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ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

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

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DRAFT
November 2014

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

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Authors:	*L Muruven and T Calmeyer*
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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

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

LIST OF REPORTS

REPORT TITLE	DWS REPORT NUMBER
Inception Report	P WMA 12/T30/00/5314/1
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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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Wetland Assessment	P WMA 12/T30/00/5314/16
Rapid Reserve Determination: Tsitsa River at Lalini	P WMA 12/T30/00/5314/17

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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

Preamble

Please note that the spelling of the town (and dam) Laleni, as published in the Scoping Report has changed to Lalini. Additionally, the Department of Water Affairs (DWA) has subsequently been changed to the Department of Water and Sanitation (DWS). These have both been amended in this document.

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ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Draft Summary for Public Comment

1. Introduction

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

This EIA report builds on the Scoping Report. It describes the proposed project and the receiving environment, and presents the findings of the second phase of investigations (EIA phase). The main objectives of the EIA are to:

- *Assess the significance of the environmental issues and impacts identified in the scoping phase, focusing on key impacts;*
- *Recommend appropriate measures to mitigate negative impacts and enhance the benefits, and include them in the draft Environmental Management Programme (EMPR); and*
- *Undertake a public participation process that provides opportunities for all interested and affected parties (I&APs) to be involved.*

2. Additional authorisations required

This EIA includes the assessments required to apply for the following authorisations that the project requires:

- ***Water Use Licence***

The construction of the dams and associated infrastructure involves a number of water uses listed in terms of section 21 of the National Water Act, 1998 (No. 36 of 1998) (NWA). An Integrated Water Use Licence Application (IWULA) will be prepared for submission to DWS.

- ***Borrow areas and quarries***

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 eight borrow pits for sand and earthfill material 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.

The impacts of the new borrow areas and quarries were investigated in the EIA, and EMPLs will be compiled for approval by the Department of Mineral Resources (DMR).

In terms of GN 704 of the NWA, 1999, the borrow areas must fall outside of the 1:100 year flood line of a watercourse or 100 m from the edge of the watercourse, whichever distance is the greatest. An exemption will therefore be required from DWS since the borrow areas will be located within the 1:100 year flood line (below the full supply level of the proposed dams). This will be included in the WULA.

- ***Heritage permits***

The proposed project involves a number of activities listed in terms of section 38 of the National Heritage Resources Act, 25 of 1999 (NHRA), which require authorisation from the relevant heritage authorities.

A Heritage Impact Assessment (HIA) has been conducted as part of the EIA process. The HIA has been submitted to the Eastern Cape Provincial Heritage Resources Authority and the South African Heritage Resources Agency (SAHRA) for decision-making regarding heritage resources.

- ***Waste Management Licence***

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

- ***Licences for the removal of protected trees***

Tree species that are protected in terms of the National Forests Act (Act No. 84 of 1998) have been identified within the project footprint. A licence must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) to disturb, to damage or to destroy/remove such trees.

3. Need and desirability

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.

Consistent with the National Framework for Sustainable Development (NFSD) (DEA, (2010), it is required that spending on economic infrastructure is focused in priority areas with potential for economic development that serves the broader society's needs equitably. What is needed and desired for a specific area is strategically and democratically determined during the formulation of Integrated Development Plans (IDPs).

- ***Integrated Development Plans***

All three District Municipalities (DMs), OR Tambo DM, Alfred Nzo DM and Joe Gqabi DM, impacted by the Mzimvubu Water Project, have published extensive IDPs. All three DM IDPs (Alfred Nzo IDP, 2010; Joe Gqabi IDP, 2012/13; OR Tambo IDP, 2012-17) refer to the DM's responsibility for planning, implementation, operation and maintenance of water and sanitation services. The Alfred Nzo IDP states that "of the estimated 127 878 households approximately 70 000 are serviced with water in one way or another which translates to 45.2% of the population having no access whatsoever to potable water." Additionally, "Communities in rural areas are still highly dependent on undeveloped water sources and there remains a challenge in meeting the water demand, due to source identification". This states the need for an additional water source, such as that which would be provided by the Mzimvubu Water Project.

The Mzimvubu Water Project should thus be promoted as an integrated local development programme in which the activities in the different sectors are coordinated in order to achieve the optimum synergies between them.

- ***National Development Plan (NDP)***

The South African Government's vision for the water sector is that before 2030, all South Africans will have affordable access to sufficient safe water and hygienic sanitation.

In the National Development Plan (NDP) (National Planning Commission, 2011: 181), the development potential offered by the Mzimvubu was specifically highlighted: "[the Mzimvubu] water resource development could support agriculture, domestic supply, hydropower production, transport and tourism if planned in a coordinated manner." The NDP proposed that "Programmes in underdeveloped regions, such as a proposed multipurpose development around a new dam on the uMzimvubu River, should also be prioritised since it could mobilise the natural resource advantages of an otherwise underdeveloped area" (National Planning Commission, 2011: 160-161).

- ***National Spatial Development Plan (NSDP)***

The NSDP seeks to assist government to achieve the following development objectives and principles for the country:

- *To focus fixed investment in areas with development potential. It is argued that these areas present the greatest possibility for both economic growth and poverty alleviation; and*
- *To ensure that citizens in areas with limited potential are provided with a package of essential public services, focusing on human resource development, labour market intelligence and social grants. It is argued that the prevalence of high poverty in an area does not mean that poverty can be more effectively addressed in that area.*

- ***Strategic Integrated Projects (SIP)***

The New Growth Path sets a goal of five (5) million new jobs by 2020, identifies structural problems in the economy and points to opportunities in specific sectors and markets ("job drivers"). The first job driver is infrastructure: laying the basis for higher growth, inclusivity and job creation. In order to address these challenges and goals, Cabinet established a Presidential Infrastructure Coordinating Commission (PICC). Under their guidance, 18 strategic infrastructure projects (SIPs) have been developed. The SIPs cover social and economic infrastructure across all nine provinces, with specific emphasis on lagging regions. The Mzimvubu Water Project is a SIP3.

- ***Financial and economic viability***

Financial viability can be defined as the ability to generate sufficient income to cover input costs and make a profit. Economic viability can be measured by the positive economic benefits that the proposed project will provide. It includes identification and quantification of all the benefits expected and typically involves an economic cost-benefits analysis using opportunity costs.

Financial viability is not a requirement for a project of this nature, as the objective of the project is not to make a profit on the investment, but rather to contribute to the development of the project area. The intention of the project is to be economically viable, in that the direct and indirect socio-economic benefits should exceed the financial cost of the project. This EIA therefore only considers economic viability.

4. 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.

5. 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 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.

6. 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.

7. 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.

8. Key issues identified

Key issues identified in the Scoping phase and discussed in the Scoping Report and its Summary are:

- *Impacts on plants and animals;*
- *Impacts on rivers and wetlands;*
- *Impacts on river flow (water quality and quantity);*
- *Social impacts on the communities in the study area;*
- *Potential impact of HIV/Aids;*
- *Loss of structures and livelihood supporting resources;*
- *Economic impacts, including net societal welfare;*
- *Impacts on heritage resources, including graves, archaeological sites and historical structures; and*
- *Impacts on the landscape and sense of place.*

9. Summary of specialist studies

Nine specialist studies were conducted during the EIA phase and are summarised as follows:

9.1 Plants and Animals

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. Vegetation surrounding the Ntabelanga Dam wall consists of rocky ridge vegetation, mostly indigenous to the area. Little transformation has occurred within this area.

Large sections of the Lalini Dam basin have undergone vegetation transformation due to small scale agricultural activities, as well as overgrazing and trampling of veld by livestock. More sensitive habitat (Euphorbia forest) located closer to the dam wall will be affected by the construction of the dam and access roads.

The primary concern is the impacts on rocky ridges, mountain bushveld, riparian and wetlands present within the study area. These areas provide highly suitable habitat for sensitive indigenous floral species and several Red Data List (RDL) faunal species. The rocky outcrops and mountain bushveld are ideal habitat zones for threatened scorpions. The wetland systems and associated grasslands provide suitable habitat for protected Crane species, as well as various small mammals. With the inundation of the dam basins, these habitats will be lost. Rescue and relocation measures for flora can be implemented in more sensitive areas such as the mountain/rocky ridge habitat before construction commences.

With the decreased available faunal habitat, the remaining faunal species will be pushed into the small pockets of remaining habitat, where inter and intraspecific competition amongst the various faunal species for space and resources will cause a decline in overall faunal abundance and diversity.

Upstream towards the tail end of the Ntabelanga Dam, there will be a section of land that, once the water levels have risen, will be transformed into an island. Any faunal species unable to fly or readily swim will be trapped on this island, with limited resources available to survive. It is therefore recommended that any small mammals that become trapped on the island be captured and relocated to the mainland by a qualified and suitable specialist.

A high diversity of bird species was observed on site. The majority of birds observed were within the mountain bushveld, rocky outcrop and riparian habitat zones. As these habitat units will be inundated, the result will be a decrease in viable habitat for foraging and breeding of avifaunal species, forcing avifaunal species to leave the area in search of new suitable larger habitat areas.

The study area provides suitable habitat to RDL bird species, most importantly communities of cranes. Secretary Birds were also observed within the study area during the site assessment as well as a number of raptor species. Inundation of the grassland/ transformed habitat units in the vicinity of the Ntabelanga Dam will result in a loss of foraging habitat for cranes within the study area. The main contributing factors to this decline are loss of wetland breeding areas, loss of grassland foraging areas and collision with high voltage power lines. The construction of the dams

and new power lines will have a negative impact on the crane population numbers in the study areas and surrounds, as key breeding populations are lost.

The inundation of the rocky outcrop, mountain bushveld and riparian habitats will push the reptiles further up the slopes of the ridges; however there is suitable habitat for them in these areas. Initially there will be overcrowding of species, but through increased mortality rates and emigration of certain species, the populations should stabilise, albeit at a lower number. The lower carrying capacity and lower population numbers will result in a decreased food source for predators of many reptile species, thereby having a knock on effect further up the food chain.

Inundation resulting from the dams is unlikely to have a negative impact on amphibians or on invertebrate conservation within the area.

One NEMBA listed and protected scorpion species, the Rock Scorpion was observed in the mountain rocky outcrop/ bushveld habitat near the proposed Lalini Dam wall. This species will be negatively impacted upon through loss of habitat due to the dam wall construction and subsequent inundation.

Hunting from the local community will now be focussed on the remaining areas above the water line. With the decrease in habitat, faunal species will have less space to evade these hunters, resulting in higher losses to hunting, affecting overall population numbers and species composition.

The pipelines will be mainly constructed close to existing roads and the impacts on habitat are expected to be low.

For the proposed road upgrades, re-alignments and construction of new access roads, alien proliferation alongside the road are one of the main concerns and it was found that the proposed new access roads to the Lalini Dam wall and the hydropower plant are located within a highly sensitive habitat area.

Power line alternatives 1 and 3 also cross large sections of indigenous and possible protected trees and other floral species. They should be re-aligned to less sensitive habitats.

Where protected trees are located within the road or pipeline servitudes, the relevant roads and pipelines should be re-aligned to avoid them.

9.2 Aquatic ecology and wetlands

Overall, the various riparian and wetland resources can be considered to be in a moderately modified condition, indicating that loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. Fish diversity is very low.

The proposed project has the potential to lead to loss of niche habitat for wetland-dependent faunal and floral taxa and/or alteration of the aquatic and riparian resources in the study area, with

particular mention of the impacts that the two dams will have on the Tsitsa River and its tributaries, as well as the associated wetland and riparian resources. Wetland habitat within the Ntabelanga and Lalini Dam basins will be permanently lost.

In terms of both dams and associated infrastructure, the impacts (inundation of habitat upstream of the dam walls and disruption of natural flow downstream) are considered high and permanent. These impacts result in secondary impacts on flow sensitive species, species of conservation concern and aquatic biodiversity in general. However, adhering to the recommended Environmental Water Requirements (EWR) will ensure that the river downstream of the dams is maintained in an acceptable ecological state.

The area is known to harbour endemic mayflies (Kleynhans 1999). With the location of the two dams situated between two waterfalls, and hence geographically isolated, the area is likely to contain several macro-invertebrate species of conservation concern. Through minimising the time in which stream flow, water quality and habitat is affected during the construction phase of the project, impact on mayflies can be mitigated to a limited degree.

Construction of the hydropower plant, pipeline/tunnel and power line will be of low impact if mitigated. Mitigation includes minimising the spatial footprint of the development to the greatest degree possible, with special reference to avoiding erosion, silting and sedimentation within the aquatic system. During the operation phase discharge through the hydropower tunnel into the river will also impact on the river. The instream flow requirements of the systems are to be adhered to at all times.

The shorter the length of the section between the dam wall and discharge point, the smaller the area of impact in terms of silting, sedimentation, decrease in water quality and excessive vegetation growth.

Anticipated impacts resulting from construction and use of roads include vegetation removal, increased risk of erosion, sediment loading into the system and inhibition of water flow. If not designed correctly roads can severely impact on instream habitat as well as bankside stability and riparian habitat. Mitigation again includes minimising the spatial footprint of the development to the greatest degree possible, with special reference to avoiding erosion, silting and sedimentation within the aquatic system during both construction and operation. Effective mitigation for wetland crossings includes ensuring the design of crossings allows for the retention of wetland soil conditions. Construction impacts of such infrastructure will be of low significance if mitigated. During the operation phase increased run-off from roads may also result in erosion.

9.3 Heritage

Impacts on heritage resources will be confined entirely to the construction phase.

One archaeological site was identified in the proposed Ntabelanga Dam basin and another site in the proposed Lalini Dam basin. These sites will be destroyed by inundation. The significance of

these impacts after mitigation was assessed as low. The identified site at Ntabelanga Dam must be mapped in detail, with judicious sampling, authorised by a permit from the heritage authority. The site may be destroyed once a destruction permit has been issued. The identified site at Lalini Dam must be mapped and excavated/sampled, authorised by a permit from the heritage authority. The site may be destroyed once a destruction permit has been issued. In addition, a detailed survey of potential Early Iron Age sites should be undertaken once crops have been harvested and vegetation clearance has occurred.

All graves, buildings and heritage structures within the full supply level of the Ntabelanga Dam (none were identified within the proposed Lalini Dam basin) will be destroyed by inundation, while those within the footprints of the dams' associated infrastructure could be damaged or destroyed.

All heritage structures have low significance while all human remains have high heritage significance. The significance of these impacts on graves and structures was assessed as low after mitigation.

The location of the graves and burial information must be recorded, affected graves must be relocated with the permission of the next-of-kin and a permit from the heritage authority, all graves within 300 m of any infrastructure must be demarcated, and no infrastructure must be located within 100 m of graves.

Structures that serve a purpose for the relevant families' socio-economic activities must be replaced, in accordance with the provisions made in the Relocation Policy Framework. A destruction permit for all affected structures older than 60 years must be obtained from the heritage authority.

9.4 Visual

The factors that affect the visual characteristics of the project are:

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

The significance of the visual impact of the Ntabelanga and Lalini Dams is considered medium-low.

The significance of the visual impact of the power line is regarded as very high for power line alternative 1; medium for power line alternative 2, and low for power line alternative 3, once re-aligned as recommended by the visual and floral specialists (see section 10 below).

The significance of the visual impact of the new and upgraded roads is considered medium-low.

9.5 Social

The study area is underdeveloped and poor and the proposed project holds potential for significant development and growth. There are, however, a number of concerns relating to institutional capacity and the need for correct implementation of the various project benefits, which would need to be in place to ensure project success.

With the Constitutional and policy obligations placed on the authorities to deliver water to the poor, the project holds the potential to move beyond this and uplift the state of development in the area. However, only through a carefully coordinated, planned and management effort and with close cooperation between the different agencies and broad based community buy in, is the project likely to succeed.

The social impact variables considered across the project are clustered in the following seven main categories:

- *Health and social well-being impacts;*
- *Quality of the living environment (Liveability) impacts;*
- *Economic impacts and material well-being impacts;*
- *Cultural impacts;*
- *Family and community impacts;*
- *Institutional, legal, political and equity impacts; and*
- *Gender relations impacts.*

With regard to the dams and associated infrastructure, most negative impacts will occur during the construction phase of the project as a result of the need for resettlement, the loss of land and the influx of the construction workforce. The size and extent of the project will result in these impacts being significant and wide spread, however, they will largely be of a temporary nature and many can be mitigated. Notwithstanding this, however, the impact of resettlement on both the displaced and host communities must not be under estimated.

In the Ntabelanga Dam basin, 62 structures and 19.9 km^2 of cultivated land will be lost. The Lalini Dam Basin technically preferred Alternative 1 will result in the loss of 12 structures and 7.6 km^2 of cultivated land. In total, it has been established that 160 structures and 0.7 km^2 of cultivated land could be lost as a result of the linear infrastructure components of the project (i.e. pipelines and roads).

Apart from the structures and cultivated areas that will be lost as a direct result of the project, 124 structures have also been identified as being within 5 m of the servitudes of the various infrastructure components and therefore are at risk. The facilities at risk are largely associated with the linear components of the project which include access roads, pipelines and the power line and, as a relatively wide servitude is currently being used for the purpose of identifying these components, it is possible to re-align the routes to avoid the majority, if not all of these structures at risk. The primary mitigation measures applied in these instances is avoidance and considering that the pipeline will be buried it is possible that the servitudes can be restored to their original condition after construction.

As the construction of the dams and associated infrastructure will require a large workforce, it is important to reduce the impact of the influx of construction workers by utilising local labour as far as possible.

The negative operational impacts, although they extend over a long period, are likely to be less significant than the more significant positive impacts, such as economic development and investment and the provision of domestic and agricultural water being of high significance for the area. The provision of water, for both domestic and agricultural use, is likely to have an effect on the division of labour. On the domestic front this is likely to be positive in nature releasing women from the arduous and time consuming task of collecting water. With regard to agriculture, however, this may result in an increased work burden being placed on women due to double or triple cropping with women undertaking such tasks as weeding.

As with the construction of the dams and associated water infrastructure most social impacts associated with the electricity generation and distribution infrastructure are related to the construction phase of the project. As this aspect of the project is not a stand-alone project it must be considered on a cumulative basis together with the rest of the project components, as the cumulative effect will be greatest. A unique aspect of the generation and distribution of electricity concerns exposure to electromagnetic fields. There has been wide international concern regarding the effect that electromagnetic fields have on public health and a possible link to various cancers. The hydro-electricity scheme has the potential to positively contribute to the economy which would have positive social benefits.

The realignment and upgrading of roads is not a separate project and must, at the social level, be assessed together with all the other project components. The unique aspect of the road infrastructure concerns easier access to the area which will carry with it both positive and negative consequences. On the positive side communities living in the area will have easier access into and out of the area as will tourists wanting to visit the area. On a more negative basis, easier access could hasten the effects of globalisation and the changes to local norms and culture. Vulnerable groups may also face greater psychological and social impacts due to rapid change as a result of greater access and exposure to outsiders.

One of the haul roads between the borrow pits and the Lalini Dam construction site will go through the town of Lalini. Due to increased traffic hazards, dust and noise, this would increase the level of health and safety risks. An alternative route should therefore be sought.

9.6 Economics

- ***Macro-Economic Impact***

A Macro-Economic Impact Analysis was performed for the construction period of the Ntabelanga and Lalini Dams and the accompanying infrastructure. The analysis was aimed to estimate the impact on Gross Domestic Product (GDP), employment and household income. The motive being the direct employment and payments made to low-income households which provide a good indication of the contribution of the project to poverty alleviation in the area.

The results for the construction of the Ntabelanga Dam and its impact on the provincial economy show that during the peak of the construction period, there will be both direct and indirect employment opportunities created as well as additional induced jobs in the provincial economy. Of the direct jobs there will be both semi-skilled and low-skilled, which would mostly be recruited from the local community, positions created.

It is anticipated that the macro-economic contribution of the irrigation scheme is estimated to contribute to the total annual GDP and provide a significant total household income for low-income households.

Of the total fulltime employment opportunities, it is estimated that 66% of the work will be on the farms. This 66 % , estimated to be 1 301 jobs, needs to be unpacked because the model provides only fulltime opportunities, while in agriculture and specifically the proposed crop mix will involve a large number of temporary employees. A separate calculation was done based on the accepted employment norms per hectare and the 1 301 unpacked, represents the following number of people:

- *Permanently on the farms – 7 per farming unit and 315 in total. This will be tractor drivers, irrigation workers and workshop staff; and*
- *The temporary workers are estimated at 80 per farming unit with a total of 3 600. This is very often the only job that these workers have and over time a clearer picture will emerge regarding their social situation.*

- ***Funding***

The funding of the project is an important issue and it is necessary that a number of issues be taken into consideration. The following aspects are important in terms of the different proposals:

Domestic Water Supply

In the Feasibility Report a future population growth of 1% per annum was used to estimate the number of beneficiaries to the year 2050. The latest StatsSA growth figures indicate an overall growth rate for the Eastern Cape Province of 0.44%, while some of the municipalities even show a decrease in the population. This leads to a difference of 133 729 potential beneficiaries with a possible reduced water demand and cost implications. To accommodate the issue a number of

scenarios were used in the Economic Cost Benefit Analysis (ECBA) as presented in the following table.

Table 2: Scenarios used in the Economic Cost-Benefit Analysis

Scenario	*Population Numbers*	*Water Volume*	*Estimated Construction Cost*
1	*Feasibility Report*	*Feasibility Report*	*Feasibility Report*
2	*Eastern Cape Growth Rate*	*Feasibility Report*	*Feasibility Report*
3	*Eastern Cape Growth Rate*	*Reduced Volume 19%*	*Reduced Cost 19%*

The very high levels of unemployment and poverty in the project area are such that it is improbable that more than 10% of the users will be able to pay for the water. Therefore, an annual subsidy over a very long period will have to be provided for.

Lalini Dam Hydropower Generation

This project component is economically and financially viable but can only be partially funded by loan, as the income from hydropower generation is intended to subsidise the operation and maintenance costs of the project, especially the high power consumption for pumping of potable and raw water.

Irrigation Scheme

It will take up to 10 years to attain maximum production and possibly financial profitability. Financial viability can only be attained by subsidisation of tariffs on an annual basis.

Grant funding and annual subsidisation is acceptable in a developmental situation as is experienced in the project area as long as it is properly motivated, controlled, managed and budgeted for. In the opinion of the economic specialist, the capital for the construction of the Ntabelanga Dam, the domestic water supply and the irrigation scheme will have to be grant funds.

As far as the operational capital is concerned, the annual maintenance of the dam, the domestic water supply infrastructure and the water supply must be subsidised. Income from power generation is intended to subsidise the operation of the water supply scheme. In the case of the irrigation scheme the operational capital will have to be provided as a subsidy on a sliding scale for the first number of years until full crop production is reached. It will gradually build up and then decrease and by the 10th year the situation should be such that it could probably be terminated. This, however, will depend on the management situation on the scheme and general prevailing agricultural economic conditions.

9.7 Irrigation

It is a known and accepted fact that the specific area of the Eastern Cape Province has a largely untapped agricultural potential. However, any agricultural development based on commercial principles will be faced with a number of stumbling blocks which include:

- *The problem of land ownership;*
- *A shortage of management skills, specifically for commercial farming;*
- *Available markets (the project area is far from the main markets);*

- *Support structures such as production inputs; and*
- *Funding.*

The concept of the proposed commercial based irrigation units is sound, but will only be successful if a number of conditions are in place:

a) *The original crop mix proposal does not make any mention of marketing structures. This will have to be investigated and could influence the crop mix.*
b) *The land issue will have to be addressed and some type of long term lease agreement reached with the local population.*
c) *The business model decided on will have to make provision for strong management leadership with a shareholder basis. The Eastern Cape Province has a number of failed irrigation projects that were based on the small farmer model and failed due to incompetent management structures.*
d) *The proposal regarding a livestock section for every unit will necessitate an upgrade in the quality of the current livestock. As the proposed grazing crops will only be available during winter, a grazing agreement with the local land owners will have to be in place for the summer period.*
e) *It will be impossible to have all 45 units up and running within a year or two. It is proposed that the implementation period be stretched to five years. For purposes of the economic cost benefit analysis it was accepted that it will take a unit another five seasons to be at full production and become financially independent.*
f) *Under current agricultural economic conditions it must be accepted that the start-up capital, Capital expenditure and Operational expenditure, will have to be through grant funding. It will be impossible for the units to start from scratch and for government to expect them to repay the start-up capital.*
g) *Proper management and financial support structures will have to be in place for the irrigation proposals to be viable.*

10. Impact assessment summary

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.

10.1 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.

The EAP recommends, as indicated by DEA, that any Environmental Authorisation is subject to the Water Use Licence (WUL) being obtained and complied with. The WUL takes the Reserve, which includes 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.

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.

The most critical socio-economic impacts associated with the construction of the dams relate to relocation and resettlement, the influx of construction workers, and risks and nuisances associated with construction activities. These impacts can be highly disruptive to communities and need to be carefully managed and mitigated.

In terms of affected households and assets, 62 structures and 19.9 km^2 of cultivated land are located within the Ntabelanga Dam basin and will have to be relocated or compensated. At the Lalini Dam site, 12 structures and 7.6 km^2 of cultivated land are located within the dam basin (alternative 1).

Regarding the proposed potable and raw water pipeline routes, 124 structures are located within the pipeline servitudes (feasibility level pipeline routes). This is a large number but it is possible to realign the pipelines during the detailed design stage to avoid most of these structures and minimise, or altogether eliminate, the need for relocation and associated negative social impacts.

The proposed pipelines are largely located within transformed habitat and construction will have a low to very low impact on terrestrial and aquatic ecology and wetlands, provided the mitigation measures contained in the EMPR are adhered to. These include, inter alia, minor realignments to avoid protected trees, and realignments to avoid wetlands where possible.

The Tsitsa River contributes a small percentage of the flow in the Mzimvubu River that reaches the estuary. The Ntabelanga/Lalini system will always be operated in a manner that fulfills the EWR downstream of the hydropower plant outfall, both in terms of minimum and maximum flows. The project is also not expected to impact on the water quality. The sizes of the Ntabalanga and Lalini Dams are such that they will support the EWR and the Best Attainable State for the estuary, as set out in the estuarine Reserve determination.The impact on the estuary is therefore predicted to be negligible.

The Macro-Economic Impact Analysis found that during the peak of the construction period, the Ntabelanga Dam will result in 2 299 direct employment opportunities created in the Province, with another 843 indirect and 1 036 induced jobs. Of the direct jobs an estimated 1 057 will be semi-skilled and 771 low-skilled and should be recruited from the local community. There is a positive impact on the GDP to the value of R282.7 million. Low income households will also receive a total of R82.42 million out of a total of R528.11 million.

Although only for a short period, the construction activity of the Ntabelanga Dam will contribute considerably to the economy of the region and the province.

The proposed construction of the Lalini Dam and accompanying hydropower plant will also contribute considerably to the economy. At the peak of construction of the dam 815 direct jobs will be created with another 491 indirect and 604 induced jobs in the provincial economy. Of the direct jobs an estimated 375 will be semi-skilled and 273 low-skilled, most of which should be recruited from the local community. There is a positive impact on the Gross Domestic Product to the value of

R164.6 million. Low income households are expected to receive a total of R52.38 million out of a total of R335.64 million of the total impact on households.

During operation, both dams will indirectly provide important social and economic benefits at a local, provincial and national level, as the water they supply will enable:

- *The provision of potable water to many households in the project area and beyond, which will have a direct positive impact on the quality of life of the recipients;*
- *The emergence of an agricultural sector which will be able to actively contribute to the economy of the area and of the province; and*
- *The provision of electricity to alleviate pressures on the national grid and cross-subsidise the cost of the other components of the project.*

The irrigation component of the project will contribute an estimated R129.3 million per year to the GDP and a total household income at R146.6 million with R38.6 million for low-income households. The total fulltime employment opportunities is estimated at 1 976 of which 1 301 is direct on the farms.

The agricultural component of the project may, however, place an additional work burden on women who may have to undertake such tasks as weeding.

10.2 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. For the construction of the power line linking the Lalini hydropower plant to the grid, three alternatives were considered and are discussed in more detail below.

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.

The impact on health of electromagnetic fields associated with power lines has not been determined. From a social point of view, the risk, or perceived risk, is considered to be the main impact of the power line during operation. The precautionary principle will be applied and human settlements and activities within the power line servitude will be restricted.

As far as the electricity generation and distribution component of the project is concerned, the main benefit will be the substantial income generated from the sale of renewable energy, and feeding this power into the national grid.

10.3 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.

However, the construction of new roads in the vicinity of the Lalini Dam wall (i.e. haul roads), as well as the access road to the Lalini hydropower plant are located within highly sensitive areas with regard to fauna and flora, and will have a very high negative impact. Alternative access routes to the hydropower plant that could avoid the impact on this sensitive area need to be considered. It is also recommended that a walk-down to undertake search and rescue be done by a qualified specialist before construction of the haul road and access road commences.

During operation, roads will result in a risk of collisions with animals, which is likely not to be fully mitigated.

From a social perspective, 26 structures are within the footprint of proposed roads and road servitudes and may require relocation. The preferred mitigation is to realign the roads to avoid structures as much as possible in order to minimise or altogether eliminate the need for relocation and associated negative social impacts.

Road alignments, the new and upgraded roads will facilitate easier access to the areas served which may indirectly stimulate economic development. On the other hand, this could hasten effects of globalisation and changes to local norms and culture.

10.4 Comparative assessment of alternatives

Preferred power generation mode

The EWR have been 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. This still needs to be confirmed.

Preferred tunnel/power line alternative

The aquatic assessment found that in order to reduce the area of impact in terms of silting, sedimentation, decrease in water quality and excessive vegetation growth, the shortest possible section between the dam wall and discharge point should be preferred (i.e. Alternative 1: short hydropower tunnel and associated power line). However, fatal flaws have been identified for Alternative 1 in terms of faunal, floral, and visual impacts. In particular, the power line crosses large sections of indigenous and possible protected trees, and the impact on the faunal habitat on the mountain and within the gorge was not considered viable.

After the environmental assessment had been conducted Alternatives 1 and 2 (associated with the short and medium length tunnels respectively) were eliminated by the technical team due to the presence of deep steep gorges which provide no access to where the tunnel daylights and the

hydropower plant would be located. In addition Alternatives 1 and 2 would have significantly less head to generate power, leaving only Alternative 3.

Alternative 3 (associated with the longest pipeline/tunnel and power line) as it is currently proposed has a very high visual impact and also crosses more sensitive floral habitats. It was recommended that this power line be realigned in order to avoid sensitive areas in terms of ecology and visual aspects. The power line route recommended by the EAP is shown in ***Figure 1.***

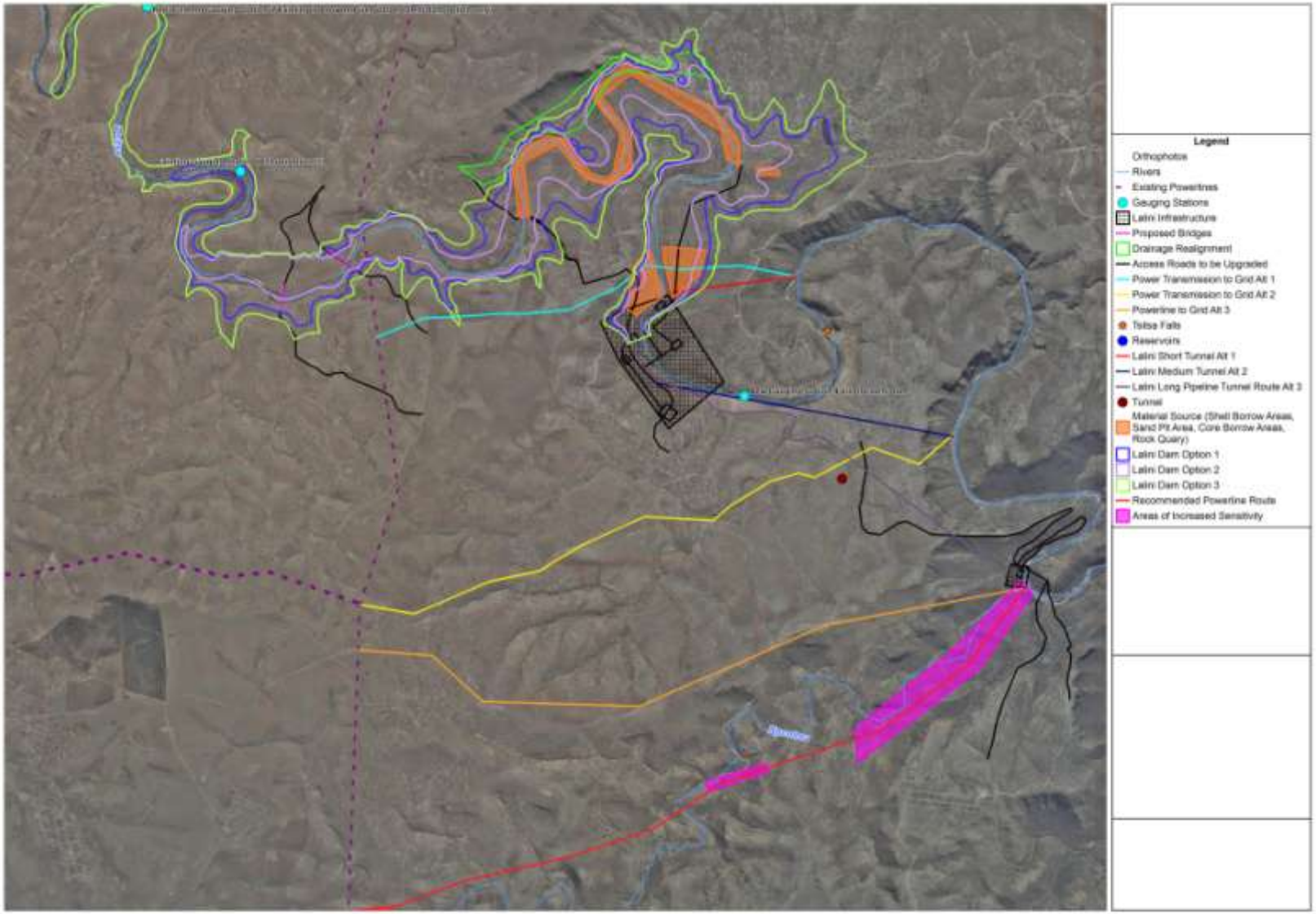

Figure 1 - Recommended power line route alignment

- ***Preferred dam size for Lalini Dam***

With regard to the Lalini Dam, three dam sizes were considered.

The smallest dam size (Alternative 2) is preferred from a number of perspectives. Firstly, it involves the least loss of cultivated land and structures (i.e. 1 dwelling and 4.9km^2 of cultivated land, compared to 12 structures and 7.6km^2 of cultivated land for technically preferred Alternative 1) and is therefore the socially preferred option. Secondly, it will result in the lowest direct loss of wetland habitat, and is thus considered to be the most viable option in terms of wetland conservation. Thirdly, it will result in the inundation of the least amount of floral and especially sensitive floral vegetation and habitat and is therefore the preferred alternative in terms of floral impacts. Finally, while all 3 alternative dam sizes will lead to a definite impact on population size of endangered, vulnerable and protected indigenous faunal species. Alternative 2 is regarded as impacting the least on faunal RDL species.

Notwithstanding this, no major red flags or fatal flaws were found with technically preferred Alternative 1 (i.e. medium dam size). The technically preferred option is therefore acceptable with the careful application of mitigation measures aimed at reducing the social impact on displaced and host communities, as well as the impacts on ecology and wetlands.

As detailed designs have not yet been finalised for the Lalini Dam, the EAP's recommendation is that the final dam size be within the range of proposed Alternatives 1 and 2 (i.e. a Full Supply Level of between 752.42 mamsl and 763.61 mamsl).

No project alternative

By and large, the no project alternative will result in the status quo being maintained.

The following points can however be noted:

- *Although no loss or decrease in sensitive species and habitats is expected, the current impacts such as overgrazed veld and alien proliferation along the riparian features will continue. Thus the ecological state of these areas will not improve if the no project alternative is implemented.*
- *No loss of faunal habitat and RDL and protected species is expected. This should be seen in contrast to the definite impact on population size of endangered, vulnerable and protected indigenous faunal species resulting from the construction of the Lalini Dam.*
- *In terms of aquatic ecology, the no project alternative will best ensure maintenance of ecological integrity within the system with the current rocky habitat in fast flowing clear water being maintained.*
- *It is expected that wetland habitats will still undergo alterations as a result of the continued impacts of anthropogenic activities such as vegetation clearing, sediment winning, crop cultivation within wetland habitats, etc. Additionally, due to the extensive erosion within the study area and the catchment, sediment inputs to wetland and riparian habitats are anticipated, thus potentially altering flow patterns within wetlands and riparian zones, as well as smothering vegetation and aquatic macro-invertebrates.*

- *No negative impacts will accrue to heritage resources. In particular, residents will not be subject to the high emotional cost associated with ancestral grave relocation. Conversely, the scientific knowledge inherent in resources such as archaeological sites will remain unrecovered until and unless funding for research is obtained from another source.*
- *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. In addition to this South Africa has a policy of recognising the human right to water at both the Constitutional and policy levels. A no project alternative 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. With the area being one of the least developed and poorest in the country these losses will have severe social consequences. With the Mzimvubu River being the largest undeveloped water resource in the country any loss of benefits associated with the use of this river will be of national significance.*

11. Key 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.

11.1 Key mitigation measures

While a comprehensive set of mitigation measures has been provided in the EMPR, the following mitigation measures have been identified as essential to minimise significant environmental impacts, and implementation of these measures is a condition to the project proceeding.

- ***Key mitigation measures to be implemented during the pre-construction phase***
  - *A walk-down of the areas impacted by the access road to the hydropower plant and haul roads must be undertaken before clearing. Search and rescue of protected vegetation must be undertaken by a suitably qualified specialist. Floral species needs to be relocated to similar habitat types, outside of infrastructure footprint areas.*
  - *The haul road linking the borrow areas to the Lalini Dam construction site must be realigned to avoid going through the town of Lalini, if possible.*
  - *Protected tree species Podocarpus fulcatus and P. latifolius were located along the sections scheduled for road upgrades. The following must be ensured:*
    - *Possible re-alignment of the roads where protected tree species were found, in order to avoid cutting and destroying the trees;*
    - *Where protected trees will be disturbed, ensure effective relocation of individuals (if possible) to suitable similar habitat; and*
    - *Permit applications must be obtained from relevant authorities.*

- *Rescue and relocation of medicinal important floral species, RDL and protected floral species is essential to minimise impacts from inundation.*
- *RDL faunal species or species of conservational concern found within the operational footprint area must be relocated to similar habitat within the vicinity of the study area with the assistance of a suitably qualified specialist.*
- *No hunting or trapping of faunal species is to occur.*
- *The construction footprint needs to remain as small as possible, especially in the sensitive habitats.*
- *Aquatic bio-monitoring must take place and if any trends are observed where impacts on the aquatic ecology is becoming unacceptable, measures to reduce the impacts must be immediately implemented.*
- *Baseline studies must be undertaken for noise, air quality, and water quality.*
- *An investigation must be undertaken by a qualified specialist to determine whether any waterfall dependant plants in the gorge and on the cliff could be significantly impacted and whether they require relocation. All findings of the investigation must be implemented.*
- *Areas of increased sensitivity, as shown in the sensitivity maps developed (Figures 4 and 5) should ideally be avoided in terms of the placement of infrastructure in order to minimise the footprints within wetland features. Where it is not possible, mitigation measures to limit the impacts (such as ensuring the design of crossings allows for the retention of wetland soil conditions as presented in the EMPR) must be implemented.*
- *Support structures for pipelines must be placed outside of riparian features, channelled valley bottom wetlands and drainage lines. Should it be essential to place such support structures within these features, the designs of such structures must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channels. In order to achieve this all crossings of wetlands should take place at right angles wherever possible.*
- *Where new roads traverse wetland / riparian habitats, with special mention of drainage lines, channelled valley bottom wetlands and riparian habitat, disturbance to any wetland crossings must be minimised and suitably rehabilitated. The crossing designs of bridges must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. All crossings of wetlands should take place at right angles wherever possible.*
- *The design of culverts / bridges should allow for wetland soil conditions to be maintained both upstream and downstream of the crossing to such a degree that wetland vegetation community structures upstream and downstream of the crossing are maintained. In this regard, special mention is made of:*
    - *The design of such culverts and/or bridges should ensure that the permanent wetland zone should have inundated soil conditions throughout the year extending to the soil surface;*
    - *The design of such culverts and/or bridges should ensure that the seasonal wetland zone should have water-logged soils within 500mm of the soil surface during the summer rainfall period; and*

- *Temporary wetland zone areas should have waterlogged soil conditions occurring to within 300mm of the land surface during the summer rainfall period.*
- *Ensure that no incision and canalisation of the wetland system takes place as a result of the construction of the culverts.*
- *It must be ensured that flow connectivity along the wetland features is maintained;*
- *The Ecological Water Requirements (EWR) as set out in the Reserve Determination Volume 1: River (Report P WMA 12/T30/00/5212/7) for the Ntabelanga Dam, and the EWR determined for the Lalini Dam, must be adhered to.*
- *The installation of multiple level outlets, with outlets at approximately 8 m intervals from 6 m below the full supply level of the dams and proper operation is required to mitigate the effect of water quality changes downstream of the proposed dams.*
- *The archaeological site identified in the proposed Ntabelanga Dam basin should be mapped in detail, with judicious sampling, authorised by a permit from ECPHRA. Thereafter the site may be destroyed once a destruction permit has been issued by ECPHRA.*
- *The archaeological site identified in the proposed Lalini Dam basin should be mapped and excavated/sampled, authorised by a permit from ECPHRA. Thereafter the site may be destroyed once a destruction permit has been issued by ECPHRA.*
- *A detailed survey of potential Early Iron Age sites should be undertaken once crops have been harvested and vegetation clearance has occurred.*
- *New roads and pipelines should be realigned as much as possible to avoid structures.*
- *The proposed access road for construction vehicles through Lotana village must be realigned to avoid the village.*
- *Fieldwork to identify heritage resources affected by roads and electrical infrastructure must be undertaken, and mitigation measures recommended, once final infrastructural locations and routes have been finalised, surveyed and pegged.*
- *All graves outside the full supply levels within 300 m of associated infrastructure should be demarcated by the Engineer's environmental representative, in consultation with the next-of-kin, for the duration of construction. These graves should not be disturbed.*
- *The power line linking the Lalini hydropower plant to the grid must be realigned to avoid the ridge, as shown in* ***Figure 1****.*
- *All access roads impacted by inundation must be compensated by providing new roads and bridges.*
- *The RPF must be implemented in a consultative manner.*
- *A dedicated Project Management Unit should be set up to manage the project.*
- *Ensure continued liaison with authorities responsible for potable water distribution. The social impacts and institutional arrangements for the proposed commercial irrigated farming scheme (land tenure/ ownership, farming model, farmer identification and support, funding, etc.) needs to be resolved between affected communities and role players before the scheme is implemented.*
- *A Decisions Register must be established and maintained, and must be available to any member of the public who wishes to access it. The register should include all commitments made to stakeholders during the public participation process, which are recorded in the Issues and Responses Report.*

- *An employment and skills development policy, maximising employment opportunities and skills development for local communities and promoting gender inclusivity and equity must be developed.*
- *A procurement policy, promoting business opportunities for local communities and gender inclusivity and equity, must be developed.*
- *An investigation on the necessity and design specifications for an eel-way should be undertaken and findings implemented.*

- ***Key mitigation measures to be implemented during the construction phase***
  - *An alien vegetation control programme must be implemented, as encroachment of alien vegetation is already apparent in the study area and is expected to increase as a result of the disturbances resulting during the construction process. Rehabilitation of disturbed areas, utilising indigenous wetland vegetation species, will assist in retaining essential wetland ecological services, particularly flood attenuation, sediment trapping and erosion control, and assimilation of nutrients and toxicants, thus reducing the impacts of construction related activities.*
  - *Prohibit the collection of plant material, outside of the proposed dam basins, for firewood or for medicinal purposes during the construction phase by construction staff.*
  - *Restrict vehicles as far as possible to travel on designated roadways to limit the ecological footprint.*
  - *No hunting or trapping of faunal species is to occur.*
  - *The construction footprint needs to remain as small as possible, especially in the sensitive habitats.*
  - *Sections of power lines that require bird diverters must be identified and implemented.*
  - *Aquatic bio-monitoring must take place, starting six months prior to construction activities, and if any trends are observed where impacts on the aquatic ecology is becoming unacceptable, measures to reduce the impacts must be immediately implemented.*
  - *Identified areas where erosion could occur must be appropriately protected by installing the necessary temporary and/or permanent drainage works as soon as possible and by taking other appropriate measures to prevent water from being concentrated in rivers/streams and from scouring slopes, banks or other areas.*
  - *Storm water control measures must provide for erosion and sedimentation control, and for reinforcement of banks and drainage features, where required. Possible measures include the use of gabions or reno mattresses and geotextiles, re-vegetation of profiled slopes, erosion berms, drift fences with hessian and silt traps.*
  - *It must be ensured that flow connectivity along the wetland features is maintained.*
  - *Monitor rivers and wetlands for incision and sedimentation.*
  - *Implement a water quality and quantity monitoring programme.*
  - *The EWR as set out in the Reserve Determination Volume 1: River (Report P WMA 12/T30/00/5212/7) for the Ntabelanga Dam, and the EWR determined for the Lalini Dam, must be adhered to at all times.*
  - *Develop a Water Management Method Statement (WMMS), including measures for water conservation, for approval by the Engineer prior to the commencement of the works.*

- *Construction personnel accommodation on site must be as limited as possible. Construction workers should as much as possible be recruited from neighbouring communities and transport provided to the construction site(s).*
- *Local residents should be recruited to fill semi and unskilled jobs.*
- *Women should be given equal employment opportunities and encouraged to apply for positions.*
- *A skills development plan should be put in place at an early stage and workers should be provided the opportunity to develop their skills which they can use to secure jobs elsewhere post-construction.*
- *A procurement policy promoting the use of local business, where applicable, should be put in place to be applied throughout the construction phase.*
- *Ensure that the appropriate procurement policies are put in place and closely followed.*
- *Ensure that all consultation is gender inclusive.*
- *Ensure that the Decisions Register is maintained, and is available to any member of the public who wishes to access it.*

- ***Key mitigation measures to be implemented during the operation phase***
  - *Implement a communication strategy for the implementation phase.*
  - *No hunting or trapping of faunal species by operational staff is to occur.*
  - Aquatic bio-monitoring must take place and if any trends are observed where impacts on the aquatic ecology is becoming unacceptable, measures to reduce the impacts must be immediately implemented.
  - *An alien vegetation control programme must be maintained, as encroachment of alien vegetation is already apparent in the study area and special attention needs to be given to areas disturbed during the construction process. Rehabilitation of disturbed areas, utilising indigenous wetland vegetation species, will assist in retaining essential wetland ecological services, particularly flood attenuation, sediment trapping and erosion control, and assimilation of nutrients and toxicants.*
  - *The EWR as set out in the Reserve Determination Volume 1: River (Report P WMA 12/T30/00/5212/7) for the Ntabelanga Dam, and the EWR determined for the Lalini Dam, must be adhered to at all times.*
  - *During operation and maintenance of infrastructure, vehicles must remain on designated roads and not be permitted to drive through sensitive wetland / riparian habitat, particularly on the edges of the dams where loss of wetland habitat and therefore ability of the wetlands to provide ecological services, is already compromised.*
  - *Maintenance personnel must ensure that any tools and/or waste products resulting from maintenance activities are removed from the site following completion of maintenance.*
  - *Regular maintenance of all roads, with specific mention of wetland / riparian crossings, must take place in order to minimise the risk of further degradation to wetland / riparian habitat.*
  - *Ensure that the Decisions Register is maintained, and is available to any member of the public who wishes to access it.*

- *Maintain the potable water infrastructure, control pollution and curb illegal taps. If no such measures are implemented the community may be worse off as a result of water borne diseases or no water at all.*
- *The use of the access road to the hydropower plant by vehicles must be controlled by way of a manned boom gate or other suitable control system.*

11.2 Relocation Policy Framework

Recommendations in the RPF include:

- *Thorough identification of abandoned homesteads and recording of field ownership is required.*
- *The locations of ancestral graves at abandoned homesteads affected by the project must be ascertained.*
- *Certain structures will require replacement so that the relevant family's socio-economic activities can continue.*
- *All graves within the full supply levels of the dam should be relocated, with the permission of the next-of-kin and a permit from ECPHRA.*
- *No associated infrastructure may be located within 100 m of graves outside the full supply levels, and if unavoidable, these graves should also be relocated.*
- *A destruction permit is required from ECPHRA; if possible a single permit should be obtained for all affected structures.*
- *Avoid involuntary resettlement wherever possible.*
- *Undertake consultations with displaced people about acceptable alternatives and strategies and include them in the planning, implementing and monitoring processes.*
- *Choose the relocation site to ensure that the minimum disruption to displaced families and host communities occurs.*
- *Sensitise host communities to the pending arrival of the displaced communities;*
- *Establish a forum or resettlement committee through which resettlement and integration can be controlled by those affected.*
- *A formal accessible grievance procedure should be implemented and communicated to both the displaced and host communities.*
- *Ensure that the receiving environment is prepared and has adequate infrastructure, facilities and social services to support both the displaced and host communities, prior to moving the displaced communities.*

11.3 Offsets

The Mzimvubu Water Project will inundate wetland and riparian habitats that are breeding and foraging areas for protected and endangered cranes. The access road to the hydropower plant site also traverses a highly sensitive area. These impacts have been assessed by the ecologist to be of high significance. It is not possible to avoid, minimize or rehabilitate the impact completely. The only mitigation measure that could potentially reduce the residual negative impact significantly is an offset. One of the difficulties associated with a biodiversity offsets are that during this EIA, it has not been possible to establish whether suitable offset areas exist in the catchment, especially if a like for like principle is applied. The process to be followed would be to compile a detailed

Baseline Report of the areas to be lost, to reach agreement of the offset ratios/principles, identify offset options, then implement and manage them indefinitely. Although the likelihood of successful and sustainable implementation of a biodiversity offset is questionable, the EAP is confident that some form of conservation initiative aimed at cranes could be implemented somewhere in the province. This option has also not been investigated any further during this EIA, but offers a wider selection of implementation options.

In order to estimate a budget for implementing a traditional biodiversity offset, the area of wetlands and riparian vegetation to be inundated was calculated (approximately 412 ha at the Ntabelanga Dam and 623 ha at the Lalini Dam site), multiplied by an offset ratio associated with the vegetation type (8:1 for Ntabelanga and 17:1 for Lalini) and multiplied by a factor of 3 to allow for the practical packaging of land parcels, in order to estimate an amount of land that would have to be acquired and set aside for protection. Any current use of this land will have to be compensated for. This is expected to be mostly grazing as dwellings are seldom located in wetlands or river beds and banks. If a budget of R2000-00 per ha is used to cover these costs, then approximately R90 million is required to make the land available. An additional R10 million will be required to implement the offset.

The EAP therefore recommends that the planning and initiation of some form of crane conservation project be stipulated as a condition of the authorisation of this project, and that a budget amount of R100 million be incorporated into the planning process.

Without taking the R100 million for an offset into account, the NPV of the project with population scenario 1 is R 1 827.11 million. Allocating an additional R100 million changes NPV to R 1 748.47 million. This is about a 4% change which doesn't change the economic viability of the project. The same applies to the Benefit-Cost Ratio and Internal Rate of Return.

12. Recommendations for the irrigation component of the project

Although authorisation for the irrigation component of the Mzimvubu Water Project was not applied for as part of this EIA process, the success of the irrigation component is considered essential for the success of the overall project. This will depend on a number of conditions being met, which are presented in the Economic Impact Assessment.

In view of the above, these recommendations are intended to guide relevant parties in planning and designing the proposed irrigation scheme:

- *Careful consideration must be given to the suitability of the crop selection for the irrigation development.*
- *A well-constructed agricultural development training and support system focused on assisting the new farmers will need to be implemented.*
- *Support structures should be available right from the start to assist with management. This support must cover the whole spectrum of the undertaking, from planting to marketing and the overall management. The best possible management will have to be available right*

from the start, which means the selection of the unit managers as well as the accepted management structure will eventually determine the success of the irrigation scheme.

- *The assistance of the Department of Rural Development and Agrarian Reform, Tsolo Agricultural College, and Jongiliswe Agricultural College for Traditional Leaders must be enlisted to train, mentor and support developing farmers.*
- *This training must include business training, and training in project planning, monitoring and evaluation.*

Consideration should also be given to the promotion of gender inclusivity and equity.

13. Programme

The draft EIR is available to I&APs for comment from the DWS website (http://www.dwa.gov.za/projects.aspx) and hard copies are also available for perusal from a number of venues in the project area. I&APs have thirty (30) days to comment on the draft EIR.

A round of public meetings will take place in November 2014 in order to provide an update on the project and report back to stakeholders on the findings of the Impact Assessment phase.

9 Conclusion and recommendations

The main aim of the Mzimvubu Water Project is the socio-economic upliftment of the largely undeveloped and impoverished communities within the project area. This is to be achieved through:

- *Supply schemes for domestic and industrial water;*
- *Supply schemes for irrigated agriculture;*
- *Hydropower generation; and*
- *The creation of temporary and permanent jobs.*

The provision of potable water to a number of rural and small urban areas is a very important aspect of the total project and is also a constitutional requirement. It should be noted here that while the bulk water distribution infrastructure will enable this constitutional requirement to be fulfilled, the District Municipalities, and not the applicant, will be responsible for the tertiary infrastructure and ultimately distributing potable water to communities. Coordination with these municipalities is therefore required to ensure they can fulfil this mandate.

The analysis of the socio-economic situation in the proposed area indicates very high levels of unemployment and household poverty, which is seen as an indication that a very small number of households will be able to pay for water. The recommendation is that this is seen as part of a developmental project and that government accepts that this will entail a grant with subsidised funding for the basic water needs over a very long period.

Financial viability is not a requirement for a project of this nature, as the objective of the project is not to make a profit on the investment, but rather to contribute to the development of the project

area. However the economic impact assessment found that the project can be economically viable, in that the direct and indirect socio-economic benefits will exceed the financial cost of the project.

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 flora, fauna, 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.

In view of the above, the positive impacts expected to result from the project, in terms of social and economic development are considered to outweigh the negative impacts.

It is therefore recommended that the proposed project proceed, on condition that the mitigation measures proposed are adhered to and that appropriate offsets are implemented.

As the success of the project in terms of socio-economic development rests largely on parties other than the applicant, and depends on factors outside the control of the applicant, it is critical that the necessary institutional arrangements and cooperation between all parties involved be in place, in order to ensure the primary objective of the project is achieved.

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT –

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DEA REF No. 14/12/16/3/3/2/677 (Dam construction application)
14/12/16/3/3/2/678 (Electricity generation application)
14/12/16/3/3/1/1169 (Roads application)

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Acronyms and abbreviations

AIDS	Acquired Immunodeficiency Syndrome
BID	Background Information Document
BLMC	Biodiversity Land Management Class
BPEO	Best Practical Environmental Option
CA	Competent Authority
CAAP	Compensation Assessment and Action Plan
CAPEX	Capital Expenditure
CBA	Critical biodiversity area
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs (former DEAT)
DEAT	Department of Environmental Affairs and Tourism (now DEA)
DEDEA	Eastern Cape Department of Economic Development and Environmental Affairs (former DEDEAT)
DEDEAT	Eastern Cape Department of Economic Development, Environmental Affairs and Tourism
DEIR	Draft Environmental Impact Assessment Report
DM	District Municipality
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWA	Department of Water Affairs (former DWS)
DWAF	Department of Water Affairs and Forestry (former DWA)
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EC	Eastern Cape
ECBA	Eastern Cape Biodiversity Assessment
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECO	Environmental Control Officer
ECPHRA	Eastern Cape Provincial Heritage Resources Authority
ECPTA	Eastern Cape Parks and Tourism Agency
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EMPL	Environmental Management Plan
EMPR	Environmental Management Programme
EWR	Environmental Water Requirements
FAO	Food and Agricultural Organisation
FEPA	Freshwater Ecosystem Priority Areas
FGM	Focus Group Meetings
FSR	Final Scoping Report
GDP	Gross Domestic Product
GIS	Geographical Information System
GLeWaP	Groot Letaba River Water Development Project
GN	Government Notice
GNR	Government Notice Regulation

GWWs	Government Water Works
HIA	Heritage Impact Assessment
HIV	Human Immunodeficiency Virus
I&AP	Interested and Affected Parties
IAIA	International Association for Impact Assessment
IAIAsa	International Association for Impact Assessment South Africa
IDA	Infrastructure Development Act\
IRR	Issues and Response Report
IUCN	International Union for Conservation of Nature (now World Conservation Union)
LM	Local Municipality
MAR	Mean Annual Runoff
MEIA	Macro-economic Impact Analysis
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MW	Megawatt
MWP	Mzimvubu Water Project
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003), as amended
NEMWA	National Environmental Management: Waste Act (Act No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OR Tambo	Oliver Reginald Tambo
PES	Present Ecological State
PICC	Presidential Infrastructure Coordinating Commission
POC	Probability of Occurrence
PoS	Plan of Study
PPP	Public Participation Process
RPF	Relocation Policy Framework
RCC	Roller-Compacted Concrete
RDSIS	Red Data Sensitivity Index Score
RDL	Red Data List
RMP	Resource Management Plan
SAHRA	South African Heritage Resources Agency
SANCOLD	South African national committee on large dams
SAPS	South African Police Services
SCC	Species of Conservational Concern
SIA	Social Impact Assessment
SIP	Strategic Integrated Project
SMMEs	Small, Micro and Medium Enterprises

SoER	State of the Environment Report
UNEP	United Nations Environmental Programme
URV	Unit Reference Value
VAC	Visual Absorption Capacity
WCD	World Commission on Dams
WMA	Water Management Area
WML	Waste Management Licence
WMMS	Water Management Method Statement
WRYM	Water Resources Yield Model
WULA	Water Use Licence Application
WTW	Water Treatment Works
WWTW	Waste Water Treatment Works

List of units

MW	Mega Watt
m	Metres
km^2	Square Kilometres
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:

- Forestry;
- 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, the creation of temporary and permanent jobs, and associated development (**Figure 1**).

Environmental authorisation is required for the infrastructure components of the proposed Ntabelanga-Lalini Conjunctive Scheme.

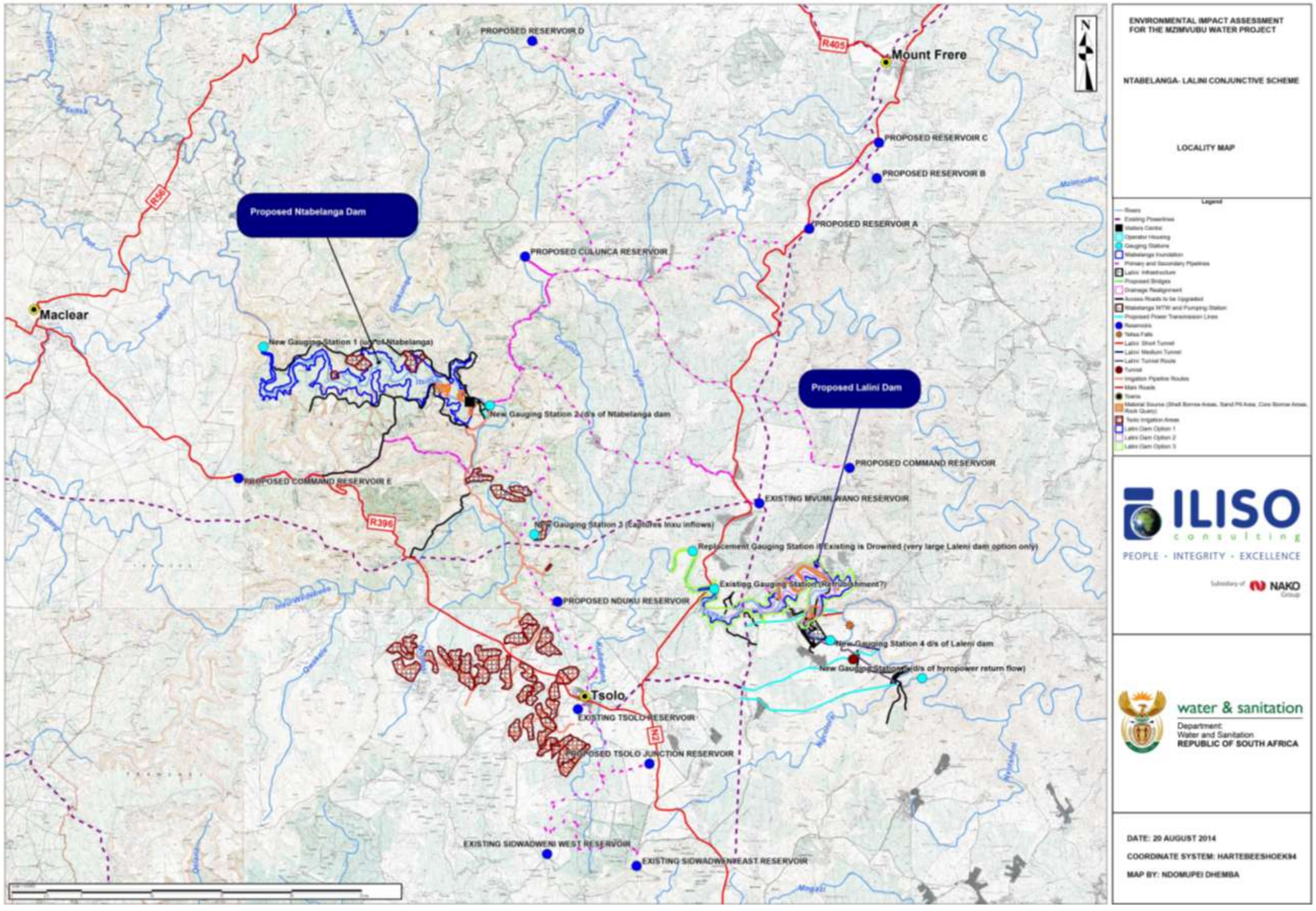

Figure 1: Locality map

1.2 PURPOSE OF THE ENVIRONMENTAL IMPACT ASSESSMENT

Chapter 5 of the National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA), aims to promote the use of appropriate environmental management tools, such as an Environmental Impact Assessment (EIA), in order to ensure the integrated environmental management of activities.

The general objective of integrated environmental management, as described in NEMA, is to identify, predict and evaluate the impacts of an activity on the social, economic, bio-physical and cultural components of the environment. This assessment includes the risks associated with activities, consequences of the activities as well as considering alternatives and mitigation measures to avoid, minimise or compensate for negative impacts, maximise benefits, and promote compliance with the principles of environmental management as set out in section 2 of NEMA. This is implemented by requiring environmental authorisation for activities that are "listed" in the EIA Regulations, 2010.

The Mzimvubu Water Project 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. The purpose of this EIA is to assess the components of the project that are NEMA listed activities for which the DWS has the mandate and intention to implement. The EIA process will provide the information that the environmental authorities require to decide whether the project should be authorised or not, and if so then with what conditions.

1.3 PURPOSE OF THIS REPORT

This report builds on the Scoping Report. It describes the proposed project and the receiving environment, and presents the findings of the second phase of investigations (EIA phase), specifically the assessment of key impacts associated with the project.

1.4 DETAILS AND EXPERTISE OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Lea Muruven is an Environmental Assessment Practitioner (EAP) with Masters degrees in Environmental Management and Political Science. She has over five years' experience in impact assessment and environmental management and has been responsible for drafting impact assessment reports and Environmental Management Programmes, and conducting public participation processes, as well as high level environmental screenings for a variety of projects in the water, energy, transport and industrial sectors. Lea has an excellent understanding of the laws and regulations relating to air quality, water, biodiversity, heritage, and waste management in South Africa. She is a member of the South African Affiliate of the International Association for Impact Assessment.

1.5 PROJECT TEAM

In addition to the EAP, the ILISO Consulting (Pty) Ltd project team includes the following individuals: Dr Martin van Veelen (Project Director and Engineer), Terry Calmeyer (Project Leader), Kim Dalhuijsen (Public Participation Process Task Leader), Joseph Masilela (Public Participation Process administrator), Ndomupei Dhemba (GIS specialist), Nadine Duncan (Water Use Licence Application Task Leader), and Sandhisha Jay Narain (Borrow Areas Task Leader). The ILISO team will be assisted by the following specialists: Stephen van Staden (Ecologist), Menno Klapwijk (Visual Specialist), William Mullins (Economic and Agricultural specialist), Bob Pullen (Relocation Action Plan Specialist), Neville Bews (Social specialist) Len van Schalkwyk (Heritage specialist), and James Cross (Legal advisor). Curricula Vitae are included in **Appendix A**.

Dr Martin van Veelen is a Professional Engineer with a PhD in aquatic health. He is a Fellow of the South African Institution of Civil Engineers, a member of the South African Society of Aquatic Scientists, of the Environmental Scientific Association, of the International Water Association, of the Water Institute of South Africa, and of the Vaal River Catchment Association. He is a certified Environmental Assessment Practitioner with over 30 years experience who specialises in project management, environmental impact assessments and water resource planning. He specifically has extensive experience in water quality, especially water quality management, water quality monitoring and water quality assessment. Martin has experience in managing projects that involve multi-disciplinary teams, and projects that involve public consultation and participation.

Terry Calmeyer is a certified Environmental Assessment Practitioner. She has a Masters degree in Environmental Management and specialises in Environmental Impact Assessments, the environmental components of project implementation and Project Management. Terry serves on the International Association of Impact Assessment (IAIA) Council, is the past President of the South African Affiliation of the International Association of Impact Assessment (IAIAsa) and an active member of the South African Committee on Large Dams (SANCOLD), the Environmental Law Association and the International Association for Public Participation. She has been involved in a variety of different types of EIAs including for transmission lines, water supply projects, dams, roads, railways, waste water treatment works and airports, in South Africa, Uganda, Lesotho, Botswana, Namibia and Mozambique. Terry was the EAP for the Groot Letaba Water Project (GLeWaP) and the Kobong pumped storage scheme. She is the specialist environmental advisor on the Mooi Mgeni Transfer Scheme Phase 2.

Kim Dalhuijsen has an Honours degree in Zoology and Environmental Sciences from the University of the Witwatersrand and 1.5 years of work experience. She has been responsible for drafting impact assessment reports and Environmental Management Programmes, and assisting with public participation processes on a variety of projects. She is a member of the South African Affiliate of the International Association for Impact Assessment.

Joseph Masilela has a Diploma in Finance and Accounting and eight years experience in office administration and community liaison work that includes arranging meetings, facilitating community workshops, meetings with traditional authorities and assisting on all project related work. Joseph assists with secretarial functions for projects including maintaining attendance registers and databases for projects.

Ndomupei Dhemba is a Geographic Information Systems (GIS) and Remote Sensing specialist with a Masters degree in GIS and Remote Sensing for Environmental Management. She has 7 years experience in natural resources management including resource Inventorying and auditing, biodiversity assessment, and has been involved in a number of EIA programmes as a biodiversity and GIS & Remote Sensing Specialist in Zimbabwe, Tanzania and South Africa. She has worked with rural communities in the promotion of rural development through the sustainable utilization of Natural Resources through group projects, capacity building and EIAs of these projects. She also has experience in public participation and research particularly in the promotion of the use of remote sensing for biodiversity assessment. She is conversant with ArcGIS, ERDAS, ILWIS, Planet GIS and ENVI.

Nadine Duncan has an Honours Degree in Geography with 7 years experience in Planning and Environmental Impact Assessment related projects including for roads, storm water infrastructure, dams and power stations in South Africa. She has been involved in S24G Rectification Applications, Environmental auditing, project management and implementation. Nadine has also been involved in GIS, data management and Visual Impact Assessments. She has gained experience in Open Space Planning and Environmental Management Frameworks and is conversant in ArcGIS, AutoCAD, CorelDRAW, Google SketchUP, Photoshop, InDesign, and Illustrator.

Sandhisha Jay Narain is an Environmental Consultant with an Honours degree in Environmental Management. She has over 6 years onsite Environmental Management and Environmental Compliance Auditing and Monitoring experience. Sandhisha has been involved in the implementation of the Environmental Management Plan for the Moses Mabhida Stadium, served as the Environmental Control Officer (ECO) for Transnet's Multi Purpose Pipeline Project and was project based as the Environmental Monitor at the Spring Grove Dam. Sandhisha is also an accredited Green Star SA Professional and is knowledgeable in the functioning of ISO 14001 Environmental Management Systems.

Dr Neville Bews is a senior social scientist and human resource professional with a PhD in Sociology and 36 years experience. He consults in the fields of Social Impact Assessments and research, and human resource management. He has worked on a number of large infrastructure, mining and water resource projects. He at times lectures at both the Universities of Pretoria and Johannesburg and is a Senior Fellow in the Centre for Sociological Research, Department of Sociology at the University of Johannesburg.

Stephen van Staden has a Masters degree from the University of Johannesburg in Environmental Management. Stephen has experience on over 1 000 environmental assessment projects specifically with aquatic and wetland ecological studies as well as terrestrial ecological assessments and project management. Stephen has a professional career spanning more than 10 years, most of which have been as the owner and managing member of Scientific Aquatic Services. He is registered by the South African River Health Project as an accredited aquatic biomonitoring specialist and as a Professional Natural Scientist with the South African Council for Natural Scientific Professions in the field of ecology. Stephen is also a member of the Gauteng Wetland Forum and South African Soil Surveyors Association.

Menno Klapwijk obtained a B.Sc. degree in Landscape Architecture at Texas A&M University. Menno is a registered Landscape Architect (South African Council for Landscape Architectural Professionals). He has 32 years experience in integrated environmental assessment and planning for existing and future land uses, visual impact assessment, mining and quarry reclamation and development planning and design. He's been involved in Landscape design for corporate headquarters, office and industrial parks, housing developments, hotels, plazas and pedestrian malls as well as recreation planning and planning and design for conservation areas, natural resource areas, nature reserves and game farms.

William Mullins has a BSc degree and 38 years experience in the agricultural and economic field. He has been involved in economic growth and development strategies for regions and sub-regions in South Africa; sectoral economic analyses; various cost-benefit analysis studies; environmental impact studies and policy analysis including irrigation projects; constructing a Building Construction Model for South Africa with specific reference to the impact of Government Capital Expenditure and the Construction of National and Regional Input Output Tables as well as the compilation of National, Regional or Multi-Regional SAM. William has also worked in specialist fields like the SKA Telescope study, and impact studies for Eskom.

Bob Pullen obtained BSc(Eng), MSc(Eng) and MBL degrees. He played a major role in the conception of the Thukela-Vaal Project, and was responsible for much of the construction phase. His interest in and experience with environmental management issues led to his significant roles in managing various Reserve determination assignments and Environmental Impact Assessments (Groot Letaba, Levhuvhu and Thukela Rivers in Limpopo and KwaZulu-Natal) and to the implementation of social components of Environmental Management Plans. Important examples of the last-mentioned are the Relocation Action Plan for Nandoni Dam near Thohoyandou (465 households, 1 000 graves, four archaeological sites and 2 100 subsistence farmers) and the relocation of about 130 graves and ten archaeological sites at De Hoop Dam in the Steelpoort River, both in Limpopo. He was also responsible for managing implementation of the

Environmental Management aspects associated with construction of Spring Grove Dam in the Mooi River, KwaZulu-Natal.

Len van Schalkwyk has an MA in Archaeology and 25 years of professional experience as a practising archaeologist and heritage resource manager in South Africa, Botswana and Mozambique. His research interests have focussed on the Iron Age of southern Africa, while his management specialisations are heritage impact assessments, community liaison and ancestral grave management.

James Cross obtained BA, LLB and LLM (Constitutional and Environmental Law) degrees from the University of Stellenbosch. He subsequently obtained a Diploma in Corporate Law from the Rand Afrikaans University (now University of Johannesburg). During 1997, James was admitted as an attorney and commenced practising law at Blakes Maphanga Incorporated. James has 18 years experience consulting with clients in the environmental consulting, engineering, heavy industrial, mining and property development sectors. His environmental law practice includes legal interpretation of environmental legislation and the drafting of legal opinions, administrative appeals, and preparation of legal requirements assessments, legal auditing, drafting and review of commercial agreements, advice on legal authorisation processes as well as legal training. He is regularly requested to assist with environmental, health and safety due diligence investigations within the context of mergers and acquisition transactions. James has been consulting to the public sector (government and parastatals) on statutory development projects. He has acted as external legal advisor and drafter of regulations under the Protected Areas Act 57 of 2003 and consults to government on the transfer of environmental impact assessment requirements from mining to environmental legislation. James has written numerous articles on aspects of environmental law, has lectured to students at the University of Pretoria and University of Stellenbosch and presented papers at various Cameron Cross and other sponsored seminars and events. He is presently the course leader for the Certificate in Environmental Law presented by the University of Pretoria.

1.6 STRUCTURE OF THIS REPORT

- **Chapter 2** describes the legislation that applies to the project and the guidelines taken into account;
- **Chapter 3** presents the environmental impact assessment approach and methodology;
- **Chapter 4** describes the proposed project;
- **Chapter 5** describes the alternatives considered;
- **Chapter 6** motivates the need and desirability of the project;
- **Chapter 7** describes the Public Participation Process that was conducted;
- **Chapter 8** describes the receiving environment;
- **Chapters 9 to 11** present the results of the impact assessment for the various project components;
- **Chapter 12** provides the results of the impact assessment for the no-project alternative;

- **Chapter 13** contains the environmental impact statement; and
- **Chapter 14** provides the conclusions and recommendations.

2. LEGISLATION AND GUIDELINES CONSIDERED

This 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.

2.1 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	The proposed project includes the construction of treated water reservoirs, as part of the potable water bulk

cubic metres or more, unless such storage falls within the ambit of activity 19 of Notice 545 of 2010.	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 30 MW or up to 150 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	Some of the new infrastructure (e.g. bridges, weirs), as well as the dams themselves will be constructed in or

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	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 CONTENTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Table 2 sets out the content requirements of an Environmental Impact Assessment Report, in accordance with regulation 31 of GN 543.

Table 2: Environmental Impact Assessment Report Contents in terms of Section 31 of GN 543

EIA Regulations requirements		**Environmental Impact Assessment Report**
(a)	Details of EAP and expertise to carry out an environmental impact assessment	Chapter 1
(b)	Description of the proposed activity	Chapter 4
(c)	Description of the property on which the activity is to be undertaken and the location of the activity on the property	Chapter 4
(d)	Description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity	Chapter 8
(e)	Details of the Public Participation Process (PPP) conducted: (i) Steps taken in accordance with the plan of study; (ii) A list of persons, organisations and organs of state that were registered as interested and affected parties; (iii) A summary of comments and issues raised by interested and affected parties (I&APs) including response from EAP on issues; and (iv) Copies of any representations and comments received from registered I&APs. .	Chapter 7
(f)	Need and Desirability of proposed activity	Chapter 6
(g)	Description of alternatives, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity	Chapter 5
(h)	Methodology used in determining the significance of potential environmental impacts	Chapter 3
(i)	Description and comparative assessment of alternatives	Chapters 5 and 15

(j)	Summary of the findings and recommendations of specialist reports	Chapter 9
(k)	Description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures	Chapters 10 to 12
(l)	Assessment of each identified potentially significant impact, including— (i) cumulative impacts; (ii) the nature of the impact; (iii) the extent and duration of the impact; (iv) the probability of the impact occurring; (v) the degree to which the impact can be reversed; (vi) the degree to which the impact may cause irreplaceable loss of resources; and (vii) the degree to which the impact can be mitigated	Chapters 10 to 12
(m)	Assumptions, uncertainties and gaps in knowledge	Chapter 3
(n)	Reasoned opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	Chapter 16
(o)	Environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment; and (ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives	Chapter 15
(p)	Draft environmental management programme	Appendix D
(q)	Specialist reports	Appendix C
(r)	Specific information required by CA	Throughout the report, see Section 2.3
(s)	Other matters required in terms of sections 24(4)(a) and (b) of the Act, i.e. NEMA section 24 (4) Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment- (a) must ensure, with respect to every application for an environmental authorisation- (i) coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state; (ii) that the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project; (iii) that a description of the environment likely to be	See Authorities Forum as discussed in Chapter 7 Chapter 8

	significantly affected by the proposed activity is contained in such application;	
	(iv) investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and	Chapters 9 to 11
	(v) public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and	Chapter 7
	(b) must include, with respect to every application for an environmental authorisation and where applicable-	
	(i) investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;	Chapters 9 to 11
	(ii) investigation of mitigation measures to keep adverse consequences or impacts to a minimum;	Appendix D
	(iii) investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;	Appendix C
	(iv) reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;	Chapter 3
	(v) investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;	Appendix D
	(vi) consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and	Chapter 8
	(vii) provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.	Section 2.4

2.3 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

In terms of the acknowledgement of receipt of and acceptance of the application forms for the project dated 14 April 2014, as well as the acceptance of the Final Scoping Report, dated 15 July 2014, the Department of Environmental Affairs requires the following:

- Alternatives must be identified and investigated to determine if they are feasible and reasonable. It is also mandatory to investigate and assess the option of not proceeding with the proposed activity (the "no-go" option).
- A detailed and complete construction and operational phase EMPR, including mitigation and monitoring measures, must be submitted with the EIR. This EMPR must not provide recommendations but must indicate actual remediation activities which will be binding on the applicant. Without the EMPR the documents will be regarded as not meeting the requirements and will be returned to the applicant for correction;
- The applicant/EAP is required to inform the Department in writing upon submission of any draft report, of the contact details of the relevant State Departments (that administer laws relating to a matter affecting the environment) to whom copies of the draft report were submitted for comment. Upon receipt of this confirmation, the DEA will in accordance with Section 24 O (2) and (3) of the NEMA inform the relevant State Departments of the commencement date of the 40 day commenting period, or 60 days in the case of the Department of Water and Sanitation for waste management activities which also require a licence in terms of the National Water Act (Act 36 of 1998);
- Should it be necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999), please submit the necessary application to SAHRA or the relevant provincial heritage agency and submit proof thereof with the Environmental Impact Assessment Report. The relevant heritage agency should also be involved during the public participation process and have the opportunity to comment on all the reports to be submitted to the DEA. DEA will not make nor issue a decision in terms of your application for Environmental Authorisation without a letter from the pertinent heritage authority categorically stating that the application fulfils the requirements of the relevant heritage resources authority as described in Chapter II, Section 38(8) of the National Heritage Resources Act;
- The impacts of the proposed facility on water courses and water resources in the area must be assessed in the EIA phase;
- The total footprint of the proposed development should be indicated. Exact locations of the roads, pipelines, gauging weirs, electricity infrastructure, dam wall, and associated infrastructure should be mapped at an appropriate scale. Geographical coordinates of all the aforementioned infrastructure should be provided in both the draft and final EIR;
- Should a Water Use License be required, proof of application for a license needs to be submitted;
- Possible impacts and effects of the development on the surrounding community should be identified and assessed;
- The EIR should include information on the following:

  - Environmental costs vs benefits of the proposed Mzimvubu Water Project (the environmental costs and benefits associated with the project are considered in Chapter 13); and
  - Economic viability of the proposed development (Mzimvubu Water Project) to the surrounding area and how the local community will benefit.
- Information on services required on site (e.g. sewage, refuse removal, water and electricity). Who will supply these services and has an agreement and confirmation of capacity been obtained?;
- Should blasting be required, appropriate mitigation measures should be provided;
- The applicant is hereby reminded to comply with the requirements of regulation 67 with regard to the time period allowed for complying with the requirements of the Regulations, and regulation 56 and 57 with regard to the allowance of a comment period for interested and affected parties on all reports submitted to the competent authority for decision-making;
- The final EIR should include at least one A3 regional map of the area and the locality maps included in the final EIR must illustrate the different proposed infrastructure and their alignments.

2.4 OTHER AUTHORISATION REQUIREMENTS

2.4.1 Water Use Licence

The construction of the dams and associated infrastructure involves a number of water uses listed in terms of section 21 of the National Water Act, No 36 of 1998 (NWA), and therefore requires a Water Use Licence.

A Water Use Licence Application (WULA) will be compiled in parallel with the EIA process, for the following water uses:

- 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 (i.e. the generation of hydropower);
- s21 (i): altering the bed, banks, course or characteristics of a water course,
- s21 (f): discharge of waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit; and
- s21 (g): disposing of waste in a manner which may detrimentally impact on a water resource.

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.

2.4.2 Borrow areas and quarries

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 eight 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 was 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.

2.4.3 Heritage permits

The proposed project involves a number of activities listed in terms of section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), which require authorisation from the relevant heritage authorities.

According to section 38 of the NHRA, the South African Heritage Resources Agency (SAHRA) requires that a Heritage Impact Assessment (HIA) is undertaken where certain activities are proposed. The activities that apply to the proposed project include:

- 38(1)(a) - The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;

- 38(1)(b) – The construction of a bridge or similar structure exceeding 50 m in length;

- 38(1)(c) - Any development or other activity which will change the character of a site exceeding 5 000 m^2 in extent; or Involving three or more existing erven or

sub-divisions thereof; or involving three or more erven or sub-divisions thereof which have been consolidated within the past five years; and

- 38(1)(d) - The rezoning of a site exceeding 10 000 m^2 in extent.

A HIA has been conducted as part of the EIA process. The HIA has been submitted to the Eastern Cape Provincial Heritage Resources Authority and SAHRA for decision-making regarding heritage resources.

2.4.4 Waste Management Licence

The Management of Waste is regulated by the National Environmental Management: Waste Act (Act 59 of 2008) (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.

2.4.5 Licences for the removal of protected trees

Trees may have to be disturbed, damaged or destroyed/removed to make way for the new infrastructure. If those trees are protected in terms of the National Forests Act, 1998, a licence must be obtained from the Department of Agriculture, Forestry and Fisheries (DAFF).

2.5 OTHER LEGISLATION

Other legislation of direct relevance to the EIA is set out in **Table 3**.

Table 3: Other legislation of direct relevance to the EIA

Legislation	Applicable Legislative Requirements	Implications for the Applicant
Constitution of the Republic of South Africa Act, 1996 (Act 108 of 1996) Constitution of the Republic of South Africa Amendment Act, 1997 (Act 35 of 1997)	Section 24 – Environmental Rights	Everyone has the right to – An environment that is not harmful to their health or well-being and 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, • Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. The Constitution sets in place all laws of the country and the Applicant should note the protection of the environment in the Bill of Rights, especially in relation to justifiable economic and social development.
	Section 33 – Access to Information	Everyone has the right to administrative action that is lawful, reasonable and procedurally fair. Everyone whose rights have been adversely affected by administrative action has the right to be given written reasons. The provisions of NEMA and its Regulations dictate the manner in which environmental authorisation processes are undertaken, decisions made, and the appeal process; all of which are applicable to the current application.
	Section 32 – Administrative Justice	Everyone has the right of access to: • Any information held by the state (unless it is information that is explicitly excluded by the Promotion of Access to Information Act, 2000 (Act 2 of 2000), • Any information held by another person and that is required for the exercise or protection of any rights. The Applicant will need to make information available to the public if requested.
National Environmental Management: Air Quality Act (Act 39 of 2004)	Sections 21 and 37	National Ambient Air Quality Standards GNR 1210 dated 24 December 2009. GNR 893 in Government Gazette 37054 dated 22 November 2013, listing activities and associated minimum emission standards identified in terms of section 21 of the Air Quality Act. Declaration of temporary Asphalt Plants as controlled emitters and establishment of emission standards, in GNR 201 in Government Gazette No 37461 dated 28 March 2014.

Legislation	Applicable Legislative Requirements	Implications for the Applicant
		National Dust Control Regulations, in GNR 827 in Government Gazette 36974 dated 1 November 2013. Activities include Macadam preparation (the mixing of aggregate and tar or bitumen to produce road surfacing in permanent facilities and mobile plants). These activities require an Atmospheric Emission Licence in terms of Section 37 of the Act.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA)		NEMBA restricts activities involving listed threatened or protected species. In addition, the Alien and Invasive Species Regulations (GNR 506 of 2013), promulgated in terms of Section 97(1) of NEMBA apply.
National Environmental Management Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMPAA)	Section 50(5)	No development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority.

2.6 INFRASTRUCTURE DEVELOPMENT ACT (ACT NO. 23 OF 2014)

The Infrastructure Development Act provides for the facilitation and co-ordination of public infrastructure development which is of significant economic or social importance to the Republic; to ensure that infrastructure development in the Republic is given priority in planning, approval and implementation; to ensure that the development goals of the State are promoted through infrastructure development; to improve the management of such infrastructure during all life-cycle phases, including planning, approval, implementation and operations. The Act commenced on 10 July 2014.

The Presidential Infrastructure Coordinating Commission (PICC) and structures of the Commission are established in terms of this Act. Strategic integrated projects (SIPs), which are projects of significant economic or social importance to the country or a region in the country, or which facilitate regional economic integration on the African continent, are identified and implemented in terms of this Act.

Section 15 states that when the Steering Committee of a SIP has identified the approvals, authorisations, licences, permissions and exemptions required to enable the implementation of the SIP, it shall inform, without any delay, the applicant to submit all applications simultaneously to allow for concurrent consideration by the persons authorised by the relevant laws to take the applicable decisions. A member of the Steering Committee must monitor the processing of the application and report to the Steering Committee any undue delays and regulatory concerns emerging for exploration or consideration of solutions thereto.

Section 18 concerns environmental assessments specifically and states that whenever an environmental assessment is required in respect of a SIP, such assessment must be done in terms of the National Environmental Management Act 107 of 1998 (“NEMA”), with specific reference to Chapter 5.

Time frames are stipulated in Schedule 2 and may not be exceeded without written approval. Schedule 2 refers to “project plans”, “applications” and “mitigation plans” that are not defined in the Act. It is not clear how these apply to the EIA process.

2.7 GUIDELINES CONSIDERED

- DEAT Integrated Environmental Management Information Series 1-5 and 12-15
- NEMA draft Implementation Guideline
- Western Cape Department of Environmental Affairs and Development Planning NEMA Environmental Impact Assessment Regulations Guideline and Information Document Series – Guideline on Public Participation (2007)
- Western Cape Department of Environmental Affairs and Development Planning NEMA Environmental Impact Assessment Regulations Guideline and Information Document Series – Guideline on Alternatives (2007)
- Western Cape Department of Environmental Affairs and Development Planning NEMA Environmental Impact Assessment Regulations Guideline and Information Document Series – Draft Guideline for Determining the Scope of Specialist Involvement in EIA Processes (2005)
- IAIA guidelines.

2.8 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).

3. ENVIRONMENTAL IMPACT ASSESSMENT APPROACH AND METHODOLOGY

3.1 SCOPE OF THE EIA

3.1.1 Project components assessed in the EIA

The EIA will investigate the impacts of, and recommend mitigation and enhancement measures for the following project components:

- The Ntabelanga and Lalini Dams;
- Five new flow gauging weirs;
- Primary and secondary bulk potable water infrastructure comprising:
  - Primary infrastructure: main water treatment works, including four major treated water pumping stations and three minor treated water pumping stations, main bulk treated water rising mains, and eight Command Reservoirs that will supply the whole region;
  - Secondary distribution lines: conveying bulk treated water from Command Reservoirs to existing and new District Reservoirs;
- Bulk raw water conveyance infrastructure (abstraction, pipelines, one raw water pumping station, one reservoir and two booster pumping stations) for irrigated agriculture (raw water supply up to field edge);
- Impact of commercial agriculture in earmarked irrigation areas;
- WWTWs at the Ntabelanga and Lalini Dam sites;
- Accommodation for operational staff at the Ntabelanga and Lalini Dam sites;
- Upgrading and relocation of roads and bridges;
- Generation of hydro power and feeding of this power into the existing grid;
- Pipeline and tunnel/conduit at the proposed Lalini Dam;
- 13 km power line from the Lalini Dam hydropower plant;
- River intake structures and associated works;
- Ten construction materials quarries and borrow pits;
- Information centres at the two dam sites; and
- Miscellaneous construction camps, lay down areas, and storage sites.

3.1.2 Issues that were not addressed in the EIA

Certain aspects related to the proposed project were identified but not specifically addressed in this EIA. These are listed below (please refer to the Scoping Report for more detail on each of these):

- Climate change projections and risks (no climate change specialist study was undertaken);
- Agriculture and land tenure: The details of how land tenure arrangements will be changed, as well as new commercial farmer establishment and support, are not included in the scope of this EIA;
- Potential for forestry: This is the subject of a separate planning process and not included in the EIA;
- Possible recreational and estate opportunities (not identified at this stage);

- Tertiary distribution lines (responsibility of the various DMs); and
- Activities undertaken as part of DEA's Catchment Rehabilitation and Management Programme (subject to a separate authorisation process).

3.2 PROPOSED APPROACH

The EIA builds on the Scoping Report and focuses on the assessment of key impacts, determining their significance, and recommending appropriate measures to mitigate negative impacts and enhance benefits.

3.3 IMPACT ASSESSMENT METHODOLOGY

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

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

The following criteria will be used to evaluate significance:

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

- **Extent and location:** This indicates the spatial area that may be affected (**Table** 4:).

Table 4: Geographical extent of impact

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

- **Duration:** This measures the lifetime of the impact (**Table 5**).

Table 5: Duration of Impact

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

- **Intensity / severity:** This is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts (**Table 6**).

Table 6: Intensity of Impact

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

- **Potential for irreplaceable loss of resources:** This is the degree to which the project will cause loss of resources that are irreplaceable (**Table 7**).

Table 7: Potential for irreplaceable loss of resources

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

- **Probability:** This is the likelihood or the chances that the impact will occur (**Table 8**).

Table 8: Probability of Impact

Rating	Probability	Description

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

- **Confidence:** This is the level of knowledge or information available, the environmental impact practitioner or a specialist had in his/her judgement (**Table 9**).

Table 9: Confidence in level of knowledge or information

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

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

- **Significance:** The significance will be rated by combining the consequence of the impact and the probability of occurrence (i.e. consequence x probability = significance). The maximum value which can be obtained is 100 significance points (**Table 10**).

Table 10: Significance of issues (based on parameters)

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

- **Cumulative Impacts:** This refers to the combined, incremental effects of the impact, taking other past, present and future developments in the same area into account. The possible cumulative impacts will also be considered.

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

3.4 ENVIRONMENTAL MANAGEMENT PROGRAMME

Based on the findings of the EIR, a practical and feasible EMPR has been compiled. The draft EMPR outlines how negative environmental impacts will be managed and

minimized, and how positive impacts will be maximised, during and after construction. The EMPR fulfils the GN 543 requirements and includes mitigation measures required during the planning, construction and operational phases of the project as well as a framework for social and environmental monitoring. Recommendations are given with regard to the responsible parties for the implementation of the EMPR.

3.5 RELOCATION POLICY FRAMEWORK

The Relocation Policy Framework (RPF) is presented as a Chapter in the EMPR. The focus of the RPF is to:

- Confirm that there are no relocation, compensation or livelihood fatal flaws that could impact on the decision on whether the project should go ahead or not;
- Identify any relocation, compensation or livelihood related conditions that should be stipulated in the Environmental Authorisation;
- Estimate the magnitude of the task of implementation of the Relocation Action Plan;
- Agree on the structure of the final Relocation Action Plan (i.e. what will be included); and
- Unblock potential bottle-necks that could delay implementation.

Livelihoods are considered in the RPF and include aspects such as access to community facilities, social opportunities, clinics and schools. In order to achieve this, the Social Impact Assessment (SIA), Heritage and public participation tasks were more extensive than the minimal requirements of an EIA in terms of the EIA Regulations.

It is essential for the RPF to provide an accurate baseline of the existing structures and resources. The Social baseline is therefore more extensive than usually required for an EIA's SIA and includes a database of directly affected parties linked to a locality plan.

3.6 ASSUMPTIONS AND LIMITATIONS

The assumptions applying to this study and any limitations of the EIA are enumerated below:

Assumptions:

- The aim of this EIA is to inform the decision making related to the project and specifically with respect to environmental authorisation and associated conditions. In the Scoping phase the project was defined, project boundaries set, key issues identified and unpacked in order to inform the ToR for the Impact Assessment Phase of the study. The key issues are those that will inform the decision on whether the project should go ahead or not, and if so then on what conditions. It is well known and accepted that construction activities will have

some temporary impacts. These can be managed by minimising them and monitoring whether acceptable targets are met, for example for dust, noise and visual impacts. These impacts will not influence whether the project is environmentally authorised or not and are therefore not investigated in detail in specialist studies. They are, however, still addressed in the Environmental Management Programme. The key NEMA principle that directs the focus of this EIA is to determine the Best Practical Environmental Option (BPEO) defined as "the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term", including consideration of the "no project" alternative.

- Financial viability is not a requirement for a project of this nature, as the objective of the project is not to make a profit on the investment. The intention of the project is to be economically viable, in that the direct and indirect socio-economic benefits should exceed the financial cost of the project. This EIA therefore only considers economic viability.
- It was assumed that, with the exception of the access road to the hydropower plant (which will be tarred or concrete), all new roads proposed are gravel.
- If the use of an asphalt plant is required, the necessary applications for environmental authorisation and Atmospheric Emissions Licence will be submitted. No applications for asphalt plants were included as part of this process.

Limitations

- Not all project components were finalised at the time of undertaking fieldwork and compiling this report. The EIA was undertaken based on the project footprint as signed off by DWS on 30 July 2014, any subsequent amendments/refinements have not been considered. The project components not included in this EIA include (*inter alia*):
  - Access roads for the borrow areas and quarries within the Ntabelanga Dam basin
  - 13 km power line from Ntabelanga Dam to the Eskom grid;
  - Power lines to supply power during construction at Ntabelanga and Lalini Dam sites and to operate pumping and booster stations along the bulk distribution infrastructure;
  - Road re-alignments at Lalini Dam; and
  - Certain access roads to the hydropower plant at the Lalini Dam tunnel.

  Assessment and authorisation of these project components (if required) will be the subject of a separate process.
- All heritage resources have not been identified.
- Dams require Resource Management Plans (RMP) that define how the water resource and its coastal area can be beneficially used. The RMP has not been compiled for the dams that form part of this project. Possible recreational and

estate opportunities associated with the proposed dams are therefore not included in the activities for which authorisation is applied.

- The project will require land tenure reform and agricultural support to be a success. Although the impact of the irrigation has been considered in the broad community and social context, no land reform strategies have been discussed as part of this process.
- The potable water supply component of the project includes primary and secondary water supply pipelines and associated water treatment, pumping and storage reservoirs. Tertiary distribution lines (i.e. smaller pipelines supplying settlements along the secondary lines and from District Reservoirs) are not included in the application and are the responsibility of the water service providers (the District Municipalities); and
- Activities undertaken as part of DEA's Catchment Rehabilitation and Management Programme are not included in this application.

Assumptions and limitations relevant to the specialist studies are included in the respective studies (**Appendix C**), and have not been repeated here.

4. 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 and affected infrastructure.

4.1 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 11**).

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.

Table 11 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

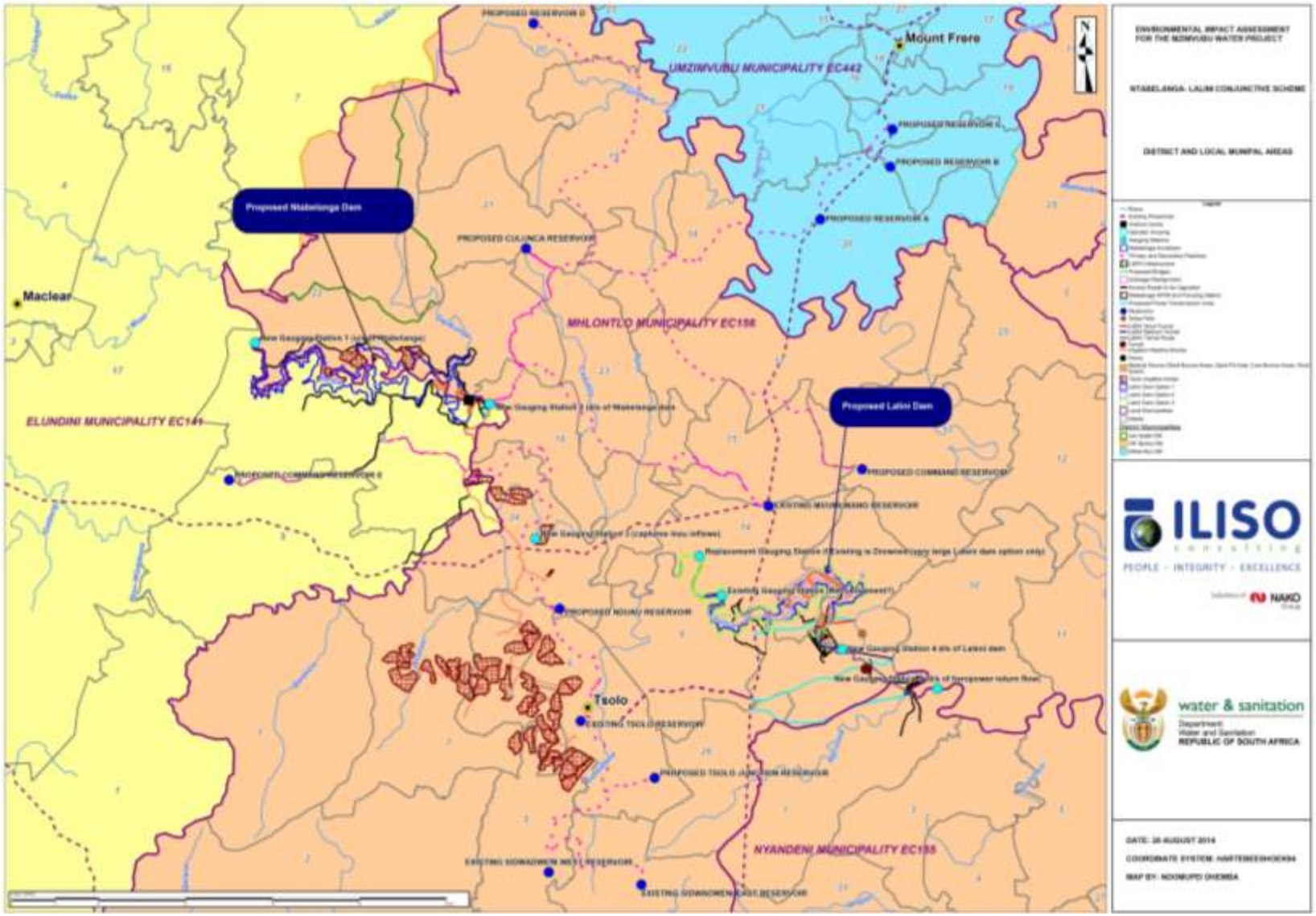

Figure 2: Study area

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 (**Figures 3** to **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

4.2 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 waste water 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.

4.2.1 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: Roller Compacted Concrete (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.

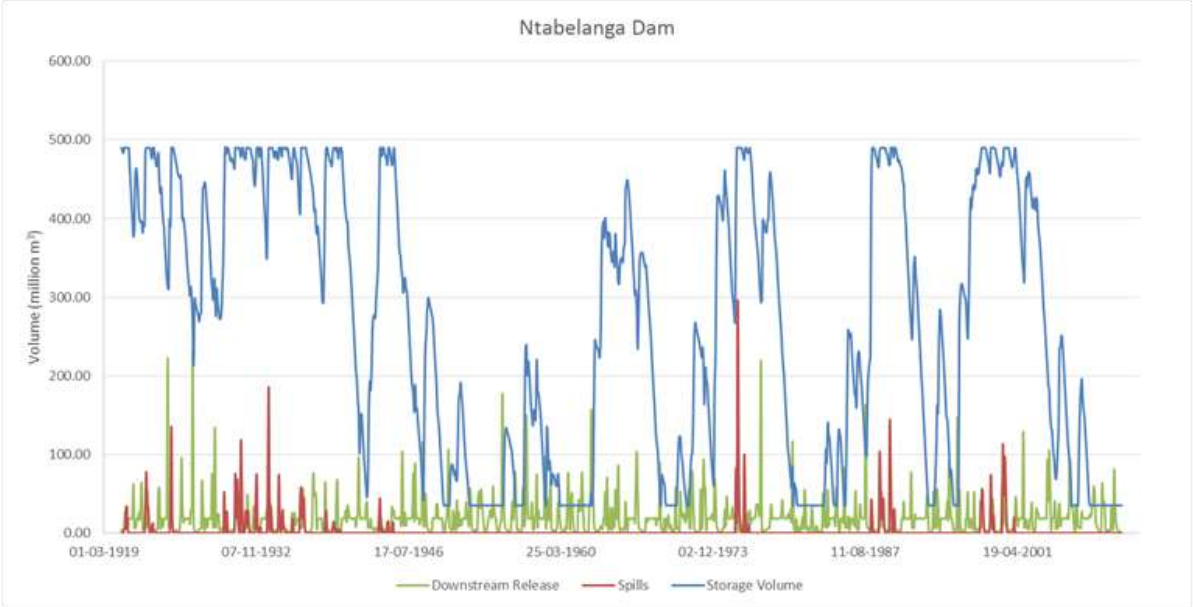

Figure 9: Monthly variation of water levels at Ntabelanga Dam

4.2.2 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.

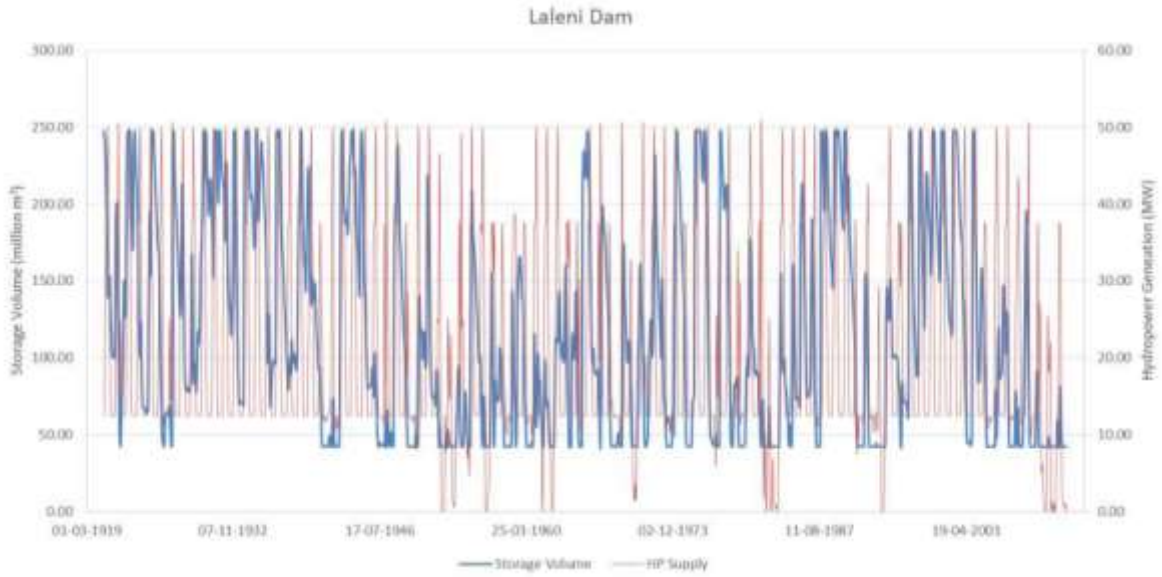

Figure 10: Monthly variation of water levels at Lalini Dam

4.2.3 The Construction of the dams

Construction of each dam will require construction camps, lay down areas, and storage sites: Five (5) areas at about 4 ha each. 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
- Resurfacing 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.

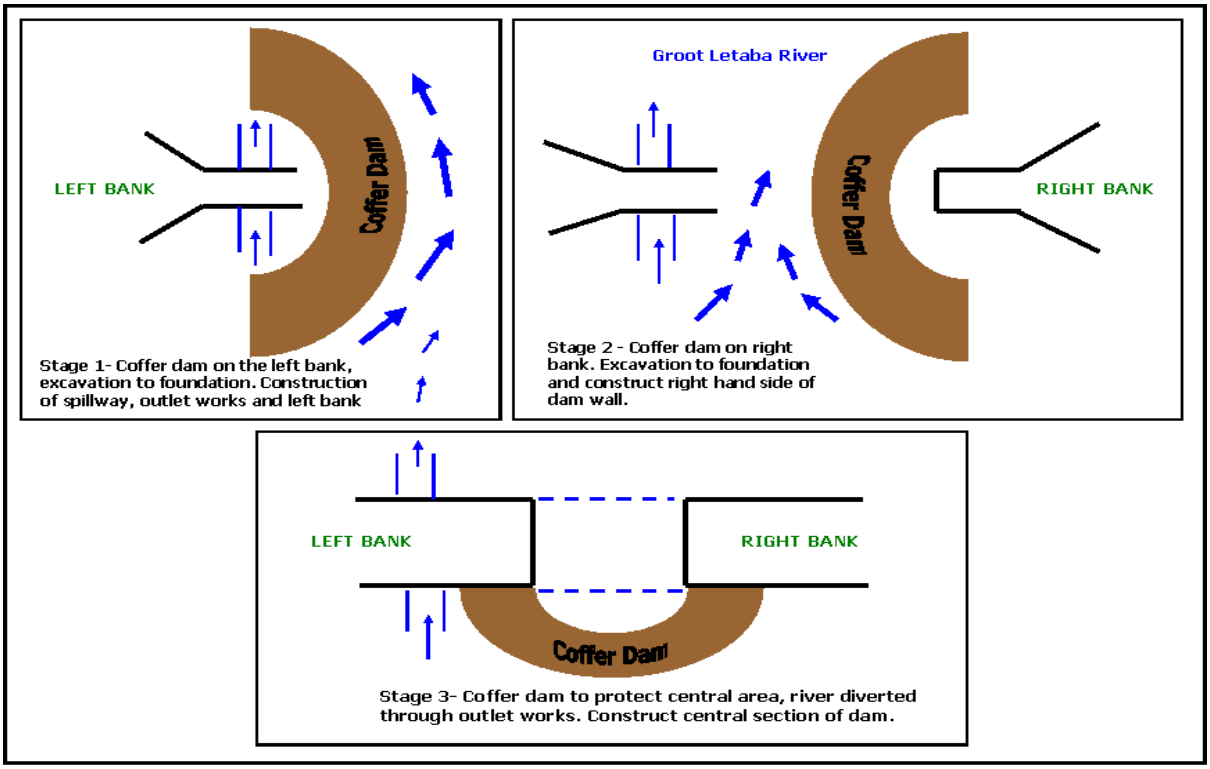

Figure 11: Typical Stages of River Diversion

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.

4.2.4 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.

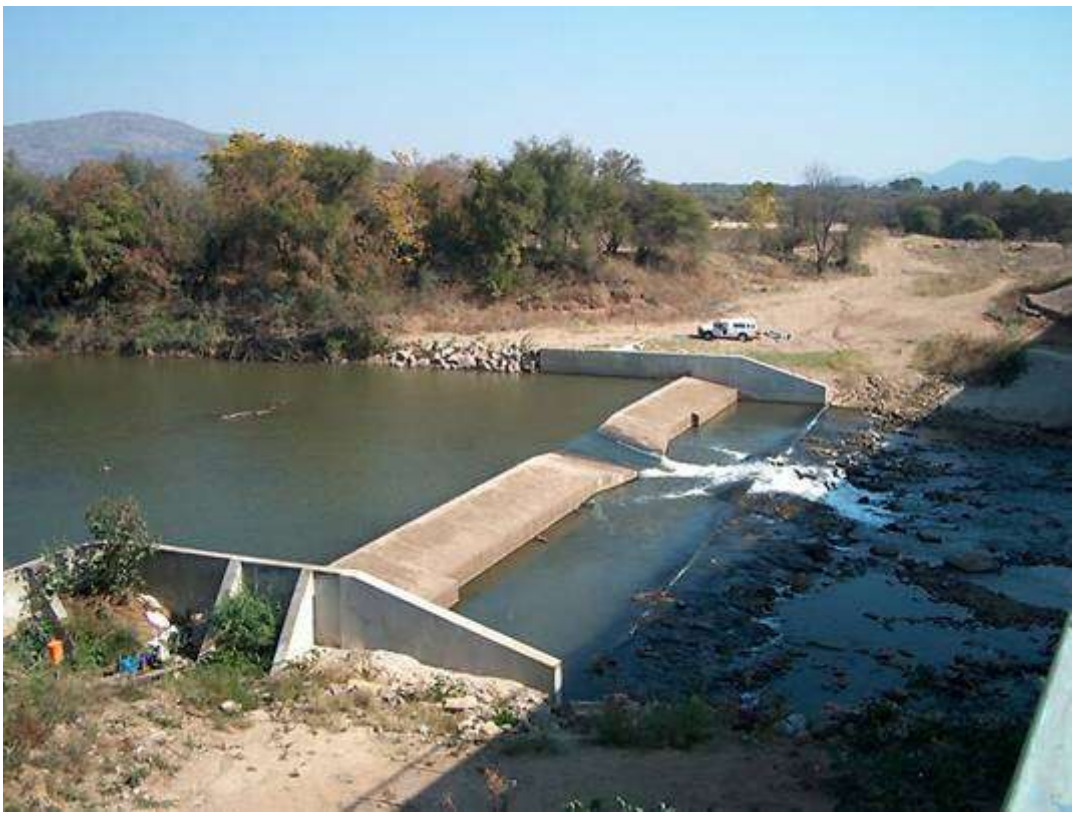

Figure 12: Flow Gauging weir in the Crocodile River at Nooitgedacht

4.3 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).**

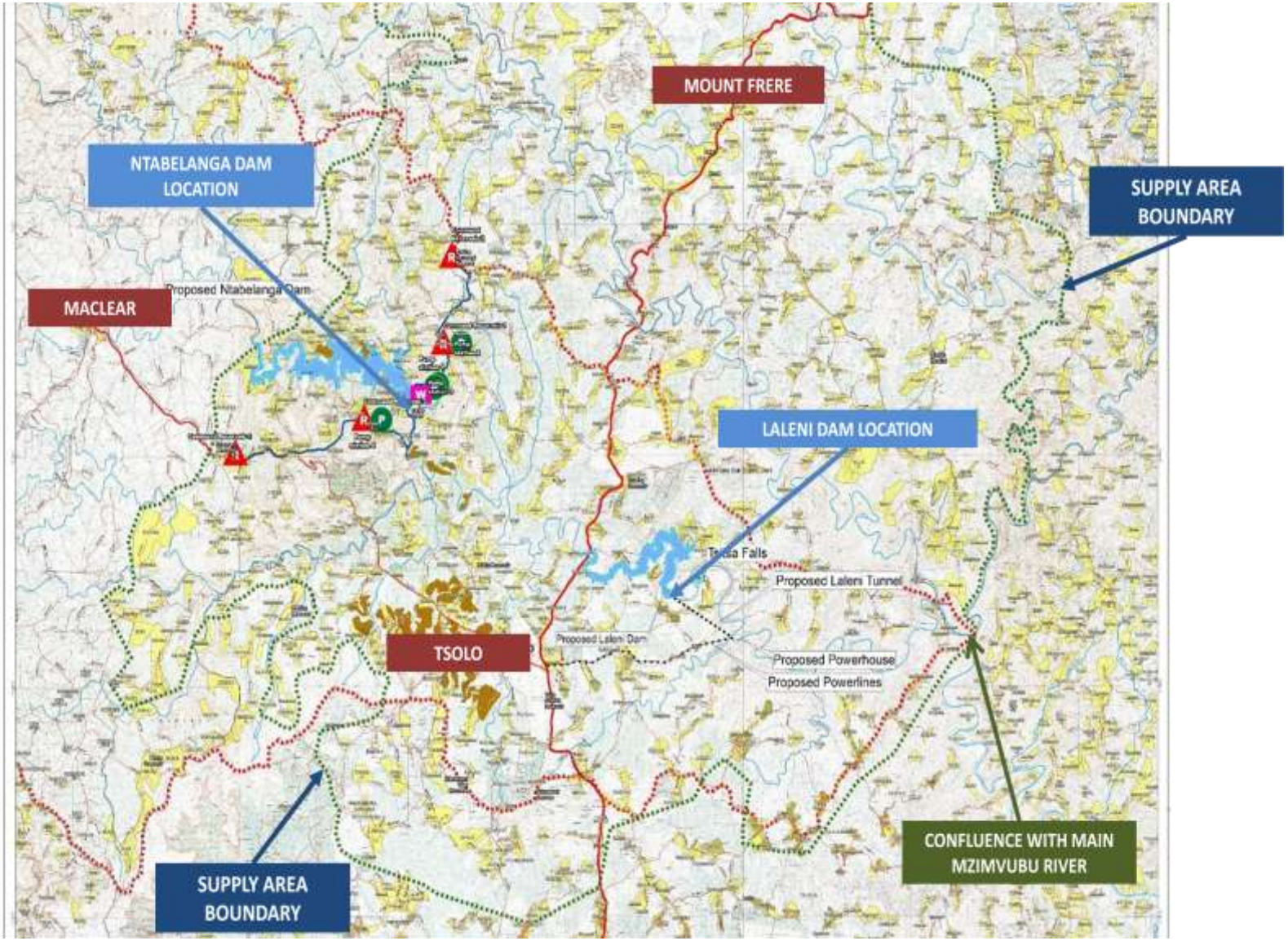

Figure 13: Ntabelanga Dam potable water supply areas

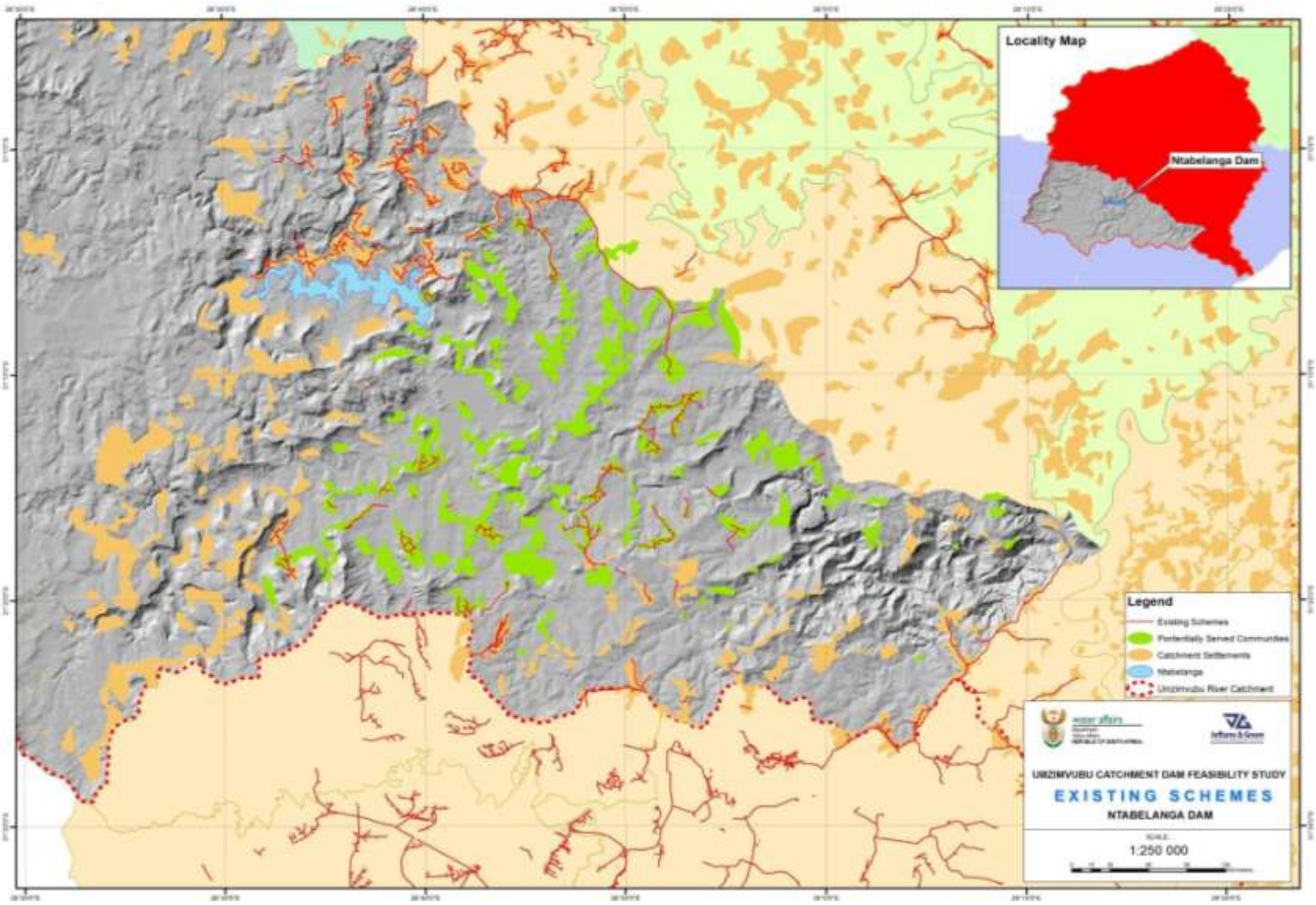

Figure 14: Existing water supply schemes

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.

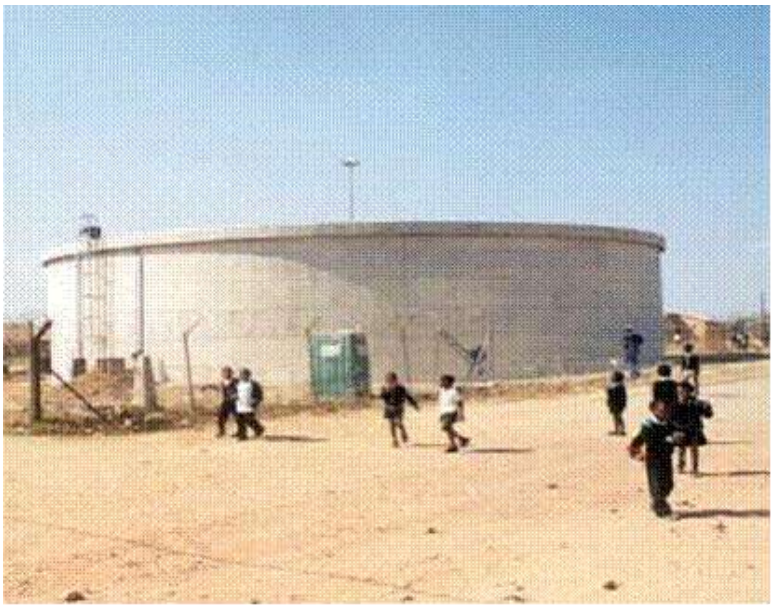

Figure 17: View of a typical large concrete reservoir

4.4 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).

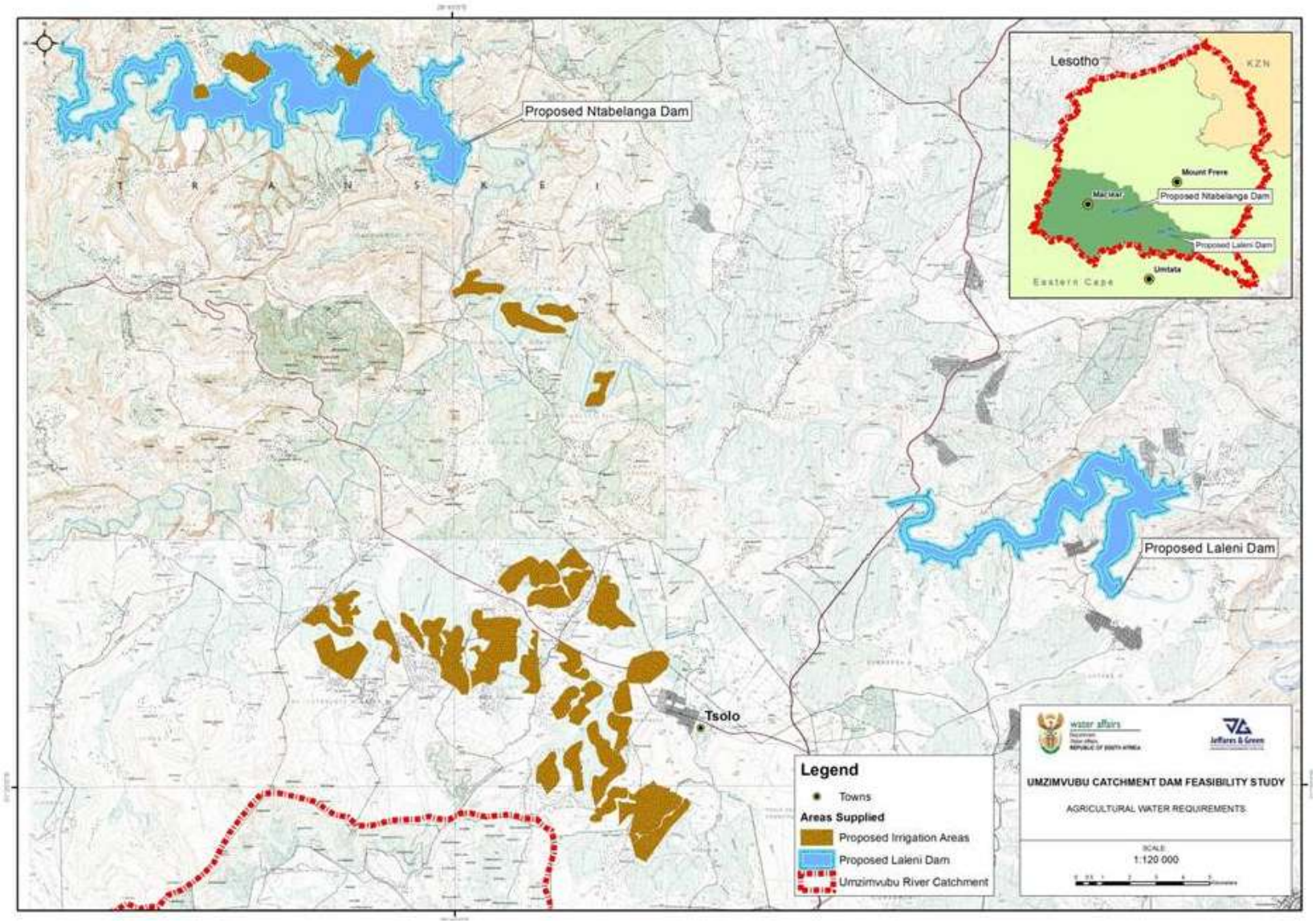

Figure 18: Proposed irrigation areas

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.

4.5 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 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 to link 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 m and 21 m.

The Energy Trader Model, as currently used by Amatola Green Power, allows non-Eskom generators to supply electricity, as a supplement to the electricity conventionally supplied by both Eskom and municipalities, to consumers of power. The model envisages that a trader would be allowed to make use of the distribution networks of Eskom and municipalities to buy “Green Power” from non-Eskom generators for onward sale to consumers.

Amatola Green Power (AGP) pays generators in cash for the energy that they supply into the Eskom Grid, while the generators pay Eskom only for the grid access usage charges.

For each 1,000 kWh (1 MWh) purchased by AGP, a number is generated as a credit with Eskom. Tradable Renewable Energy Certificates (TRECS) are sold by AGP to energy consumers to allow them to obtain their energy requirements from their local grid (Eskom or Municipality), which energy is duly certified to have been generated from renewable sources.

It is envisaged that a similar model could be used for energy produced at the Lalini hydropower plant.

4.6 GEOGRAPHIC COORDINATES OF INFRASTRUCTURE COMPONENTS

The coordinates for all infrastructure components are indicated in **Table 12**.

Infrastructure	Description	Start (Northern Most Point)		End Southern Most Point)		Western Most Point		Eastern Most Point		Length (m)	Area (ha)
		Latitude (S)	Longitude (E)	Latitude (S)	Longitude (E	Latitude (S)	Longitude (E	Latitude (S)	Longitude (E		
Reservoirs	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								
Gauging Stations	New Gauging Station 1 (u/s of Ntabelanga)	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 (Refrubishment?)	31.2376586	28.852515								
	New Gauging Station 4 d/s of Lalini 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 Lalini dam option only)	31.2132512	28.8364011								
Operator Housing	Operator Housing	31.1206	28.6817	31.1263	28.68099	31.1222	28.6781	31.1251	28.6841		19.3321
Visitors Centre	Visitors Centre	31.1166	28.6695								
Ntabelanga WTW and Pumping Station	Ntabelanga WTW and Pumping Station	31.1201	28.6854	31.1216	28.6853	31.1207	28.6845	31.1211	28.6862		1.45167
Lalini Infrastructure	Lalini Infrastructure	31.25598	28.9264	31.2758	28.9264	31.26	28.9146	31.2688	28.93598		245.8226
Tunnel Options	Lalini Short Tunnel	31.2557	28.9262	31.2532	28.9484					2136.57	
	Lalini Medium Tunnel	31.269	28.9242	31.2769	28.9756					4973.75	
	Lalini Pipeline/Tunnel	31.2624	28.9207	31.2973	28.9874					8146.78	
Power Transmission Options	Powerline Alt 1	31.2532	28.9484	31.2621	28.8761					7189.01	
	Powerline Alt 2	31.2766	28.9755	31.30178	28.8733					10659.17	
	Powerline Alt 3	31.3085	28.8729	31.2994	28.9878					11568.43	
Irrigation Lines	Irrigation Lines	31.1208	28.686	31.356	28.7389	31.2834	28.6798	31.292	28.7481	94807.88	
Lalini Material Sources	Sand Pit Area	31.2217	28.9191	31.2443	28.9022	31.2374	28.995	31.2368	28.9387		130.16
	Shell Borrow Area	31.2491	28.9229	31.2589	28.9208	31.258	28.9193	31.256	28.9255		37.12
	Rock Quarry	31.2372	28.9451	31.2382	28.9421	31.2372	28.9416	31.2382	28.9457		4.14
	Core Borrow Area	31.2489	28.9253	31.2563	28.9271	31.2513	28.9255	31.2493	28.9328		37.92
Ntabelanga Material Sources	Rock Agrregate	31.1174	28.6733	31.1201	28.6733	31.1199	28.6723	31.1177	28.6745		3.42
	Sand Pit Area	31.1054	28.6495	31.1131	28.652	31.1058	28.6486	31.1063	28.6548		11.21
	Shell/General Fill 1	31.1044	28.6447	31.1104	28.6477	31.1071	28.6433	31.1067	28.6522		31.42
	Shell/General Fill 2	31.1092	28.6646	31.1131	28.6638	31.1115	28.6615	31.112	28.6659		12.13
	Core Borrow Area 1	31.1114	28.6608	31.116	28.6644	31.1136	28.6603	31.1154	28.6646		9.58
	Core Borrow Area 2	31.1199	28.6694	31.125	28.6713	31.1246	28.6686	31.1215	28.6715		11.02
Ntabelanga Dam	Ntabelanga Dam	31.0829	28.5892	31.1305	28.667	31.1095	28.51196	31.1178	28.6737		2333.4452
Lalini Dam Options	Lalini Dam Option 1	31.2182	28.9298	31.2628	28.9193	31.2384	28.8405	31.236	28.9555		1534.4723
	Lalini Dam Option 2	31.2216	28.919	31.26295	28.9196	31.246	28.8421	31.2346	28.9477		961.9287
	Lalini Dam Option 3	31.2258	28.8199	31.26356	28.9193	31.2351	28.9605	31.2122	28.332		2126.5298
Access Roads	Ntabelanga Access Roads	31.0765	28.5981	31.2176	28.664	31.0936	28.5228	31.1188	28.6854	75803.9	
	Lalini Access Roads	31.2382	28.8924	31.3247	28.9815	31.2591	28.8591	31.2887	28.9984	39826.8	
Primary and Secondary Pipelines	Primary and Secondary Pipelines	30.8832	28.6125	31.4167	28.7945	31.1661	28.4963	30.949	28.9759	228104	
Drainage Realignment	Drainage Realignment	31.2205	28.9192	31.2397	28.8945	31.237	28.8903	31.2239	28.9341		139.7919

Table 12: Geographic coordinates of infrastructure components

4.7 AFFECTED INFRASTRUCTURE

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

4.7.1 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.

4.7.2 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.

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

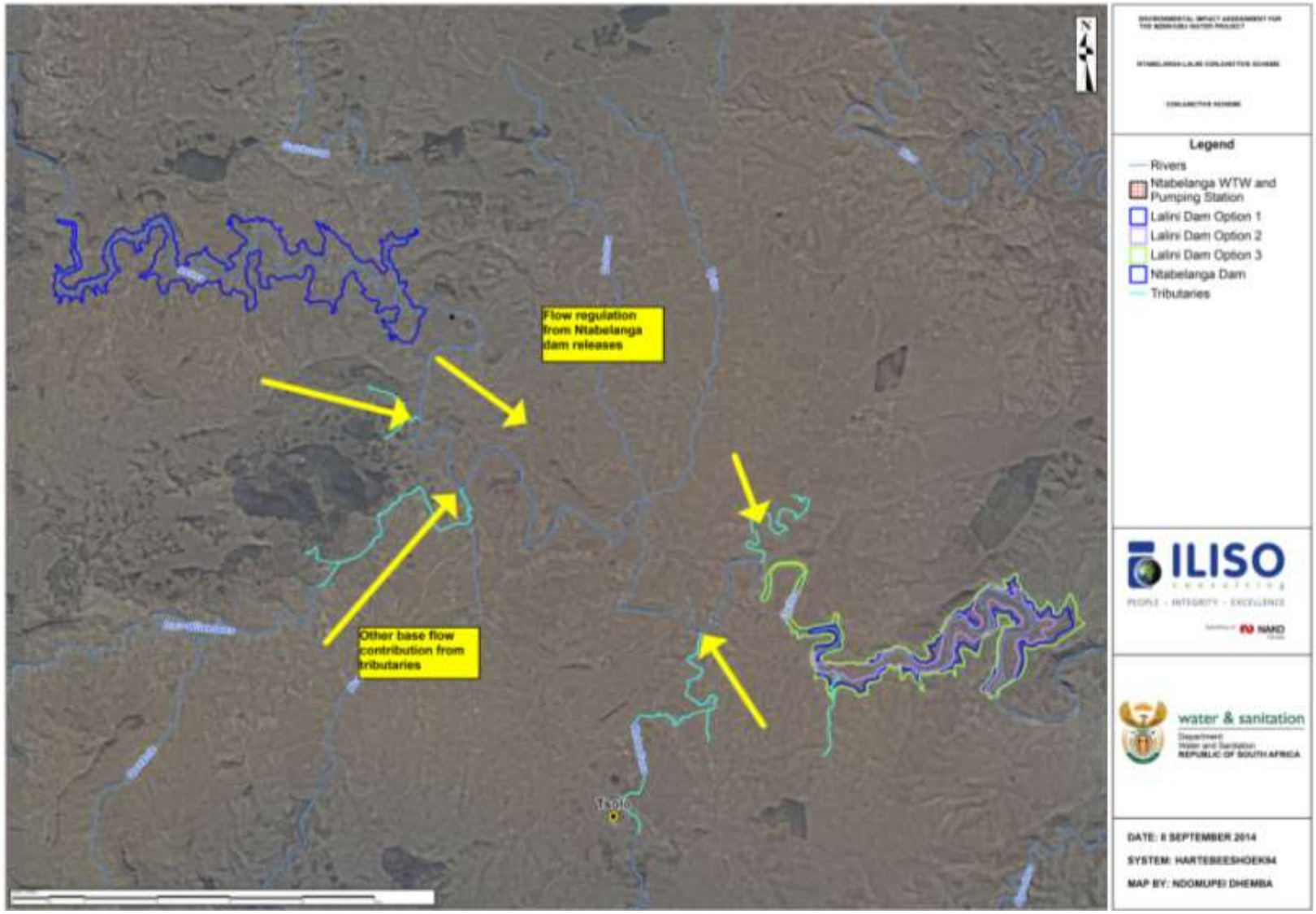

Figure 19: Proposed Ntabelanga-Lalini Conjunctive Scheme

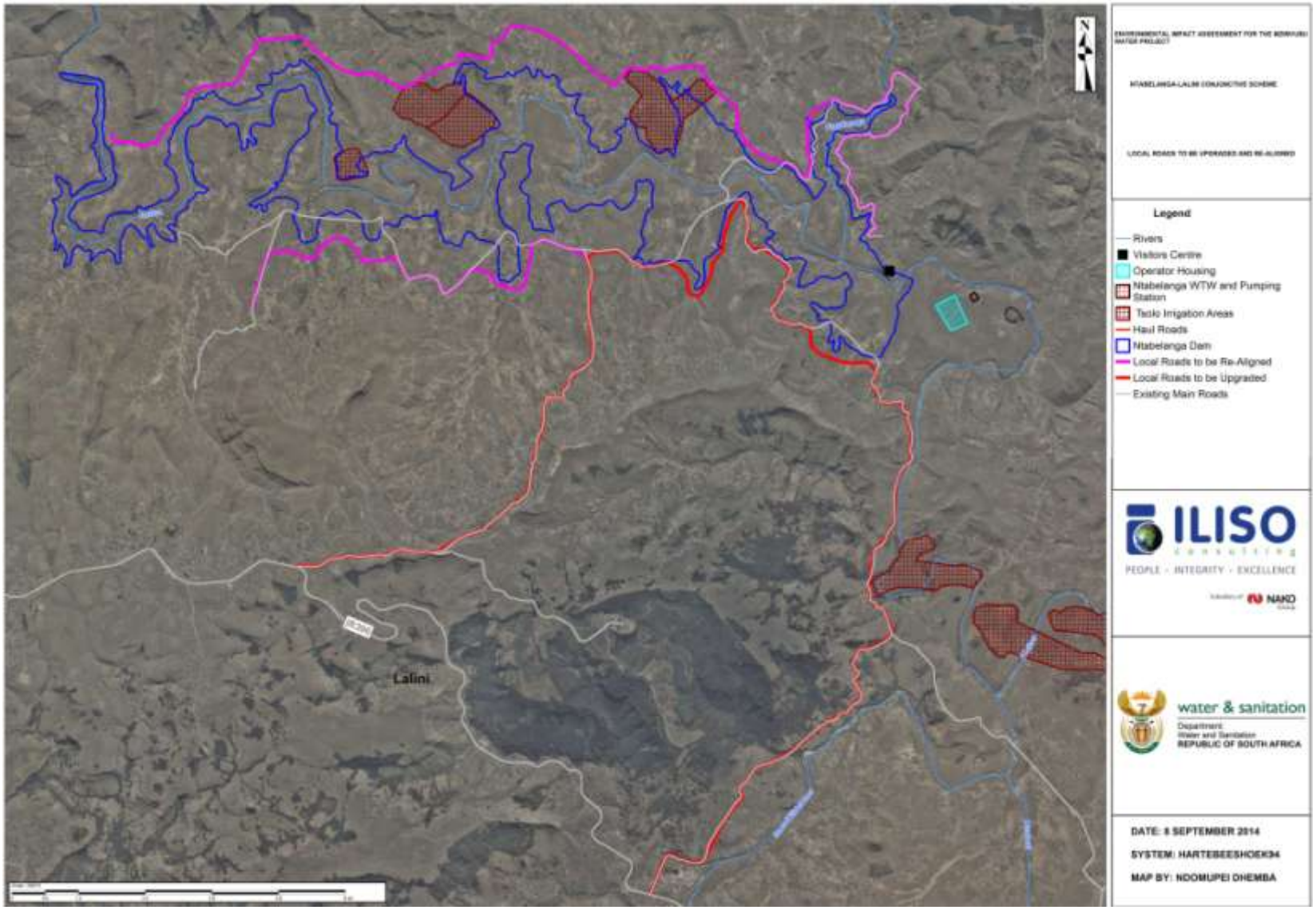

Figure 20: Re-alignment of inundated roads and upgrading of access roads in the vicinity of the Ntabelanga Dam site

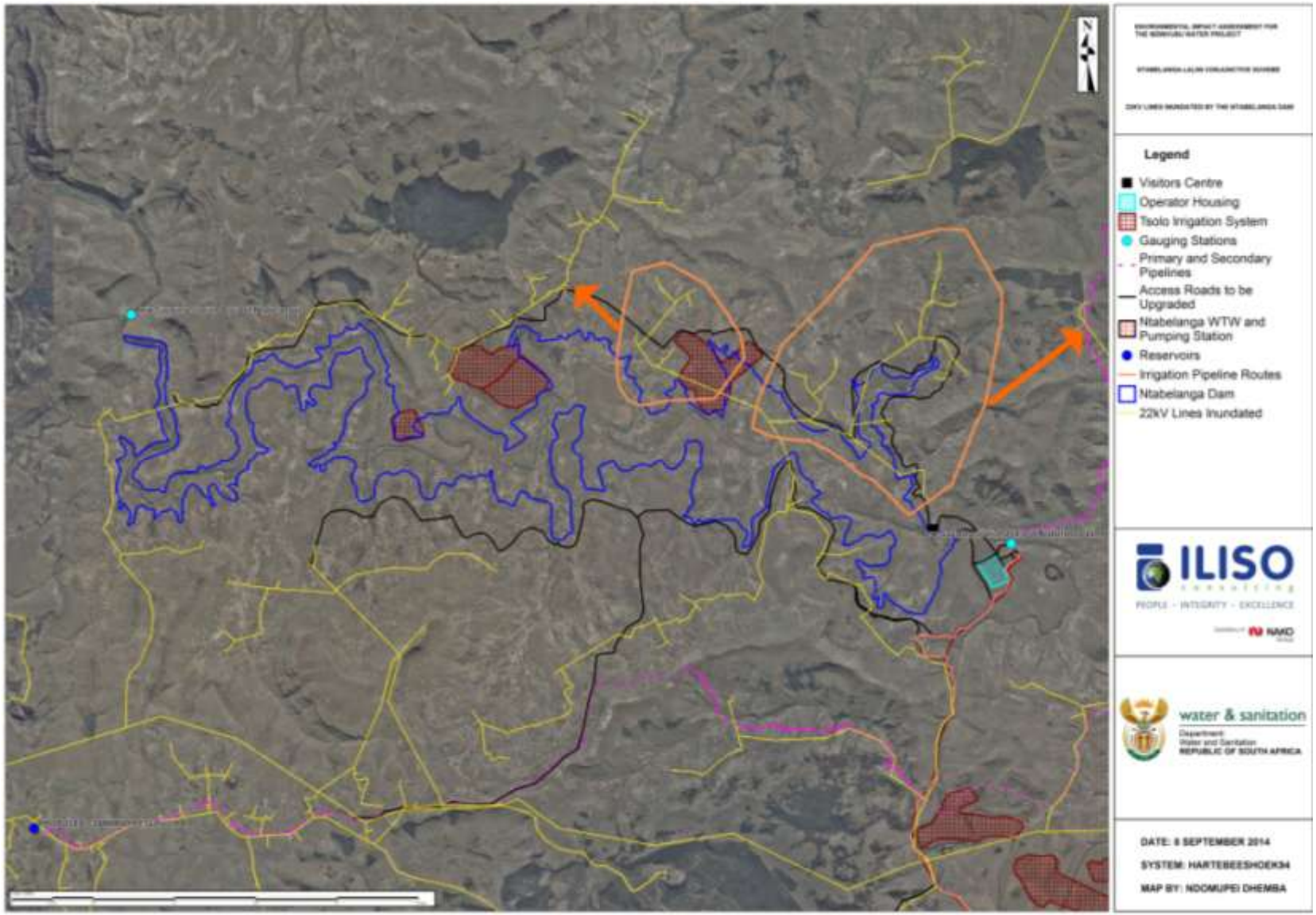

Figure 21: Affected power lines at Ntabelanga Dam

Figure 22: Affected power lines at Lalini Dam

4.8 SERVICES REQUIRED

During construction the Contractors will provide the following services:

- Water, initially via tankers until a treatment plant is installed;
- Sewage, by portable toilets and a treatment plant;
- Refuse removal, to a suitable landfill site; and
- Electricity, by generators until the power line from Eskom is completed.

The municipalities therefore will not provide any services, except to receive the waste at a landfill site (no up-front agreements needed). Eskom will provide power, but the application will only be made during implementation.

During operation, water supply, sewage treatment and power supply will be in place on site and operated as part of the scheme (i.e. not by the municipalities). There may be an agreement with the municipality/ies for refuse removal or the operator may transport refuse to a registered landfill site.

4.9 EXPENDITURE, INCOME AND EMPLOYMENT

Expenditure, income and employment anticipated by the project is summarised in **Table 13**.

Table 13: Projected Expenditure, Income and Employment

Anticipated CAPEX value of the project on completion	R12.45 billion
Expected annual income to be generated by or as a result of the project	R 5.9 billion during construction R 1.6 billion during operation
New skilled employment opportunities created in the construction phase of the project	And estimated 3 880 jobs
New skilled employment opportunities created in the development phase of the project	Up to 2 620 jobs
New un-skilled employment opportunities created in the construction phase of the project	Up to 2 930 jobs
New un-skilled employment opportunities created in the development phase of the project	Up to 2 300 jobs
Expected value of the employment opportunities during the development and construction phase	R 376 million/year during construction R 268 million/year during operation
Percentage of this value that will accrue to previously disadvantaged individuals	At least 30% during construction
Expected current value of the employment opportunities during the first 10 years	R 3.33 billion

5. 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 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 5.2.

5.1 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.

5.1.1 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:

5.1.1.1 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.

5.1.1.2 Develop groundwater resources

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

5.1.1.3 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.

5.1.2 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.

5.1.3 Alternative dam types

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**.

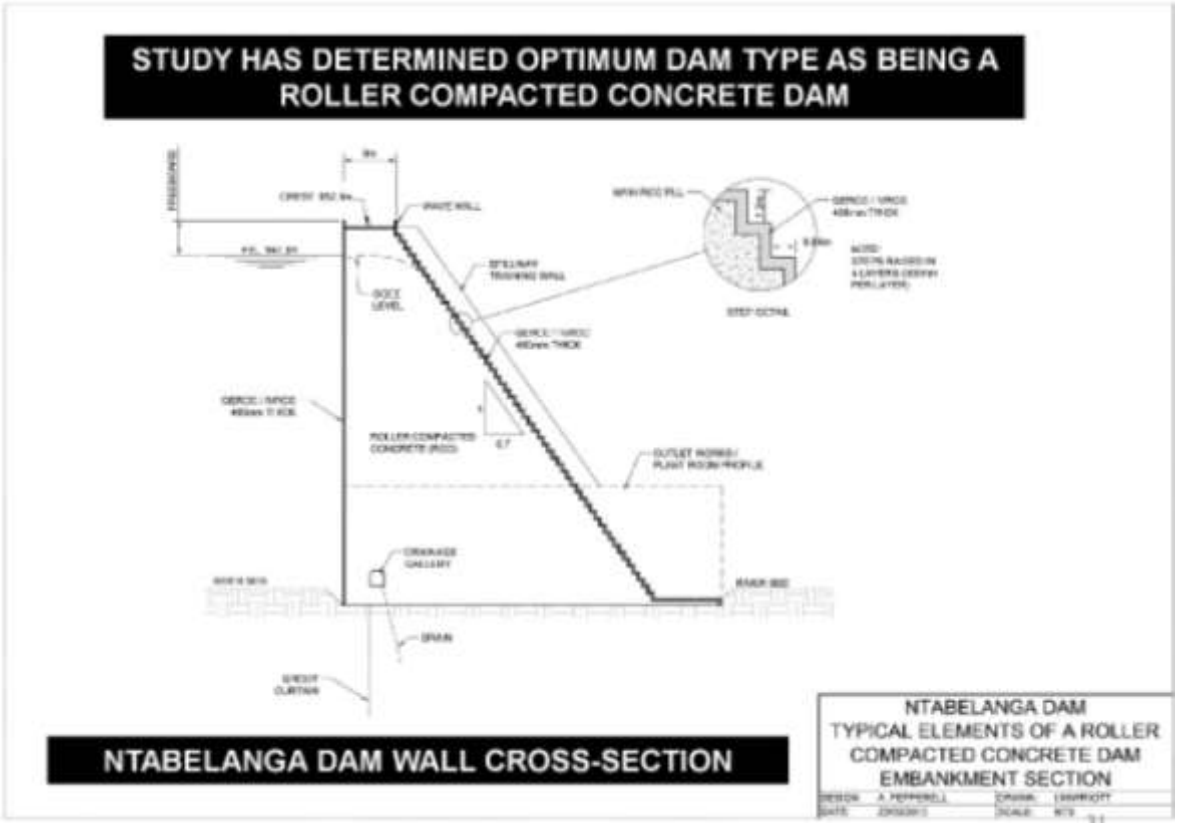

Figure 23: Typical Ntabelanga Dam wall cross-section

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

5.1.4 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.

5.2 ALTERNATIVES ASSESSED DURING THE IMPACT ASSESSMENT PHASE

5.2.1 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. Base load generation (37.5MW or 50MW) means generating 24 hours a day; while peaking (150MW) means that the hydropower plant runs for 4 to 8 hours a day during peak energy demand periods.

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 Licence 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. This still needs to be determined.

5.2.2 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 downsream 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 13 km power line (in orange on the map). All three alternative routes have been considered in the EIA.

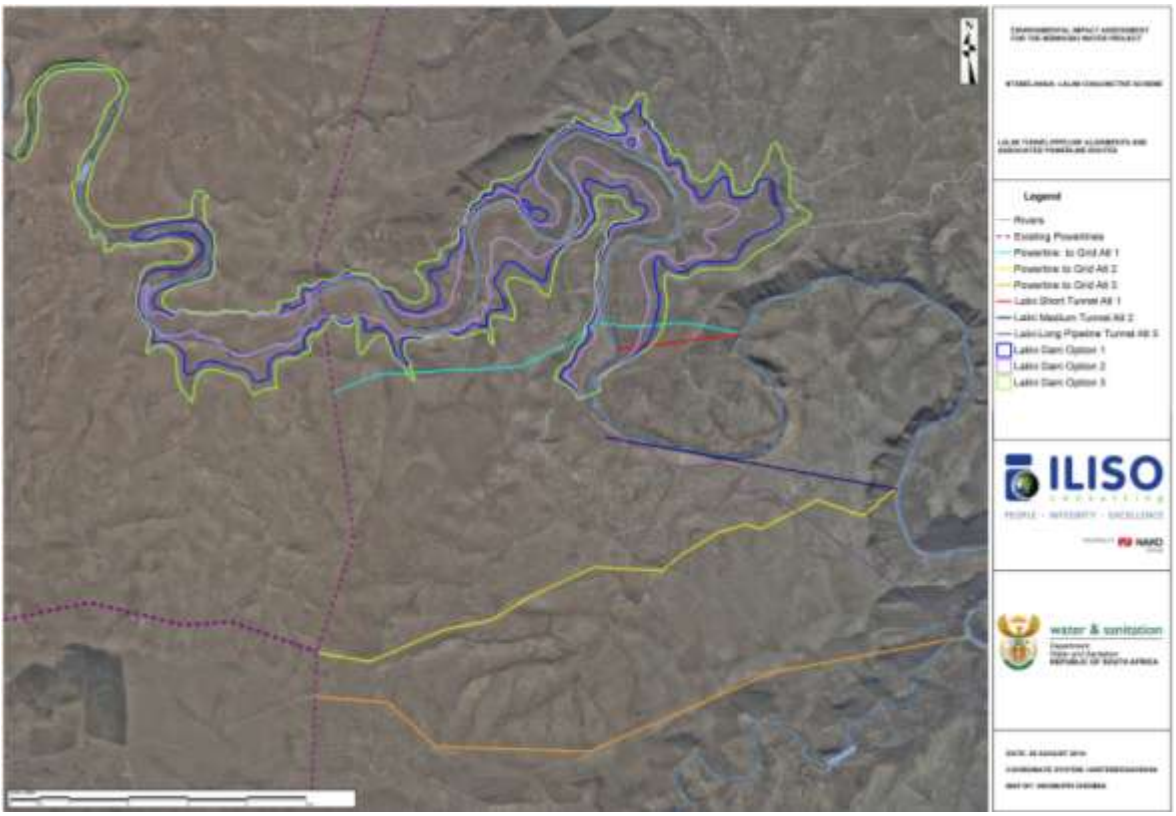

Figure 24: Alternative tunnels and power line routes at Lalini Dam

5.2.3 Alternative dam sizes

Three dam sizes are proposed for the Lalini Dam (**Figure 25**) and have been considered in the EIA.

Figure 25: Lalini Dam alternative dam sizes

5.3 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 Impact Assessment chapters (**Chapters 9 to 11**).

6. NEED AND DESIRABILITY

6.1 STRATEGIC CONTEXT FOR THE CONSIDERATION OF NEED AND DESIRABILITY

The Department of Environmental Affairs draft guidelines on need and desirability in terms of the EIA Regulations, 2010 (DEA, 2010) explains that, while it is essential that growth in the economy affects national policies and strategies, it is essential that the implementation of these social and economic policies take cognisance of strategic concerns such as climate change, food security as well as the sustainability in supply of natural resources and the status of our ecosystem services.

Consistent with the National Framework for Sustainable Development (NFSD) (DEA, (2010), it is required that spending on economic infrastructure is focused in priority areas with potential for economic development that serves the broader society's needs equitably. What is needed and desired for a specific area is strategically and democratically determined during the formulation of Integrated Development Plans (IDPs), and Spatial Developmental Frameworks (SDFs).

6.2 NATIONAL STRATEGY FOR SUSTAINABLE DEVELOPMENT, 2011

The following strategic objectives are identified in the National Strategy for Sustainable Development and Action Plan (2011):

- Enhancing systems for integrated planning and implementation;
- Sustaining our ecosystems and using natural resources efficiently;
- Building sustainable communities;
- Responding effectively to climate change; and
- Moving towards a green economy.

The Environment sector has developed an implementation plan with nine key focus areas, for contributing to the achievement of a national green economy (DEA 2011), namely:

1. Resource conservation and management;
2. Sustainable waste management practices;
3. Water management;
4. Environmental sustainability;
5. Green buildings and the built environment;
6. Sustainable transport and infrastructure;
7. Clean energy and energy efficiency;
8. Agriculture, food production and forestry; and
9. Sustainable consumption and production.

6.3 NATIONAL DEVELOPMENT PLAN (NDP)

The South African Government's vision for the water sector is that before 2030, all South Africans will have affordable access to sufficient safe water and hygienic sanitation. Since 1994 there have been significant changes in the water sectors policies, practices, institutional development and thus outcomes. Enhancing water resource management and infrastructure development became a key part to addressing problems resulting from earlier under investments. Local governments would retain the responsibility of ensuring that adequate services are provided to the people while regional utilities would provide facilities where municipalities have insufficient technical and financial capabilities. Water supply and sanitation services (water in pipes) depend on the availability of adequate water resources. (National Development Plan, 2011: 155).

In the National Development Plan (NDP) (National Planning Commission, 2011: 181), the development potential offered by the Mzimvubu was specifically highlighted: "[the Mzimvubu] *water resource development could support agriculture, domestic supply, hydropower production, transport and tourism if planned in a coordinated manner*." The NDP proposed that "*Programmes in underdeveloped regions, such as a proposed multipurpose development around a new dam on the uMzimvubu River, should also be prioritised since it could mobilise the natural resource advantages of an otherwise underdeveloped area*" (National Planning Commission, 2011: 160-161).

6.4 NATIONAL SPATIAL DEVELOPMENT PLAN (NSDP)

The NSDP argues that the spatial configuration of our country is not only the product of investment and growth, but also of apartheid spatial planning. The resulting spatial marginalisation from economic opportunities by large segments of the country's population is still a significant feature of South Africa's space economy and needs to be addressed to reduce poverty and inequality, ensuring shared growth.

The NSDP seeks to assist government to achieve the following development objectives and principles for the country:

- To focus fixed investment in areas with development potential. It is argued that these areas present the greatest possibility for both economic growth and poverty alleviation; and
- To ensure that citizens in areas with limited potential are provided with a package of essential public services, focusing on human resource development, labour market intelligence and social grants. It is argued that the prevalence of high poverty in an area does not mean that poverty can be more effectively addressed in that area.

In order to achieve a common platform for deliberation and decision-making around infrastructure investment and development spending decisions, there are two fundamental key components of the NSDP:

1. The defining of the space economy in terms of 'need' and 'development potential'; and
2. Utilising the set of guiding principles by all actors in government when planning, deliberating and budgeting for investment and spending.

This requires a well-coordinated and integrated system of planning in which the plans at a national, provincial and local level mutually inform each other, and in which there is agreement on the priorities for infrastructure investment and development spending. This in turn requires coordination and alignment in and between the spheres of government, notably through the alignment and harmonisation between:

- The national Medium Term Strategic Framework (MTSF);
- The national and provincial Medium Term Expenditure Frameworks (MTEFs);
- The Provincial Growth and Development Strategies (PGDSs);
- The annual budgets of national and provincial government departments, State-owned enterprises and municipalities; and
- Municipal Growth and Development Strategies (GDSs), IDPs and Spatial Development Frameworks (SDFs).

To utilise this prospect requires that intergovernmental District-wide agreements are reached on the needs and development potentials of the district space economy. Once these have been reached, these agreements then provide the base for:

- Preparing and reviewing an IDP in a District; and
- Agreements on the roles and responsibilities regarding infrastructure investment and development spending in the development of the District.

6.5 STRATEGIC INTEGRATED PROJECTS (SIP)

Government, under the leadership of Minister Ebrahim Patel, on 23 November 2010 released the framework of the new economic growth path aimed at enhancing growth, employment creation and equity. The new growth path sets a goal of five (5) million new jobs by 2020, identifies structural problems in the economy and points to opportunities in specific sectors and markets ("job drivers"). The first job driver is infrastructure: laying the basis for higher growth, inclusivity and job creation. In order to address these challenges and goals, Cabinet established a Presidential Infrastructure Coordinating Commission (PICC) to:

- Coordinate, integrate and accelerate implementation;
- Develop a single common National Infrastructure Plan that will be monitored and centrally driven;
- Identify who is responsible and hold them to account; and

- Develop a 20-year planning framework beyond one administration to avoid a stop-start pattern to the infrastructure roll-out.

Under their guidance, 18 strategic infrastructure projects (SIPs) have been developed. The SIPs cover social and economic infrastructure across all nine provinces, with specific emphasis on lagging regions. The Mzimvubu Water Project is a SIP3.

Textbox 1: Strategic Infrastructure Project 3: South-Eastern node and corridor development

- New dam at Mzimvubu with irrigation systems.
- N2-Wild Coast Highway which improves access into KwaZulu-Natal and national supply chains.
- Strengthen economic development in Port Elizabeth through a manganese rail capacity from Northern Cape.
- A manganese sinter (Northern Cape) and smelter (Eastern Cape).
- Possible Mthombo refinery (Coega) and transshipment hub at Ngqura and port and rail upgrades to improve industrial capacity and performance of the automotive sector.

6.6 EASTERN CAPE ENVIRONMENTAL IMPLEMENTATION PLAN (EIP)

The Constitution of the Republic of South Africa (Act 108 of 1996) sets the basis for both the protection of the environment (Section 24 environmental right) and for cooperative governance (Chapter 3 of the Constitution). The purpose of an EIP is to co-ordinate and harmonise the environmental policies, plans, programmes and decisions of the various national departments that exercise functions that may affect the environment or are entrusted with powers and duties aimed at achievement, promotion and protection of a sustainable environment, and of provincial and local spheres of government. The EIP assists in facilitating intergovernmental relations in environmental matters and thus, should become a mechanism of the Premier's Co-ordinating Forum for achieving sound environmental governance in provincial planning.

The second edition of the EIP for the Eastern Cape was promulgated in GN 82 on 24 March 2014.

6.7 INTEGRATED DEVELOPMENT PLANS AND SPATIAL DEVELOPMENT FRAMEWORKS

6.7.1 Municipal IDPs

According to the Municipal Act (MSA) (Act 32 of 2000), all municipalities have to undertake an Integrated Development Plan (IDP) process. The IDP is a legislative requirement thus it has legal status and supersedes all other plans that guide development at local government level.

An IDP is defined as an inclusive and strategic plan that:

- Links, integrates and co-ordinates a municipality's sector specific plans;
- Aligns the resource and capacity of the municipality to the overall development objectives of the municipality;
- Forms the policy framework on which annual budgets rest; and
- Informs and aligns with similar development plans at national and provincial spheres.

All three District Municipalities (DMs), OR Tambo DM, Alfred Nzo DM and Joe Gqabi DM, impacted by the Mzimvubu Water Project, have published extensive IDPs. All three DM IDPs (Afred Nzo IDP, 2010; Joe Gqabi IDP, 2012/13; OR Tambo IDP, 2012-17) refer to the DM's responsibility for planning, implementation, operation and maintenance of water and sanitation services. The Alfred Nzo IDP states that "*of the estimated 127 878 households approximately 70 000 are serviced with water in one way or another which translates to 45.2% of the population having no access whatsoever to potable water*." Additionally, "*Communities in rural areas are still highly dependent on undeveloped water sources and there remains a challenge in meeting the water demand, due to source identification*". **This states the need for an additional water source, such as that which would be provided by the Mzimvubu Water Project.**

The Mzimvubu Water Project should thus be promoted as an integrated local development programme in which the activities in the different sectors are coordinated in order to achieve the optimum synergies between them.

6.7.2 Spatial Development Frameworks

In terms of Section 26(e) of the Municipal Systems Act (Act 32 of 2000), every municipality is required to formulate a Spatial Development Framework (SDF) as a part of its IDP.

A SDF is a plan that seeks to guide overall spatial distribution of current and future desirable land uses within a municipality, in order to give physical effect to the vision, goals and objectives of the municipal IDP. It highlights priority investment and development areas and serves as a guide to decision-makers and investors. A SDF is thus an integral component of the corresponding IDP, its purpose being to translate the IDP into its spatial implications to provide broad, overall development guidelines. The aim of a SDF is not to control spatial development but rather to act as a framework that gives strategic guidance in respect of the location and nature of anticipated future development in a given municipality. Because land is a scarce resource, it needs to be planned in the most optimum manner.

Only the OR Tambo DM SDF is reviewed here as the other DMs are only marginally affected in terms of spatial development.

The OR Tambo DM, in partnership with DWS, has appointed Umgeni Water Board and Amatola Water Board to assist in identification of an improved bulk water supply system within its area of jurisdiction. Feasibility studies were undertaken to investigate the reliability of the identified schemes:

- The Central Scheme (Ingquza Hill and parts of Port St Johns) fed by the Mzintlavana River: Feasibility Study complete and preliminary design in progress; and
- The Southern Scheme (King Sabatha Dalindyebo, Nyandeni and parts of Mhlontlo): Optimal Utilization of Mthatha Dam for domestic consumption: Study complete but awaiting abstraction permit from DWS.

Other Sub-Regional Schemes to be integrated within the Regional Schemes have been proposed, including:

- The Sidwadweni Regional Water Supply under the Mhlontlo LM, which also supplies parts of the Nyandeni LM and rural villages within Tsolo and Tsolo Hospital: Approximately R250 million has been allocated for the development of the scheme since its inception and currently the last phase (phase 5) is in the design stage.
- The Mvumelwano Regional Water Supply under the Mhlontlo LM, which supplies Qumbu town and other Rural Villages within Qumbu: Approximately R150 million has been allocated for the development of the scheme since its inception and the first phase is being implemented.
- The Upper Culunca Regional Water Supply under the Mhlontlo LM, which supplies rural villages within Qumbu: Approximately R150 million has been allocated for the development of the scheme since its inception and the last extension is under construction. Currently the possible construction of a Dam to sustain the scheme is under investigation and the submission of a business plan for additional funding may be put forward.

In respect of the Mvumelwano scheme, it can be noted here that an abstraction point used as part of the scheme is located within the Lalini Dam basin and will be inundated.

6.8 GREEN VILLAGE CONCEPT

Poverty and lack of service delivery affects millions of people in South Africa. Various intervention strategies, including the SIPs, aim to catalyze the process of service delivery by line function departments, such as Water and Sanitation, Environmental Affairs, Agriculture, Forestry and Fisheries, etc. Although integration of knowledge and interventions is essential, in practice the “silo approach” is often visible.

The Water Research Commission's (WRC) Green Village programme seeks to demonstrate that the un-integrated (silos) research products that are aimed at bettering the livelihoods of marginalized societies, can respond better to addressing the basic needs if an integrated approach to implementation is followed.

Natural resources tend to suffer in unsustainable development, such as when carbon footprints escalate, causing ecosystem degradation and global change. For this reason and others, green economy and green innovation is encouraged, but must be viable and tested through research and technology in support of line departments and strategies.

The Green Village programme will be piloted in communities in the Ntabelanga Dam area, and aims to generate and test new technological innovations, and provide an adaptable framework of "green" solutions (a tool box) for meeting the fundamental needs of poor communities. The purpose of the programme is thus to uplift the standard of living by transforming impoverished dependent communities to self-sufficient independent communities, through creation of sustainable jobs and entrepreneurship.

6.9 FINANCIAL AND ECONOMIC VIABILITY

Financial viability can be defined as the ability to generate sufficient income to cover input costs and make a profit.

Economic viability can be measured by the positive economic benefits that the proposed project will provide. It includes quantification and identification of all the benefits expected and typically involves an economic cost-benefits analysis using opportunity costs.

Financial viability is not a requirement for a project of this nature, as the objective of the project is not to make a profit on the investment, but rather to contribute to the development of the project area. The intention of the project is to be economically viable, in that the direct and indirect socio-economic benefits should exceed the financial cost of the project.

This EIA therefore only considers economic viability (see **section 9.6**).

7. PUBLIC PARTICIPATION PROCESS

7.1 OBJECTIVES OF THE EIA PHASE

The main objectives of the EIA are to:

- Assess the significance of the environmental issues and impacts identified in the scoping phase, focusing on key impacts;
- Recommend appropriate measures to mitigate negative impacts and enhance the benefits, and include them in the draft EMPR; and
- Undertake a public participation process that provides opportunities for all interested and affected parties (I&APs) to be involved.

7.2 AUTHORITY CONSULTATION

A pre-application meeting was held at the Department of Environmental Affairs (DEA) offices in Pretoria on 25 March 2014. The purpose of the meeting was to introduce the project to DEA, and agree on the proposed process and programme to be followed as well as associated roles and responsibilities.

As the project is a Strategic Integrated Project (SIP3) and a priority for DWS, delays in the EIA process should be avoided as far as possible. The programme for the EIA study was presented at the meeting and it was resolved that an Authorities Forum be established for the project, in order to obtain inputs and comments on the draft reports from the various organs of state involved ,in a timeous manner.

The First Authorities Forum meeting took place on 28 May 2014. The objectives of the meeting were to present the project and the findings of the Draft Scoping Report to the various organs of State involved, and obtain their comments on the draft Scoping Report.

The Authorities Forum includes representatives from the following organs of State:

- Department of Environmental Affairs;
- DWS regional and head office;
- Department of Agriculture, Forestry and Fisheries;
- Department of Rural Development and Land Reform;
- Department of Trade and Industry;
- Department of Energy;
- Eskom;
- SAHRA;
- Department of Public Enterprises;
- Department of Minerals Resources;
- Economic Development Department;
- EC Department of Economic Development, Environmental Affairs and Tourism;
- EC Department of Rural Development and Agrarian Reform;

- Eastern Cape Local Government and Tribal Authorities;
- EC Department of Roads and Public Works;
- EC Provincial Heritage Resources Authority;
- Affected Local and District Municipalities; and
- Amatola Water.

7.3 STAKEHOLDER IDENTIFICATION AND DATABASE

DWS has engaged with a number of stakeholders and role-players on this project during the feasibility study stage. A stakeholder database, including existing I&APs was provided at the beginning of the EIA process, which is updated on an ongoing basis as new stakeholders register on the database (**Appendix B**).

7.4 PARALLEL STAKEHOLDER LIAISON BY THE DEPARTMENT OF WATER AND SANITATION

There are several parallel stakeholder liaison initiatives for the project as a whole in addition to the public participation process for the EIA. Issues relevant to the EIA identified during these initiatives are incorporated into the process on an ongoing basis.

Table 14 lists the Department's formal and informal liaison structures and activities for this project, their purpose and representation.

Table 14: Department of Water and Sanitation formal and informal liaison structures and activities for the Mzimvubu Water Project

Liaison Structure	Purpose	Representation
Project Steering Committee (PSC) (Meetings take place every second month)	Guidance pertaining to strategic issues related to the project	▪ Department of Water and Sanitation and other relevant national departments ▪ EC Government ▪ Municipalities in the project area ▪ Key sectors such as conservation
Study Management Committee (Meetings take place every second month)	To co-ordinate and synchronize all the activities, to ensure efficient communication and to manage components and phases of the project	Department of Water and Sanitation: Options Analysis and EAP.
Eastern Cape Social and Economic Consultative Council (ECSECC) (13 February 2014, 26 March 2014, 6 March 2014)	ECSECC is a multi-stakeholder policy research and development planning organisation dedicated to evolving new forms of development cooperation between government, labour, organised business and developmental non governmental organisations	The ECSECC team is made up of over 40 committed professional and administrative staff. Subject experts, facilitators and development practitioners work in multidisciplinary teams.

Integrated Wild Coast Development Programme Steering Committee (19 February 2014)		

7.5 NOTIFICATION LETTERS, ON-SITE NOTICE AND BACKGROUND INFORMATION DOCUMENT

A letter notifying I&APs of this application for environmental authorisation, as well as the applications for the Water Use Licence, heritage permits, and borrow areas approval was sent to all registered stakeholders together with a Background Information Document (BID) (**Appendix B**). Both the English and isiXhosa versions were distributed by the local facilitators as well as placed on the DWS website. The BID covers all the applications that form part of the project. A newspaper advertisement was published in both local and provincial newspapers announcing the EIA process for this project and providing contact details for I&APs to register as a stakeholder. On-site notices were also posted, providing a brief background on the project and contact details in order for I&APs to request further information and/or to register as a stakeholder (**Figure 26**). All documents are available in **Appendix B**.

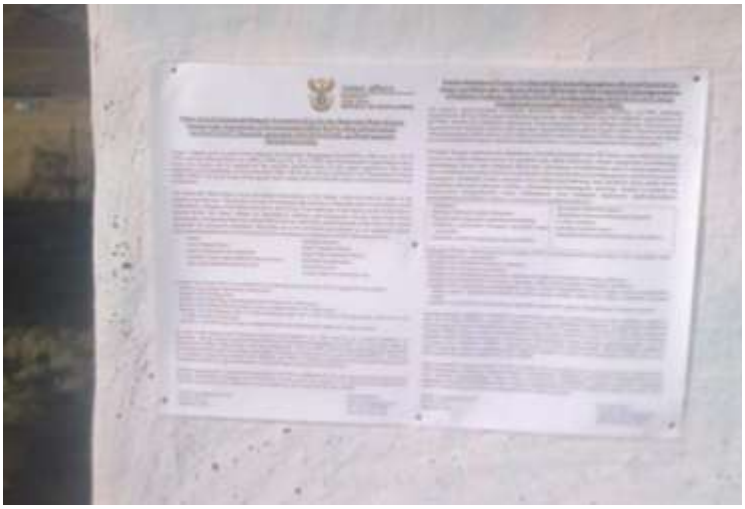

Figure 26: On-site notice (English and isiXhosa)

7.6 NEWSPAPER ADVERTISEMENTS

Notice of the applications was advertised in the Herald on 29 April 2014, in the Daily Dispatch on 05 June 2014 (**Figure 27**) and in the Mthatha Fever on 12 June 2014. Tearsheets are available in **Appendix B**.

ISAZISO MALUNGA NOVAVANYO LWEMPEMBELELO KOKUSINGQONGILEYO (EIA) LWEPROJEKTHI YAMANZI YASEMZIMVUBU, EMPUMA KOLONI

iReferensi yeSebe Lamicimbi Yokusingqongileyo (Uluwakhiwo lweDama: 14/12/16/3/3/2/677, Uveliso lombane 14/12/16/3/3/2/678, kunye Nokuphuculwa kweendlela 14/12/16/3/3/1/1169.

Esi sazizo ngokwemimiselo yoMthetho kaZwelonke wezoKusingqongileyo (NEMA), ka-1998 (uMthetho onguNombolo 107 ka-1998), kunye noMthetho kaZwelonke waManzi (NWA), ka-1998 (uMthetho onguNombolo 36 ka-1998), sibuba kuza kudingeka iSiganyazisi Ngokusingqongileyo kunye nePhepha leMveme Yokuseteyenziswa Kwamanzi kule misebenzi ichazwe apha ngezantsi. Ngokumalunmene noku ke, izicelo zifakwe kwiSebe Lemicimbi Yokusingqongileyo (DEA) kwaye zize kufakwa kwiSebe Lemicimbi Yamanzi (DWA). Ngenxa yobume bale projekthi, kuza kulandelwa imiqobo zokuthelela umsebenzi kwaNezo zinxaniyo kwempembelelo kokusingqongileyo.

iProjekthi Yamanzi yaseMzimvubu ibandakanya imimandla karoalipala wase-OR Tambo, owase-Alfred Nzo kunye nowase-Joe Gqabi, eMpuma Kolony. Le projekthi iquka idama elikekiweyo, elaziwa njengeDama laseNtabelanga, nelikuMambo iTsitsa, osebe koMambo iMzimvubu, nokwandawo okwakhiwomthe ozityi-12 emnta-mpuma kwendawo osembindini kwendlela yabuTsolo nasekhaxeni ilizi eziku/ubhane yeyaseNgqungqweni, eyakuCekwayo neyaseSigungqweni. KuMambo iTsitsa, emazantsi esiza seDama laseNtabelanga, kuza kwakhiwa elinye idama elaziwa njengeDama laseLalani lokuvelisa umbane, nelisemantla kweNgqungqwi zaseTsitsa. Omabini la madama aza kusetyenziswa njengesibonelelo esinye esihlangeneyo. Kuza kudingeka isiguntyazisi ngokusingqongileyo ngokuphathelele kulwakhiwo olukhoyo xa kusetyenziswa le misebenzi ilandelayo:

- Amadama;
- Indonga Ezilawula Amanzi Emanyeni;
- Ukuphuculwa nokumiswa ngokutsha kweendlela;
- Imibhobho yonkcukolelo kwamanzi asocindini kunye namachibi;
- Imibhobho yamanzi angahlungiswanga namachibi;
- Izikhuvalo zokumpompa amanzi;
- Imisebenzi Yokucoca Amanzi;
- Imisebenzi Yokucoca Inkunkuma Emanzini;
- Uveliso Lombane;
- Intambo zombane; kunye
- Neendlela zokuya kulindela kwizizi zokwakhiwo.

Kudingeka iMvume Yokuseteyenziswa Kwamanzi (WUL) xa kuseteyenziswa amanzi kwezi zinto zilandelayo nokuzithi kuphenjelelwe yiprojekthi le:

- Icandelo 21(a) ukukhiwa kwamanzi emlanjeni;
- Icandelo 21(b) ukugcinwa kwamanzi;
- Icandelo 21(c) ukuphoxonyiswa okanye ukujikwa kwendlela yokuhamba kwamanzi emlanjeni;
- Icandelo 21(i) ukukhintahwa kwesakho, lindunga, umjelo okanye nazisiphi na iimpawu zombambo;
- Icandelo 21(f) ukukhutshwa kwenkunkuma okanye emanzi anenkunkuma aye kuvimba wamanzi ngombhobho, imijelo, imijelo engaphantsi komhlaba ehambisa amanzi amdaka, okanye enye indlela yokombiso kwamanzi, kunye
- Necandelo 21 (g) ukukhutshwa kwenkcukuma ngomjelo enokuthi ibe negalelo elingathi hlanga kwindawo yamanzi.

Ngokwemimiselo yoMthetho Wophuhliso Lwezibonelelo zeMfuwa nePetroliyam, ka-2002 (uMthetho onguNombolo 28 ka-2002) (MPRDA), njengoko ulungiswe, kwakunye neMiniselo Yophuhliso Lwezibonelelo zeMfuwa nePetroliyam okwiseqo sikakhulumente esingunombolo GNR 527 somhla we-23 ku-Epreli 2004, iSebe Lemicimbi Yamanzi (DWA), ngenxa yesazizo sikakhulumente esingunombolo GNR . 762 somhla we-25 kuJuni 2004, sibalingi imiqobo zofako kwesicelo kwakunye nokwamkelwa kwamalungelo okunye kimvume ngokwemiselandelo u-16, 20, 22, kunye no-27 oMthetho i-MPRDA, Nangona kunjalo ke kodwa, ngokwecandelo 10B(2) loMthetho i-MPRDA, iSebe Lemicimbi Yamanzi kudingeka ukuba liqulunge iNkqubo yoLawulo lokuSingqongileyo (EMP) ukuze yomkelwe ngokwemiselo yecandelo 39 (4) lalo Mthetho.

iSebe Lemicimbi Yamanzi liyamcela i-ILISO Consulting (Pty) Ltd ukuba ibe yiyo eyenza uVavanyo lwaMgcembelelo kokuaNgongileyo kwakunye noqhubo lokuqinisekisa ukuthathwa kwemiqathe nokubandakanywa kolunti. Amaqela achaphazelekayo adinga ukuzi neekcukacha ezingaphezulu mayinga neenjelethi zingabhalisa njengegwa elinomdla nelibandakanyekayo ngokuthi aphagamshelwane no-Kim Dafkajaen ngepost, umnxeba, ifeksi okanye i-imeyile kwezi nkcukacha zoqtagamshelwano zilapha ngezantsi zingakapheli imbuku ezityi-14 emva kokuba sikhutshwe esi sazizo.

Kim Dafkajaen
ILISO Consulting (Pty) Ltd
PO Box 68735, Highveld, 0169

I-imeyile: Kim.d@iliso.com
Umnxeba: (012) 665 0900
Ifeksi: (012) 665 1899

ILISO

Figure 27: Advertisement in the Daily Dispatch (isiXhosa)

7.7 PUBLIC COMMENT PERIOD FOR DRAFT AND FINAL REPORTS

7.7.1 Draft Scoping Report

The Draft Scoping Report was made available to I&APs for a 30-day public comment period, from 9 May 2014 to 9 June 2014. The draft report was available for download from the DWS website (http://www.dwa.gov.za/mzimvubu) and hard copies were also available for perusal.

Copies of the Draft Scoping Report were available at the following venues:

Location	Venue
East London	Mrs Glenn Hartwig East Landon Central Library, Reference Library First Floor Gladstone Street East London 5200 (043) 722-4991
Mthatha	Mrs Vuyiswa Lusu Walter Sisulu University Nelson Mandela Drive Unitra, Umtatha 5117, 047-5022382 /2319

Tsolo	Mhlontlo Local Municipality 128 Mthuthuzeli Mpehle Avenue Tsolo 5170
Ntabelanga	Siqhungqwini Junior Secondary School Siqhungqwini A copy was also given to the local Chief (Chief Mabantla). Tel: 079 397 7131
Lalini	Mhlontlo Local Municipality Technical department Office 26 96 Church Street Qumbu 5180

Three public meetings were held during the week of the 12th of May 2014 near the proposed Ntabelanga Dam site (in Siqhungqwini), in Tsolo and in Lalini. The purpose of these meetings was to engage with the public, provide information and allow stakeholders to raise any comments or objections.

7.7.2 Final Scoping Report

The Final Scoping Report was made available electronically for a 21-day public comment period.

7.7.3 Draft Environmental Impact Assessment Report

The draft EIR is available to I&APs for comment from the DWS website (http://www.dwa.gov.za/projects.aspx) and hard copies are also available for perusal from the venues listed in section 7.7.1. I&APs have thirty (30) days to comment on the draft EIR.

A round of public meetings will take place in November 2014 in order to provide an update on the project and report back to stakeholders on the findings of the Impact Assessment phase.

7.8 FOCUS GROUP MEETINGS

A focus group meeting with the Department of Agriculture, Forestry and Fisheries was held on 20 May 2014 to discuss agriculture and land tenure issues associated with the project.

Between 28 June and 11 July 2014 a field trip was undertaken across the project region. During this time various meetings were held as indicated below.

Date	**Venue**
28 June 2014	Shukunxa Village

30 June 2014	Ngqongweni
10 July 2014	Mpetsheni
10 July 2014	Sibomvaneni Village
10 July 2014	Ntabelanga Dam Basin
10 July 2014	Mawasa Location
11 July 2014	Lalini Dam Basin

In addition, focus group meetings were held with the Department of Energy (18 July 2014) and Nyandeni LM (30 September 2014).

Focus Group Meetings were also held with representatives of the Mhlonlto and Elundini Local Municipalities, as well as the Traditional Leaders, Ward Councillors of the towns that have been identified as being directly affected by the project. The purpose was to inform the Traditional Leaders and Ward Councillors of the status of the Environmental Impact Assessment as well as to obtain guidance in formulating a Relocation Policy Framework for the Environmental Management Programme.

7.9 NEWSLETTERS

A Newsletter (Newsletter #3) was compiled, providing information on the Environmental Impact Assessment process, progress to date and the way forward.

The newsletter was distributed electronically to all registered stakeholders on 12 August 2014. In addition, 150 copies (in English) and 350 copies (in isiXhosa) of the newsletter were printed and distributed to local communities by the local facilitators within the project area on 19 and 20 August 2014. Hard copies were also left at the relevant municipal offices.

A follow up newsletter (Newsletter #4) will be compiled and distributed once a decision has been made regarding the application for environmental authorisation.

7.10 ISSUES AND RESPONSES REPORT

Feedback received from stakeholders is recorded in the Issues and Responses Report (IRR) (**Appendix B**) and has been incorporated in the Draft EIR where applicable.

7.11 KEY ISSUES

The key issues that have been raised during the public participation process are summarised below.

1. The dams will store water that would previously have flowed down the Tsitsa River into the Mzimvubu River and ultimately through the estuary to the sea. Some water will be abstracted from the dams for, primarily, domestic and

agricultural use. Other water will be released from the dams for power generation in a way that alters the natural flow regime. At some times the rivers will therefore have less water than natural and at other times they will have more. Changes to the flow regimes in rivers, especially where potentially sensitive area such as the Tsitsa Falls and associated pristine gorge downstream of the proposed Lalini Dam and the Mzimvubu estuary, could impact on the aquatic and riparian ecosystems and associated ecosystem services provided by the rivers. The impact of the proposed altered flow regimes in the rivers on the **aquatic and riparian ecosystems** therefore need to be assessed.

2. The Mzimvubu Project is located in a part of the country that currently experience severe soil erosion with associated high **sediment** levels in the rivers. Concern has been raised that this condition will cause the dams to silt up, reducing their yield and affecting the functioning of the equipment (e.g. abstraction and water treatment). Impacts on the river channel and water quality immediately downstream of the dams, where water carrying less sediment than when entering the dam is released, are also envisaged.

3. When a dam is constructed the land that will be inundated by water will be permanently altered and the current functionality will be lost (and replaced with a lake). The proposed dams are expected to inundate 10.34 km^2 of wetlands, grassland and savannah habitats as well as man-made structures, roads and powerlines. The plants and animals that currently depend on the river, wetland, grassland or savannah habitats will either have to move/be moved to use other resources or will die. The significance of this **ecological impact** needs to be assessed.

4. Some people are currently living and providing for their existence from the resources in the areas that will be inundated by water or replaced by infrastructure. These families will have to be **relocated** to new homes and **compensated** for their loss of livelihoods. This is usually a socially disruptive and personally traumatic experience that needs careful attention and management.

5. The Mzimvubu Project is expected to cost R 12.5 billion. The **financial and economic viability** has been questioned. Financial viability implies the project is evaluated at market prices. Economic viability implies that the project is evaluated at prices which reflect the relative scarcity of inputs and outputs. The main purpose of this project is to contribute to the development of an impoverished rural area of the Eastern Cape by making water available to the area. The investment by government must therefore be evaluated against the background of the projected contribution to social and economic development. A project of this nature may make economic sense, but not be affordable. In such a case government's continuous grants and subsidies may be necessary. The EIA study is not the right vehicle to determine financial viability and affordability. An

economic cost benefit analysis (ECBA) was therefore done as part of this EIA and not a financial cost benefit analysis. The funding of the project is an important issue and during this analysis it became clear that it will take up to 10 years to attain maximum production from the irrigation scheme and possibly financial profitability. Financial viability can only be attained by grant funding on an annual basis without any repayment pre-conditions. The high poverty levels in the project area are such that it is improbable that more than 10% of the domestic users will be able to pay for the water. Therefore, a long term annual subsidy will have to be provided for. The Lalini Dam Hydro-Electricity Generation is financially viable and can be funded by loans.

6. The specific area of the Eastern Cape Province has a large untapped **agricultural potential**. Any agricultural development based on commercial principles will, however, be faced with a number of stumbling blocks. These include the problem of land ownership, shortage of management skills for commercial farming, available markets, and support structures such as production inputs and funding.

7. A large infrastructure project of this nature will result in an influx of people and consequently increase the demand for municipal services such as water, electricity, roads, sewerage, housing and social services (clinics, schools etc.). This will place a significant burden on an already over-extended **Local government**.