intensity	Description
1	Negligible	Change is slight, often not noticeable, natural functioning of environment not affected.
2	Low	Natural functioning of environment is minimally affected. Natural, cultural and social functions and processes can be reversed to their original state.
3	Medium	Environment remarkably altered, still functions, if in modified way. Negative impacts cannot be fully reversed.
4	High	Cultural and social functions and processes disturbed – potentially ceasing to function temporarily.
5	Very high	Natural, cultural and social functions and processes permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed.

- **Potential for irreplaceable loss of resources:** This is the degree to which the project will cause loss of resources that are irreplaceable (**Table 5**).

Table 5: Potential for irreplaceable loss of resources

Rating	Potential for irreplaceable loss of resources	Description
1	Low	No irreplaceable resources will be impacted.
3	Medium	Resources can be replaced, with effort.
5	High	There is no potential for replacing a particular vulnerable resource that will be impacted.

- **Probability:** This is the likelihood or the chances that the impact will occur (**Table 6**).

Table 6: Probability of Impact

Rating	Probability	Description
1	Improbable	Under normal conditions, no impacts expected.
2	Low	The probability of the impact to occur is low due to its design or historic experience.
3	Medium	There is a distinct probability of the impact occurring.
4	High	It is most likely that the impact will occur
5	Definite	The impact will occur regardless of any prevention measures.

- **Confidence:** This is the level of knowledge or information available, the environmental impact practitioner or a specialist had in his/her judgement (**Table 7**).

Table 7: Confidence in level of knowledge or information

Rating	Confidence	Description
	Low	Judgement based on intuition, not knowledge / information.
	Medium	Common sense and general knowledge informs decision.
	High	Scientific / proven information informs decision.

- **Consequence:** This is calculated as extent + duration + intensity + potential impact on irreplaceable resources.

- **Significance:** The significance will be rated by combining the consequence of the impact and the probability of occurrence (i.e. consequence x probability = significance). The maximum value which can be obtained is 100 significance points (**Table 8**).

Table 8: Significance of issues (based on parameters)

Rating	Significance	Description
1-14	Very low	No action required.
15-29	Low	Impacts are within the acceptable range.
30-44	Medium-low	Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible.
45-59	Medium-high	Impacts are important and require attention; mitigation is required to reduce the negative impacts to acceptable levels.
60-80	High	Impacts are of great importance, mitigation is crucial.
81-100	Very high	Impacts are unacceptable.

- **Cumulative Impacts:** This refers to the combined, incremental effects of the impact. The possible cumulative impacts will also be considered.

- **Mitigation:** Mitigation for significant issues will be incorporated into the EMP.

The visual impact will, however, vary when evaluated against the criteria of intensity of visual impact and the significance of the impact.

An example is the situation where a project component such as a toll plaza or bridge is located within a fairly narrow undisturbed valley between two rising landforms. The visual impact's intensity is low since it cannot be seen from surrounding areas. The component has the hillsides as a backdrop and therefore blends into the valley texture. The significance, however, is high within the context of the scenic value of the pristine valley because the sense of place and the character of the valley are severely compromised.

The converse is also true in that a high visual intensity impact can have a low significance. The visual impact assessment will therefore be based on the criteria of intensity and significance relative to land use and the nearness to important viewpoints.

3.4 LEGISLATION AND GUIDELINES CONSIDERED

There are no specific legal requirements nor is there any direct reference to the visual environment in the legislation. General legislation pertaining to the environment is contained in the National Environmental Management Act (NEMA) (Act No. 107 of 1998) as well as the National Heritage Resources Act No. 25, 1999 and the associated provincial regulations provide legislative protection for listed or proclaimed site, such as urban conservation areas, nature reserves and proclaimed scenic routes.

The National Environmental Management Principles as contained in NEMA require that sustainable developments require the following considerations (amongst others):

2(4)(ii) that pollution and degradation of the environment are avoided, or, that where they cannot be altogether avoided, are minimised and remedied; and

2(4)(iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied.

The National Heritage Resources Act refers, under Part 1 General Principles, to the National Estate:

3.(2)(d) Landscapes and natural features of cultural significance

Visual pollution is controlled to a limited extent, by the Advertising on Roads and Ribbons Act (Act No. 21 of 1940) which deals mainly with signage on public roads.

The Protected Areas Act (NEMA) (Act 57 of 2003, Section 17) is also intended to protect natural landscapes

The Western Cape DEA&DP have produced 'A Guideline for Involving Visual and Aesthetic Specialists in EIA Processes'

4. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are applicable to this study:

- The basis for this assessment is that scenic wilderness areas form the core of eco-tourism due to the high positive aesthetic appeal;

- The assessment is based on assumed demographic data. No detailed study was done to determine accurate data on potential viewers of the project components. If necessary these studies could be undertaken during the design phase of the project;

- Determining a visual resource in absolute terms is not achievable. Evaluating a landscape's visual quality is both complex and problematic. Various approaches have been developed but they all have one problem in common: unlike noise or air pollution, which can be measured in a relatively simple way, for the visual landscape mainly qualitative standards apply. Therefore subjectivity cannot be excluded in the assessment procedure (Lange 1994). Individually there is a great variation in the evaluation of the visual landscape based on different experiences, social level and cultural background. Exacerbating the situation is the inherent variability in natural features. Climate, season, atmospheric conditions, region, sub-region all affect the attributes that comprise the landscape. What is considered scenic to one person may not be to another (NLA, 1997);

- Localized visual perceptions of the economically depressed communities have not been tested as these may be influenced rather by the economic and job opportunities that would exist rather than the direct visual perception of the project;

- The viewshed map is computer generated and does not take into account local and minor visual interruptions in the landscape such as trees on the edge of roads, minor landforms, buildings, etc. As a result the visibility on these maps could be overstated.

- The assessment does not consider the ancillary project infrastructure and components such as borrow pits, spoil dumps, construction camp sites, reservoirs, etc. ;

- Detailed site specific mitigation for each cut and fill slope is not provided. This will be addressed by the landscape architect during the detailed design phase of the project should it go ahead;

- The 'Do Nothing' alternative was not specifically addressed as it is likely that the existing landscape will remain in its existing condition;

If the study, however, determined that the negative visual impact is of such a magnitude and significance that it will seriously influence the decision on whether or not to build, it will then be necessary to test and determine the visual perceptions of neighbouring communities. Such a study is involved, costly and time consuming.