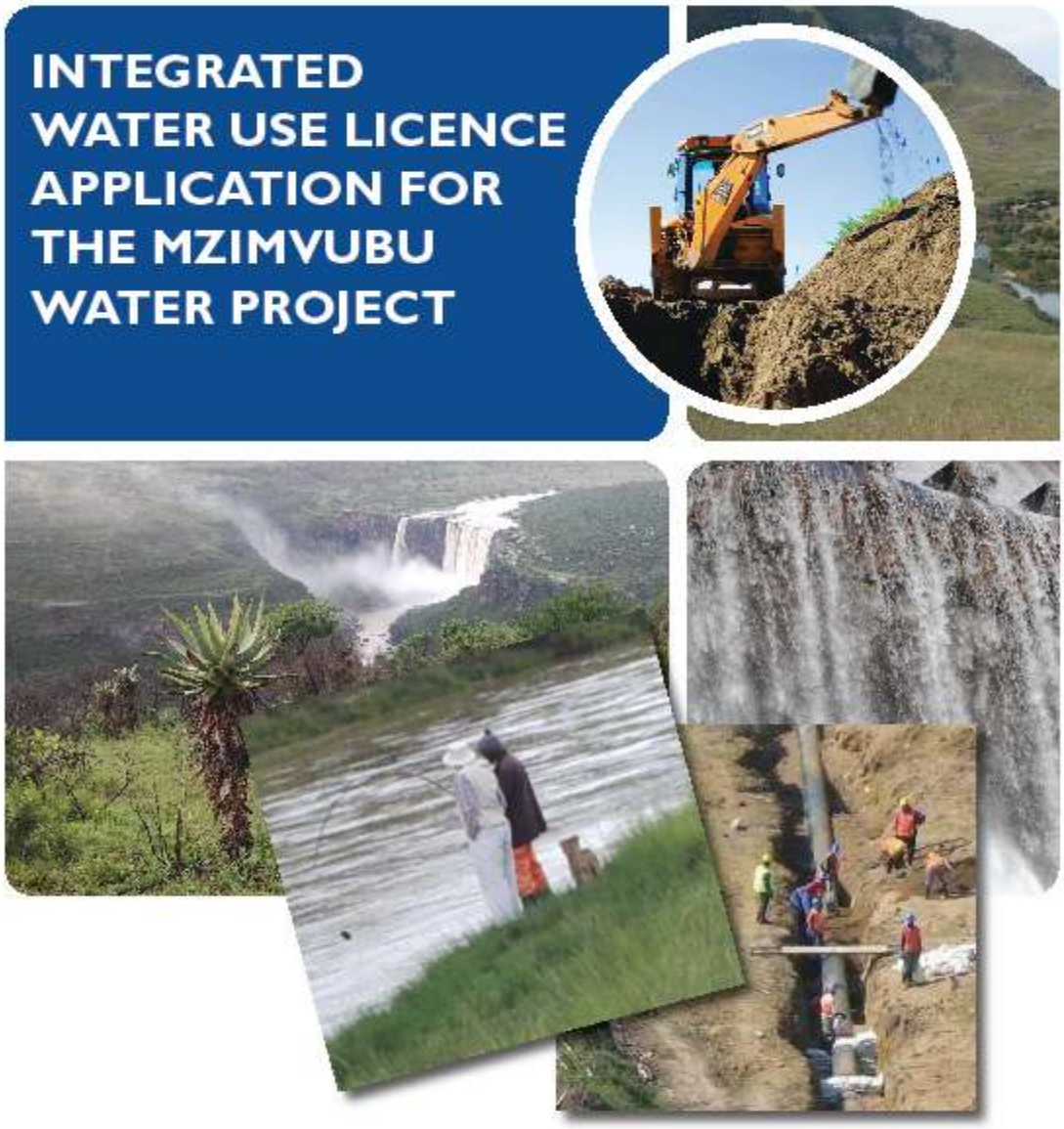
water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

DWA Report No: P WMA 12/T30/00/5314/4

INTEGRATED WATER USE LICENCE APPLICATION FOR THE MZIMVUBU WATER PROJECT



TECHNICAL REPORT

DRAFT

November2014

INTEGRATED WATER USE LICENSE APPLICATION FOR THE MZIMVUBU WATER PROJECT

Report Title:	***Integrated Water Use License Application: Technical Report***
Authors:	*N Duncan, M van Veelen and T Calmeyer*
Project name:	***Environmental Impact Assessment for the Mzimvubu Water Project***
DWS Report Number:	*P WMA 12/T30/00/5314/4*
ILISO project reference number:	*1300113*
Status of report:	*Draft v.1.0*
First issue:	*November 2014*
Second issue:	
Final issue:	*Pending*

CONSULTANTS: ILISO CONSULTING (PTY) LTD

Approved for ILISO Consulting (Pty) Ltd by:

Dr M van Veelen
Director

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

INTEGRATED WATER USE LICENSE APPLICATION 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
Lalini Dam borrow pits and quarry Environmental Management Plan	P WMA 12/T30/00/5314/6
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Heritage Impact Assessment	P WMA 12/T30/00/5314/12
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Rapid Reserve Determination: Tsitsa River at Lalini	P WMA 12/T30/00/5314/17

INTEGRATED WATER USE LICENSE APPLICATION FOR THE MZIMVUBU WATER PROJECT

This report is to be referred to in bibliographies as:

Department of Water and Sanitation, South Africa (2014). ***Integrated Water Use License Application for the Mzimvubu Water Project: Technical Report***

DWS Report No: P WMA 12/T30/00/5314/4

Prepared for: Directorate – Options Analysis

Prepared by: ILISO Consulting (Pty) Ltd, P O Box 68735, Highveld, 0169
Tel: (012) 685 0900, Fax: (012) 655 1886
Contact: Ms T Calmeyer
Email: terry@iliso.com

INTEGRATED WATER USE LICENSE APPLICATION FOR THE MZIMVUBU WATER PROJECT

TECHNICAL REPORT

Executive summary

1. Introduction

The Mzimvubu Water Project (MWP) is an integrated multi-purpose (domestic water supply, agriculture, power generation, transport, tourism, conservation and industry) project and provides a socio-economic development opportunity for the region. An EIA is being undertaken in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998). A Water Use Licence Application (WULA) is required for the water uses associated with the MWP. The purpose of the Technical Report is to provide technical information in support of the WULA.

This application will include information for any water uses that are triggered in terms of the National Water Act (Act 36 of 1998) (NWA). The following uses, as defined in Section 21 of NWA are being applied for:

- *s21 (a): taking water from a water resource;*
- *s21 (b): storing of water;*
- *s21 (c): impeding or diverting the flow of water in a water course;*
- *s21 (e): engaging in a controlled activity identified as such in section 37(1)(c);*
- *s21 (f): discharging of waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;*
- *s21 (g): disposing of waste in a manner which may detrimentally impact on a water resource; and*
- *s21 (i): altering the bed, banks, course or characteristics of a water course.*

2. Administrative information

The applicant is the Department of Water and Sanitation (DWS): Directorate – Options Analysis.

The proposed MWP crosses the Mzimvubu-Keiskamma Water Management Area. An investigation to determine the current ownership of properties and who would be affected by the proposed project is currently underway.

Due to the linear extent of the domestic and irrigation pipeline layout of the MWP, the direct alignment across open country will impact on a significant number of wetlands and will

require the crossing of a large river and several other watercourses as well as erosion gulleys.

3. Project description

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, a tributary of the Mzimvubu River.

The proposed 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 232.5 million m^3;*
- *A tunnel/conduit and 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*
- *An information centre at each of the dam sites.*

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

- *An intake structure and associated works;*
- *A regional water treatment works at Ntabelanga Dam;*
- *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 of arable land. 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 is 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.

The hydropower plant at the proposed Lalini Dam and tunnel (used conjunctively with the Ntabelanga Dam) will have an installed capacity of 37.5 MW if operated as a base load power station and 150 MW if operated as a peaking power station. Base load generation means generating 24 hours a day while peaking (150MW) means the plant runs for 4 to 8 hours a day during peak energy demand periods. 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 linking the Lalini power station to the existing Eskom grid will be approximately 13 km.

The area to be inundated by the dams will submerge some roads. Approximately 80 km of local roads will therefore be re-aligned and two bridges over the Tsitsa River will have to be replaced. Additional local roads will also be upgraded to provide access to the dam sites and 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.

4. Alternatives

The following alternatives to the project were considered during the Scoping Phase:

- *Constructing smaller dams;*
- *Developing groundwater resources;*
- *Provision of water by rain-fed tanks;*
- *Dam site alternatives;*
- *Alternative dam types; and*
- *A number of smaller water sources rather than a dam.*

The following alternatives were assessed during the impact assessment phase:

- ***Hydropower generation options***

The Lalini Dam, downstream of the Ntabelanga Dam but upstream of the Tsitsa Falls, is proposed for generating hydropower. The two dams will be operated together in a conjunctive scheme to improve the economic sustainability of the overall scheme. Water from the Lalini Dam will be conveyed to a Hydro Electric Power generating plant downstream of the Tsitsa Falls, after which the water used for generation is released back into the river.

Power generation can be implemented on a base load only, full-time peaking or part time peaking basis. Up to 37.5 MW can be generated if operated as a base load power station and up to 150 MW if operated as a peaking power station. The difference that these options will make will be in the size and timing of the flows that are released back into the Tsitsa River, and the amount of income generated. Base load generation will result in the release of consistent quantities of water, while peak generation will result in significantly larger flows of water being released for fewer hours in a day.

- ***Alternative tunnel and associated power line routes***

Three alternative power line routes, linking the hydropower plant downstream of the Lalini Dam to the grid, are being considered. The three power line routes correspond to three possible tunnel (or pipeline-tunnel combination) lengths from Lalini Dam to the hydropower plant. The amount of power generated depends on the available head, which increases with distance downstream of the Tsitsa Falls and corresponding increased length of the tunnel.

Alternative 1 consists of a 2.1 km tunnel and 7.1 km power line. Alternative 2 consists of a 4.9 km tunnel and 10.2 km power line. Alternative 3 consists of an approximately 4.6 km pipeline and 3.2 km tunnel and an approximately 13 km power line.

- ***Alternative dam sizes***

Three dam sizes are proposed for the Lalini Dam, as shown in ***Table 1*** *(and* ***Figure 2****) and have been considered in the EIA.*

Table 1: Proposed alternatives for the Lalini Dam

Dam size alternatives	***Full Supply Level (meters above sea level)***	***Appropriation line (meters above sea level)***
Lalini Dam size 1 (technically preferred)	*763.61*	*768.61*
Lalini Dam size 2	*752.42*	*757.42*
Lalini Dam size 3	*778.07*	*782.57*

Regarding the road alignments, pipeline routes and reservoir positions, no alternative routes/positions were identified during the feasibility study. The approach to the impact assessment was to identify any sensitive areas that should be avoided, for consideration by the technical team, and where appropriate, to recommend deviations.

The no project option was also assessed.

5. Description of the Water Use – Ntabelanga Dam and Associated Infrastructure

The following water uses are being applied for:

<u>Section 21 (a): "Taking water from a water resource" for the following project components:</u>

- *Domestic Water Supply Infrastructure*
- *Irrigation Infrastructure*
- *Hydropower Infrastructure*

Section 21 (b): "Storing of water" for the following project components:

- *Ntabelanga Dam*

Section 21 (c): "Impeding or diverting the flow of water in a water course" for the following project components:

- *Ntabelanga Dam*
- *Domestic Water Supply Infrastructure*

Section 21 (e): "Engaging in a controlled activity identified as such in section 37(1)" for the following project components:

- *Ntabelanga Dam Hydropower Plant*

Section 21 (i): "Altering the bed, banks, course or characteristics of a water course" for the following project components:

- *Ntabelanga Dam*
- *Flow gauging weirs*
- *Domestic water supply infrastructure*
- *Irrigation infrastructure*
- *Hydropower infrastructure*
- *Roads*

Section 21 (f): "Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit" for the following project components:

- *Ntabelanga Waste Water Treatment Works (WWTW)*

Section 21 (g): "Disposing of waste in a manner which may detrimentally impact on a water resource" for the following project components:

- *Ntabelanga Water Treatment Works (WTW)*

Other

- *Application of General Notice (GN) 399 as published in the Government Gazette 26187 of 2004 for the following project components:*
    - *S21(a)"Taking of water" – abstraction of water fro construction activities*
    - *S21(b) "Storing of water" - Bulk water storage reservoirs (9)*

- *Exemption from Regulation GN 704 of the NWA, GN 704 for the following project components:*
    -
    - *Borrow Areas*

6. Description of the affected environment

The study area falls within the South Eastern Uplands Aquatic Ecoregion and the Mzimvubu to Kieskamma Water Management Area (WMA). The Mzimvubu River is one of South Africa's largest rivers (accounting for 5.5% of total river flow in the country). It has four major tributaries, namely the Mzintlava, Kinira, Tina and Tsitsa Rivers. Rivers in this catchment possess water surpluses.

The proposed Ntabelanga and Lalini Dam sites are both situated on the Tsitsa River, a perennial river classified as a Category C (moderately modified).

The pipelines in the northern part of the project area cross the Tina River which is also classified as being in Category C condition (moderately modified). The Tina River is regarded as an important fish sanctuary, translocation and relocation zone and is classified as being a fish support area according to the National Freshwater Ecosystem Priority Areas Database (2011).

Four habitat units have been identified within the study area, namely the Mountain / Rocky Outcrops habitat unit, Grassland / Acacia Thornveld habitat unit, Riparian / Wetland habitat unit and the Transformed (Grassland) habitat unit.

According to the National List of Threatened Terrestrial Ecosystems (2011), sections of the proposed infrastructure fall into a vulnerable ecosystem. Vulnerable ecosystems, have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention. Large areas within the project area have been identified as Critical Biodiversity Areas. These areas are of conservation importance due to the presence of Red Data species, endemic species and potential habitat for these species.

There are extensive areas of severe gulley erosion in the project area. Soil erosion in the catchment is an outcome of high rainfall intensities, steep slopes, erodible soils and land use practices that are conducive to erosion, such as overgrazing and cultivation on unsuitable thin soils with sloping terrain. Erosion and land degradation affect ecosystem health and negatively impact on the majority of downstream rivers, which are characterised by high turbidity and increased siltation. The high sediment loads in rivers will increase water treatment costs and decrease the lifespan of any dams or hydropower schemes.

The mammal species observed in the study area are considered to be mostly common species, found throughout South Africa, that are adaptable to changing and transformed habitats, as well as being known to occur around human settlements. The mountain bushveld habitat located at the Lalini Dam wall provides habitat for scorpion species, including Rock Scorpions, which are protected. A large diversity of avifaunal species was

observed in the study area. Avifaunal species of concern include cranes and Cape Vultures.

The following heritage resource types are present in the study area: archaeological sites; buildings and structures; and graves and traditional burial places.

The project impacts the three district municipalities of Joe Gqabi, O. R. Tambo and Alfred Nzo, and four local municipalities: Elundini, Mhlontlo, Umzimvubu and Nyandeni.

The population profile of the people living in the study area is described as:

- *A majority of Black Xhosa speaking people;*
- *More women than men;*
- *A high proportion of children under 15 years and people over 65 years;*
- *Population densities up to 110 people/km^2;*
- *HIV prevalence amongst antenatal women of up to 29.3%;*
- *Unemployment rate up to 35%; and*
- *Very low or negative population growth, with the O. R. Tambo District having the highest population growth at 0.52%.*

The situation regarding schooling in the area improved somewhat between 2001 and 2011. But there is still a need to improve the situation further with the O. R. Tambo District still having over 17% of the population over 20 years of age having no schooling. At a provincial level 10.5% of the population aged over 20 years have no schooling, 19.8% have a matric and 8.7% have a higher education. This places all the district and local municipalities below the provincial level of education with only Umzimvubu, at 8%, having a lower percentage of the population with no education.

In respect of household services, apart from electricity as a source of lighting, where it is surpassed by both the Mhlontlo local and O. R. Tambo District Municipalities, on a general basis the Joe Gqabi District Municipality has the highest level of service delivery.

The proportion of households owning household goods across the area is lower than that of the province. On a general basis, households in the Joe Gqabi municipality own a greater proportion of household goods than those across the other municipalities.

Although there have been some improvements across the region the area remains one of the poorest parts of the country, characterised by high poverty and out-migration resulting in sex ratio imbalances, a high proportion of female headed households and a low population growth rate. At large the population lacks basic amenities and relies heavily on subsistence farming which is not highly successful.

The study area is rural, characterised by low densities and generally low levels of economic activity. The main land uses are pastoral stock and subsistence crop farming.

The proposed project is located on state-owned land which is administered by traditional authorities. The land is therefore currently subject to communal land tenure arrangements. Under this system the State owns the land, but it is managed and allocated to community members by the Traditional Leaders.

About 37.7% of households in the Eastern Cape engaged in agricultural activities over the period June 2011- June 2012. Of these households 24.8% were involved with poultry production, 20.5% with livestock production, 19 % with grains and food crops, 19.9% with fruit and vegetables and only 0.2% with industrial crops (Statistics South Africa, 2012). Of the households in the province involved with different crop planting activities, 23.8% were in backyard gardens, 0.2% in communal gardens and 0.1% in school gardens. The percentage of households classified as food access adequate was 72% while 19.4% were food access inadequate and 8.8% food access severely inadequate. Although in this respect there are no statistics specific to the study area, it is unlikely that the situation in the study area will be significantly different.

An aerial inspection of the immediate area shows that much less crop production is currently practised than in the past and it is estimated that about 20% of the previously contoured lands are currently still cultivated. Farmer support structures would be needed to revive crop production in the region.

Commercial irrigation farming is not the traditional farming method in the area and extensive public consultation will be required to obtain buy-in from traditional leaders and communities and facilitate the transformation of this sector.

7. Motivation for the project

Environmental aspects were identified that could be affected by the construction of the MWP during the EIA. The EIR provides an in depth assessment of all environmental studies done in order to identify potential impacts of the MWP. The studies related to water use included:

- *Wetlands;*
- *Aquatic; and*
- *Water Quality.*

For full details on all significant potential impacts please refer to the ***Environmental Impact Assessment Report: P WMA 12/T30/00/5314/3.***

8. Section 27 National Water Act Motivation

The MWP is a Strategic Integrated Project (SIP 3) which includes the development of a new dam at Mzimvubu with irrigation system.

The MWP will contribute on a macro-economic level to the National as well as the Eastern Cape Province economy. The long term economic benefits associated with the MWP include an increase in quality of life and would impact positively on labour and economic productivity.

The authorisation of the water uses will impact positively on the provincial economy. Although only for a short period, the construction of the Ntabelanga Dam will contribute considerably to the economy of the region and the province. There is also a positive impact on the Gross Domestic Product. Once the irrigation scheme is in full production it will also make a very positive contribution in terms of job creation and income to specifically low-income households. The total fulltime employment opportunities are estimated at 1 976 of which 1 301 are direct on the farms.

There is an obligation on the State to advance the interests of the poor and, in accordance with the Bill of Rights, take adequate measures in ensuring that all citizens have access to basic housing, health care, food, water, social security, education and a healthy environment (South African Human Rights Commission, 2004). Failure to authorise the water uses would contradict these obligations as the Department of Water and Sanitation and the Eastern Cape Province would lose an opportunity to supplement the water resources in the area and consequently to deliver both domestic water and water for irrigation. Together with this lost opportunity would be the loss of a number of job opportunities, not only associated with the construction of the dams and infrastructure, but also associated with the productive potential of the irrigation scheme.

It is recommended that this licence be issued for the maximum allowed period in terms of the National Water Act, 1998, namely 40 years as this is a project of socio-economic significance.

9. Impact prediction and risk assessment

10. *While the project was assessed holistically, it is acknowledged that the impacts associated with the various infrastructure components have different degrees of significance. Impacts are summarised below for the dams and associated infrastructure, electricity generation and distribution infrastructure, and road infrastructure.*

Dams and associated infrastructure

The construction of the dams, and to a lesser extent the associated infrastructure (including construction offices, potable and raw water distribution infrastructure, borrow pits and quarries etc.) will have significant negative impacts on the terrestrial and aquatic ecology, as well as on the wetlands. To a large extent these impacts will be permanent.

The riparian and wetland areas, as well as the mountain/rocky outcrop areas and Euphorbia Forest near the Lalini Dam wall that provide habitat for sensitive indigenous vegetation as well as fauna, including possible red data list and protected species, will be

lost and the habitat within the river will be permanently altered. This impact is considered to be of high significance.

In addition, wetlands in the project area provide important ecological services in the way of sediment trapping, nutrient cycling and toxicant assimilation, flood attenuation and biodiversity maintenance. Considering the extensive, and often severe, erosion within the study area and greater catchment, sediment trapping is especially important. In view of this, the permanent loss of wetland habitat due to inundation is regarded as being of high significance. The anticipated cumulative loss of riparian and wetland habitat arising from the construction of the dams is estimated to be 1034.30 hectares. Overall however, the loss of riparian and wetland habitat is deemed to constitute a relatively insignificant fraction of the wetland resources within the Mzimvubu sub Water Management Area.

At Lalini Dam, large scale loss of habitat for animals will result in a loss of animal species numbers and diversity, as species leave the area, adapt to the new environment in lower numbers, or are lost in totality within the study area. In particular, the loss of wetlands, lower grassland areas, mountain bushveld and rocky outcrops will directly impact on the population of red data list and protected species.

At Ntabelanga Dam, the main concern relates to the loss of key breeding crane populations. Wetlands and grasslands within the Ntabelanga Dam basin are used by cranes (Crowned Cranes, Blue Cranes and Wattled Cranes) for breeding and foraging. Cranes are red data list species, threatened with extinction throughout South Africa; Crowned Cranes in particular are listed as endangered by IUCN with rapidly declining populations. Loss of wetlands and grasslands has been identified as one of the main contributing factors. This impact is considered to be of high significance.

Most of the above-mentioned impacts are permanent and thus extend into the operation phase.

For this assessment, the specialists and EAP have assumed that the EWR, as defined in the Reserve determinations will be adhered to during the construction and operational phases. Adhering to the EWR will ensure that sufficient water goes over the Tsitsa Falls to prevent the endemic cremnophytes identified at the Falls from being negatively affected, and that the river downstream of the hydropower plant outlet works can also be maintained in an acceptable ecological state.

Impacts on the surface water quality of the dam is relevant but insignificant as water will be fit for all users and is such that no water quality problems are expected to occur. The dam will be able to provide water of an acceptable quality to all users.

The release of cold and anaerobic bottom water during periods when the dam becomes stratified could impact on the water quality. This can effectively be mitigated by the installation and correct operation of multiple level outlets.

There is some risk of contamination from construction material and waste discharge during construction. This can be mitigated by the implementation of proper construction methods and effective waste management.

The sediment balance of the Mzimvubu River and associated estuary will be slightly altered during the life cycle of the project. Sedimentation is unlikely to lead to negative impacts on the Mzimvubu River and the associated estuary and some improvements in the overall sediment balance of the system is considered possible.

The impact on water quality by fertilizers contained in the runoff from irrigated areas was determined by calculating the potential salinity level in the dam. There will be a slight increase in the conductivity and phosphorous levels in the dam. Although this is relevant, it is not significant and the water quality still falls within the ideal range.

In terms of water quality there is therefore no significant effect on the environment from the construction of the proposed new dams.

Electricity generation and distribution

During construction, the main impact of the electricity generation and distribution infrastructure relates to the construction of the tunnel/conduit and hydropower plant.

During operation, the primary concern relates to the alteration of the natural flow rate and water levels in the Tsitsa River due to releases of water through the tunnel/conduit for hydropower generation. This constitutes a risk for the riparian habitat and the ability of the riparian zone to support biodiversity, with secondary impacts on flow sensitive species, species of conservation concern and aquatic biodiversity in general. The EWR should be adhered to at all times in order to manage this risk. After mitigation, the impact is rated as very low to medium low.

Roads

In general, road upgrades, and to a lesser extent new access roads and road realignments will have a low to very low impact on terrestrial and aquatic ecology and wetlands, provided effective mitigation is implemented.

11. Mitigation measures

Based on the findings of the EIA, an EMPR has been compiled. The draft EMPR outlines how negative environmental impacts will be managed and minimized, and how positive impacts will be maximised, before, during and after construction.

Mitigation measures were identified for the following:

- *River and stream crossings*
  - *Bridges*
  - *Temporary river crossings*
  - *Culverts*

- *Construction camp sites*
- *Rehabilitation*
- *Drainage from bridge crossings*

- *River intake structures*
- *River outlet structures*
- *Wetland crossings*

12. Monitoring and compliance

Monitoring and compliance measures were identified for the following:

- *The abstraction of water;*
- *Water quality;*
- *Aquatic environment.*

13. Public Participation in the EIA Phase

The public participation process during the Scoping Phase included the following activities:

- *Authority consultation with DEA and the DWS Regional Office;*
- *Authorities Forum meetings for all commenting authorities;*
- *Distribution of notification letters, Background Information Documents and Newsletters (in English and isiXhosa);*
- *Placement of site notices and newspaper advertisements (in English and isiXhosa);*
- *Comment periods for draft and final Scoping report;*
- *Public Meetings; and*
- *Focus Group Meetings.*

The stakeholder database and Issues and Responses Report is updated on an ongoing basis.

I&APs and the public will be informed of the availability of the draft EIA report (through written notification to registered stakeholders), as well as of the authorities' decision and the appeal process in respect of the various applications (through newspaper advertisement and written notification to all registered stakeholders).

The draft EIA report will be distributed to public places and made available for a 30 calendar day public comment period. The draft reports will also be presented at stakeholder meetings, where I&APs will be able to confirm that their issues have been captured correctly, properly understood by the environmental team, and included in the specialist studies and impact assessment. The final documents will be made available for public comment for a 21 calendar day public comment period and be submitted to the authorities. Draft and final reports will be made available for download on the DWS website.

The relevant authorities will be kept up to date with progress on the EIA through the Authorities Forum.

All issues and comments received during the stakeholder consultation process will be captured in the Issues and Responses Report that will form an Appendix to the EIA Report.

14. Conclusion and recommendations

The MWP is a Strategic Integrated Project (SIP 3) identified by the South African Government which includes the development of a new dam at Mzimvubu with irrigation system. The MWP consists of the development of the Ntabelanga and Lalini Dams and its associated infrastructure which is a conjunctive scheme that consists of water resource infrastructure, treated domestic water supply infrastructure, raw water supply infrastructure, power and affected infrastructure.

Although two separate WULA's will be applied for, development at the two dams should not be viewed in isolation.

The MWP will redress the results of past racial and gender discrimination by contributing, on a macro-economic level, not only to the National but the Eastern Cape Province economy. The long term economic benefits associated with the MWP include an increase in quality of life and would impact positively on labour and economic productivity.

Failure to authorise the water uses would contradict the obligation on the State to advance the interests of the poor .Together with this lost opportunity would be the loss of a number of job opportunities, not only associated with the construction of the dams and infrastructure, but also associated with the productive potential of the irrigation scheme. With the area being one of the least developed and poorest in the country these losses will have severe social consequences.

The benefits of the project in terms of economic and social development are expected to be high, provided the necessary conditions for the success of the project are met and the recommended mitigation and enhancement measures are adhered to.

However, some significant negative impacts, mostly related to aquatic ecology and wetlands, have been identified. Some of these impacts are permanent and cannot be mitigated to an acceptable level.

In instances where high residual impacts are expected, an offset is the last resort for mitigating these impacts. In addition to their purpose in terms of mitigation, offsets in this particular context may also constitute an opportunity to enhance the potential benefits of the project.

The Impacts on water quality, although relevant is insignificant and the development will not detract from the fitness for use of the water in the study area.

LICENSE APPLICATION EVALUATION CHECKLISTS

Name of the Applicant	DWS Options Analysis	Application Date	November 2014
Name of the Site/Place:	Mzimvubu Water Project – Eastern Cape Province		

APPLICABLE SECTION 21 WATER USES (indicated with X):

S 21	Description as per the NWA	Applied for	Not Licensed	Licensed	Existing Lawful use	General Auth
a	Taking water from a water resource	x				x
b	Storing water	x				x
c	Impeding or diverting the flow of water in a watercourse	x				
d	Engaging in a stream flow reduction activity					
e	Engaging in a controlled activity	x				
f	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit	x				
g	Disposing of waste in a manner which may detrimentally impact on a water resource	x				
h	Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process					
i	Altering the bed, banks, course or characteristics of a watercourse	x				
j	Removing, discharging or disposing of water found underground if it is necessary for the effective continuation of an activity or for the safety of people					
k	Using water for recreational purposes					

1. Evaluation of Licence: Procedural checklist

Information	Yes	No
Forms		
Correctly completed and signed Application Forms[1]	Annexure A	
Are applicant, property, ownership, and occupancy forms for all applicants and properties correctly completed on the application forms?	Annexure A	
Are all appropriate and required supplementary forms indicated in the application form, included in the application and correctly filled in?	Annexure A	
Is a copy of the ID of the applicant/responsible person included with the forms?	Annexure A	
Is the licence application fee and proof of payment included in the application?	Annexure A2	
FINAL / BRIEF APPLICATION REPORT		
Is a Final/Brief Application Report signed and included in the application?	This Report	
Does the FINAL / BRIEF APPLICATION REPORT contain the following information/sections?		
The applicant	Chapter 2 Page 2-1	
The properties on which the water use will take place	Annexure A	
The development that requires the water use	Chapter 3	

(1) [1] A list of all licence application forms is appended to this checklist for ease of reference

Information	Yes	No
The proposed water use	Chapter 5	
Legal assessment of existing and proposed new water use, including EIA requirements	Chapter 2	
The expected impacts of the water use	Chapter 9	
Management and monitoring measures to address expected/potential impacts	Chapter 10 & 11	
Public participation conducted to inform potentially affected users of the application	Chapter 12	
Section 27 considerations	Chapter 8	

List of Water Use Licensing Application Forms

Form number	Title	Included?
Part 1 Application Forms: Applicant, property and ownership information forms **Applicant, property and ownership information must be provided on these forms. Certified copies of ID documents, title deeds, power of attorney statements, and other documents indicated in the forms must also accompany the submission.**		**Yes, No or N/A**
DW756/769	Licensing Part 1: Individual	
DW757/770	Licensing Part 1: Water Services Provider (including Water Boards)	
DW758/771	Licensing Part 1: Company, Business or Partnership; National or Provincial Government	
DW759/772	Licensing Part 1: Water User Association, including: • Irrigation Boards • Subterranean Water Control Boards • Water Boards For Stock Watering • Settlement Boards • Water Conservation Boards	
Part 2 Application forms for water use licensing		
DW773	Licensing Part 2A: Taking Water from a Water Resource	
DW774	Licensing Part 2B: Storing Water	
DW775	Licensing Part 2C: Impeding or Diverting the Flow of Water in a Watercourse	
DW776	Licensing Part 2D: Engaging in a Stream Flow Reduction Activity	
DW765	Licensing Part 2E: Engaging in a Controlled Activity: Irrigation of Any Land with Waste or Water Containing Waste generated through any industrial activity or by a waterwork	
DW766	Licensing Part 2F: Discharging Waste or Water Containing Waste Into a Water Resource through a Pipe, Canal, Sewer, Sea Outfall or Other Conduit	
DW767	Licensing Part 2G: Disposing of Waste in a Manner which may Detrimentally Impact on a Water Resource	
DW780	Licensing Part 2H: Disposing of Water which Contains Waste from, or which has been Heated in, any Industrial or Power Generation Process	
DW781	Licensing Part 2I: Altering the Bed, Banks, Course or Characteristics of a Watercourse	
DW782	Licensing Part 2J: Removing, Discharging or Disposing of Water Found Underground if it is Necessary for the Efficient Continuation of an Activity or for the Safety of People (water quantity)	
DW805	Licensing Part 2J: Removing, Discharging or Disposing of Water Found Underground if it is Necessary for the Efficient Continuation of an Activity or for the Safety of People (water quality)	
DW783	Licensing Part 2K: Using Water for Recreational Purposes (not currently licensed) Information required for specific water uses must be provided on these forms	
Part 1 Supplementary forms		
DW901	Property where water use occurs	
DW902	Details of Property Owner	
Part 2 Supplementary forms		
DW784pmp	Taking Water from a Water Resource: Pump Technical Data	
DW786cnl	Taking Water from a Water Resource: Canal Technical Data	
DW787	Taking Water from a Water Resource: Irrigated Field and Crop Information	
DW788ind	Taking Water from a Water Resource: Power Generation, Industrial or Mining Use	

DW789loc	Taking Water from a Water Resource: Domestic, Urban, Commercial or Industrial use.	
DW790tec	Storing Water: Dam and Basin Technical Data	
DW793dla	Storing Water: Dam Classification	
DW799	Discharging or Disposing of Waste Water: Quality of Water, Waste or Water Containing Waste	
DW903	Actual/Monitored Waste Discharge Details Section 21 f/h water uses	
DW904	Actual/Monitored Waste Discharge Details Section 21 e/g water uses	
DW905	Details of Waste Management Facility	
DW775suppl	Supplementary Water Use Information Form for Section 21(c) and (i) Water Uses	

2. Evaluation of Licence: Substantive Checklist

If the answer to any of the questions is NO, the Record of Recommendation must either be towards a letter of refusal, or must contain adequate motivation in support of the issuing of a license.

Information	**Included? (Yes/No)**	**Relevant section of WULA Report (Paragraph and page #)**
Evaluate to determine if the following aspects are addressed in the FINAL / BRIEF APPLICATION (WULA) REPORT:		
The Applicant		
Is the name and address of the applicant provided?	YES	Chapter 2
Properties and developments		
Are the properties on which the water use will take place described, including the registered farm description, subdivisions, and municipal boundaries?	YES	Annexure A
Describe the applicant's rights to the properties.	YES	Chapter 2
Is a Map showing the properties, existing or new (proposed) development(s) requiring the water use, location of the water use, and the affected users and water resources included?	YES	Chapter 3
The surrounding environment		
Is an A4, (or A3 if necessary,) topo-cadastral map at a 1:50 000 or other suitable scale included?. The map must show all relevant spatial information, including relevant properties, surrounding land use, towns, infrastructure, catchment2, water resources, existing and planned works and other development and management areas.	YES	Chapter 3
Are the environmental and socio-economic circumstances of the area described?	YES	Chapter 6
Are the Water Management Area (WMA) and Region described?	YES	Chapter 2 & 3
Is the quaternary catchment reference number provided?	YES	Chapter 2 & 3
Existing/Proposed development that requires the water use		
Is a brief description of the proposed development or circumstances that require the water use license provided?	YES	Chapter 3 & 5
Is a brief description of existing development and investments already made provided?	YES	Chapter 8
Is a development or implementation schedule provided?	NO	
Is the volume and seasonal pattern of water use requirements and the required assurance of supply described, including information on the parameters used to determine the water requirement and the required assurance of supply, for example, water services plans, population served, quantities produced, crops, irrigated areas and crop irrigation requirement?	YES	Chapter 5
Proposed taking and storing of water		
Is the water resources from which water will be taken described, including the locations, volumes and abstraction rates of the proposed water uses?	YES	Chapter 5
Are alternative ways, including ways which don't require water, of meeting the need for which water is to be used discussed? Are alternative sources of water described, and an explanation given why the proposed alternative is preferred?	NO	

(2) [2] The order of the catchment is to be verified with the relevant Regional Office and Primary Responsible Official

Information	Included? (Yes/No)	Relevant section of WULA Report (Paragraph and page #)
Legal assessment of existing and proposed new water use, including EIA requirements		
Is the proposed water use that requires the license properly described?	YES	Chapter 5
Is the legal need for a licence (as opposed to an Existing lawful use or a General Authorisation) properly described?	YES	Chapter 5
Is the required licence period and the reasons for it provided?	YES	Chapter 8
Is the most applicable legislation to govern the water use by (NWA vs. other applicable legislation) discussed	YES	Chapter 2
Are there any other possible water uses associated with this water use that could require licensing? If so, are they authorised? Are copies of all ELU's provided?		N/A
Impact Assessment and Management measures – Did the applicant's Brief WULA Report describe:		
The potential impacts of the water use on the environment	YES	Chapter 9
The socio-economic impacts of the water use	YES	Chapter 8
The socio-economic advantages of the water use	YES	Chapter 8
The potential impacts of the water use on the water resource	YES	Chapter 9
An appropriate and correct water balance (resource-related)		N/A
The technical acceptability and efficiency of infrastructure associated with the water use	NO	
The stream and the point along the stream where return flows associated with the taking of water will be discharged and the impacts of this discharge.		Annexure B
The impact of the return flow discharge on the yield of government water schemes and the quality of water supplied from them.		N/A
The impact of the discharge on other water users and the measures to ameliorate the impact.		N/A
For 21(f) and (g) applications: Efficient IWWMP included?	NO	
The purpose, objectives and efficiency of the water use		Chapter 5
WCDM measures implemented to optimise the water use	NO	
Management and monitoring measures to address expected/potential impacts	YES	Chapter 10 &11
Public Participation and Objections - Did the applicant's Brief WULA Report describe:		
Public participation conducted to inform potentially affected users of the application	YES	Chapter 12
Is all the information identified in the pre-application consultation included in the report?	YES	Chapter 12
Have all the consultations identified in the pre-application consultation been done and the information included in the application?	YES	Annexure 12
Is a list of users who will be directly AND incrementally affected by the proposed water use included? Are measures taken to inform them of the proposed development, their comments and objections and measures to address these concerns, described?	YES	Annexure 12
Is a list of objections received and the objectors provided, and an explanation given of how each of the objections is resolved?	YES	Annexure 12
Section 27 considerations – Did the applicant's Brief WULA Report:		
S27(1)(a) existing lawful water uses in terms of section 35;		
Describe the applicant's existing lawful water uses	YES	Chapter 8
Contain copies of licences, permits, declarations of ELUs, & Water Court Orders if any.		N/A
S27(1)(b) the need to redress the results of past racial and gender discrimination;		
List public policies/regulations that address racial and gender equity and BBBEE. Outline how the applicant is addressing the results of past racial and gender discrimination in the context of public policies and BBEEE regulations, and how the licensing of this water use will facilitate the redress of past racial and gender discrimination.	YES	Chapter 8
Describe, in terms of ownership and control over water resources, how this licence will promote the redress of past racial and gender discrimination.	YES	Chapter 8
S27(1)(c) efficient and beneficial use of water in the public interest;		

Information	Included? (Yes/No)	Relevant section of WULA Report (Paragraph and page #)
Explain why the water use will be regarded as efficient & beneficial use in the public interest, and what efficiency measures have been taken, eg WCDM. Also describe how the authorisation of the water use will be in the public interest.	YES	Chapter 8
S27(1)(d) the socio-economic impact of the water use or uses if authorised or of the failure to authorise the water use or uses;		
Describe the socio-economic benefit or impact that the proposed water use will have on local communities and on the local, regional and national economy.	YES	Chapter 8
Describe the alignment of the water use with relevant development plans, eg SDF's, IDP,s, etc	YES	Chapter 8
If applicable, describe the socio-economic benefit or impact that the inter-sector transfer of water use entitlement will have.	YES	Chapter 8
If applicable, provide the Provincial Dept of Agriculture's comments on the inter-sector transfer and the measures to address their concerns.	YES	N/A
S27(1)(e); any catchment management strategy applicable to the relevant water resource		
Describe the agreement of the licensing decision with the Internal Strategic Perspective (ISP) or CMS, or give reasons why there is a difference.	YES	Chapter 8
S27(1)(f) the likely effect of the water use to be authorised on the water resource and on other water users;		
Explain briefly how the available water was determined, including information from the ISP, the Reserve and registered water use.	YES	Chapter 7
Explain, if applicable, why the stated availability of water differs from the National Water Resource Strategy (NWRS) and the ISP.		N/A
Summarise the impact that the proposed water use will have on other users and public participation measures taken to inform other users of the proposed development and it impacts.		Chapter 8 & 9
Describe comments and objections of affected users and measures to address these concerns, as well as remediation measures that need to be taken to address impacts and concerns.		Chapter 12
S27(1)(g) the class and the resource quality objectives of the water resource;		
Explain how the water use affects the Reserve, which is based on the class and resource quality objectives, and, if necessary, the measures to ameliorate the impact.	YES	Chapter 8
Describe the water resource quality requirements of the Reserve and other users and the impact that the proposed taking and storing will have on it. Describe remediation measures that need to be taken.	YES	Chapter 8
S27(1)(h) investments already made and to be made by the water user in respect of the water use in question;		
Describe the nature and value of investments already made and to be made in the proposed development. Explain the impact that refusal will have on the investments.	YES	Chapter 8
S27(1)(i)the strategic importance of the water use to be authorised;		
Describe the strategic importance of the water use, as defined in the NWRS.	YES	Chapter 8
S27(1)(j) the quality of water in the water resource which may be required for the Reserve and for meeting international obligations;		
Describe the impact of the water use on the quality of water in the water resource and, if necessary, the measures taken to ameliorate the impact.	YES	Chapter 8
S27(1)(k) the probable duration of any undertaking for which a water use is to be authorised.		
Explain how the licence period was determined	YES	Chapter 8

3. For Section (c) & (i) applications, more detail is required for the following:

Information	Included ? (Yes/No)	Relevant section of WULA Report (Paragraph)
1. Watercourse Attributes		
1.1 Description		
1.1.1. Provide the name and/or description of the affected watercourse	YES	Chapter 2 & 3

Information	Included ? (Yes/No)	Relevant section of WULA Report (Paragraph)
1.1.2. Provide a map indicating the segment and affected reach/es of the watercourse in which the water use/s is to take place and which indicates/delineates the regulated area3 including: *1.1.2.1.* The extent of the riparian habitat; and *1.1.2.2.* The 1:100 year flood line	YES	Chapter 3
1.1.3. Describe within context of the immediate catchment and segment, the historic as well as current state (Present Ecological State or PES) of the affected reach/es of the watercourse with regards to the following characteristics (attributes)4: *1.1.3.1.* Flow and sediment regimes (quantity, pattern, timing, water level and assurance of instream flow); *1.1.3.2.* Water quality (including the physical, chemical and biological characteristics of the water) in relation to the flow regime *1.1.3.3.* Riparian and In-stream Habitat 1.1.3.3.1. Morphology (physical structure) 1.1.3.3.2. Vegetation 1.1.3.3.3. Biota	YES	Annexure D, E & F
1.1.4. Describe the ecological importance and sensitivity (EIS) of the affected reach/es of the watercourse including the functions5	YES	Annexure F
1.1.5. Discuss existing land and water use impacts (and threats) on the characteristics of the watercourse	YES	Annexure D, E & F
1.1.6. List and map sensitive environments in proximity of the project locality - sensitive environments include wetlands, nature reserves, protected areas, etc.	YES	Annexure C
2. Water Use Information		
2.1 Description and Methodology		
2.1.1. Describe the activities associated with the water use/s	YES	Chapter 5
2.1.2. Describe the project phases for each activity (i.e. planning, construction, operation and maintenance, decommissioning) including, but not limited to, the programme for and duration of the various phases	NO	
2.1.3. Provide a site lay-out plan/s (master plan) indicating the various activities and existing and proposed infrastructure in relation to the 1:100 flood line and edge of the watercourse, etc.	YES	Chapter 3
2.1.4. Provide work method statements for the various water use activities	NO	
2.1.5. Provide engineer design drawing(s) for construction activities within the watercourse	NO	
2.1.6. Provide a description and a map/s indicating any Storm Water Management Practices (SWMPs) specifically addressing 'end of pipe' practices	NO	
2.1.7. Provide information on all existing lawful water uses [refer s 27(1)(a)]		N/A
2.1.8. Provide information on investments already made and to be made by the water user in respect of the proposed water use/s [refer s 27(1)(h)]	YES	Chapter 8
2.1.9. Indicate and motivate the probable duration of any undertaking for which the water use/s should be authorised [refer s 27(1)(k)]	YES	Chapter 8
2.2 Motivation		
2.2.1. Provide information on the need/intention/objective of the water use/s	YES	Chapter 7 & 8
2.2.2. Provide information on contributions to rectify the results of past racial and	YES	Chapter 8

(3) [3] The applicant will require a water use authorisation from the Department for any activity within the *regulated area* which is the outer edge of the riparian habitat or 1:100 year flood line, whichever is the greatest distance from the watercourse. The outer edge of the watercourse must be delineated using the Departmental guideline, *A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas*

(4) [4] Refer to the Chief Directorate Resource Directed Measures (RDM) procedure for determining Present Ecological State

(5) [5] Refer to the RDM procedure for determining Ecological Importance and Sensitivity

Information		Included ? (Yes/No)	Relevant section of WULA Report (Paragraph)
	gender discrimination6 [refer s27(1)(b)]		
2.2.3.	Provide information to support efficient and beneficial use of water in the public interest [refer s 27(1)(c)]	YES	Chapter 8
2.2.4.	Provide information on relevant catchment management strategies7 and local government planning frameworks that support the proposed water use [refer s 27(1)(e)]	YES	Chapter 8
2.2.5.	Provide information on the strategic importance of the water use to be authorised [refer s 27(1)(i)]	YES	Chapter 8
3.	**Impact Assessment and Management**		
3.1	**Impact Prediction and Assessment**		
3.1.1.	Provide a prediction and assessment of the likely environmental and socio-economic impacts or effects8 associated with the water use/s for the different project phases: *3.1.1.1.* On the watercourse & its characteristics as set out above [s27(1)(f)] *3.1.1.2.* On other water users [refer s 27(1)(f)] *3.1.1.3.* On the broader public and property *3.1.1.4.* If the water use/s is not authorised [refer s 27(1)(d)]	YES YES	Chapter 9 Chapter 9
3.1.2.	Provide a description of the methodologies employed to undertake impact prediction and assessment as well as a motivation for these>		
3.2	**Risk Assessment**		
3.2.1.	Provide an assessment of the risks associated with the water use/s and related activities	YES	Chapter 9
3.3	**Alternatives**		
3.3.1.	Describe the alternatives considered to prevent negative impacts on the watercourse with regard to locality, procedures, materials, etc	YES	Chapter 4
3.4	**Mitigation Measures**		
3.4.1.	Provide mitigation measures[9] to prevent, reduce, remediate or compensate the pre-determined impacts; also provide emergency responses	YES	Chapter 10
3.4.2.	Provide a site map/s that marks the limits of disturbance to the watercourse and in particular indicates erosion and sediment controls	NO	
3.5	**Changes to the Watercourse**		
3.5.1.	Assess to what extent the impacts after mitigation will bring about changes in respect of the PES (and recommended ecological category, if this information is available at the stage of study) and functionality of the watercourse; as well as the socio-economic environment (including redress considerations as well impacts on other water users)	YES	Chapter 9 & 10
3.6	**Monitoring and Compliance**		
3.6.1.	Provide a detailed monitoring programme and describe the auditing, compliance and reporting mechanisms to ensure execution of the mitigation measures and for informing DWAF of incidents – ensure that these measures are appropriate in relation to the impacts, mitigation measures, status of the watercourse, etc.	YES	Chapter 11

(6) [6] Refer to the DWAF *Broad-Based Black Economic Empowerment (BBBEE) Guidelines For Water Allocation, Final Draft, June 2007* and the Department of Trade and Industry's requirements relating to compliance with the BBBEE Act, 2003 (Act No. 53 of 2003)

(7) [7] Consult the relevant Regional Office and Primary Responsible Official

[8] Assess the potential impacts with regard to their nature, extent, magnitude, duration, probability and significance – each impact must be described in terms of source of impact, pathway (propagation of impact) and receptor (target that experience the risk or impact)

[9] The mitigation measures should be collated in an Environmental Management Programme (EMPR)

INTEGRATED WATER USE LICENSE APPLICATION FOR THE MZIMVUBU WATER PROJECT

TECHNICAL REPORT

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Glossary of Terminology

Catchment - The area from which any rainfall will drain into the watercourse or watercourses or part of the water course, through surface flow to a common point or common points

Constitution – Refers to the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).

Environment – The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group; these circumstances include biophysical, social, economic, historical, cultural and political aspects. Environment means the surroundings within which humans exist and that are made up of-
(i) the land, water and atmosphere of the earth;
(ii) micro-organisms, plant and animal life;
(iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Impact Assessment - An environmental Impact Assessment (EIA) refers to the process of identifying, predicting and assessing the potential positive and negative social, economic and biophysical impacts of any proposed project, plan, programme or policy which requires authorisation of permission by law and which may significantly affect the environment. The EIA includes an evaluation of alternatives, as well as recommendations for appropriate mitigation measures for minimising or avoiding negative impacts, measures enhancing the positive aspects of the proposal and environmental management and monitoring measures.

Existing Lawful use - An existing lawful use means a water use which has taken place at any time during a period of two years immediately before the date of commencement of the National Water Act 1998, (Act 36 of 1998) or which has been declared an existing lawful water use under section 33 and which was authorised by or under any law which was in force immediately before the date of commencement of the National Water Act.

Groundwater Recharge - The inflow of water into a groundwater reservoir from the surface, e.g. infiltration of precipitation and its movement to the water table.

Hydrogeological –The study of distribution and movement of groundwater.

Hydrological – The study of movement, distribution and quality of surface water and groundwater.

Public Participation Process – A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers

to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific matters.

Reserve means the quantity and quality of water required -
(a) to satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act, 1997 (Act No. 108 of 1997), for people who are now or who will, in the reasonably near future, be -
(i) relying upon;
(ii) taking water from; or
(iii) being supplied from, the relevant water resource; and
(b) to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.

The Act - The National Water Act, (NWA) (Act 36 of 1998)

The Department - Means the Department of Water and Sanitation

Tributaries - A stream or river which flows directly into a larger river or stream.

Monitoring programme - means a programme for taking regular measurements of the quantity and/or quality of a water resource, waste or wastewater discharge at specified intervals and at specific locations to determine the chemical, physical and biological nature of the water resource, waste or wastewater discharge.

Watercourse means -
(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Water quality means the physical, chemical, toxicological, biological (including microbiological) and aesthetic properties of water that determine sustained (1) healthy functioning of aquatic ecosystems and (2) fitness for use (e.g. domestic, recreational, agricultural, and industrial). Water quality is therefore reflected in (a) concentrations or loads of substances (either dissolved or suspended) or micro-organisms, (b) physico-chemical attributes (e.g. temperature) and (c) certain biological responses to those concentrations, loads or physico-chemical attributes.

Water Resource - A water resource includes any watercourse, surface water, estuary or aquifer. Watercourses include rivers, springs, and natural perennial and non-perennial channels. Wetlands, lakes, dams, or any collection identified as such by the Minister in the Government Gazette.

Water use license - An authorisation from the Department to a designated water user to use water. The authorisation will provide details on the time-frames and conditions for the designated water use.

Acronyms

BLMC	Biodiversity Land Management Class
CAAP	Compensation Assessment and Action Plan
CBA	Critical biodiversity area
DEA	Department of Environmental Affairs
DECM	Desired Ecological Management Class
DEA	Department of Environmental Affairs
DEDEA	Eastern Cape Department of Economic Development and Environmental Affairs (former DEDEAT)
DM	District Municipality
DMR	Department of Mineral Resources
DRM	Desktop Reserve Model
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EC	Eastern Cape
EC	Ecological Class
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ELWU	Existing Lawful Water Use
EMPR	Environmental Management Programme
ESO	Environmental Site Officer
ES	Ecological Sensitivity
FEPA	Freshwater Ecosystem Priority Areas
FRAI	Fish Response Assessment Index
FSL	Full Supply Level
FSR	Final Scoping Report
EWR	Environmental Water Requirements
GN	Government Notice
GWW	Government Water Works
IHI	Index of Habitat Integrity
IRR	Issues and Response Report
ISP	Integrated Strategic Perspective
IUCN	International Union for the Conservation of Nature
IWRM	Integrated Water Resource Management
MAR	Mean Annual Runoff
MIRAI	Macroinvertebrate Response Assessment Index
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MWP	Mzimvubu Water Project

NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003), as amended
NEMWA	National Environmental Management: Protected Areas Act, (Act 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Area
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act , 1998 (Act 36 of 1998)
PAI	Physicochemical Assessment Index
PES	Present Ecological State
POC	Probability of Occurrence
PS	Pump Station
RCC	Roller-compacted concrete
RDL	Red data Land
RDM	Resource Directed Measures
RDSIS	Red Data Sensitivity Index Score
RMP	Resource Management Plan
SAHRA	South African Heritage Resources Agency
SAWS	South African Weather Services
SIP3	Strategic Infrastructure Project
SMME	Small Medium and Micro Enterprises
SEF	Safety Evaluation Flood
SoER	State of Environment Report
subWMA.	Sub Water Management Area
WCD	World Commission on Dams
WMA	Water Management Area
WRCS	Water Resource Classification System
WML	Waste Management Licence
WUL	Water Use Licence
WULA	Water Use Licence Application
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works

Abbreviations

MW	Mega Watt
m	Meters
km^2	Square Kilometers
ha	Hectare
°C	Degrees Celsius
%	Percentage
Ha	Hectares

1. INTRODUCTION

1.1 BACKGROUND

The Mzimvubu River catchment in the Eastern Cape of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country which is still largely unutilised, is considered by the Eastern Cape Provincial Government, as offering one of the best opportunities in the Province to achieve such development.

The five pillars on which the Eastern Cape Provincial Government proposed to model the Mzimvubu River water resources development are:

- Afforestation;
- Irrigation;
- Hydropower;
- Water transfer; and
- Tourism.

As a result of this the Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project, which consists of two multi-purpose dams on the Tsitsa River, a major tributary to the Mzimvubu River. Socio-economic upliftment is expected to be achieved through bulk potable water supply schemes for domestic and industrial water supply, bulk raw water supply schemes for irrigated agriculture, hydropower generation and the creation of temporary and permanent jobs (**Figure 1**).

Environmental authorisation is required for the infrastructure components of the proposed Ntabelanga-Lalini Conjunctive Scheme. The Ntabelanga-Lalini conjunctive scheme consists of water resource infrastructure, treated domestic water supply infrastructure, irrigation, power generation and associated infrastructure.

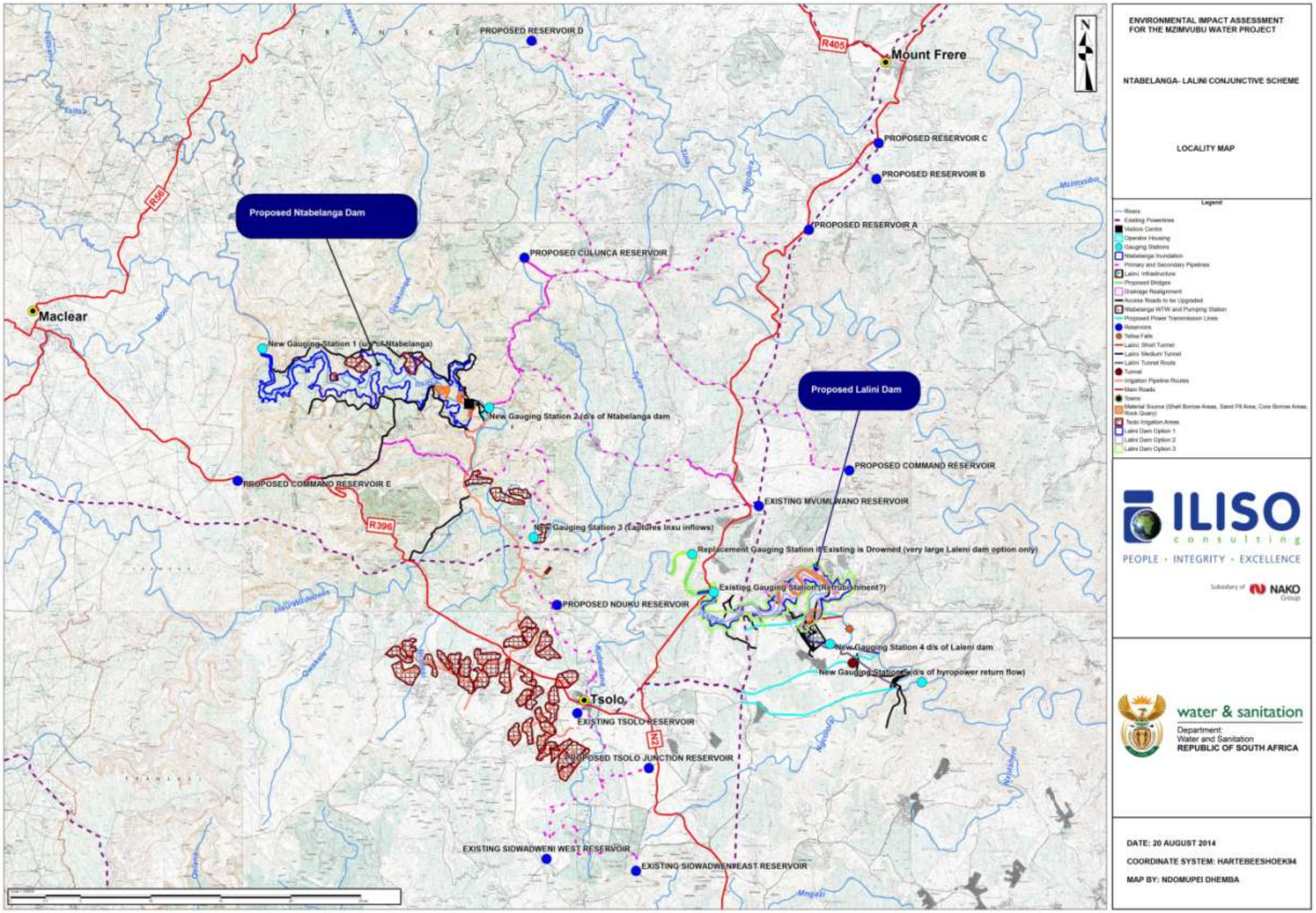

Figure 1: Locality map

1.2 PURPOSE OF THIS REPORT

The purpose of this report is to provide technical information in support of the Water Use Licence Application (WULA) for the Mzimvubu Water Project. This application will include information for any water uses that are triggered in terms of the National Water Act (Act 36 of 1998) (NWA).

Although separate Water Use Licence Applications will be submitted for the Ntabelanga Dam and its associated infrastructure and the Lalini Dam and associated infrastructure, development at the two sites should not be viewed in isolation but as a conjunctive scheme.

The following water uses for the Ntabelanga Dam and associated infrastructure, as defined in Section 21 of NWA are being applied for (application forms attached in **Appendix A**):

- s21 (a): taking water from a water resource;
- s21 (b): storing of water;
- s21 (c): impeding or diverting the flow of water in a water course;
- s21 (e): engaging in a controlled activity identified as such in section 37(1)(c);
- s21 (f): discharging of waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- s21 (g): disposing of waste in a manner which may detrimentally impact on a water resource; and
- s21 (i): altering the bed, banks, course or characteristics of a water course.

1.3 OBJECTIVES OF THIS REPORT

This report aims to achieve the following objectives:

- Meet the requirements of the NWA and the requirements of the DWS water management policies;
- Provide sufficient information in order to determine whether the water use will be used efficiently and is beneficial to the public interest – Refer to Section 27 Motivation;
- Provide sufficient information to allow for an assessment to determine whether the results of past and racial discrimination have been addressed;
- Provide sufficient information to allow for an assessment to be made on the significant impacts that the project may have on the environment;
- Identify negative impacts and propose mitigation measures that will be taken to prevent and/or minimise the impacts; and
- Identify and enhance positive impacts.

1.4 STRUCTURE OF THIS REPORT

The administrative information, including the legal assessment and location of the project is provided in **Chapter 2**. An in depth description to the project, including engineering design, construction plans and alternatives that were assessed during the EIA are provided in

Chapter 3 and 4. The description of the water uses that will be triggered by the life of the project is expanded upon in **Chapter 5. Chapter 6** provides a detailed description of the project environment. **Chapter 7** provides a detailed motivation for why a Water Use Licence (WUL) should be issued and the overall benefits the construction of the MWP would provide, while **Chapter 8** satisfies the requirements of Section 27 NWA motivation. **Chapter 9** provides a breakdown of the Impact Assessment, including the risk assessment. **Chapter 10** expands on the mitigation measures that will be required while **Chapter 11** provides detail regarding monitoring and compliance during both construction and operation phases of the MWP. A summary of the public participation process, to date, is provided in **Chapter 12** with the conclusions and references in **Chapter 13** and **Chapter 14** respectively.

2. ADMINISTRATIVE INFORMATION

2.1 GENERAL INFORMATION

Applicant

Name:	Department of Water and Sanitation (DWS): Directorate – Options Analysis
Address:	Department of Water and Sanitation, Private Bag X 313, PRETORIA, 0001
Tel:	012 336 6838
Fax:	082 804 5162
Email:	mugumom@dwa.gov.za
Contact Person:	Mr Menard Mugumo

2.2 LEGAL ASSESSMENT

2.2.1 Constitution of South Africa

The Constitution of South Africa compels all to ensure the rights of South African citizens. Section 24 of the constitution provides: Everyone has the right:

- to an environment that is not harmful to their health or well-being;
- to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
  - prevent pollution and ecological degradation;
  - promote conservation; and
  - secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

2.2.2 National Environmental Management Act, 1998 (Act 107 of 1998)

An EIA is being undertaken in terms of the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998). The following Regulations promulgated in terms of NEMA apply:

- GN 543 – specifies the process that must be undertaken to obtain an Environmental Authorisation;
- GN 544 – Listing Notice 1 which identifies activities that would require environmental authorisations prior to commencement of that activity for which a Basic Assessment is required;
- GN 545 – Listing Notice 2 which identifies activities that would require environmental authorisations prior to commencement of that activity for which a Scoping and Environmental Impact Assessment is required; and
- GN 546 - Listing Notice 3 which identifies activities that would require environmental authorisations prior to commencement of that activity in specific identified geographical areas only.

The following references numbers have been issued by DEA in respect of the applications for environmental authorisation: 14/12/16/3/3/2/677 (application for the dams and associated infrastructure), 14/12/16/3/3/2/678 (application for electricity generation and distribution), and 14/12/16/3/3/1/1169 (application for the construction of roads).

2.2.3 Listed activities to be authorised in terms of NEMA

The proposed project involves several activities listed in terms of Section 24 of NEMA (**Table 1**). An Environmental Authorisation must be issued by the national Department of Environmental Affairs (DEA) prior to commencing with the project.

Table 1: List of activities to be authorised in terms of NEMA

• **Listed activity as described in General Notice (GN) R.544, 545 and 546**	• **Description of project activity that triggers listed activity**
GN R.544 Item 9: The construction of facilities or infrastructure exceeding 1000 metres in length for the bulk transportation of water, sewage or storm water - (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more.	• The project involves the construction of potable water and raw water pipelines.
GN R.544 Item 10: The construction of facilities or infrastructure for the transmission and distribution of electricity - (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts	• Power lines will be constructed in order to feed the power generated at the Lalini and Ntabelanga Dams into the national grid. •
GN R.544 Item 11: The construction of: (iii) bridges; (iv) dams; (v) weirs; (xi) infrastructure or structures covering 50 square metres or more. • where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.	• The project involves the construction of 2 dams. • 2 bridges crossing the Tsitsa River will have to be demolished and relocated or raised. • Five flow gauging stations (weirs) are planned as part of the project. • A river intake structure will be built as part of the irrigation scheme.
GN R.544 Item 12: The construction of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010.	• The proposed project includes the construction of treated water reservoirs, as part of the potable water bulk infrastructure, and a raw water reservoir for the irrigation system.
GN R.544 Item 18: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 5 cubic metres from: (i) a watercourse	• Construction of the dams will involve infilling material into the Tsitsa River.
GN R.544 Item 22: The construction of a road, outside urban areas, (i) with a reserve wider than 13,5 meters or, (ii) where no reserve exists where the road is wider than 8 metres, or (iii) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Notice 545 of 2010	• Existing district roads inside the two dams' footprint will need to be rerouted as the existing roads will be inundated. New access roads will be built in order to facilitate access to the sites during construction and operational phases.

	•
GN R.545 Item 1: The construction of facilities or infrastructure for the generation of electricity where the electricity output is 20 megawatts or more.	• The hydropower plant at Ntabelanga Dam will generate an average of 2.1 MW and the plant at Lalini Dam will generate up to 30 MW average output. Combined scheme output is an average of 32 MW or up to 180 MW peaking power.
GN R.545 Item 19: • The construction of a dam, where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the high-water mark of the dam covers an area of 10 hectares or more.	• Both the Ntabelanga and Lalini Dams trigger this activity. • The maximum dam wall height for the Ntabelanga Dam is 67 m; the inundated area upstream at maximum flood level will be approximately 40 km^2. • The maximum dam wall height for the Lalini Dam is 32 m; the inundated area upstream at maximum flood level will be approximately 15 km^2.
GN R.546 Item 2: • The construction of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. ii. Outside urban areas, in: (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	• Some reservoirs will fall within Critical Biodiversity Areas (CBA) identified in terms of the Eastern Cape biodiversity plan.
GN R.546 Item 13: The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous vegetation, except where such removal of vegetation is required for: (1) the undertaking of a process or activity included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), in which case the activity is regarded to be excluded from this list. (2) the undertaking of a linear activity falling below the thresholds mentioned in Listing Notice 1 in terms of GN No. 544 of 2010. **(a)** Critical biodiversity areas and ecological support areas as identified in systematic biodiversity plans adopted by the competent authority. **(c) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape and Western Cape:** ii. Outside urban areas, the following: (bb) National Protected Area Expansion Strategy Focus areas	• Vegetation clearance for construction of dam and associated infrastructure, borrow areas, roads and power lines within Critical biodiversity areas identified in terms of the Eastern Cape biodiversity plan.. • The secondary pipelines also go through the Southern Berg Griqualand National Protected Area Expansion Strategy Focus area.
GN R.546 Item 16: The construction of: (iv) infrastructure covering 10 square metres or more where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line. **(a) In Eastern Cape, Free State, KwaZulu-Natal, Limpopo, Mpumalanga and Northern Cape:** ii. Outside urban areas, in: (bb) National Protected Area Expansion Strategy Focus areas; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	• Some of the new infrastructure (e.g. bridges, weirs), as well as the dams themselves will be constructed in or within 32 m of a watercourse, and some of that infrastructure will be located within identified Critical biodiversity areas identified in terms of the Eastern Cape biodiversity plan. • One of the gauging weirs is located within the Pondoland National Protected Area Expansion Strategy Focus area.

2.2.4 National Water Act, 1998 (Act 36 of 1998)

The purpose of the National Water Act (Act 36 of 1998) (NWA) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled. Sections 40 and 42 of NWA provides for the responsible authority to request public participation and an assessment of the likely effect of the proposed license the protection, use, development, conservation, management and control of the water resource.

The following chapters of the NWA are of particular importance:

- Chapter 3, Part 4 states that anyone who owns, occupies, controls or uses land is deemed responsible for taking measures to prevent pollution of water resources;
- Chapter 4 deals with water use regulation; and
- Chapter 12 deals with water management in terms of dam safety.
- Section 19 deals with water management at mines in terms of pollution prevention and control, Section 21 defines the water uses requiring authorisation and Section 26 (1) provides for the development of regulations requiring monitoring, measurement and recording as well as the effects to be achieved through management practices prior to discharge or disposal.

Section 21 of the NWA defines 11 consumptive and non-consumptive water uses:

- 21(a): Taking water from a water resource.
- 21(b): Storing water
- 21(c): Impeding or diverting the flow of water in a watercourse.
- 21(d): Engaging in a stream flow reduction activity.
- 21(e): Engaging in a controlled activity.
- 21(f): Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit.
- 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.
- 21(h): Disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process.
- 21(i): Altering the bed, banks, course or characteristics of a watercourse.
- 21(j): Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.
- 21(k): Using water for recreational purposes.

Water uses that are not permissible in terms of Schedule 1 of the NWA need to be authorised under a tiered authorisation system as a General Authorisation in terms of the General Authorisations as published under section 39 of the NWA or as a water use licence, as provided for in terms of section 21 of the NWA.

An Existing Lawful Water Use (ELWU) is a water use that lawfully took place in the period of two years before the commencement of the National Water Act (Act 36 of 1998). This allows any water use that lawfully took place to continue until such time as it can be converted into a license.

The authorisation system allows for the "Reserve" and provides for public consultation processes in the establishment of strategies and decision making and guarantees the right to appeal against such decision.

Section 27 of the NWA specifies that the following factors regarding water use authorisation be taken into consideration:

- The efficient and beneficial use of water in the public interest;
- The socio-economic impact of the decision whether or not to issue a licence;
- Alignment with the catchment management strategy;
- The impact of the water use and possible resource directed measures; and
- Investments made by the applicant in respect of the water use in question.

The NWA introduced the concept of Integrated Water Resource Management (IWRM), comprising all aspects of the water resource, including water quality, water quantity and the aquatic ecosystem quality. The IWRM approach provides for both resource directed and source directed measures. Resource directed measures aim to protect and manage the receiving environment, whilst source directed measures aim to control the impacts at source.

Possible future water uses

Multi-purpose government water works (GWWs) provide opportunities for the consideration of a number of uses and potential developments. Examples of generic uses and potential developments that can be accommodated and supported on multi-purpose GWWs include:

- Water based activities:
  - Subsistence fishing (livelihood – fishing for food);
  - Small scale / commercial fisheries;
  - High impact activities (high speed, power driven vessels, wake and noise activities e.g. motorised boats, leisure/house boats, skiing, jet skiing);
  - Low impact activities (no wake zone, non-motorised vessels or power driven vessels travelling at no wake e.g. canoeing, rowing, sailing, kayaking, swimming);
  - Conservation area [nesting, breeding and feeding habitat, research programme (this can also be extended to open water surface as well)]; and
  - Security area (dam wall).
- Shoreline (land based activities):

- Public access area (promoting equitable access to all);
- Tourism [accommodation (hotel, chalets, resort, camping), picnic area];
- Eco-tourism (cultural village); and
- Conservation area (natural open space, bird-watching, hiking, horse trails, cycling).

These will only be confirmed during the Resource Management Plan (RMP) process, zoned accordingly and subjected to relevant legislation, acts, etc. where applicable. The RMP, which is part of the implementation stage of the project (after authorisation and approval), will identify possible uses and potential developments at the dam.

The applications for Environmental Authorisation and Water Use Licence for this project therefore do not include any such uses. If those uses (such as aquaculture) are identified, they will require separate authorisation.

2.2.5 General Authorisation

A General Authorisation replaces the need for a water user to apply for a licence in terms of the NWA for Section 21 activities. The general authorisations, however, does define exclusions where a General Authorisation would not be applicable and a full water use licence would be needed.

General Notice (GN) 399 as published in the Government Gazette 26187 of 2004 states that a general authorisation is applicable for Section 21(a) and Section 21 (b) – 'The taking of water from a water resource and storage of water', provided that the taking or storage is within the limits and conditions as set out in the general authorisation.

General Notice (GN) 665 as published in the Government Gazette 36820 of 2013 states that a general authorisation is applicable to the following water uses, provided that the water use is within the limits and conditions as set out in the general authorisation:

- Section 21 (e) - Engaging in a controlled activity, identified as such in section 37(1) (a): Irrigation of any land with waste or water containing waste generated through any industrial activity or by a waterwork.
- Section 21 (f) and (h) - Discharge of waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit; and disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process.
- Section 21 (g) – Disposing of waste in a manner which may detrimentally impact on a water resource.
- Section 21(j) - Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people.

General Authorisation (GA) GN399 and GN 665 states the following in terms of the Quaternary Drainage Areas located in Primary Drainage Region T. **Table 2** below shows the drainage regions excluded from these General Authorisations. The proposed MWP will not be located in the drainage regions shown in **Table 2**.

Table 2: Areas excluded from General Authorisation for the taking of surface water

Primary Drainage Region	Secondary/Tertiary/Quaternary drainage region and excluded resources	Description of main river in drainage region for information purposes
T	T35A,B,C,D,F,G	Tsitsa, Pot, Mooi, Inxu, Wildenees, Gatberg Rivers

GN 1199 as published in the Government Gazette 32805 of 2009, however, excludes wetlands as sensitive areas and states in Section 6(b) that the General Authorisation notice does not apply to the use of water in terms of Section 21(c) and (i) within 500 metre radius from the boundary of any wetland. Furthermore, GN 1198 Section 6(a) states that the General Authorisation does not apply to any activity that may have a potential to impact a wetland in terms of NEMA. The Mzimvubu Water Project footprint infringes both these statements thus requiring an application to apply for a section 21(c) and (i) Water Use Licence.

The following water uses will be triggered during the construction and operation of the MWP and will require authorisation in terms of the NWA:

- Section 21 (a): taking water from a water resource;
- Section 21 (b): storing of water;
- Section 21 (c): impeding or diverting the flow of water in a water course;
- Section 21 (e): engaging in a controlled activity identified as such in section 37(1) (c);
- Section 21 (f): discharching waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- Section 21 (g): disposing of waste in a manner which may detrimentally impact on a water resource; and
- Section 21 (i): altering the bed, banks, course or characteristics of a water course.

2.2.6 Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA)

Approval of Environmental Management Plans by DMR

Construction materials such as sand, gravel and rock material will be required for the construction of the dams and roads. Existing licensed quarries and borrow pits in the area may not be adequate or suitable to provide all the required construction

materials and two new rock quarries and six sand borrow pits will be necessary for the Ntabelanga and Lalini Dam sites.

In terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA), as amended, and the Mineral and Petroleum Resources Development Regulations in GNR 527 of 23 April 2004, DWS has been exempted by virtue of GNR 762 of 25 June 2004 from the application procedures and the approval of rights and permits in terms of sections 16, 20, 22, and 27 of the MPRDA. However, in accordance with section 106(2) of the MPRDA, the DWS is required to compile an Environmental Management Plan (EMPL) for approval in terms of the provisions of section 39 (4) of the Act.

Where the establishment and use of borrow pits result in a listed activity being undertaken, the impact of the new borrow areas and quarry will be investigated in the EIA, and EMPLs will be compiled for approval by the DMR.

Exemption from Regulation GN 704 of the NWA
GN 704 of the NWA, 1999 contains regulations on use of water for mining, including borrowing activities and related activities aimed at preventing the pollution of water resources and protecting water resources in areas where mining activity is taking place.

GN 704 states that:
No person in control of a mine or activity may:

- Locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100 metres, whichever is the greatest, from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become waterlogged, undermined, unstable or cracked.

According to the above, the borrow areas must fall outside of the 1:100 year flood line of the drainage feature or 100 m from the edge of the feature, whichever distance is the greatest. Therefore an exemption will be required from DWS since the borrow areas will be located within the 1:100 year flood line.

2.2.7 National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA)

The Management of Waste is regulated by the National Environmental Management: Waste Act (Act 59 of 2008) as amended (NEMWA) and associated Regulations.

GN 921 lists Waste Management Activities in respect of which a Waste Management Licence (WML) is required. These include various activities associated with the storage of waste, reuse, recycling and recovery of waste, treatment of waste (which includes the remediation of contaminated land) and disposal of waste. The Schedule

to the Notice distinguishes between two categories of waste management activities which require licensing and for which a basic assessment process (for Category A Waste Management Activities) or an Environmental Impact Assessment process (for Category B Waste Management Activities) must be conducted. A third category (Category C) refers to activities for which norms and standards have been set.

Construction activities usually result in general as well as hazardous waste.

WMLs are required for, amongst others:

- The storage of general or hazardous waste in lagoons;
- The disposal of inert waste to land in excess of 25 tons;
- The disposal of any hazardous waste to land;
- The disposal of general waste to land covering an area of more than 50 m^2 and
- The disposal of domestic waste generated on premises in areas not serviced by the municipal service where the waste disposed exceeds 500 kg per month.

Schedule 3 of the NEMWA, as amended, defines "general waste" as waste that does not pose an immediate hazard or threat to health or to the environment, and includes:
(a) domestic waste;
(b) building and demolition waste;
(c) business waste; and
(d) inert waste; or
(e) any waste classified as non-hazardous waste in terms of the regulations made under section 69, and includes non-hazardous substances, materials or objects within business, domestic, inert, building and demolition wastes as outlined in Schedule 3 of the Act.

Where
"building and demolition waste" means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition; and includes discarded concrete, bricks, tiles and ceramics, discarded wood, glass and plastic, discarded metals, discarded soil, stones and dredging spoil and “other” discarded building or demolition wastes.

"inert waste" means waste that—
(a) does not undergo any significant physical, chemical or biological transformation after disposal;
(b) does not burn, react physically or chemically biodegrade or otherwise adversely affect any other matter or environment with which it may come into contact; and
(c) does not impact negatively on the environment, because of its pollutant content and because the toxicity of its leachate is insignificant and which include discarded

concrete, bricks, tiles and ceramics, discarded glass and discarded soil, stones and dredging spoil, as listed in Schedule 3 of the Act.

Sludge will be dewatered/pressed/dried (depending upon the actual process selected at detailed design stage) and the treated sludge will be disposed to farmland or at a licensed approved solid waste disposal site. The sludge will be classified before it is disposed of in order to prove that it is not hazardous. A Waste Management Licence may be required if it is disposed to land and covers more than 50 m^2.

A WML may be required for the settling ponds that will be used to capture runoff from the batching and crusher plants (Activity (1) of Category A: Storage of general waste in lagoons).

The construction of the tunnel at the Lalini Dam for the generation of hydropower will result in spoil (inert general waste) that needs to be disposed of and may require a WML.

No WML Applications are included in this EIA process and if applications are required, they will have to be applied for separately.

The requirements of the Waste Classification and Management Regulations (GNR 634 in Government Gazette No. 36784 dated 23 August 2013), National Norms and Standards for the Assessment of Waste for Landfill Disposal (GNR 635 in Government Gazette No. 36784 dated 23 August 2013), and National Norms and Standards for Disposal of Waste to Landfill (GNR 636 in Government Gazette No. 36784 of 23 August 2013) are considered in the EMPR.

2.2.8 Other

World Commission on Dams

Cognisance is taken of the final report of the World Commission on Dams (WCD) that was published in November 2000. (The following section is based on the document Applying the World Commission on Dams Report in South Africa: Summary Report, the South African Multi-stakeholder Initiative on the World Commission on Dams: November 2004).

The WCD, initiated in 1998, conducted the first comprehensive global and independent review of the performance and impacts of large dams, and the options available for water and energy development. The final report of the WCD was released in November 2000. At a multi-stakeholder symposium in Midrand in July 2001 South African stakeholders accepted the core values and approaches and declared themselves to be broadly supportive of the strategic priorities outlined in the WCD report, but believed that the guidelines needed to be contextualised in the South African situation. A Co-ordinating Committee for the South African Multi stakeholder Initiative on the World Commission on Dams Report was elected to

contextualise the WCD report and to make recommendations on its implementation in South Africa.

The five core values underpinning the WCD are

- Equity;
- Efficiency;
- Participatory decision-making;
- Sustainability; and
- Accountability.

The WCD proposed an approach to guide future planning and decision-making based on recognition of rights and assessment of risks, in particular all rights at risk. According to this rights-and-risks approach, a first and essential step is to clarify the rights context for a proposed project (and its alternatives). This will allow for identification of legitimate claims and entitlements that might be affected by the project. It will also provide the basis for effective identification of stakeholder groups that must participate in the development process.

South Africa's Constitution provides a strong anchor for the rights-and-risks approach proposed by the WCD. Participation of all interested and affected parties has become a widespread fundamental principle entrenched in numerous pieces of legislation, including the NWA and the NEMA, that have particular relevance for dams and development and which provide for equitable and inclusive decision-making.

The NWA provides the principles and legal framework for water resources management, based on equitable access, beneficial utilisation and environmentally sustainable practices. The provision of the Reserve (ecological and basic human rights) in the NWA is fundamentally in line with the WCD values and principles.

The principles in the NEMA include a people-centred approach to environmental management, transparency and access to information, a risk averse and cautious approach, environmental justice and equity.

The WCD identified seven strategic priorities and corresponding policy principles to further guide water and energy planning and decision-making.

- Gaining public acceptance;
- Comprehensive options assessment;
- Addressing existing dams;
- Sustaining rivers and livelihoods;
- Recognising entitlements and sharing benefits;
- Ensuring compliance; and
- Sharing rivers for peace, development and security.

The seven strategic priorities are supported in the WCD report by sets of guidelines designed for adoption, adaptation and use by all stakeholders involved in water resources development and utilisation, where relevant.

The priority recommendations identified at the South Africa Multi-stakeholder Forum held in 2004 are:

- Addressing social impacts;
- Enhancing governance of water and energy resources development; and
- Promoting river health and sustainable livelihoods.

Of particular relevance when undertaking an Environmental Impact Assessment for a proposed new dam are:

- Exploring and implementing mechanisms for recognising entitlements and sharing benefits for new dams: The Forum recommended that a clear national policy on recognising entitlements and sharing benefits for dam-affected people for new dams should be agreed to by all stakeholders. The Reparations Sub-Committee established during this Initiative should interact with DWS to take this recommendation to develop a national policy on compensation further. Based on this national policy, a Compensation Assessment and Action Plan (CAAP) should be developed for each project. Based on the CAAP, individual contracts with affected people should be entered into.
- Monitoring river systems against objectives of the Reserve: The flows of the Reserve are a function of the categorisation / classification system. Once the Reserve has been determined, through an equitable, objective and scientific methodology that is the product of broader participation, and applied to a river, the river system should be monitored closely to ensure that the Reserve is achieving its stated objectives of maintaining the ecological integrity of the river and providing for basic needs.

The United Nations Environment Programme's Dams and Development Project was established in November 2001 in response to a request of the Third Forum meeting of the World Commission on Dams (WCD) for a neutral entity to take forward the consideration of the WCD recommendations into local contexts through promoting inclusive multi-stakeholder dialogue and, widely disseminating the WCD materials.

A compendium of relevant Practices for Improved Decision-making was published in 2007. The key issues dealt with in the Compendium are:

- The identification of options;
- Stakeholder participation;
- Social Impact Assessment and addressing outstanding social issues;
- Compensation policy and benefit-sharing mechanisms;
- Environmental Management Plans;
- Compliance; and

- International policy on shared rivers.

The compendium aims to deal with key issues essential to ensuring environmental and social sustainability. It suggests that the sustainability of dams involves consideration of engineering, environmental, social, economic and financial aspects within the context of an informed and participatory decision-making process. This integrated approach includes dealing with the entire basin when planning, developing and managing water resources, recognizing upstream and downstream inter-linkages and being aware of particular stakeholder interests and areas of potential conflict. (UNEP, 2007).

Many aspects of the compendium do not apply directly to an Environmental Impact Assessment. Cognisance has, however, been taken of aspects that are applicable (particularly related to EMPRs, social impact assessment and public participation).

2.3 LAND OWNERSHIP

The project is located on government owned property administered by Traditional Authorities.

2.4 ZONING OF ADJACENT LAND

Adjacent land is zoned for Agricultural purposes.

2.5 AFFECTED RIVER CATCHMENTS

The proposed Mzimvubu Water Project crosses the Mzimvubu-Keiskamma Water Management Area.

Table 3 shows the quaternary drainage areas that are being affected:

Table 3: Quaternary drainage areas

MWP Infrastructure	Primary Catchment	Sub-Catchment Area	Quaternary catchments
Lalini Dam	T	Mzimvubu - Keiskamma	T35L and T35K
Ntabelanga Dam and Roads	T	Mzimvubu - Keiskamma	T35E
Bulk water supply pipeline	T	Mzimvubu - Keiskamma	T20B, T34H, T34J, T35E, T35H, T35K
HEP Plant			
Tunnel			

2.6 BRIEF DESCRIPTION OF THE INTENTION OF THIS APPLICATION

Due to the linear extent of the domestic and irrigation pipeline layout of the MWP, the direct alignment across open country will impact on a number of wetlands and will

require the crossing of a large river and several other watercourses as well as erosion gulleys.

3. DESCRIPTION OF THE PROPOSED PROJECT

The Ntabelanga-Lalini conjunctive scheme consists of water resource infrastructure, treated domestic water supply infrastructure, raw water supply infrastructure, power generation & transmission and affected infrastructure.

3.1 PROJECT LOCATION

The Mzimvubu River Catchment is situated in the Eastern Cape (EC) Province of South Africa.

The project footprint spreads over three 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 (**Figure 2** and **Table 4**).

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

The study area falls within the Mzimvubu to Kieskamma Water Management Area (WMA). The Tsitsa River is tributary of the Mzimvubu River and will be partially inundated by both of the proposed dams.

The Lalini Dam is located within the T35L and T35K Quaternary Catchments, whilst the Ntabelanga Dam and road upgrades are located within the T35E quaternary catchment and the particular river resource in the area is the Mzimvubu River. The pipelines traverse over several quaternary catchments, namely T20B, T34H, T34 J, T35E, T35H and T35K.

Table 4:Project Location Information

Province	Eastern Cape
District Municipality	Joe Gqabi, OR Tambo and Alfred Nzo District Municipalities
Local Municipality	Mhlontlo, Nyandeni, Umzimvubu and Elundini Local Municipalities
Ward number(s)*	Umzimvubu LM: Wards 20, 25 and 19 Elundini LM: Wards 1, 5 and 6 Nyandeni LM: Wards 1 and 10 Mhlontlo LM: Wards 1, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 26.
Nearest town(s)	Tsolo, Lalini, Maclear, Mthatha, Mount Frere
Farm name(s) and number(s)*	59, 61, 65, 66, Esek 41, Mahlungulu 79, 59, 63, 55, 62, 55, Nxakolo 78, Mbalishweni 54, 54, Mimosa Hoek 42, Tsitsa Drift 41, Matanga's Kraal 40, 69, 54, 66, 38, 89, 68, 58, Xokonxa 4, 81, 62, 55, 37, 379, 71, 69, 404, 63, 64, 425,

	64, 65, 61, 60, 59, 118, 406, 408, 392, 390, 119, 391, 76, Nxotwe 58, Lower Culunca 57, 412, 73, Upper Sinxago 410, 76, 74, 72, 50, 51, 87, 84, 86, 75, 409, 397, 419.					
Coordinates of corner points of study area	Latitude (S) (DDMMSS)			Longitude (E) (DDMMSS)		
	30	48	49.025	28	23	18.024
	30	49	19.141	29	21	12.074
	31	27	6.437	29	21	22.086
	31	27	10.739	28	23	8.013

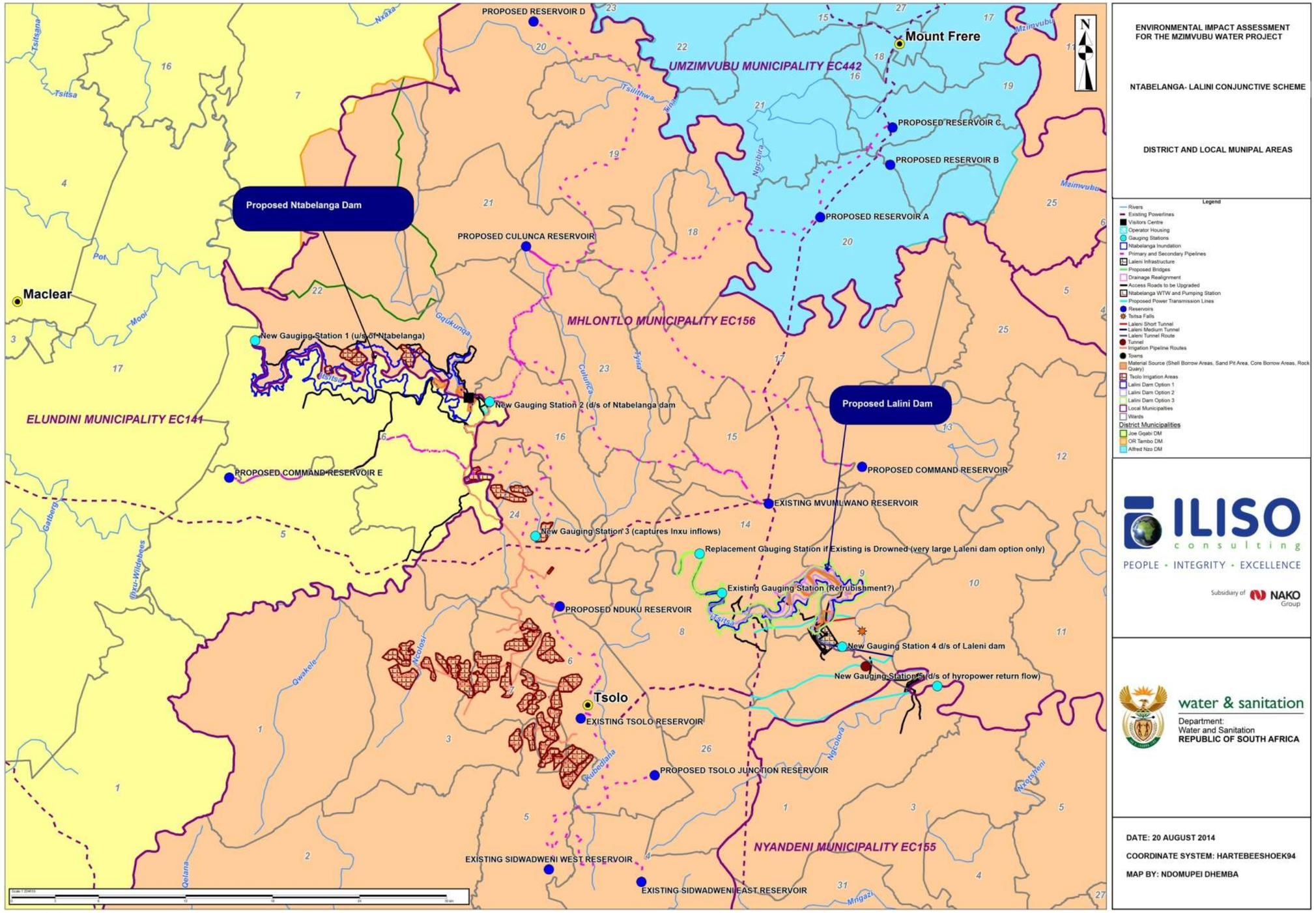

Figure 2:Study Area

The Mzimvubu River has four major tributaries, namely the Mzintlava, Kinira, Tina and Tsitsa Rivers. The proposed Ntabelanga and Lalini Dams are situated on the Tsitsa River (**Figure 3** to **Figure 7**).

Figure 3: Proposed Ntabelanga Dam upstream basin

Figure 4: Proposed Ntabelanga Dam inundated area above dam

Figure 5: Approximate location of the proposed Ntabelanga Dam

Figure 6: Approximate location of the proposed Lalini Dam

Figure 7: Tsitsa Falls downstream of the proposed Lalini Dam

3.2 WATER RESOURCES INFRASTRUCTURE

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/conduit and a power house at Lalini Dam site for generating hydropower;
- Five new flow gauging stations 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 (Figure 8); and
- An information centre at each of the dam sites.

Figure 8: Location of accommodation and wastewater treatment works at the Ntabelanga Dam

Two thirds of the water at the Ntabelanga Dam will be utilised for hydro-energy, one sixth for potable water and on sixth for irrigation.

3.2.1 The Ntabelanga Dam

The technical characteristics of the proposed Ntabelanga Dam are summarised below:

- Dam wall crest length: 407 m
- Maximum dam wall height: 67 m
- Mean Annual Runoff of River at Dam: 415 million m^3/a
- Volume impounded by dam: 490 million m^3
- Spillway capacity: 5 530 m^3/sec
- Dam type: RCC with integral spillway
- Surface area of lake behind dam: 31.5 km^2
- Backwater reach upstream of dam 15.5 km

Water levels at the Ntabelanga Dam will vary considerably as water is released to the Lalini Dam for hydropower generation. **Figure 9** shows anticipated monthly variations of water levels at the dam. The monthly variations will be the same whether base load or peaking power is generated. The daily variations would however be different depending on the power generation option.

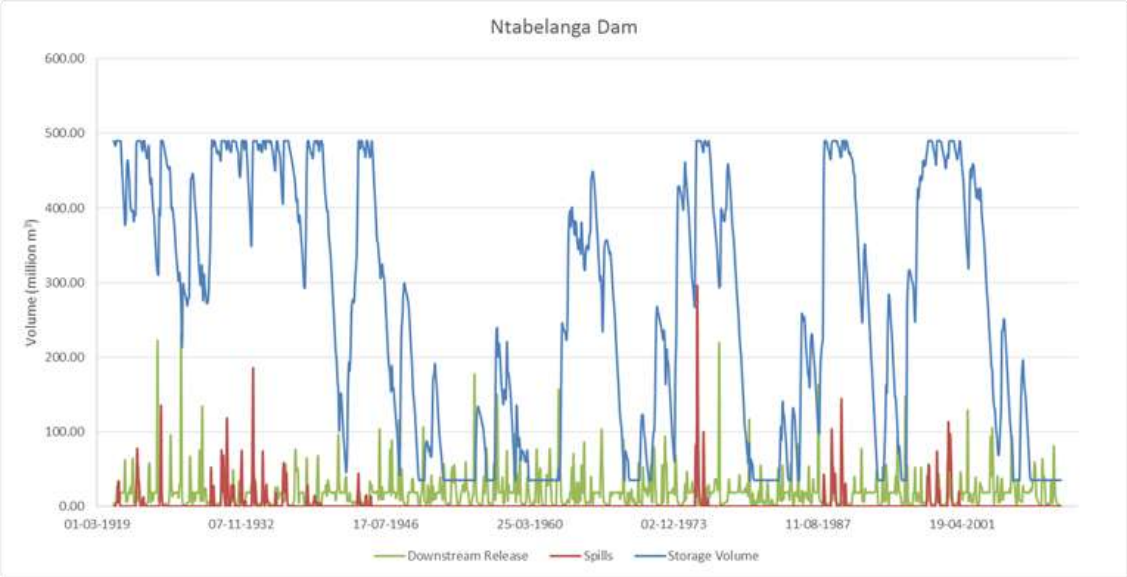

Figure 9: Monthly variation of water levels at Ntabelanga Dam

3.2.2 The Lalini Dam

The Lalini Dam characteristics are summarised below:

- Dam wall crest length: 383 m
- Maximum dam wall height 56.8 m
- Mean Annual Runoff of River at dam: 828 million m^3/a
- Maximum volume impounded by dam: 248 million m^3
- Surface area of lake behind dam: 14.7 km^2
- Backwater reach upstream of dam: 24.5 km^2

Water levels at the Lalini Dam will vary considerably as water is released for hydropower generation. **Figure 10** shows anticipated monthly variations of water levels at the dam. The monthly variations will be the same whether base load or peaking power is generated. The daily variations would however be different depending on the power generation option.

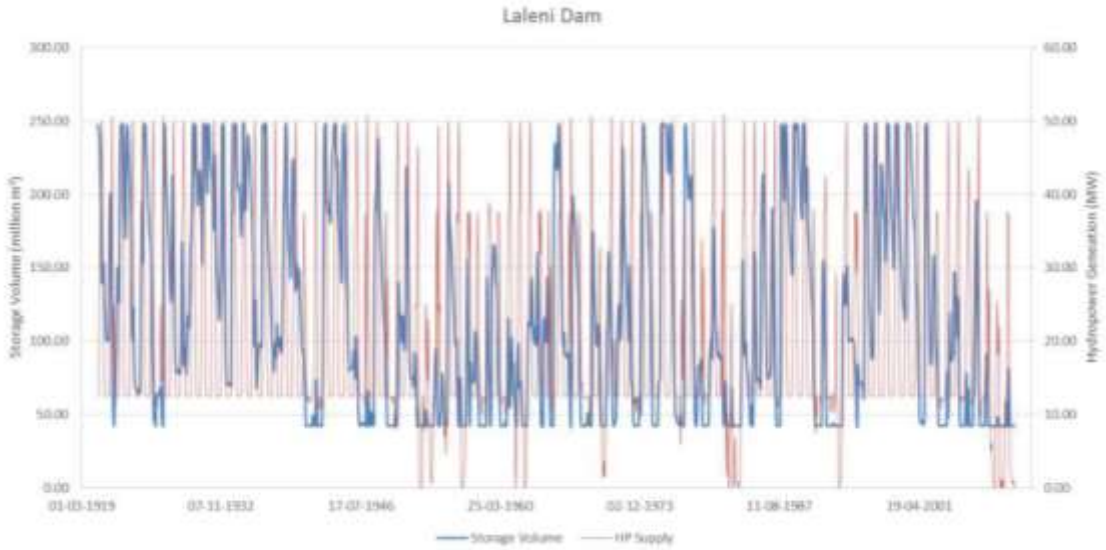

Figure 10: Monthly variation of water levels at Lalini Dam

3.2.3 The construction of the dam

Construction of each dam will require construction camps, lay down areas, and storage sites. The site will accommodate the following:

- Concrete Batching Plants, including bulk storage silos for cementitious materials;
- Site Offices and Parking - comprising two office blocks (one to house the personnel of the Resident Engineer, and one to house the Site Agent and his personnel) and 20 covered parking bays per office block, and a taxi rank;
- Materials testing Laboratory;
- Workshops and Stores - approximately five buildings;
- Reinforcing Steel Bending Yard;
- Permanent Housing for married operating personnel;
- Helipad;
- Weather Station;
- Sand and crushed stone Stockpile Areas – less than 450 m x 250 m with access roads (above area of inundation);
- Areas for the handling of hazardous substances;
- An explosives storage magazine;
- Wash bays for construction plant;
- Radio communication infrastructure;
- Facilities for the bulk storage and dispensing of fuel for construction vehicles;
- Power lines;
- A small-scale sewage treatment plant; and
- Upgrading existing gravel access road.

Construction activities will commence with the stripping of vegetation and topsoil to establish access and construction roads, site offices, dam foundations and crusher and concrete mixer stations. Topsoil will be stockpiled for reuse during the

rehabilitation stage, whilst cleared woody vegetation suitable for firewood will be stockpiled for collection by the local population for a period of time, after which it will be burnt.

Soon after commencement the river will be diverted to expose the rock foundations for the concrete spillway section / outlet works. During this period, coffer dams will be constructed to protect all foundation activities in the riverbed against flood damage (**Figure 11**). Excavators, bulldozers and trucks will be engaged to remove all loose material on the foundation of the dam until sound founding material is exposed. Limited controlled blasting will be necessary.

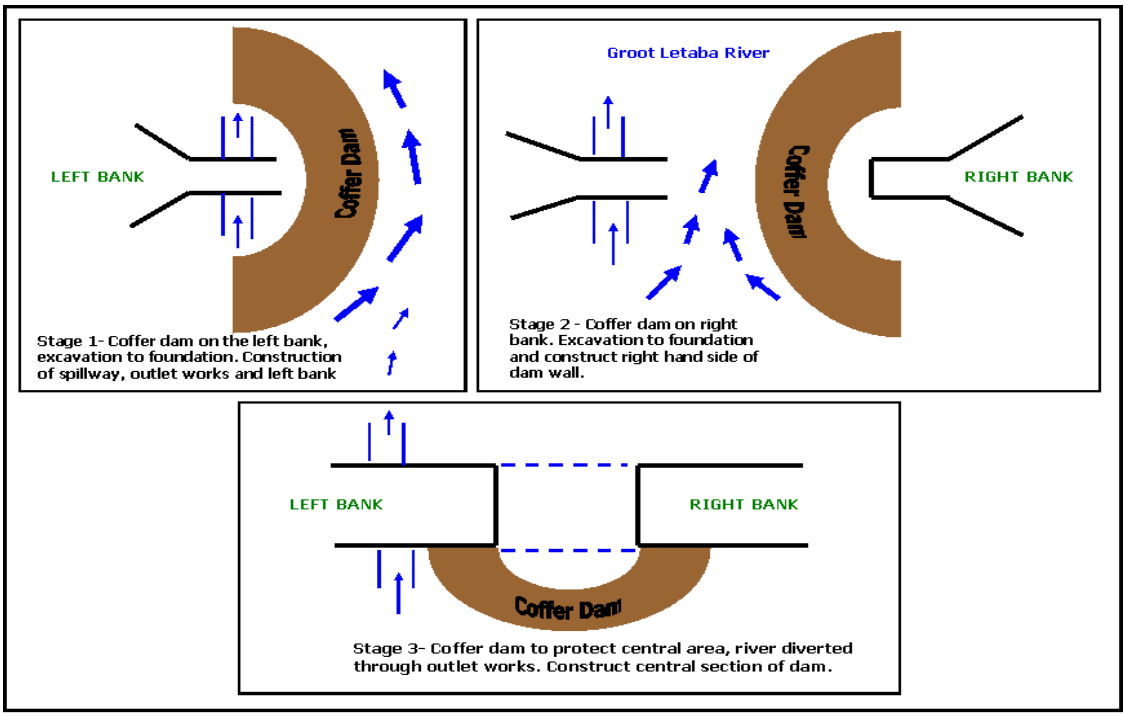

Figure 11: Typical Stages of River Diversion

Sand required for the production of concrete will be obtained from borrows areas in the dam basins. Stone for concrete production will be obtained from rock quarried in the dam basin and crushed to the required size in a crushing plant.

Concrete production at the batching plant will then commence and placement in the central spillway section, outlet works, non-overspill flanks and apron areas of the dam wall, probably by roller compaction techniques and the use of high tower and mobile cranes, will occur 24 hours a day, seven days a week, for a period of time.

The temporary site administrative buildings will be erected complete with security fencing, a water supply, sewage purification plant and an overhead power supply line.

After construction activities have been completed all the crushers, mixers and site offices, etc. will be removed and the construction site rehabilitated. All temporary access roads not in the dam basin will be ripped and covered with topsoil and planted with suitable grass and tree cover. The aim is to return the whole construction site as close as possible to its undeveloped appearance. Areas that are inundated by water in the dam basin will be shaped to avoid unintended ponding and no grass will be planted.

Permanent houses will be erected within the project area to accommodate operation and maintenance staff.

3.2.4 Flow gauging weirs

Five new flow measuring weirs will be required in order to measure the flow that is entering and released from the dams (an example of a flow gauging weir is shown in **Figure 12**. These flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams.

Positions of the weirs are indicated on **Figure 1**.

Each weir will take about six months to construct and will be a low concrete structure with erosion control measures on both banks to prevent out-flanking. It is envisaged that construction of the weirs will form part of the dam construction contract.

Figure 12: Flow Gauging weir in the Crocodile River at Nooitgedacht

3.3 DOMESTIC WATER SUPPLY INFRASTRUCTURE

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

- An intake structure and associated works at Ntabelanga Dam;
- Regional water treatment works at Ntabelanga Dam;
- Potable bulk water distribution infrastructure for domestic and industrial water requirements (primary and secondary distribution lines);
- Nine (9) bulk treated water storage reservoirs strategically located; and
- Pumping stations.

The stand-alone water storage, treatment works and pumping station compounds will be up to 3 ha each.

The scheme will have a single WTW located at the Ntabelanga Dam site that will treat raw water for domestic and industrial use. These works will be supplied with raw water from the dam outlet works to the WTW inlet works by gravity under all operating conditions.

Sludge produced from the settlement and filtration processes will be stored in sludge settlement tanks and drying beds which will periodically need to be dewatered and de-sludged, in an environmentally acceptable manner. It is proposed that all the residuals produced by the works be dried and disposed of off-site.

A significant portion of the domestic water supply schemes in this area will fall under the OR Tambo and Joe Gqabi DMs (**Figure 13**). Some communities are served by existing schemes (**Figure 14**), which have been taken into account in the development of the proposed infrastructure.

The total pipeline servitudes amount to a length of approximately 375 km.

Construction of the pipelines will commence with pipes being strung out along the pipeline routes and trenches, up to 3.5 m deep and 2.5 m wide for the largest of the pipes, being excavated (**Figure 15**). Under normal circumstances a maximum of 5 km of open trench is permitted, whilst the pipes will be strung out as they arrive from the manufacturer. Excess spoil material from the trenches will be transported to a suitable disposal site and sandy material will be brought in as bedding and selected backfill for pipe protection. Once the pipes have been laid and tested, the trench will be backfilled, compacted and shaped to the natural ground profile. Topsoil will be replaced to re-establish vegetation.

A ten to thirty meter wide strip would be impacted during constructing **(Figure 16).**

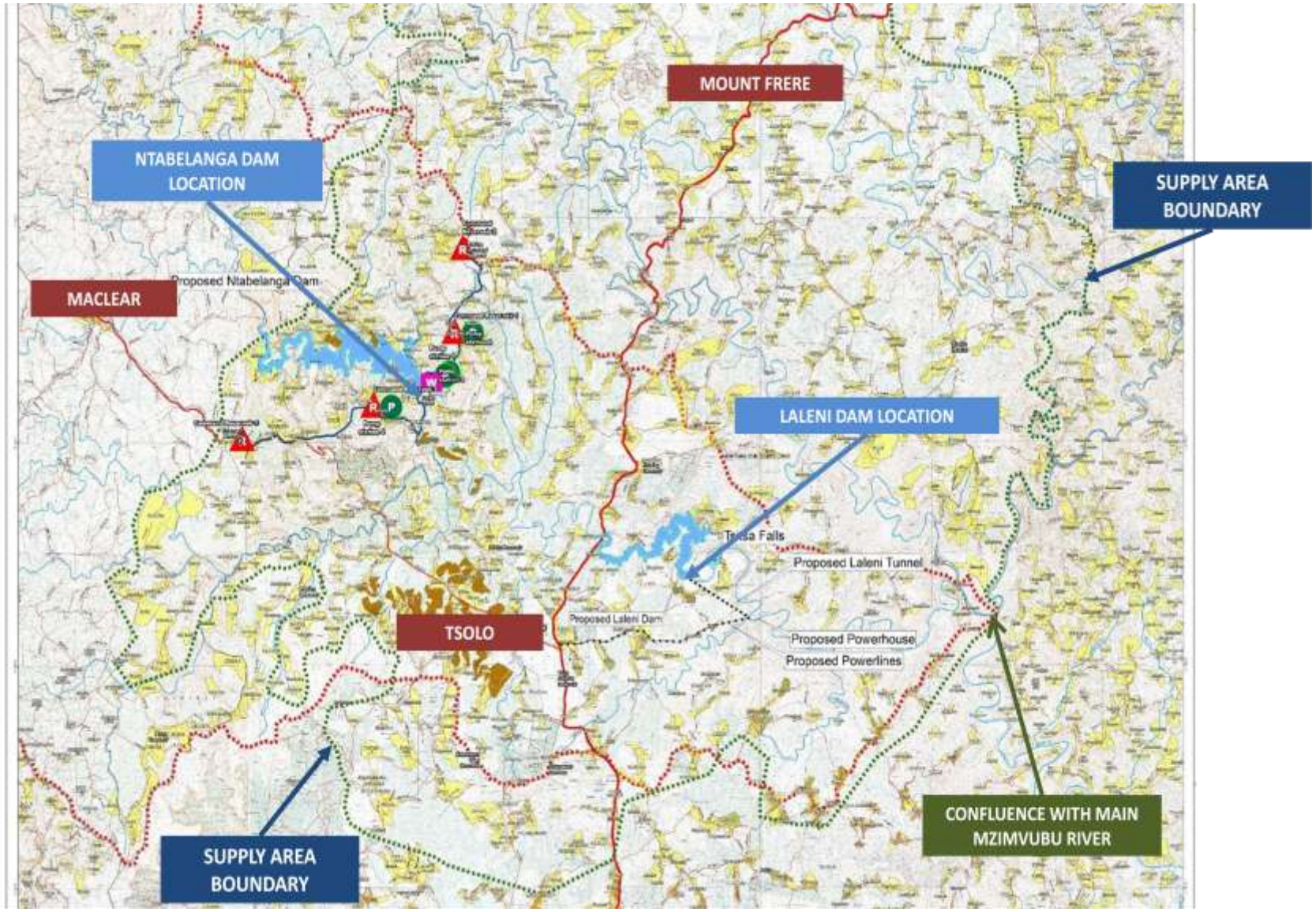

Figure 13: Ntabelanga Dam potable water supply areas

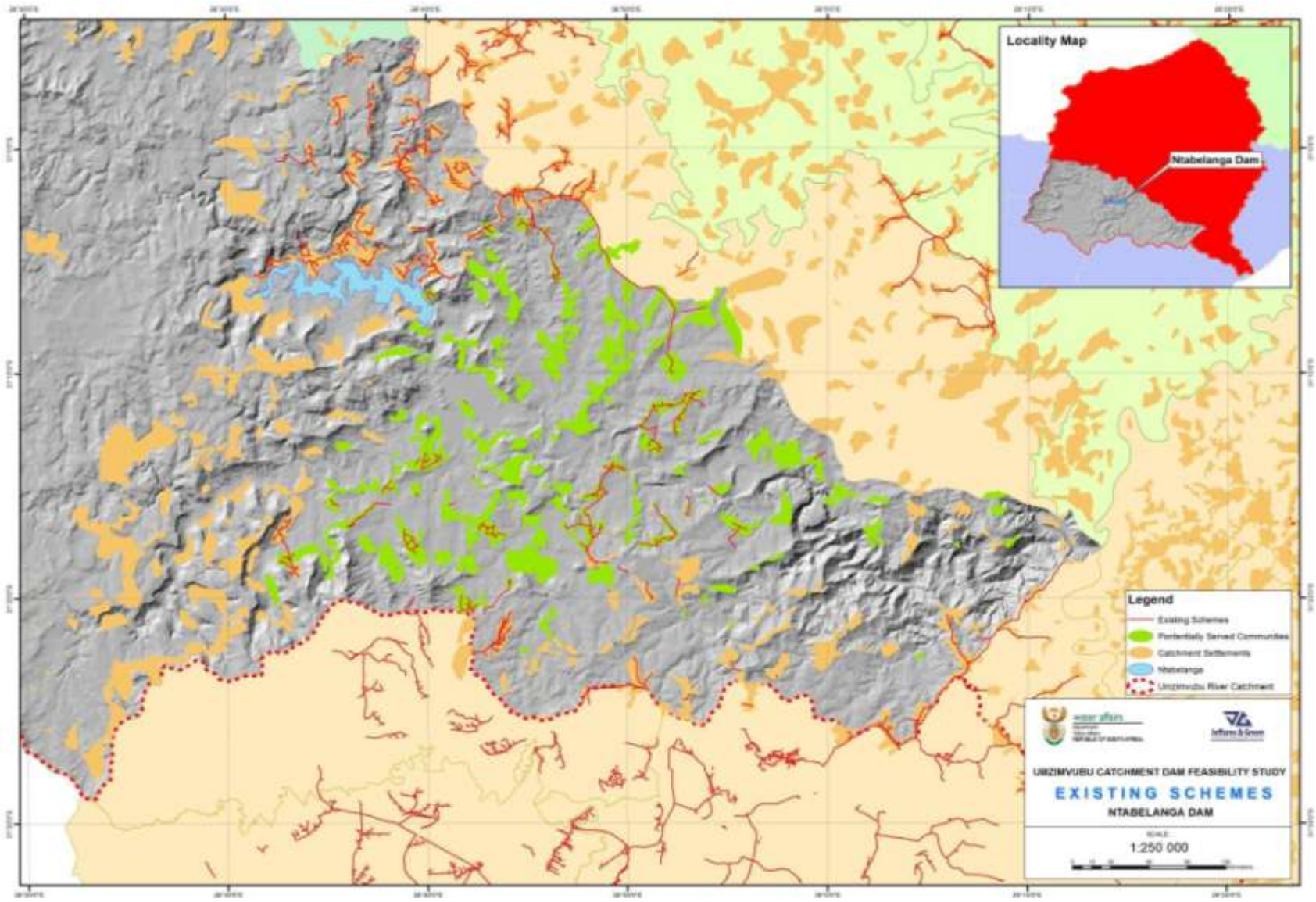

Figure 14: Existing water supply schemes

Figure 15: Pipe laying

Figure 16: Trench and working area for pipe lying

Although the reservoirs associated with the pipelines may differ according to their individual capacity and local topography, the technical details are similar for each and are presented below.

Construction Material -	Concrete or steel
Shape and Height-	Shape and height will be determined during the detail design stage but usually circular up to 8 m high (**Figure 17**). Steel reservoirs are rectangular.
Area Required -	Approximately 2 ha
Storage Capacity-	Approximately 1 Mℓ to 30 Mℓ providing between 4 and 24 hours storage per site, but subject to finalisation.

Fencing and Security- Each reservoir will be fenced. No permanent security staff will be present on site.

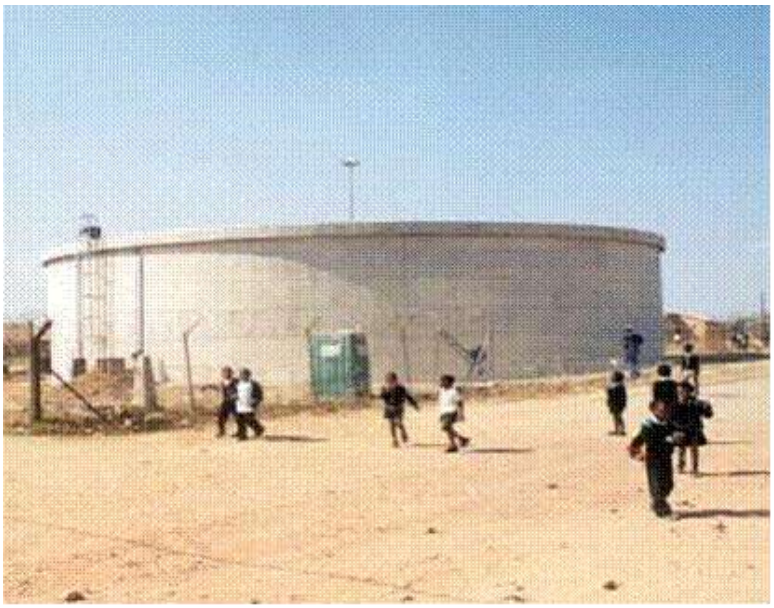

Figure 17: View of a typical large concrete reservoir

3.4 IRRIGATION

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.

The entire Mzimvubu catchment was considered in the identification of high potential land for irrigated agriculture. During Phase 1 of the feasibility study, a desktop GIS exercise was carried out to identify high potential irrigable soils according to certain criteria, for purposes of ranking the dam sites identified. The criteria were:

- High potential soils according to soil form, depth, texture;
- Slope less than 12%;
- Elevation less than 60 m above the river at the dam site, or in the river below the dam site;
- Distance less than 5 km from the dam wall or either side of the river below the dam site; and
- Water deficit – medium to high water stress (shortage of natural rainfall).

When combined with other non-agricultural criteria in a ranking matrix, Ntabelanga Dam site emerged as the top ranked dam. The land identified around Ntabelanga Dam now met the following criteria:

- High potential soils;
- Slope less than 12; and
- Water deficit – medium to high water stress (shortage of natural rainfall).

The Irrigation Development study (DWA, 2013a) identified about 2 450 ha of the high potential land suitable for irrigated agriculture associated with the Ntabelanga Dam site. This land is located 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 (**Figure 18**).

Agricultural land near the river will be supplied with raw water pumped by pipeline from the nearest river abstraction point on the Tsitsa River, downstream of the Ntabelanga Dam.

For the Tsolo area schemes, raw water would be pumped from the dam to a storage reservoir and delivered to the edge of these fields through a bulk water distribution system. These lands are located near to the following settlements/wards: Godini, Qhotira, KuGubengxa, St Cuthberts, Jwabuleni, Mazizini, KwaNomadolo and Gumbini. For the other areas, raw water would be abstracted directly from the adjacent dam or river using mobile pumping systems.

The proposed farming model is commercial irrigation farming. Forty five (45) rationalised farming units of between 40 ha and 90 ha each (average of 60 ha) are envisaged. This will require acceptance of a change of land use and mind set from the current subsistence farming approach.

Distribution of water to the farming units will be mostly gravity based, with booster pumping stations for higher lying areas.

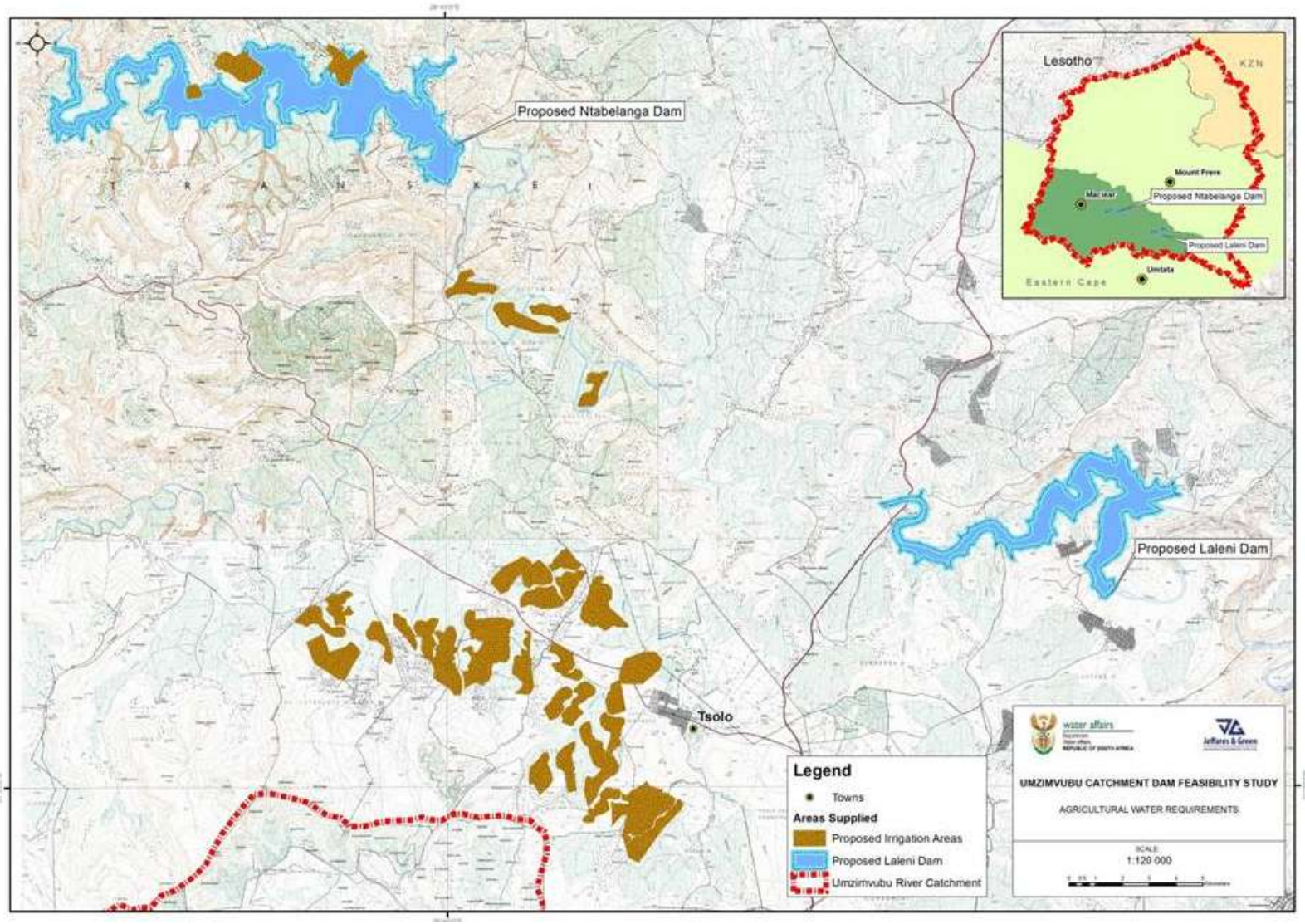

Figure 18: Proposed irrigation areas

3.5 POWER

The feasibility study findings indicate that the viability of the proposed Ntabelanga Dam is dependent on its development as a strategic part of a conjunctive hydropower scheme. A dam at the Lalini site, also on the Tsitsa River upstream of the Tsitsa Falls, is considered to be a viable hydropower generation scheme (**Figure 19**).

There will be a small hydropower plant at 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.

The hydropower plant at the proposed 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. Neither the Lalini Dam nor the hydropower plant will be visible from the Tsitsa Falls.

The power line linking the Lalini hydro-electric power station to the existing Eskom grid will be approximately 13 km. It is expected that monopole structures will be used, which after planting, will protrude between 19.2 m and 21 m.

3.6 AFFECTED INFRASTRUCTURE

The area to be inundated by the dams will submerge some roads as well as other infrastructure such as power lines.

3.6.1 Roads

Approximately 80 km of local roads will be re-aligned in the Ntabelanga Dam area (indicated in magenta in **Figure 20**). Additional local roads will also be upgraded to support social and economic development in the area (indicated in red in **Figure 20**). The road design will be very similar to the existing roads and will be constructed using similar materials.

All road designs will be submitted to the relevant road authorities to obtain their approval before construction commences.

The major items of work to be carried out are the following:

- Clearing of the road footprint;
- Construction of the roads with gravel surfacing;

- The gravel for the pavement layers and fill will be obtained from DMR approved borrow pits and/or cuttings along the road;
- All stormwater drainage will be accommodated using either pipe or portal culverts; and
- The existing roads will be utilised whilst the new realigned sections are constructed; in order to avoid the need for temporary detours during construction.

Materials required for the construction of the roads will be sourced as far as possible from borrow areas with existing permits or from commercial sources. Any new sources required will be subject to separate approval processes.

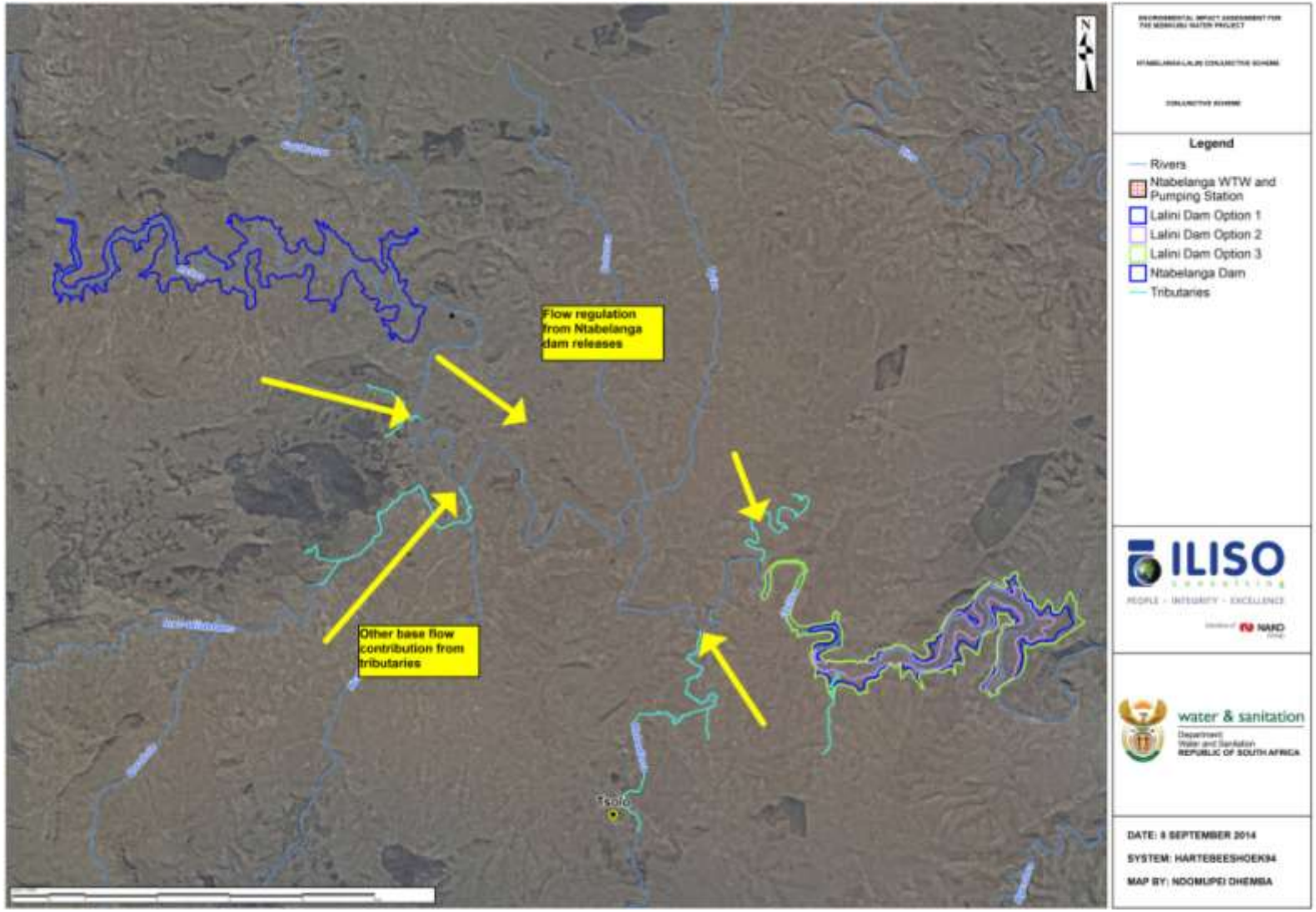

Figure 19: Proposed Ntabelanga-Lalini Conjunctive Scheme

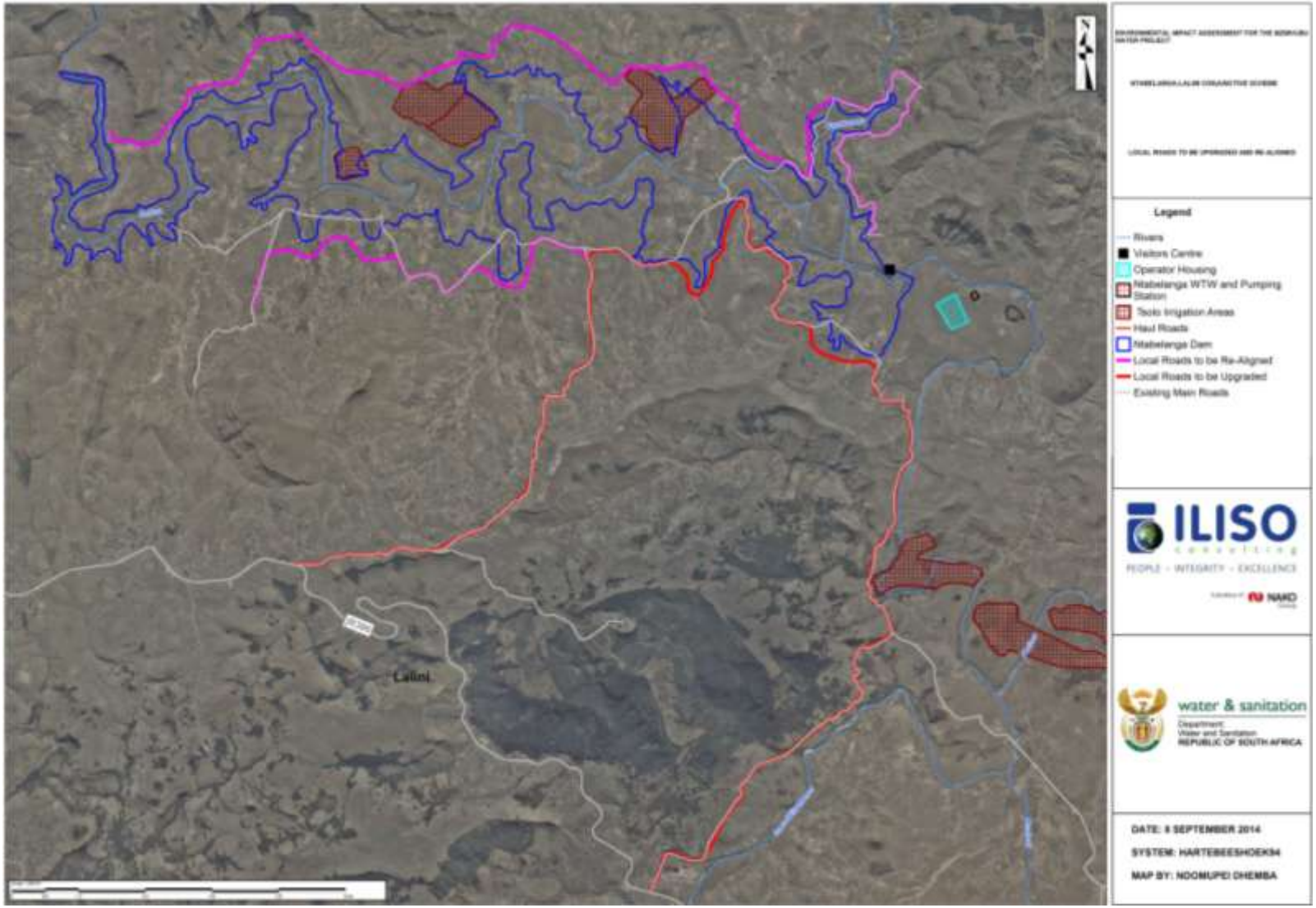

Figure 20: Re-alignment of inundated roads and upgrading of access roads in the vicinity of the Ntabelanga Dam site

3.6.2 Power lines

Power line realignments will be required due to dam inundation levels for both the Ntabelanga and Lalini Dams. Consultation with Eskom is on-going to determine how affected areas will be re-connected. This will be finalised at detailed design stage when formal applications are submitted to Eskom for new power supplies.

Figure 21 and **Figure 22** indicate how the existing power line network will be affected by the inundation at the Ntabelanga and Lalini Dams respectively.

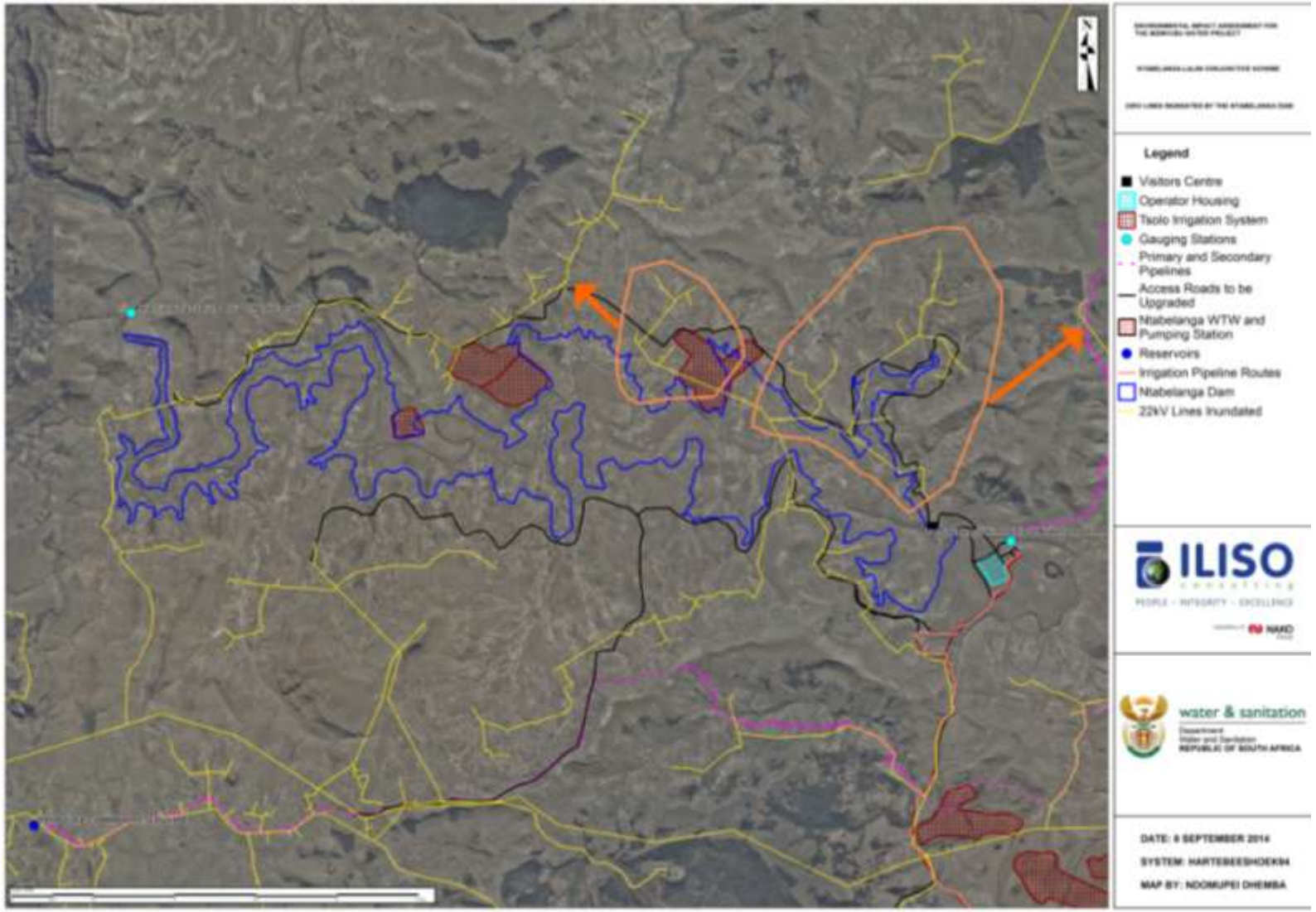

Figure 21: Affected power lines at Ntabelanga Dam

Figure 22: Affected power lines at Lalini Dam

3.7 LALINI DAM BORROW AREAS

Three borrow areas and one rock quarry will be required for the construction of the Lalini Dam and associated works. One core borrow area, one shell/fill borrow area, one sand borrow area and one rock quarry have been identified to source the required materials.

The proposed borrow areas and rock quarry are located within the appropriation line of the dam basin, upstream of the dam wall and in most cases below the Full Supply Level (FSL) **(Figure 23). Table 5** details the estimated area and volumes of material required from the various borrow areas and the rock quarry for Lalini Dam.

Table 5: Estimated Volumes and Areas for Lalini Borrow Pits and Quarry Area:

Material to be Mined	Estimated Area (m^2)	Estimated Volume (m^3)
Fill Borrow Pit	370 000	740 000
Core Borrow Pit Site	400 000	1 000 000
Sand Borrow Pit Site	900 000	1 000 000
Rock Quarry Site	52 500	750 000

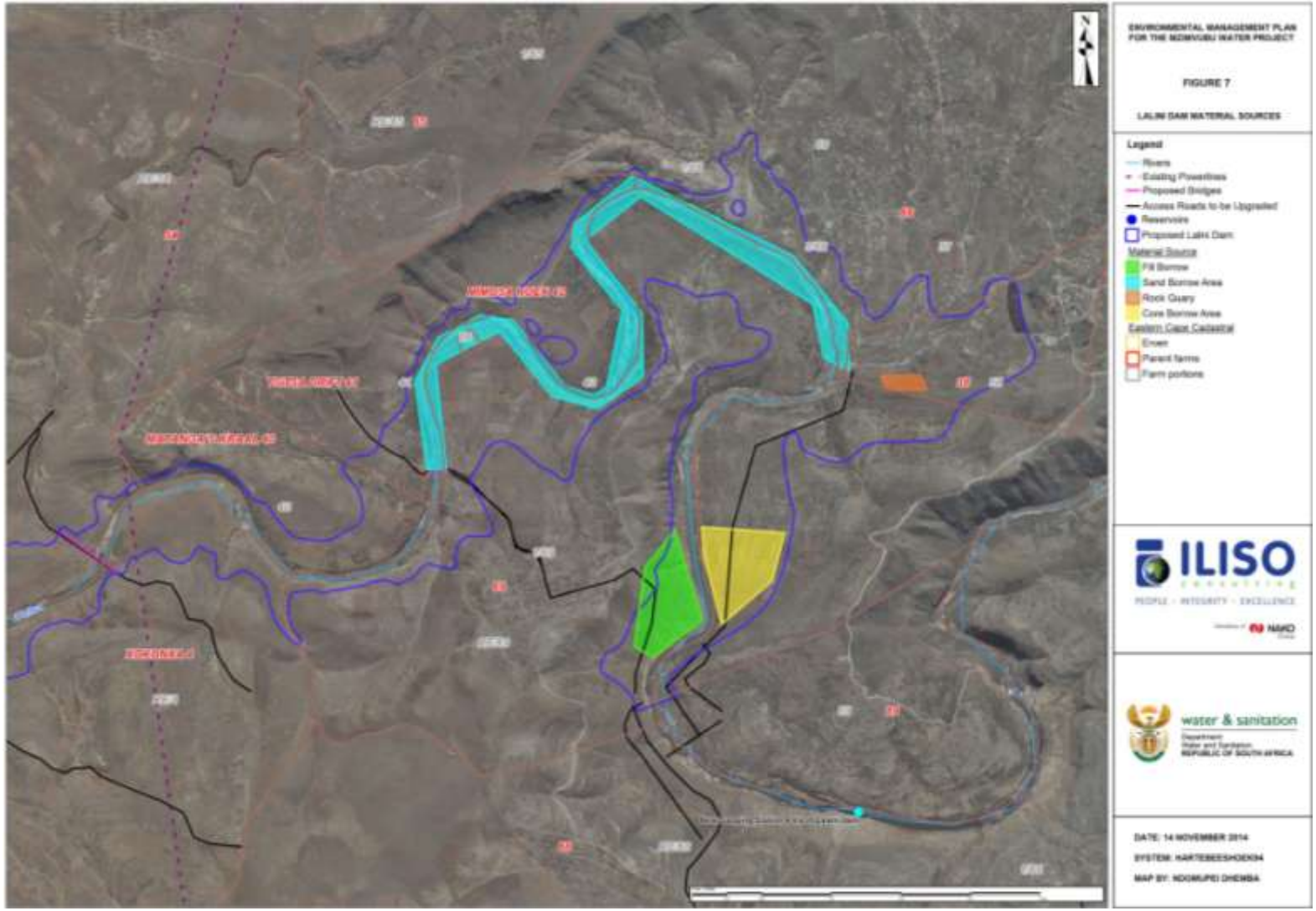

Figure 23: Lalini Borrow pits and Quarry Area

3.7.1 Core Borrow Pit

The core borrow pit is located upstream of the dam wall on the left bank of the river. As detailed in chapter 5 of this report the area exhibits transformed vegetation and there is no infrastructure or servitude areas within the vicinity of the proposed borrow area. The current access road will have to be upgraded.

3.7.2 Shell Borrow Area

The shell borrow pit is located upstream of the dam wall on the right bank of the river. As detailed in chapter 5 of this report the area exhibits transformed vegetation and there is no infrastructure or servitude areas within the vicinity of the proposed borrow area.

3.7.3 Rock Quarry

The rock quarry is located upstream of the dam wall on the left bank of the river. As detailed in chapter 5 of this report the area exhibits transformed vegetation and there is no infrastructure or servitude areas within the vicinity of the proposed quarry area.

3.7.4 Sand Borrow Area

General Description

The area demarcated for the sand borrow pit is located upstream of the dam wall across the left and right banks of the river. The mining operations will take place within the riverine environment. The Mzimvubu subWMA is important with regards to fish corridors for movement of threatened fish between habitats. In this regard the riverine environment is considered to merit particular protection.

This activity forms part of the water use license application to the DWS for the MWP. The best practice guideline for small scale mining developed by DWS will be adhered to as a minimum requirement together with any other conditions that DWS may impose.

3.7.5 Access

Access roads to the proposed borrow and quarry areas will be established as part of the dam construction and associated infrastructure. This aspect and management thereof will be covered in more detail in the MWP EMPR. In general, access roads will be constructed in accordance with provincial standards and codes of practice and in consultation with the Engineer.

Access to the riverbed for the purpose of conducting excavations in the riverbed, shall be through the use of only one access at a time. The location of the access to the river channel across the river-bank shall be at a point of the riverbank where the least excavation and damage to vegetation will occur and shall not be wider than is reasonably required. The position of the river access together with all planned future access points must be indicated on a layout plan.

3.8 NTABELANGA DAM BORROW AREAS

Five borrow areas and one rock quarry will be required for the construction of Ntabelanga Dam and associated works. Two core borrow areas, two fill borrow areas, one sand borrow area and one rock quarry have been identified to source the required materials.

The proposed borrow areas and rock quarry are located within the appropriation line of the dam basin, upstream of the dam wall and in most cases below the FSL **(Figure 24). Table 6** details the estimated area and volumes of material required from the various borrow areas and the rock quarry.

Table 6: Estimated Volumes and Areas for Ntabelanga Borrow Pits and Quarry Area:

Material to be Mined	Estimated Area (m^2)	Estimated Volume ($m^{3)}$
Core Material Borrow Pit 1	95 549.78	260 000
Core Material Borrow Pit 2	109 899.81	75 000
Shell/General Fill Borrow Pit 1	313 179.38	2 100 000
Shell/General Fill Borrow Pit 2	120 916.02	
Sand Borrow Pit	111 715.65	105 000
Rock Quarry	34 134.72	362 500

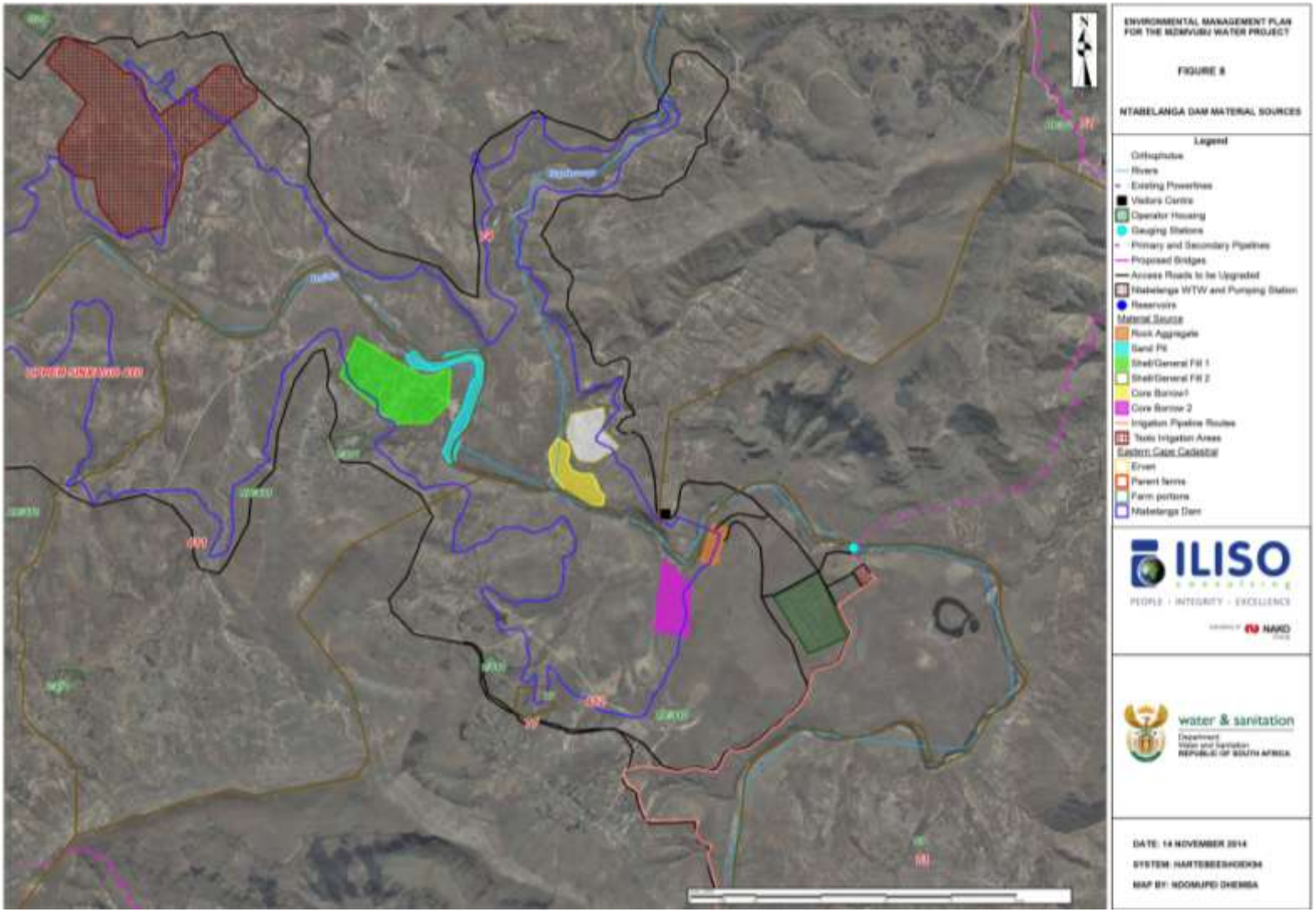

Figure 24: Ntabelanga borrow and quarry areas

3.8.1 Core Borrow Pit 1

The core borrow pit 1 is located upstream of the dam wall on the left bank of the river. As detailed in chapter 5 of this report the area exhibits transformed vegetation and there is no infrastructure or servitude areas within the vicinity of the proposed borrow area.

3.8.2 Core Borrow Pit 2

The core borrow pit 2 is located upstream of the dam wall on the right bank of the river. As detailed in chapter 5 of this report the area exhibits transformed vegetation and there is no infrastructure or servitude areas within the vicinity of the proposed borrow area.

3.8.3 Fill Borrow Pit 1

The fill borrow pit 1 is located upstream of the dam wall on the left bank of the river. As detailed in chapter 5 of this report the area exhibits transformed vegetation and there is no infrastructure within the vicinity of the proposed borrow area.

3.8.4 Fill Borrow Pit 2

The fill borrow pit 2 is located upstream of the dam wall on the left bank of the river. As detailed in chapter 5 this report the area exhibits transformed vegetation and there is no infrastructure within the vicinity of the proposed borrow area.

3.8.5 Rock Quarry

The rock quarry is located upstream of the dam wall on the right bank of the river. As detailed in chapter 5 of this report the area exhibits transformed vegetation and there is no infrastructure or servitude areas within the vicinity of the proposed quarry area.

3.8.6 Sand Borrow Area

The area demarcated for the sand borrow pit is located upstream of the dam wall across the left and right banks of the river. The mining operations will take place within the riverine environment.

This activity forms part of the water use license application to DWS for the MWP. The best practice guideline for small scale mining developed by DWS will be adhered to as a minimum requirement together with any other conditions that DWS may impose.

3.8.7 Access

Access roads to the borrow and quarry areas will be established as part of the dam construction and associated infrastructure. This aspect and management thereof will be covered in more detail in the MWP EMPR. In general access roads will be constructed in accordance with provincial standards and codes of practice and in consultation with the Engineer. Access to the riverbed for the purpose of conducting excavations in the riverbed, shall be through the use of only one access at a time.

The location of the access to the river channel across the river-bank shall be at a point of the riverbank where the least excavation and damage to vegetation will occur and shall not be wider than is reasonably required. The position of the river access together with all planned future access points must be indicated on a layout plan.

4. ALTERNATIVES

One of the objectives of the EIA is to avoid and minimise negative impacts wherever possible. The primary tool for avoiding impacts is to consider alternatives. An alternative is a possible course of action, in place of another, that would generally meet the same purpose and need defined by the development proposal, but which would avoid or minimize negative impacts or enhance project benefits.

Alternatives must be practical, feasible, relevant, reasonable and viable. They can be in terms of:

- Activity (project) alternatives (e.g. incineration rather than landfill);
- Location;
- Scheduling (Timing);
- Technology (Process);
- Design;
- Different use of land;
- Demand;
- Inputs; or
- Routing.

It is also a requirement of the EIA Regulations that the "No-go"/"Do nothing" option be comparatively assessed.

Previous investigations done in the feasibility phase of the project assessed alternative dam sites for the project. These assessments have been reviewed and are considered adequate for the EIA requirements. Further studies on alternative dam sites have therefore not been undertaken in the impact assessment phase of this study. Project level alternatives that have been considered are discussed in section 4.2.

4.1 ALTERNATIVES CONSIDERED DURING THE SCOPING PHASE

The following alternatives were considered during the scoping phase, but not carried forward to the impact assessment phase, for various reasons summarised below.

4.1.1 A different activity that achieves the same objective as the project

An activity alternative would be to consider different uses for the same financial investment that could provide potable and irrigation water to the supply area, improve the quality of life and generate an equivalent number of jobs and income to the area.

As the applicant for this project is the Department of Water and Sanitation who has a mandate to develop water resources infrastructure and not to implement development projects of a different nature, it is not feasible to investigate such alternatives.

However, within the mandate of DWS, the following alternatives have been proposed:

a) Construct smaller dams

Several smaller dams could be constructed. In parallel, improvements in water infiltration by improving vegetation cover in the catchment to provide more volume and quality with improved winter flows, could be implemented to render the extraction from those small dams more sustainable. Improvement of infiltration would also mitigate against big floods that are prevalent in the area.

The technical feasibility study has looked into options of building smaller dams vis-a-vis the project objectives of supplying as many households as possible within economic reach of the dams, maximising the development of irrigated agriculture, developing hydropower for local consumption on the scheme as well as excess energy for revenue generation to improve the economics of the scheme, employment creation and above all socio-economic development of the area. The study found that the potential sedimentation into the newly created reservoirs worked against smaller dams, as they could easily be silted up, thereby shortening the useful life of the project and decreasing its financial viability.

Catchment rehabilitation and management is being implemented as part of the broader development in the catchment, and also in direct support to the project. The rehabilitation of the catchment would need to be implemented, be effective and be sustainable before smaller dams could be economically constructed as an alternative to a large dam. This implies that the implementation of the proposed project to provide socio-economic upliftment of the area would need to be postponed for 10 to 15 years.

b) Develop groundwater resources

Improving water infiltration will improve underground water reserves and could allow for the development of boreholes in villages to provide higher quality water.

This alternative was considered but does not fully address the objectives of the project, notably in terms of socio-economic development of the area. The development of groundwater resources is dependent on the availability of such resources in the particular area where villages are located. Adequate and sustainable underground water reserves are not available to supply all villages in the area.

The development and operation of village boreholes is the mandate of district municipalities and not DWS, although the Department can provide support where possible. The district municipalities will still likely continue to develop groundwater to supply those communities that cannot be economically reached by the project and other developments in the area. A major disadvantage of isolated boreholes

scattered throughout a wide area, as experienced by district municipalities, are the huge operational and maintenance challenges.

c) Provision of water by rain-fed tanks

Rain water harvesting does not fully address the objectives of the project, notably in terms of socio-economic development of the area. A rain water harvesting programme can however be implemented to complement the Mzimvubu Water Project.

4.1.2 Dam site alternatives

Location alternatives would be building the dam/s at a different site. As dam site alternatives have already been investigated, and as the site selection process included environmental and social criteria, only the preferred dam sites (i.e. Ntabelanga and Lalini) have been investigated in the EIA.

4.1.3 Alternative dam types

The feasibility study considered various dam types and the selected optimum dam type for both the Ntabelanga and Lalini Dams is a mass gravity Roller Compacted Concrete (RCC) dam, with integrated outlet works and spillway. A typical cross-section of the dam wall is shown on **Figure 25**.

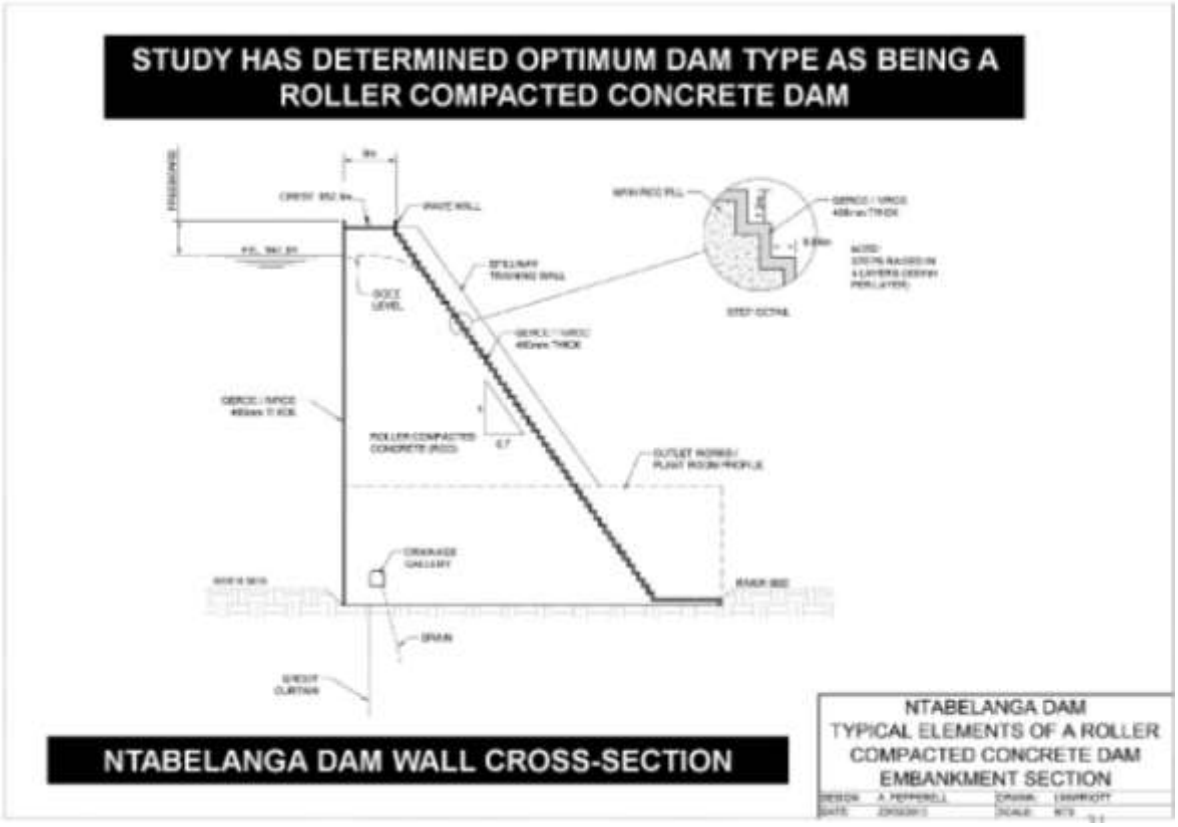

Figure 25: Typical Ntabelanga Dam wall cross-section

The choice of dam type is driven by technical aspects and is not included in the specialist studies.

4.1.4 A number of smaller water sources rather than a dam

For rural water supply a single large water source or a number of smaller sources can be used. The option of a number of smaller schemes has been considered but the conclusion was reached that, for the large population involved, the cost and risks of a large scheme should be accepted because of the difficulties and cost of sustaining a large number of smaller schemes (Muller, 2014). The smaller schemes alternative was therefore not considered in this report.

4.2 ALTERNATIVES ASSESSED DURING THE IMPACT ASSESSMENT PHASE OF THE EIR

4.2.1 Hydropower generation options

The Ntabelanga Dam is considered to be the best option to supply domestic water requirements and irrigated agriculture. The Lalini Dam, downstream of the Ntabelanga Dam but upstream of the Tsitsa Falls, is being proposed for generating hydropower. The two dams will be operated together in a conjunctive scheme to improve the economic sustainability of the overall scheme. Releases from the Ntabelanga Dam can provide a reliable stream flow for generating hydropower at the Lalini Dam. Water from the Lalini Dam will be conveyed to a Hydro Electric Power generating plant downstream of the Tsitsa Falls, after which the water used for generation is released back into the river.

The Mzimvubu Water Project infrastructure will require power supplies from ESKOM for an estimated peak demand of 12.5 MW, with average annual consumption of 87 million kWh/a, and an estimated energy cost of Rand 73 million/a. Developing the conjunctive hydropower scheme would allow a wheeling arrangement to be established, which could provide the above energy into the grid as well as generating surplus revenue to fund overall scheme operation and maintenance.

Power generation can be implemented as base load only, full-time peaking or part time peaking basis. The greatest impacts of the hydropower generation are that the natural flows in the river are altered (negative) and that income is generated (positive). The difference that these options will make will be in the size and timing of the flows that are released back into the Tsitsa River, and the amount of income generated. Base load generation will result in the release of consistent quantities of water, while peak generation will result in significantly larger flows of water being released for fewer hours in a day.

The EAP recommends, as indicated by the DEA, that any Environmental Authorization is subject to the Water Use License being obtained and adhered to. The WUL takes the Reserve determination, which includes setting the Ecological

Water Requirements (EWR), into account. The EWR are determined to protect the in-stream aquatic and riparian ecology of the river by setting the limits of deviation from the natural flow beyond which the impact would be unacceptable. Whichever option of hydropower generation results in the greatest financial income while still fully meeting the EWR is therefore recommended. The feasibility study and EIA propose the base load scenario as the preferred option.

4.2.2 Alternative tunnel and associated power line routes

Three alternative power line routes, linking the hydropower plant downstream of the Lalini Dam to the grid, are being considered (**Figure 26**). The three power line routes correspond to three possible tunnel (or pipeline-tunnel combination) lengths from Lalini Dam to the hydropower plant. The amount of power generated depends on the available head, which increases with distance downstream of the Tsitsa Falls and corresponding increased length of the tunnel.

Alternative 1 consists of a 2.1 km tunnel and 7.1 km power line (in red and light blue on the map). Alternative 2 consists of a 4.9 km tunnel and 10.2 km power line (in dark blue and yellow on the map). Alternative 3 consists of a approximately 4.6 km pipeline and approximately 3.2 km tunnel (in purple on the map) and 12 km power line (in orange on the map). All three alternative routes have been considered in the EIA.

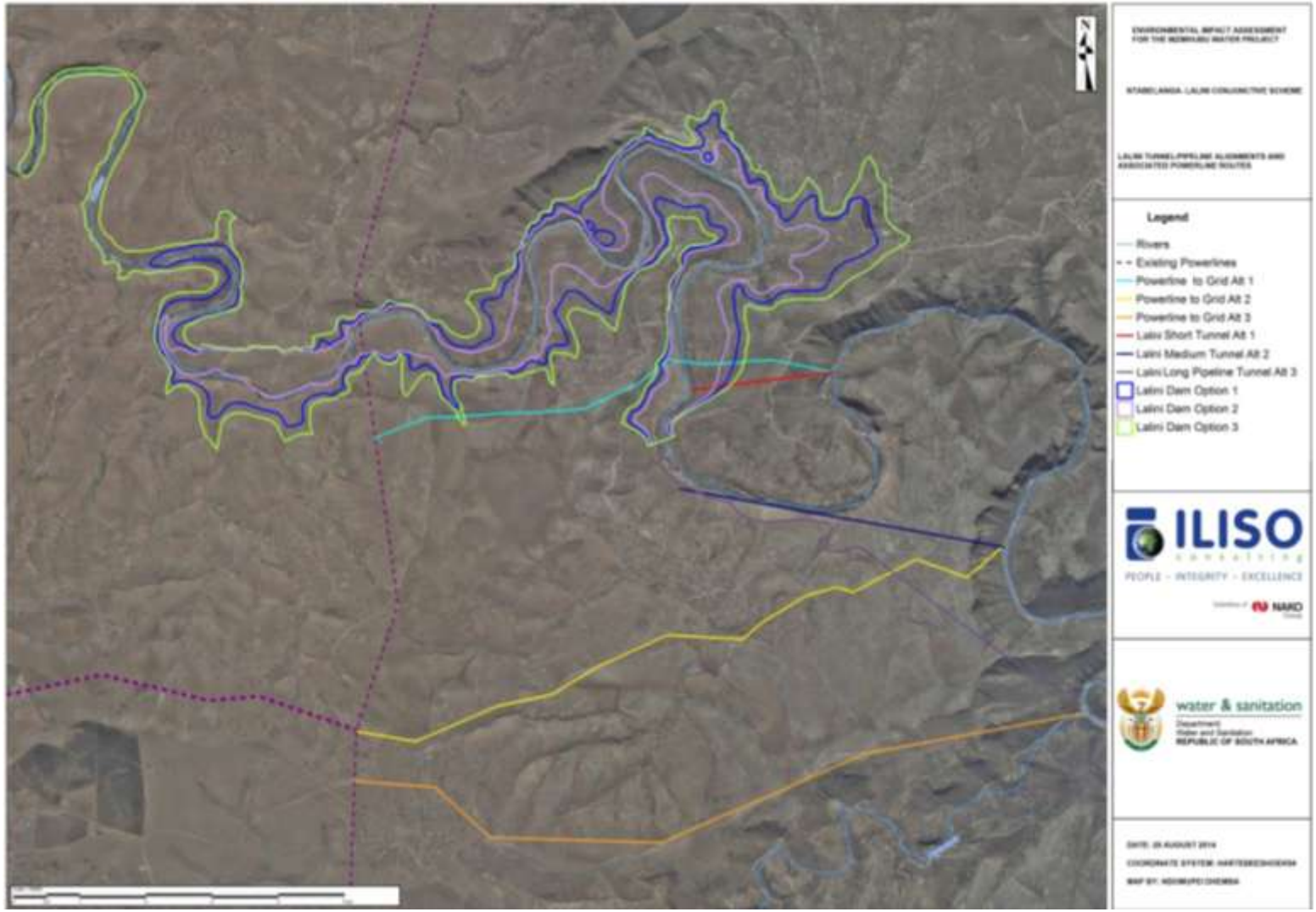

Figure 26: Alternative tunnels and power line routes at Lalini Dam

4.2.3 Alternative dam sizes

Three dam sizes are proposed for the Lalini Dam (**Figure 27**) and have been considered in the EIA.

4.3 SUMMARY OF ALTERNATIVES ASSESSED IN THE EIA

The alternatives that are considered in the EIA are therefore:

- Three hydropower 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.

Regarding the road alignments, pipeline routes and reservoir positions, no alternative routes/positions were identified during the feasibility study. The approach to the impact assessment was therefore to identify any sensitive areas that should be avoided, for consideration by the technical team. Any deviations derived in this manner were included in the ***Environmental Impact Assessment Report: P WMA 12/T30/00/5314/3***.

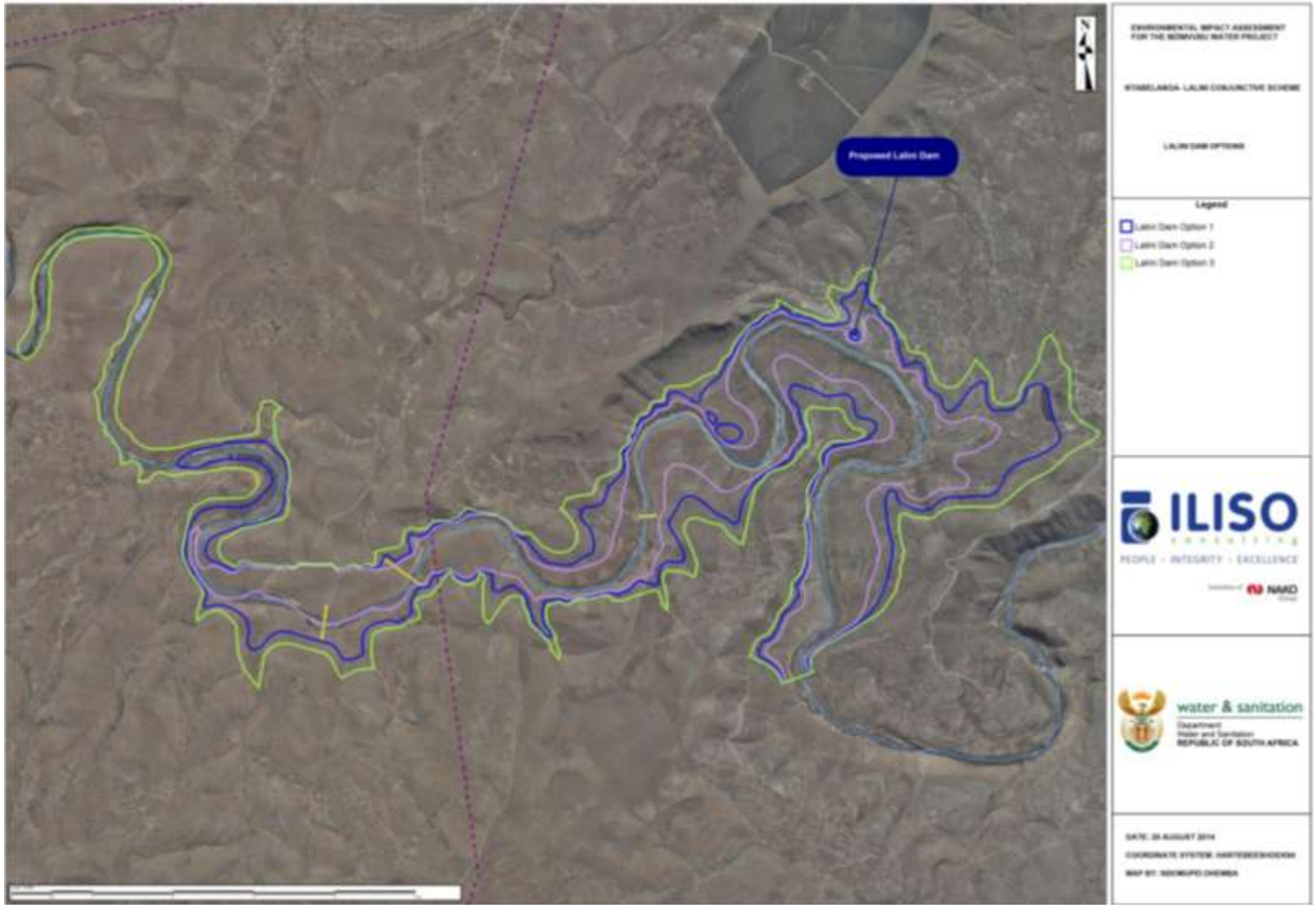

Figure 27: Lalini Dam alternative dam sizes

5. DESCRIPTION OF THE WATER USE

The following water uses will be applied for:

- **Section 21 (a)**: taking water from a water resource;
- **Section 21 (b)**: storing of water;
- **Section 21 (c)**: impeding or diverting the flow of water in a water course;
- **Section 21 (e)**: engaging in a controlled activity identified as such in section 37(1) (c);
- **Section 21 (f)**: discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- **Section 21 (g)**: disposing of waste in a manner which may detrimentally impact on a water resource; and
- **Section 21 (i)**: altering the bed, banks, course or characteristics of a water course.

5.1 NTABELANGA DAM - WATER RESOURCES INFRASTRUCTURE

Water resources infrastructure will include the following:

a) <u>The construction of a dam at the Ntabelanga site</u>

The Ntabelanga Dam (RCC with integral spillway) will have a storage capacity of 490 million m^3 and will operate together with the Lalini Dam in a conjunctive scheme operated as one integrated scheme to improve the sustainability of the overall system.

- The purpose of the Ntabelanga Dam will be to:
  - Supply potable water to a new water treatment works with a capacity of 102,000 m^3/day (and a bulk water distribution system supplying some 724 000 people in the year 2050);
  - Supply raw water to 2 868 ha of high potential irrigable land, mostly in the Tsolo area;
  - Generate hydropower ranging from 0.75 MW to a peak of 5.0 MW;
  - Maintain Environmental Water Releases downstream of the dam; and
  - Release water downstream to supplement flow to the hydropower scheme at the Laleni Dam site.

The following water uses apply:

- The Ntabelanga Dam will store water which constitutes a **Section 21 (b)** water use.
- The dam wall will permanently impede the flow of the Tsitsa River during its operational phase. This constitutes a **Section 21 (c)** water use.

- During construction the Tsista River will be diverted to expose the rock foundations for the concrete spillway section / outlet works which constitutes a **Section 21 (c)** water use.
- The dam wall will permanently alter the bed, banks, course and characteristics of the watercourse which constitutes a **Section (i)** water use.
- The dam will inundate wetlands (**Figure 28**), permanently altering the characteristics of these watercourses within the proposed dam basin which constitutes a **Section 21 (i)** water use.

b) Five new flow gauging stations will be constructed to measure the flow that is entering and released from the dams.
The flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams.

The construction of flow gauging weirs across the river will impede the flow of water in the Tsitsa River (**Section 21 (c)** water use) and alter the bed, banks and characteristics of this watercourse (**Section 21 (i)** water use). Although some water will be retained in the weirs, this is negligible and does not constitute a **Section 21 (a)** water use.

The locations of the proposed gauging stations are listed in **Table 7**.

Table 7: Location of flow gauging weirs

Name	Latitude (S)	Longitude (E)
New Gauging Station 1 (u/s of Ntabelanga Dam)	31.0810951	28.5149849
New Gauging Station 2 (d/s of Ntabelanga dam	31.1189893	28.6846354
New Gauging Station 3 (captures Inxu inflows)	31.2024161	28.7177334
Existing Gauging Station (Refurbishment)	31.2376586	28.852515
New Gauging Station 4 d/s of Laleni dam	31.2708878	28.9395301
New Gauging Station 5 (d/s of hyropower return flow)	31.2953937	29.0081783
Replacement Gauging Station if Existing is Drowned (very large Laleni dam option only)	31.2132512	28.8364011

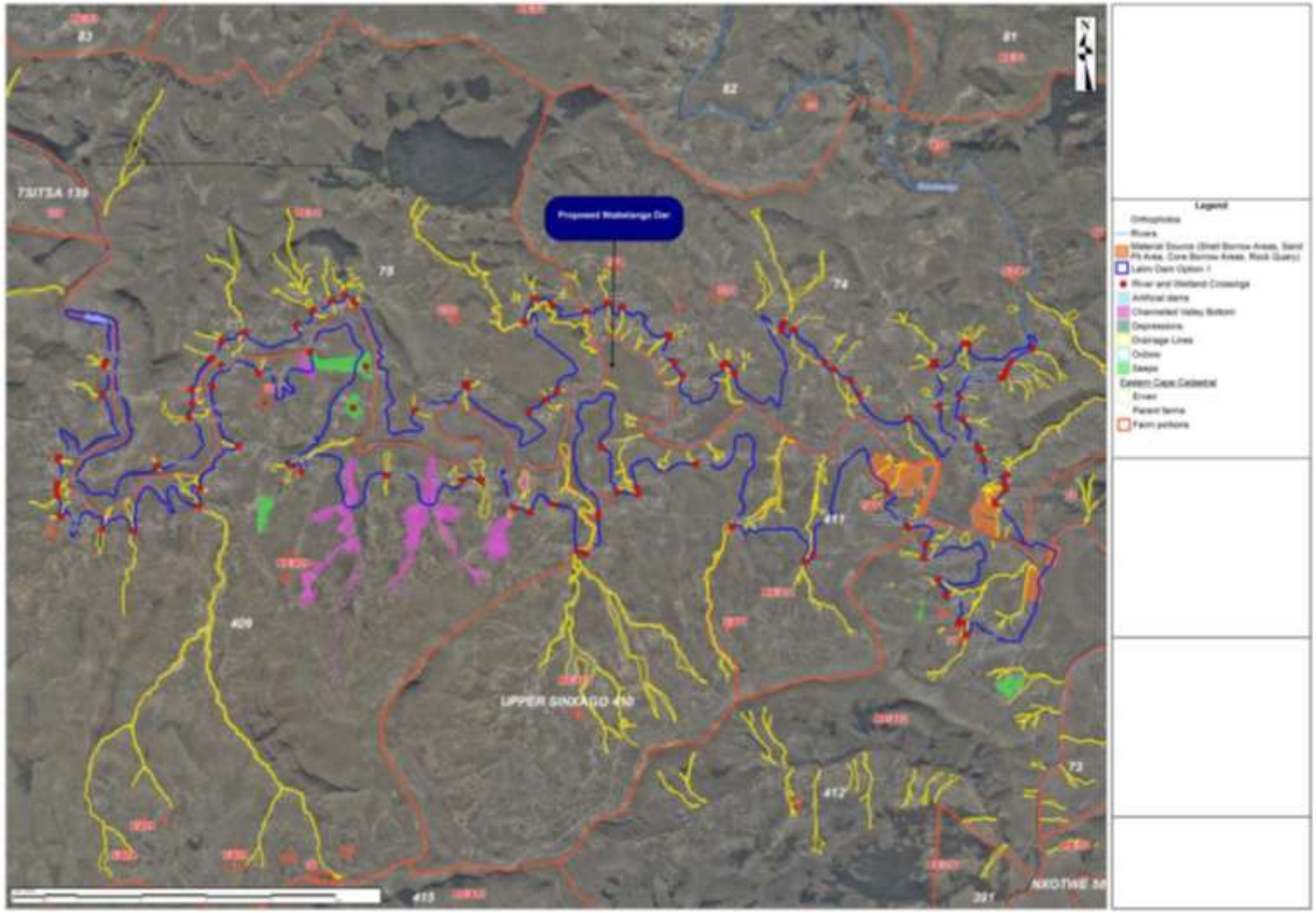

Figure 28: Ntabelanga Dam and Associated Infrastructure – Affected Wetlands

c) Construction of a waste water treatment works (WWTW) at the Ntabelanga Dam Site.

A wastewater treatment plant will be required to treat effluents produced by the Ntabelanga Dam operations centre and housing. This will be appropriately sized for this purpose and it is probable that this requirement could be met by using a screening and pre-treatment process followed by a reed bed system.

The wastewater treatment plant will not be used to treat the effluent from the construction activities, as this would be oversized and would have to deal with industrial pollutants as well as domestic effluents. The contractors are responsible for the safe and environmentally sensitive disposal of all of their effluents and waste products.

The treatment plant will consist of a small activated sludge WWTW with reinforced concrete septic tank, pre-treatment, aerobic reactor and settling tank. This is followed by a constructed reedbed which is lined with a Geosynthetic Clay Liner. The effluent from the reedbed is disinfected with gaseous chlorine (assuming this is what will be used at the water treatment plant). Sludge would be wasted to the septic tank which would be desludged every 6 months to taken to a larger WWTW for processing.

The plant will be designed to treat to the standards as set out in Section 2 of the General Authorisation published in Government Notice No. 665 of 6 September 2013.

The following water uses apply:

- Treated wastewater effluent (150 m³ /day) will be pumped into the Tsitsa River at (coordinates of probable discharge point 31° 7'8.24"S 28°41'24.63"E) upstream of the confluence with the Inxu River.

  General Authorisation No. 665 as published in GN 36820 allows for the -

  i) Discharge of up to 2 000 m³ of wastewater on any given day into a water resource not listed in Table 2.3 of General Authorisation No. 665. The Tsitsa and Inxu Rivers up to their confluence is listed in Table 2.3 of General Authorisation No. 665, thus the general authorisation does not apply and constitutes a **Section 21 (f)** water use.

5.2 LALINI DAM - WATER RESOURCES INFRASTRUCTURE

Water resources infrastructure will include the following:

a) The construction of a dam at the Lalini site

The Lalini Dam (RCC with integral spillway) will have a storage capacity of 150 million m^3 and will operate together with the Ntabelanga Dam in a conjunctive scheme operated as one integrated scheme to improve the sustainability of the overall system. The purpose of the Lalini Dam will be to generate hydropower.

The following water uses apply:

- The Lalini Dam will store water which constitutes a **Section 21 (b)** water use.
- The dam wall will permanently impede the flow of the Tsitsa River during the operational phase which constitutes a **Section 21 (c)** water use.
- During Construction the Tsista River will be diverted to expose the rock foundations for the concrete spillway section / outlet works. This constitutes a **Section 21 (c)** water use.
- The dam wall will permanently alter the bed, banks, course and characteristics of the watercourse which constitutes a **Section (i)** water use.
- The dam will inundate wetlands, permanently altering the characteristics of these watercourses within the proposed dam basin (**Figure 29**) which constitutes a **Section 21 (i)** water use.

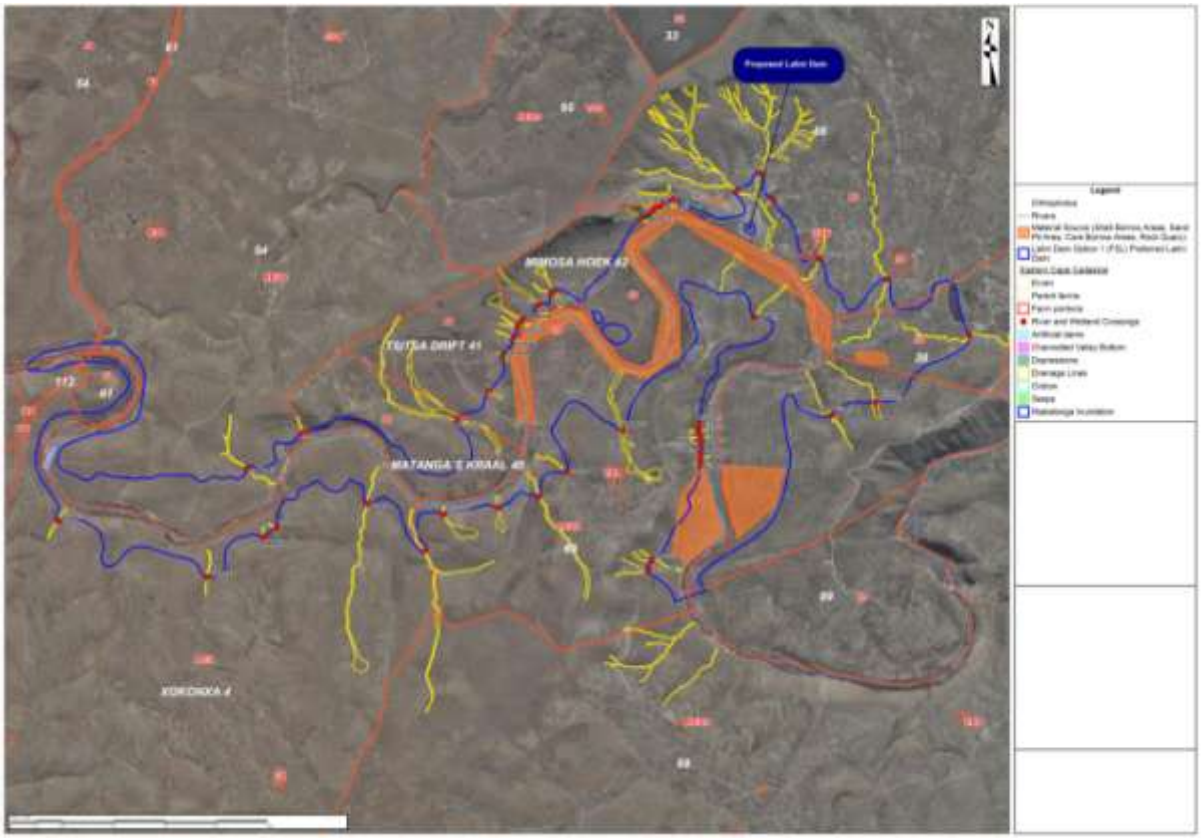

Figure 29: Lalini Dam and Associated Infrastructure - Affected Wetlands

b) Construction of waste water treatment works (WWTW) at the Lalini Dam Site.

A wastewater treatment plant will be required to treat effluents produced by the Lalini Dam operations centre and housing. This will be appropriately sized for this purpose and it is probable that this requirement could be met by using a screening and pre-treatment process followed by a reed bed system.

It is not recommended that such a wastewater treatment plant be designed or used to treat the effluent from the construction activities, as this would be oversized and would have to deal with industrial pollutants as well as domestic effluents. The contractors themselves must be made responsible for the safe and environmentally sensitive disposal of all of their effluents and waste products, leaving only domestic effluents for the permanent wastewater treatment plant to deal with.

The treatment plant will consist of a small activated sludge WWTW with reinforced concrete septic tank, pre-treatment, aerobic reactor and settling tank. This is followed by a constructed reedbed which is lined with a Geosynthetic Clay Liner. The effluent from the reedbed is disinfected with gaseous chlorine (assuming this is what will be used at the Water treatment plant). Sludge would be wasted to the septic tank which would be desludged every 6 months to taken to a larger WWTW for processing.

The plant would be designed to treat to the standards as set out in Section 2 of the General Authorisation published in Government Notice No. 665 of 6 September 2013.

The following water uses apply:

- Treated wastewater effluent (150 m³ /day) will be pumped into the Tsitsa River (31° 17' 51.09" S, 28° 59' 16.11" E) downstream of the confluence with the Inxu River.

  General Authorisation No. 665 as published in GN 36820 allows for the

  i) discharge of up to 2 000 m³ of wastewater on any given day into a water resource that is not a listed water resource set out in Table 2.3 of the General Authorisation.
     a) Complies with the general wastewater limit values set out in **Table 7**, which may be amended from time to time;
     b) Does not alter the natural ambient water temperature of the receiving water resource by more than 3 degrees Celcius; and
     c) Is not a complex industrial wastewater.

Table 8: Wastewater limit values applicable to discharge of wastewater into a water resource

SUBSTANCE/PARAMETER	GENERAL LIMIT	SPECIAL LIMIT
Faecal Coliforms (per 100 ml)	1000	0
Chemical Oxygen Demand (mg/l)	75 (i)	30(i)
pH	5,5-9,5	5,5-7,5
Ammonia (ionised and un-ionised) as Nitrogen (mg/l)	6	2
Nitrate/Nitrite as Nitrogen (mg/l)	15	1,5
Chlorine as Free Chlorine (mg/l)	0,25	0
Suspended Solids (mg/l)	25	10
Electrical Conductivity (mS/m)	70 mS/m above intake to a maximum of 150 mS/m	50 mS/m above background receiving water, to a maximum of 100 mS/m
Ortho-Phosphate as phosphorous (mg/l)	10	1 (median) and 2,5 (maximum)
Fluoride (mg/l)	1	1
Soap, oil or grease (mg/l)	2,5	0
Dissolved Arsenic (mg/l)	0,02	0,01
Dissolved Cadm ium (mg/l)	0,005	0,001
Dissolved Chromium (VI) (mg/l)	0,05	0,02
Dissolved Copper (mg/l)	0,01	0,002
Dissolved Cyanide (mg/l)	0,02	0,01
Dissolved Iron (mg/l)	0,3	0,3
Dissolved Lead (mg/l)	0,01	0,006
Dissolved Manganese (mg/l)	0,1	0,1
Mercury and its compounds (mg/l)	0,005	0,001
Dissolved Selenium (mg/l)	0,02	0,02
Dissolved Zinc (mg/l)	0,1	0,04
Boron (mg/l)	1	0,5

General Authorisation No. 665 thus replaces the need for a **Section 21 (f)** water use application.

5.3 DOMESTIC WATER SUPPLY INFRASTRUCTURE

The Ntabelanga Dam will supply potable water to 539 000 people, estimated to rise to 730 000 by 2025.

The whole scheme is to be supplied by a proposed new WTW located immediately downstream of the Ntabelanga Dam wall which will be supplied with raw water from the dam by gravity.

The system is divided into three components viz. Primary, Secondary and Tertiary systems (the tertiary distribution system is not applied for here and will be subject to separate water use license application and EIA processes).

From the WTW, treated water is pumped from pump station 1 (PS1) **(Figure 30**) via a rising main going north to Primary Command Reservoir 1 which then gravity feeds the bulk water distribution system designated as Zone 1.

A pump station (PS2) lifts water from Primary Command Reservoir 1 to Primary Command Reservoir 2 which is located at a higher elevation. From this reservoir water is gravity fed to the bulk water supply system in the higher elevations of the Tsitsa Valley watershed, as well as supplying some of the neighbouring DM settlements over the watershed and reaching almost to the southern outskirts of the town of Mount Frere. This is designated as supply Zone 2.

Similarly on the southern bank, water is pumped from pump station PS3 at the WTW to Primary Command Reservoir 3 from where gravity fed bulk mains transfer water to the settlements in Zone 3.

A pump station (PS4) at Primary Command Reservoir 3 lifts water in a westerly direction to the higher lying Primary Command Reservoir 4, which can also deliver water by gravity in the direction of Maclear, and to settlements in the Tsitsa Valley adjacent to the flooded area of impoundment when the dam is constructed.

The *Secondary* bulk water distribution system consists of the main bulk pipelines fed by the Primary system, which then supply a network of *Tertiary* lines to the individual settlements, and Secondary Command Reservoirs, which form the second level of strategic storage, and which themselves gravity feed other tertiary pipelines supplying the many settlements to the north, east and south of the supply area.

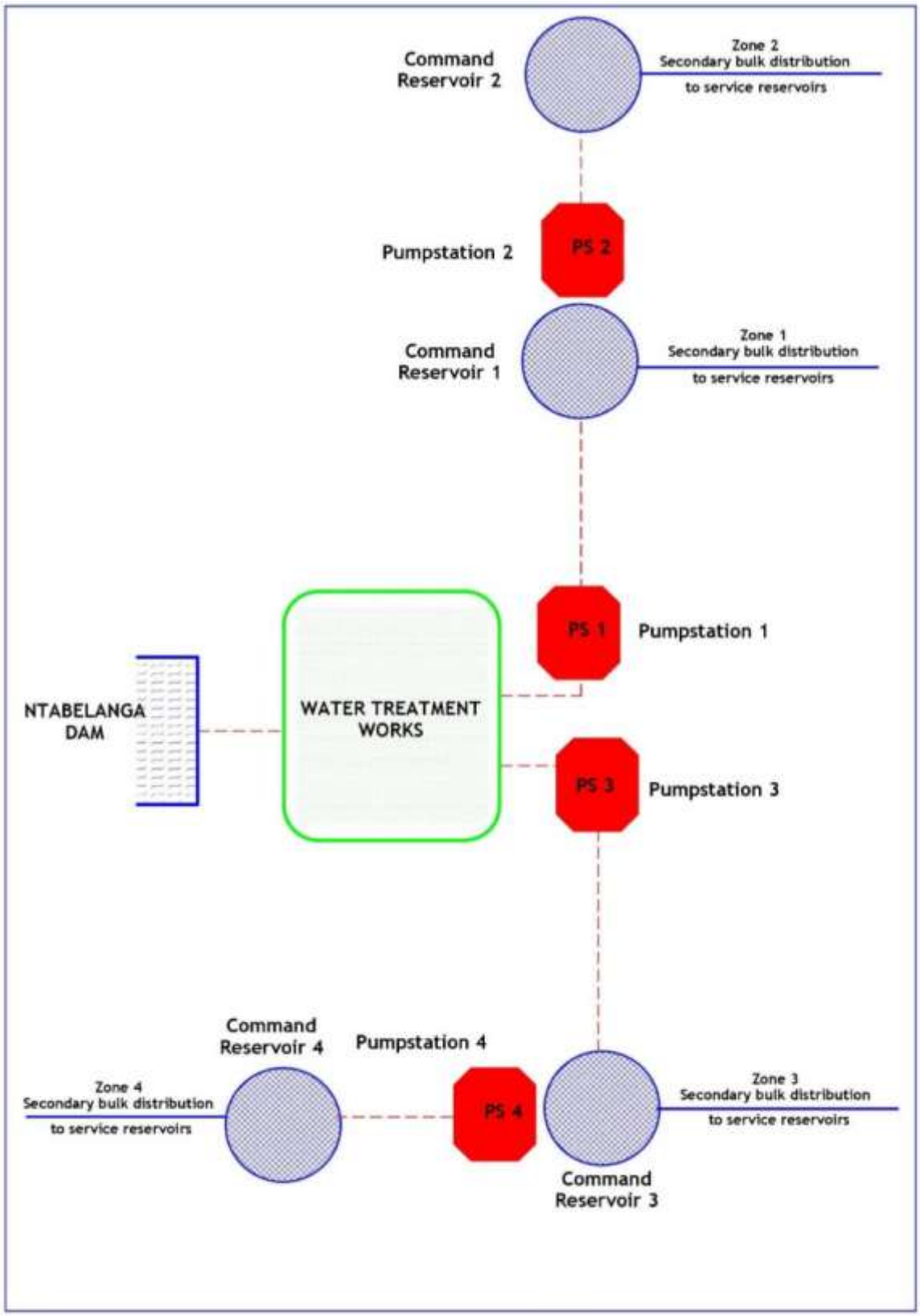

Figure 30: Diagram showing proposed layout of Primary Bulk Water Distribution System

The domestic water supply infrastructure will include the following:

a) An intake structure at Ntabelanga Dam

The works will be supplied with raw water from the dam outlet works to the WTW inlet works by gravity under all operating conditions. Water can be drawn off from the dam at different levels based upon the monitored limnology conditions, in order to obtain the best quality water given the seasonal and depth variations that occur in normal dam operation.

The normally preferred condition is to draw off water from as near to the dam surface as possible without experiencing vortexing problems at the drawoff point. Outlet works will be set up with at least six different drawoff levels, so that a preferred level of abstraction can be selected for the full operating range of dam water levels.

The following water uses apply:

The abstraction of water from the Ntabelanga Dam constitutes a **Section 21(a)** water use.

b) Water Treatment Works (WTW)

The WTW will treat 100 000m³ of water per day.

The 898.00 m.a.s.l. elevation at the WTW inlet works is such that raw water from the Ntabelanga Dam outlet works can be transferred under gravity flow, even at the bottom operating level of the dam (**Figure 31**).

The works is also located with space allowed for sludge dewatering lagoons, and all works are located above the river flood line, even under SEF conditions.

The clear water pumping station containing PS1 and PS3 is also located such that the pumps will always operate under drowned suction conditions, when transferring treated water from the WTW clear water contact tank, to the Primary Command Reservoirs.

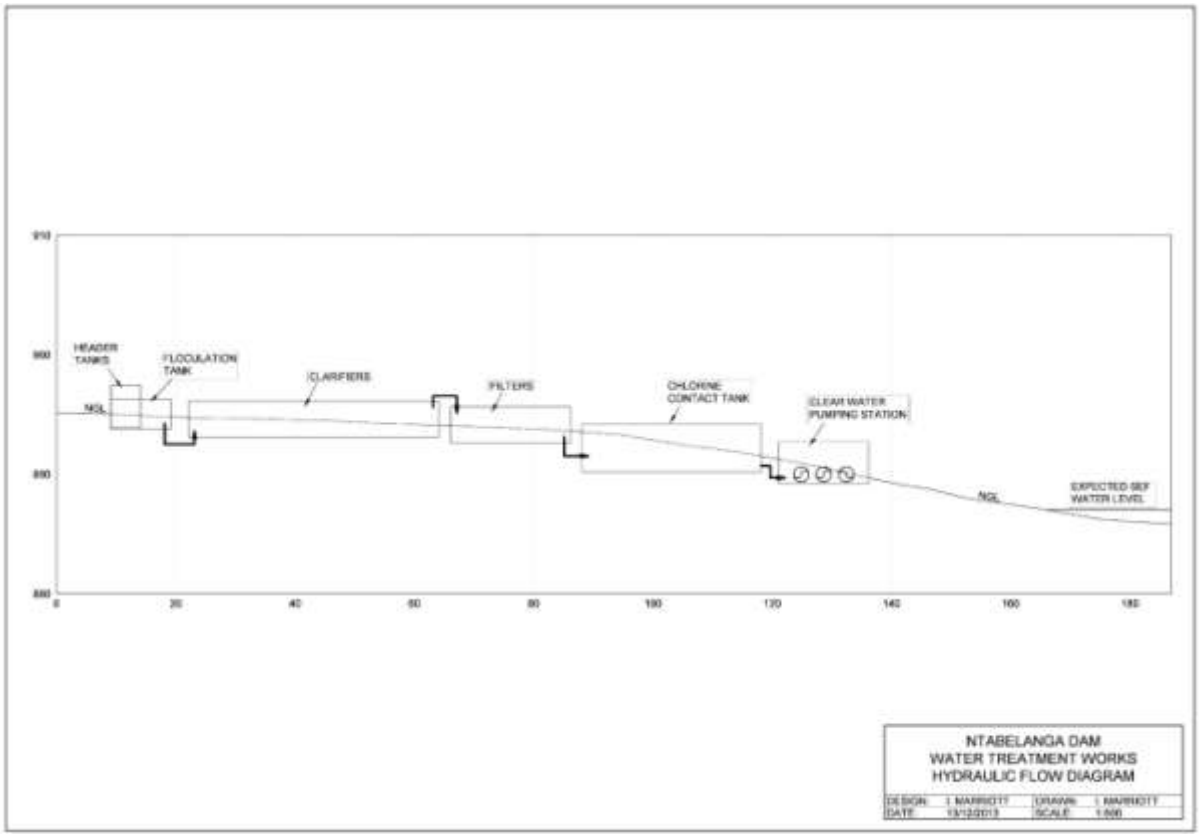

Figure 31: Hydraulic flow diagram through Ntabelanga WTW

Sludge produced from the settlement and filtration processes will be stored in sludge settlement tanks and drying beds which will periodically need to be dewatered and de-sludged, in an environmentally acceptable manner.

South African regulations limit the suspended solids concentration in discharges to the watercourse to a maximum of 25mgTSS/litre. Sludge withdrawn from the clarifiers is expected to be in excess of 5,000mgTSS/litre and cannot be legally discharged into the watercourse.

It is, therefore, proposed that all the residuals produced by the works be dried and disposed of off-site. Drying beds are allowed for dewatering the residuals generated by the plant as the technology is considered appropriate for the plant location. The volume of residuals will be reduced by the incorporation of backwash recovery tanks into the process train.

Disinfection is likely to be through a gaseous chlorination process unless the water quality dictates that specific alternative processes might be needed (eg Ozone). However, this latter option is unlikely to be needed.

Whilst the DWS requirements for minimum contact time is 6% of a day, or 1.5 hours, it is proposed that a total contact tank volume equivalent to 3 hours contact time be provided, with the contact tank split into two compartments so

that the minimum contact time of 1.5 hrs can still be achieved with one tank off-line for servicing. This will also provide some flexibility of operation by providing more balancing capacity for the plant throughflow rate, and for the treated water pumps.

It is also recommended that the treated water pumping station is integrated into, or close to, the contact tank at the WTW, at an elevation such that the suction of these pumps are continuously drowned.

The net output capacity of the works being 84 596 m^3/day average and 101 515 m^3/day peak daily has been determined by the 2050 water demand into the bulk water delivery infrastructure inclusive of allowances for transmission losses, as well as losses within the process stream including backwash.

The WTW will be located close to the river downstream of the dam wall (**Figure 32**). The footprint of the works will be located close to the right hand bank of the river but outside the flood line of the river under SEF conditions.

The water treatment works structures will be orientated and located on sloping ground such that the hydraulic flow path from the WTW inlet works, through the settlement tanks, filters, and to the contact tank can be undertaken by gravity.

Backwash of the filters will require pumping, and may also include air scour. Treated water will be drawn from the contact tank and pumped into the bulk water infrastructure from the treatment works pumping station.

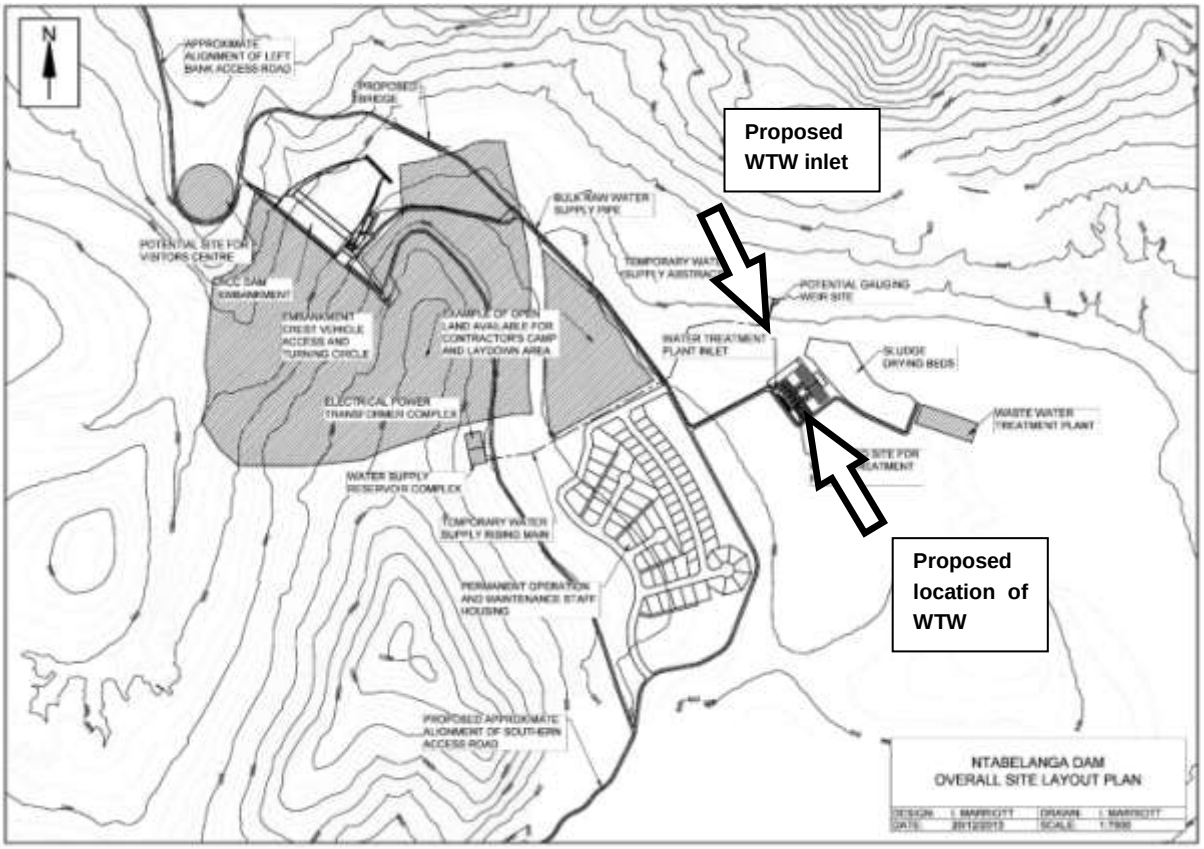

Figure 32: Proposed location of the WTW and inlet

The following water uses apply:

Sludge produced from the settlement and filtration processes will be stored in sludge settlement tanks and drying beds. This constitutes a **S21 (g)** water use.

c) <u>Potable bulk water distribution infrastructure for domestic and industrial water requirements (primary and secondary distribution lines)</u>

Construction of the primary and secondary distribution pipelines will commence with pipes being strung out along the pipeline routes and trenches up to 3.5 m deep and 2.5 m wide for the largest of the pipes being excavated. Under normal circumstances a maximum of 5 km of open trench is permitted, whilst the pipes will be strung out as they arrive from the manufacturer. Excess spoil material from the trenches will be transported to a suitable disposal site and sandy material will be brought in as bedding and selected backfill for pipe protection. Once the pipes have been laid and tested, the trench will be backfilled, compacted and shaped to the natural ground profile. Topsoil will be replaced to re-establish vegetation. A ten to thirty meter wide strip would be impacted during construction.

The Primary and Secondary distribution lines will cross various wetlands as well as the Tsitsa River and Tina River.

The following water uses apply:
Construction of the pipeline through rivers will require the diversion of the river at that point which constitutes a **Section 21 (c)** water use. The pipeline will permanently alter the bed and banks of the rivers and will alter the characteristics of the wetlands which constitute a **Section 21 (i)** water use.

c) Bulk water storage reservoirs (9)
The bulk water reservoirs will each have a storage capacity of approximately 1 Ml to 30 Ml providing between 4 and 24 hours storage per site.

General Notice (GN) 399 as published in the Government Gazette 26187 of 2004 allows for the storage of up to 50 Ml of water in accordance with the conditions as set out in the general authorisation, thus a **Section 21 (b)** water use **does not** apply.

The locations of the reservoirs are listed in **Table 9**.

Table 9: Locations of bulk water reservoirs

Name	Latitude (S)	Longitude (E)
PROPOSED RESERVOIR D	30.8832682	28.7162845
PROPOSED RESERVOIR C	30.9489748	28.9759191
PROPOSED RESERVOIR A	31.0046864	28.9236313
PROPOSED CULUNCA RESERVOIR	31.0226588	28.711001
PROPOSED COMMAND RESERVOIR E	31.1661294	28.4963409
PROPOSED COMMAND RESERVOIR	31.1593965	28.9538811
PROPOSED NDUKU RESERVOIR	31.2459316	28.7353458
PROPOSED TSOLO JUNCTION RESERVOIR	31.3507211	28.8039673
PROPOSED RESERVOIR B	30.9721418	28.9741931
EXISTING MVUMLWANO RESERVOIR	31.1822777	28.8863359
EXISTING TSOLO RESERVOIR	31.3154003	28.7504963
EXISTING SIDWADWENI WEST RESERVOIR	31.4090711	28.7273812
EXISTING SIDWADWENI EAST RESERVOIR	31.4168338	28.7943707

5.4 IRRIGATION INFRASTRUCTURE

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

For the total irrigated area, the water demand from the dam would be a maximum of 32.724 million m^3/a at 80 % assurance of supply, and more realistically 17.753 million m^3/a at 80 % assurance of supply.

The Irrigation Development study (DWA, 2013a) identified about 2 450 ha of the high potential land suitable for irrigated agriculture associated with the Ntabelanga Dam

site. This land is located 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.

Agricultural land near the river will be supplied with raw water pumped by pipeline from the nearest river abstraction point on the Tsitsa River, downstream of the Ntabelanga Dam.

For the Tsolo area schemes, raw water would be pumped from the dam to a storage reservoir and delivered to the edge of these fields through a bulk water distribution system. These lands are located near to the following settlements/wards: Godini, Qhotira, KuGubengxa, St Cuthberts, Jwabuleni, Mazizini, KwaNomadolo and Gumbini. For the other areas, raw water would be abstracted directly from the adjacent dam or river using mobile pumping systems.

Distribution to the farming units will be mostly gravity based, with booster stations for higher lying areas.

The following water uses apply:

- Raw Water will be abstracted from the Tsitsa River. The abstraction point will be located at the following coordinates: 31° 12’ 24.54”S, 28° 43’ 00”E downstream of the proposed Ntabelanga Dam.

  The abstraction of water constitutes a **S 21(a)** water use. The construction of the intake works will permanently alter the bed and banks of the Tsitsa River at this point which constitute a **Section 21 (i)** water use.

- The irrigation pipeline will cross various wetlands as well as the Inxu River. Construction of the pipeline through the river will require the diversion of the river at that point. This constitutes a **Section 21 (c)** water use. The pipeline will permanently alter the bed and banks of the river and characteristics of the wetlands which constitute a **Section 21 (i)** water use.

5.5 HYDRO POWER INFRASTRUCTURE

Ntabelanga Dam

There will be a small hydropower plant at Ntabelanga Dam – to generate between 0.75 MW and 5 MW (average 2.1 MW). This will comprise of 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.

The following water uses apply:

- Water will be abstracted from the Ntabelanga Dam which constitutes a S 21(a) water use.
- The operation of a hydropower plant constitutes a Section 21 (e) water use (Engaging in a controlled activity) in terms of Section 37 (1) (c) (a power generation activity which alters the flow regime of a watercourse).
- The hydropower plant outlet will be constructed on the banks of the Tsitsa River which constitutes a **Section 21 (i)** water use.

Lalini Dam

The hydropower plant at the proposed Lalini Dam and tunnel (used conjunctively with the Ntabelanga Dam) will generate an average output of 35 MW if operated as a base load power station and up to 180 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 linking the Lalini power station to the existing Eskom grid will be approximately 13 km. It is expected that monopole structures will be used, which after planting will protrude between 19.2 and 21 m.

The power line infrastructure will not impact on any watercourses.

The following water uses apply:

- Water will be abstracted from the Lalini Dam which constitutes a **Section 21(a)** water use.
- The hydropower pipeline will cross five drainage lines thus altering the characteristics of these watercourses which constitute a **Section 21 (i)** water use.
- The hydropower tunnel outlet will be constructed on the banks of the Tsitsa River which constitutes a **Section 21 (i)** water use.
- The operation of a hydropower plant constitutes a **Section 21 (e)** water use (*Engaging in a controlled activity*) in terms of **Section 37 (1) (c)** *(a power generation activity which alters the flow regime of a watercourse*).

5.6 ROADS

Ntabelanga Dam

Approximately 80 km of local roads will be re-aligned in the Ntabelanga Dam area. 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 and will be constructed using similar materials. All roads will be surfaced with gravel.

All road designs will be submitted to the relevant road authorities to obtain their approval before construction commences.

The major items of work to be carried out are the following:

- Clearing of the road footprint;
- Construction of the roads with gravel surfacing;
- The gravel for the pavement layers and fill will be obtained from DMR approved borrow pits and/or cuttings along the road;
- All stormwater drainage will be accommodated using either pipe or portal culverts; and
- The existing roads will be utilised whilst the new realigned sections are constructed; in order to avoid the need for temporary detours during construction.

The following water uses apply:

- The access roads will cross various wetlands thus altering the characteristics of these watercourses which constitutes a Section 21 (i) water use.
- One of the access roads will cross the Tsitsa River immediately downstream of the Ntabelanga Dam wall thus altering the characteristics of these watercourses which constitutes a **Section 21 (i)** water use.

Lalini Dam Basin

- Two new access roads will be constructed within the Lalini Dam basin. These roads will cross the Tsitsa River at 31° 15’ 21.92”S, 28° 51’ 34.99”E and 31° 15’ 05.96”S, 28° 52’ 17.04”E.
- An existing road, located within the proposed Lalini Dam basin, will be upgraded and will cross the Tsitsa River at 31° 14’ 39.86”S, 28° 54’ 06.27”E.
- Two haul roads will be constructed to gain access to and from the borrow areas in the Lalini Dam basin. These roads will cross three drainage lines.

Lalini hydropower plant

- A new access road will be constructed to gain access to the Lalini power plant and will cross two wetlands.

Lalini Dam construction site

- A new access road will be constructed to gain access to the construction site immediately upstream of the dam wall at 31° 15’ 56.4”, 28° 55’ 24.35”E

The following water uses apply:

- The two new access roads within the dam basin will cross the Tsitsa River, altering the banks of the river which constitutes a **Section 21 (i)** water use.
- The existing road to be upgraded within the dam basin will cross the Tsitsa River, altering the banks of the river which constitutes a **Section 21 (i)** water use.

- The proposed haul roads within the dam basin will cross three drainage lines thus altering the characteristics of these watercourses which constitute a **Section 21 (i)** water use.
- The access road to the hydropower plant will cross two drainage lines thus altering the characteristics of these watercourses which constitute a **Section 21 (i)** water use.
- The proposed new access road to the construction site within the dam basin will cross the Tsitsa River, altering the banks of the river which constitutes a **Section 21 (i)** water use.

5.7 BORROW AREAS

Exemption from Regulation GN 704 of the NWA

GN 704 of the NWA, 1999 contains regulations on use of water for mining, including borrowing activities and related activities aimed at preventing the pollution of water resources and protecting water resources in areas where mining activity is taking place.

GN 704 states that:

No person in control of a mine or activity may:

- locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100 metres, whichever is the greatest, from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become waterlogged, undermined, unstable or cracked.

The borrow areas and quarries are located within the dam basin and will be inundated once the full supply level of the dams has been reached. This location therefore has the least long term impact.

According to GN 704, the borrow areas must fall outside of the 1:100 year flood line of the drainage feature or 100 m from the edge of the feature, whichever distance is the greatest. Therefore an exemption will be required from DWS since the borrow areas will be located within the 1:100 year flood line.

5.8 CONSTRUCTION WORKS

During the construction phase, water will need to be abstracted for various construction activities. The direct abstraction of water from any water resource constitutes a **Section 21(a)** water use.

General Authorisation 399 as published in Government Gazette 26187 replaces the need for a water user to apply for a licence in terms of the National Water Act for the

taking of water from a water resource. Areas excluded from this General Authorisation, applicable to the MWP study area, are shown in **Table 10**.

The guidelines, as set out in the General Authorisation, must be adhered to. These include but are not limited to the following:

- Acceptable construction, maintenance and operational practices are to be followed to ensure the consistent, effective and safe performance of the taking of water from a water resource for construction purposes.

- The water user must ensure the establishment of monitoring programmes to measure the quantity of water taken, as follows:

    - The quantity of surface water abstracted must be metered or gauged and the total recorded as at the last day of each month; and
    - Where no meter or gauge is used, the quantity of water abstracted may be calculated to methods set by the responsible authority.

Table 10: Areas excluded from General Authorisation for the taking of surface water

Primary drainage region	Secondary/Tertiary/Quaternary drainage region and excluded resources	Description of main river in drainage region for information purposes
T	T11A & B T35A, B, C, D, F & G	Slang, Xuka Rivers **Tsitsa**, Pot, Mooi, **Inxu**, Wildebees, Gatberg Rivers

The abstraction of water for construction activities will not take place in any of the drainage regions that are excluded from the General Authorisation, thus **Section 21 (a)** water use does not need to be licensed separately.

Refer to **Appendix B** for a summary of the applicable Water Use Applications.

5.9 SUMMARY OF APPLICABLE WATER USES

5.9.1 SECTION 21 (A): "TAKING WATER FROM A WATER RESOURCE"

The following activities will constitute a Section 21 (a) water use:

- **Domestic Water Supply Infrastructure**
  - The WTW will be supplied with 100 000 m³ of raw water per day from the dam outlet works to the WTW inlet works by gravity under all operating conditions.
- **Irrigation Infrastructure**
  - The Ntabelanga Dam will provide water (maximum of 32.724 million m^3/a) to irrigate approximately 2 900 ha of agricultural land. This project includes bulk water conveyance infrastructure for raw water supply to edge of field.
- **Hydropower Infrastructure**
  - Raw water will be abstracted from the Ntabelanga Dam (making use of available EWR flows) for the Ntabelanga hydro power plant.
  - Water will be abstracted from the Lalini Dam for the Lalini hydro power plant.

5.9.2 SECTION 21 (B): "STORING OF WATER"

The following activities will constitute a Section 21 (b) water use:

- **Ntabelanga Dam**
  - The Ntabelanga Dam will store water and will have a storage capacity of 490 million m^3
- **Lalini Dam**
  - The Lalini Dam will store water and will have a storage capacity of 248 million m^3

5.9.3 SECTION 21 (C): "IMPEDING OR DIVERTING THE FLOW OF WATER IN A WATER COURSE" AND SECTION 21 (I): "ALTERING THE BED, BANKS, COURSE OR CHARACTERISTICS OF A WATER COURSE"

The following activities will constitute Section 21 (c) and (i) water uses:

- **Ntabelanga Dam**
  - The Ntabelanga Dam wall will permanently impede the flow of the Tsitsa River during its operational phase.
  - The dam wall will permanently alter the bed, banks, course and characteristics of the Tsitsa River at that point.

  - During the construction of the Ntabelanga Dam wall the Tsista River will be diverted to expose the rock foundations for the concrete spillway section / outlet works.
  - The dam will inundate wetlands, permanently altering the characteristics of these watercourses within the proposed dam basin.
- **Lalini Dam**
  - The dam wall will permanently impede the flow of the Tsitsa River during the operational phase.
  - During Construction the Tsista River will be diverted to expose the rock foundations for the concrete spillway section / outlet works.
  - The dam wall will permanently alter the bed, banks, course and characteristics of the Tsitsa River.
  - The dam will inundate wetlands, permanently altering the characteristics of these watercourses within the proposed dam basin.
- **Domestic water supply infrastructure**
  - Construction of the pipeline through rivers will require the diversion of the river at that point.
  - The distribution pipeline will cross various wetlands as well as the Tsitsa River, permanently altering the bed and banks of the river altering the characteristics of the wetlands.
- **Flow gauging weirs**
  - The construction of flow gauging weirs across the river will alter the bed, banks and characteristics of this watercourse.
- **Irrigation infrastructure**
  - The construction of the intake works will permanently alter the bed and banks of the Tsitsa River at this point
  - The irrigation pipeline will cross various wetlands as well as the Tsitsa River, permanently altering the bed and banks of the river altering the characteristics of the wetlands.
- **Ntabelanga hydropower infrastructure**
  - The hydropower plant outlet will be constructed on the bank of the Tsitsa River, permanently altering the bank of the river at this point.
- **Lalini hydropower infrastructure**
  - The hydropower pipeline will cross five drainage lines thus altering the characteristics of these watercourses.
  - The hydropower tunnel outlet will be constructed on the banks of the Tsitsa River thus permanently altering the banks of the river.
- **Roads**
  - The access roads will cross various wetlands thus altering the characteristics of these watercourses.
  - One of the access roads will cross the Tsitsa River immediately downstream of the Ntabelanga Dam wall thus altering the banks of the river at this point.

- The two new access roads within the Lalini Dam basin will cross the Tsitsa River, altering the banks of the river.
- The existing road to be upgraded within the Lalini Dam basin will cross the Tsitsa River, altering the banks of the river.
- The proposed haul roads within the Lalini Dam basin will cross three drainage lines thus altering the characteristics of these watercourses.
- The access road to the Lalini hydropower plant will cross two drainage lines thus altering the characteristics of these watercourses.
- The proposed new access road to the construction site within the Lalini Dam basin will cross the Tsitsa River, altering the banks of the river.

5.9.4 SECTION 21 (E): "ENGAGING IN A CONTROLLED ACTIVITY IDENTIFIED AS SUCH IN SECTION 37(1)"

The following activities will constitute a Section 21 (e) water use:

- **Ntabelanga Dam**
  - The operation of the hydropower plant at the Ntabelanga Dam.
- **Lalini Dam**
  - The operation of the hydropower plant at the Lalini Dam.

5.9.5 SECTION 21 (F): "DISCHARGING WASTE OR WATER CONTAINING WASTE INTO A WATER RESOURCE THROUGH A PIPE, CANAL, SEWER, SEA OUTFALL OR OTHER CONDUIT"

- **Ntabelanga Waste Water Treatment Works (WWTW)**
  - Treated wastewater effluent (150 m^3 /day) will be pumped into the Tsitsa River upstream of the confluence with the Inxu River.

5.9.6 SECTION 21 (G): "DISPOSING OF WASTE IN A MANNER WHICH MAY DETRIMENTALLY IMPACT ON A WATER RESOURCE"

- **Ntabelanga Water Treatment Works (WTW)**
  - Sludge produced from the settlement and filtration processes will be stored in sludge settlement tanks and drying beds.

5.9.7 OTHER

- **Bulk water storage reservoirs (9)**
  - The bulk water reservoirs will each have a storage capacity of approximately 1 Mℓ to 30 Mℓ providing between 4 and 24 hours storage per site.

General Notice (GN) 399 as published in the Government Gazette 26187 of 2004 allows for the storage of up to 50 Mℓ of water in accordance with the conditions as set out in the general authorisation, thus a **Section 21 (b)** water use **does not** apply.

- **Lalini waste water treatment works (WWTW)**
  Treated wastewater effluent (150 m³ /day) will be pumped into the Tsitsa River (31° 17' 51.09" S, 28° 59' 16.11" E) downstream of the confluence with the Inxu River.

  General Authorisation No. 665 in GN 36820 allows for the

  ii) discharge of up to 2 000 m³ of wastewater on any given day into a water resource that is not a listed water resource set out in Table 2.3 of the General Authorisation. Thus a **Section 21 (f)** water use does not apply.

- **Borrow Areas**
  - *Exemption from Regulation GN 704 of the NWA*
    GN 704 states that:
    No person in control of a mine or activity may:
    - Locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year flood line or within a horizontal distance of 100 metres, whichever is the greatest, from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become waterlogged, undermined, unstable or cracked.

      According to the above, the borrow areas must fall outside of the 1:100 year flood line of the drainage feature or 100 m from the edge of the feature, whichever distance is the greatest. Therefore an exemption will be required from DWS since the borrow areas will be located within the 1:100 year flood line.

- **Construction works**
  - During the construction phase, water will need to be abstracted for various construction activities. General Authorisation 399 in Government Gazette 26187 replaces the need to apply for a **Section 21 (a)** water use (see **Section 5.8**).