3. DESCRIPTION OF THE PROPOSED ACTIVITY / PROJECT

The Ntabelanga-Laleni conjunctive scheme consists of water resource infrastructure, treated domestic water supply infrastructure, irrigation, power and affected infrastructure.

3.1 PROJECT LOCATION

The Mzimvubu River Catchment is situated in the Eastern Cape (EC) Province of South Africa. The latter consists of six District Municipalities (DM) and two Metropolitan Municipalities (East London/Buffalo City and Port Elizabeth/Nelson Mandela Bay).

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 3**).

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

Table 4 Project Location Information

Province	Eastern Cape					
District Municipality	Joe Gqabi, OR Tambo and Alfred Nzo District Municipalities					
Local Municipality	Mhlontlo, Nyandeni, Umzimvubu and Elundini Local Municipalities					
Ward number(s)*	Umzimvubu LM: Wards 20, 25 and 19 Elundini LM: Wards 1, 5 and 6 Nyandeni LM: Wards 1 and 10 Mhlontlo LM: Wards 1, 4, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 and 26.					
Nearest town(s)	Tsolo, Laleni, 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

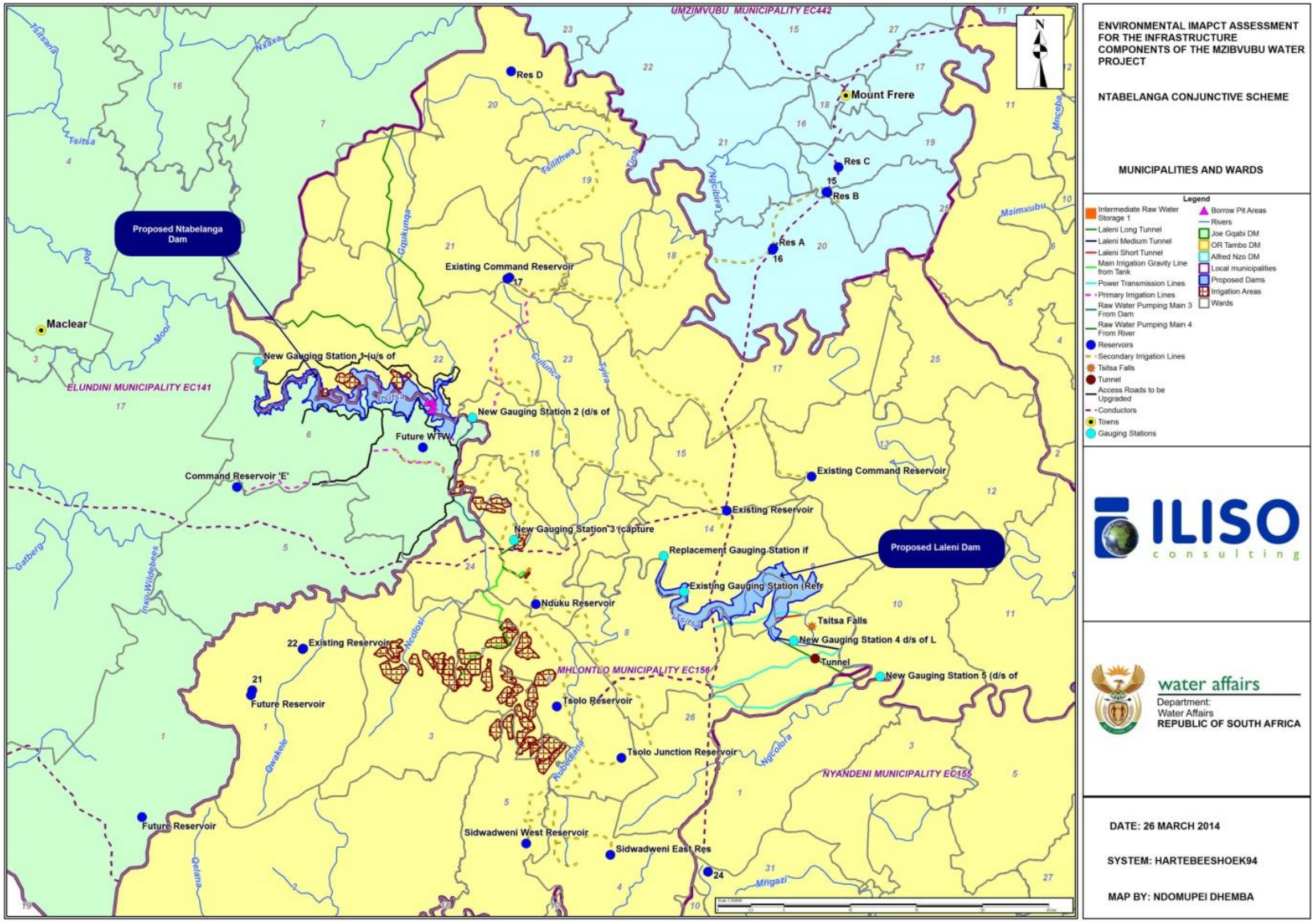

Figure 2: Study area

The Mzimvubu River has four major tributaries, namely the Mzintlava, Kinira, Tina and Tsitsa Rivers. The proposed Ntabelanga and Laleni 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

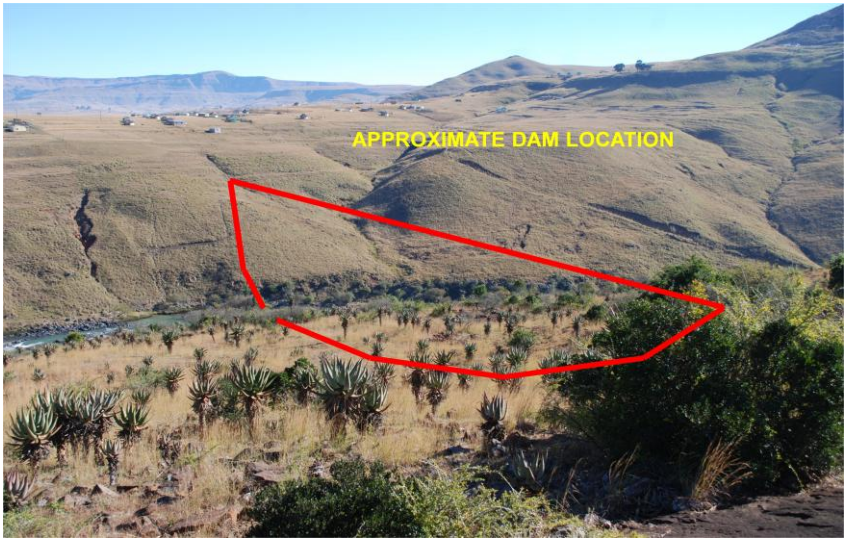

Figure 5: Approximate location of the proposed Ntabelanga Dam

Figure 6: Approximate location of the proposed Laleni Dam

Figure 7: Tsitsa Falls downstream of the proposed Laleni Dam

3.2 WATER RESOURCES INFRASTRUCTURE

Water Resource Infrastructure includes:

- A dam at the Ntabelanga site with a storage capacity of 490 million m^3;
- A dam at the Laleni site with a storage capacity of approximately 150 million m^3;
- A tunnel and power house at Laleni 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

- Two information centres at the dam sites.

Figure 8: Location of accommodation and waste water treatment works at the Ntabalenga Dam

2/3 of the water at the Ntabelanga Dam will be utilised for hydro-energy, 1/6 for potable water and 1/6 for irrigation.

3.2.1 The Ntabelanga Dam

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

- Dam wall crest length: 440 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 types under consideration:
  - Earth core, rock fill embankment
  - Concrete-faced rock fill embankment
    - Either side-channel or side cutting spillway
  - RCC with integral spillway
- Inundated area upstream at max flood level: ± 40 km^2

3.2.2 The Laleni Dam

The Laleni Dam characteristics are summarised below:

- Dam wall crest length: 250 m

- Maximum dam wall height 32 m
- Mean Annual Runoff of River at Dam: 828 million m^3/a
- Volume impounded by dam: 150 million m^3
- Inundated area upstream at max flood level: ± 15 km^2

3.2.3 The Construction of the dams

Construction of each dam will require construction camps, lay down areas, and storage sites: 5 at 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, cofferdams will be constructed to protect all foundation activities in the riverbed against flood damage (**Figure 9**). 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.

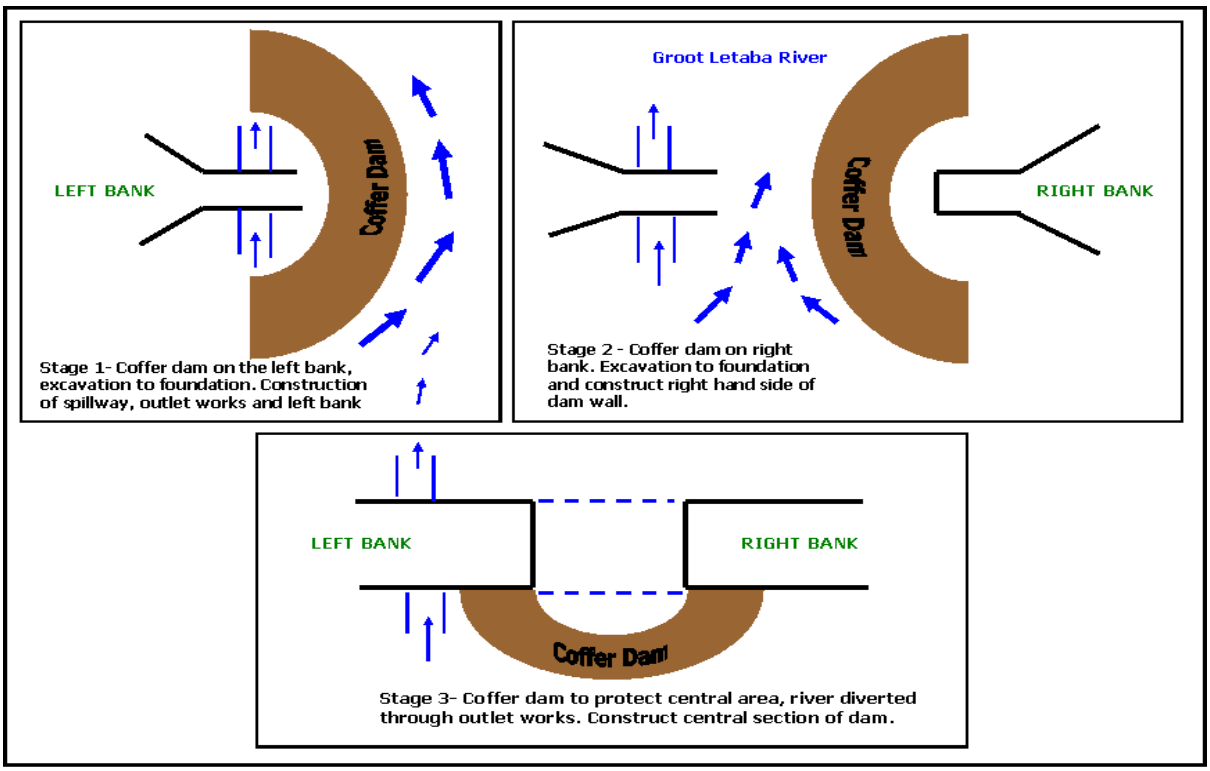

Figure 9: Typical Stages of River Diversion

Sand required for the production of concrete and for filter construction 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, 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. Earth embankments may be constructed on both banks by compacting material hauled in by large trucks from the borrow areas upstream of the dam.

The temporary site administrative buildings will be erected complete with security fencing, a water supply, sewage purification plant and an electric overhead 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 will be shaped to avoid unintended ponding and no grass will be planted.

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

3.2.4 Flow Gauging weirs

Five new flow measuring weirs will be required in order to measure the flow that is entering and released from the dams (an example of a flow gauging weir is shown in **Figure 10**). These flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams.

The exact locations of the weirs have not yet been determined, but approximate positions are indicated on **Figure 2**.

Each weir will take about three 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 10: Flow Gauging weir in the Crocodile River at Nooitgedacht

3.3 DOMESTIC WATER SUPPLY INFRASTRUCTURE

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

- An intake structure and associated works at Ntabelanga Dam;

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

The approximately 20 stand-alone water storage, treatment works and pumping station compounds will be up to 3 ha each.

A significant portion of the domestic water supply schemes in this area will fall under the OR Tambo and Joe Gqabi DMs (**Figure 11**). Some communities are already served by schemes (**Figure 12**); these have been taken into account in the development of the proposed infrastructure.

The total bulk water and potable water pipeline servitudes total 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 13**). 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 14).**

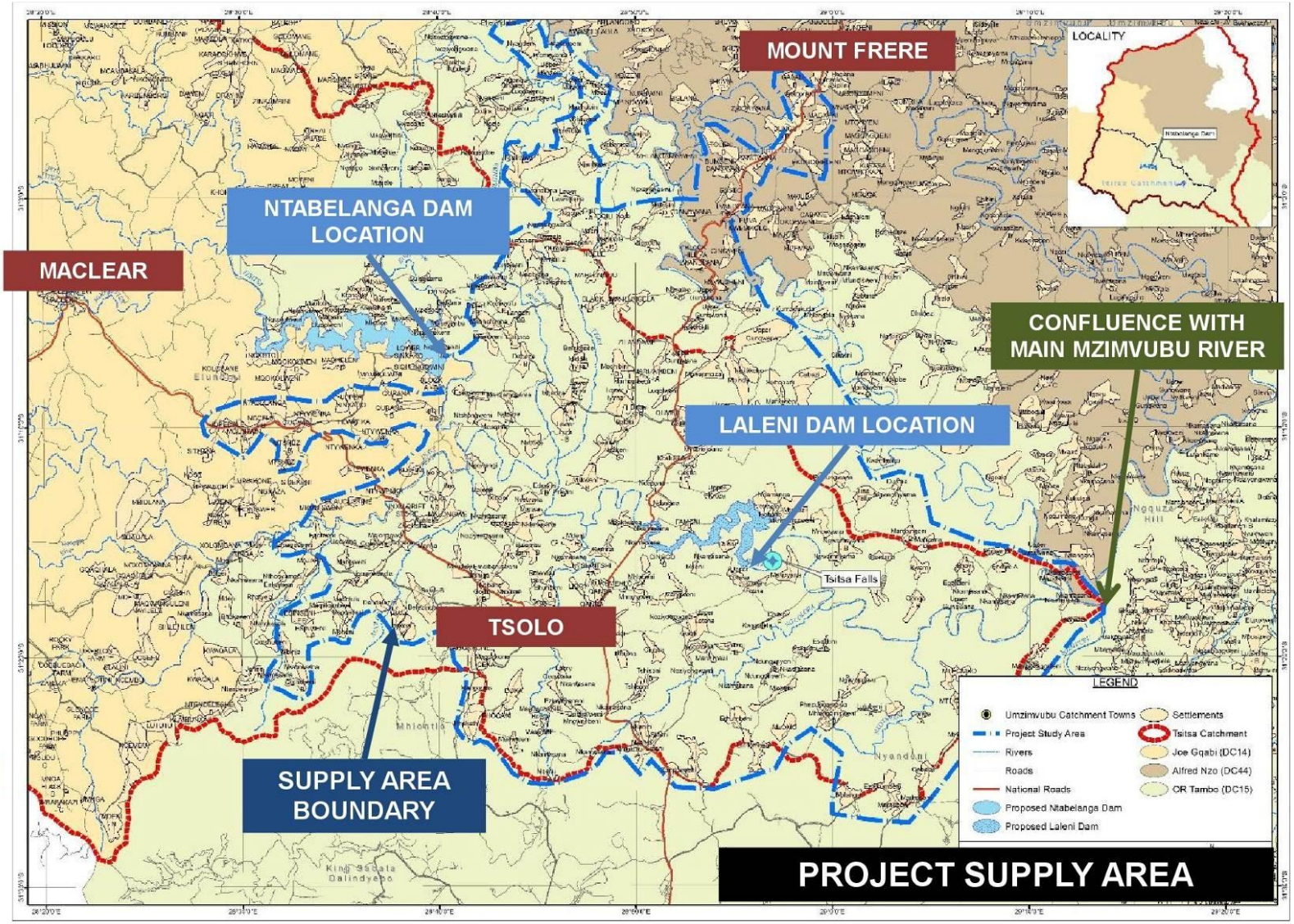

Figure 11: Ntabelanga Dam potable water supply areas

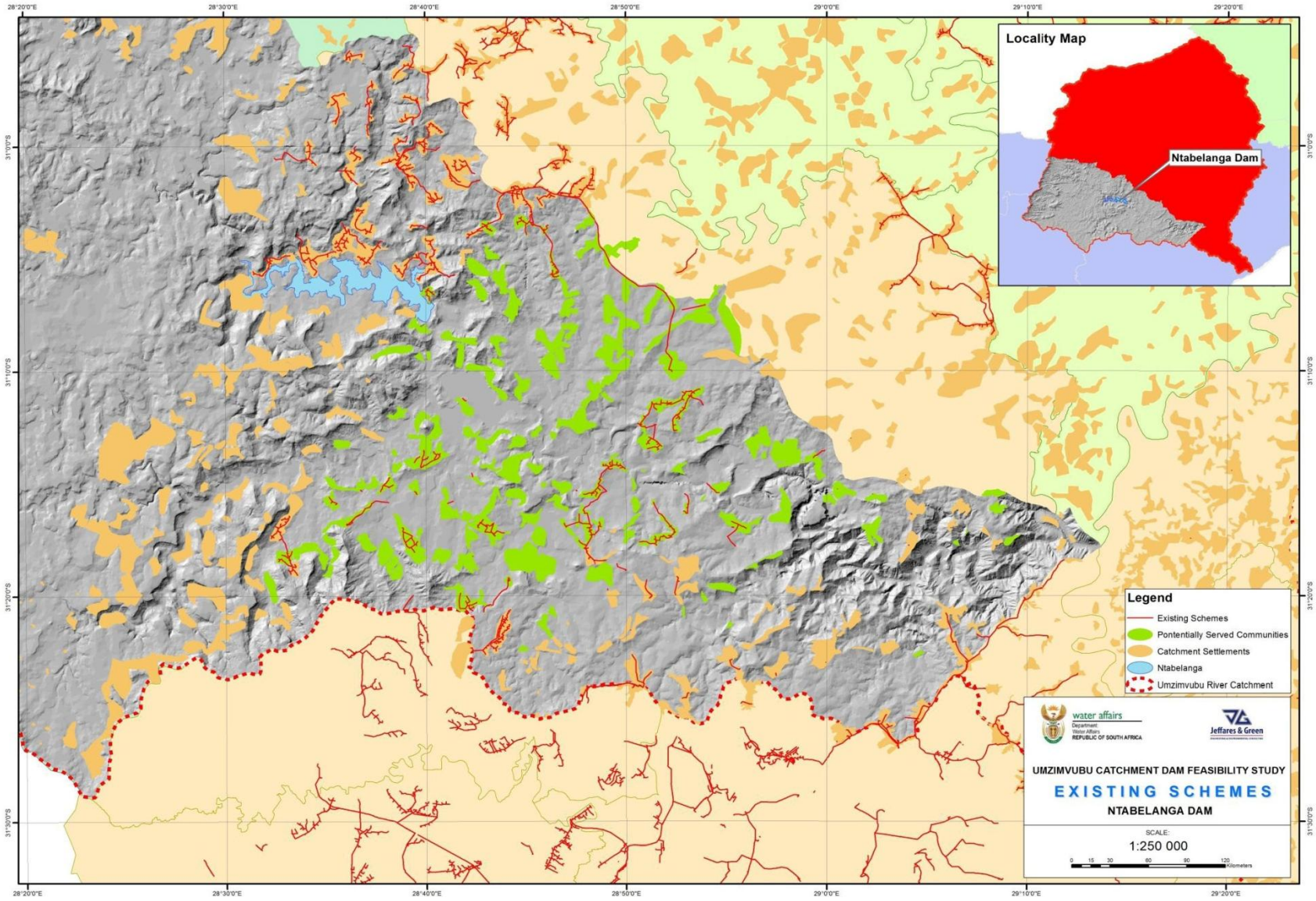

Figure 12: Existing water supply schemes

Figure 13: Pipe laying

Figure 14: 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 15**). 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.

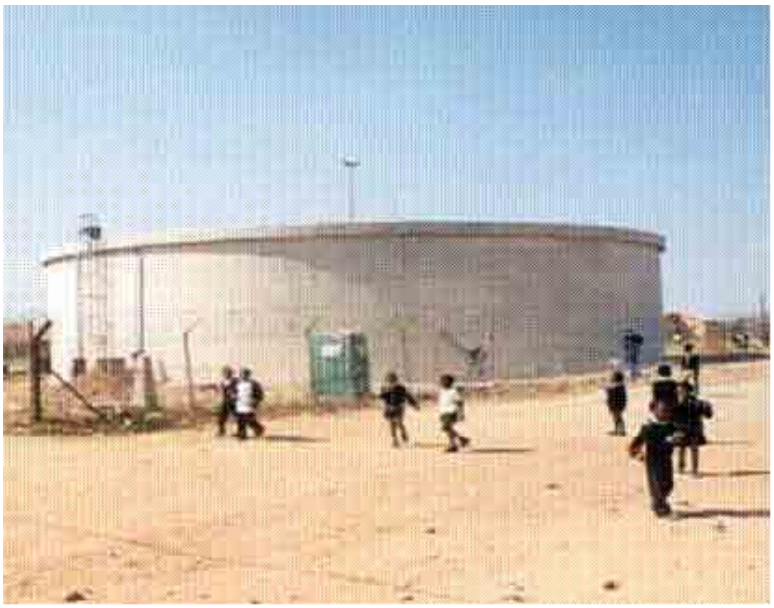

Figure 15: View of a typical large concrete reservoir

3.4 IRRIGATION

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

About 2 450 ha of the high potential land suitable for irrigated agriculture are in the Tsolo area and the rest near the proposed Ntabelanga Dam and along the river, close to the villages of Machibini, Nxotwe, Culunca, Ntshongweni, Caba, Kwatsha and Luxeni (**Figure 16**).

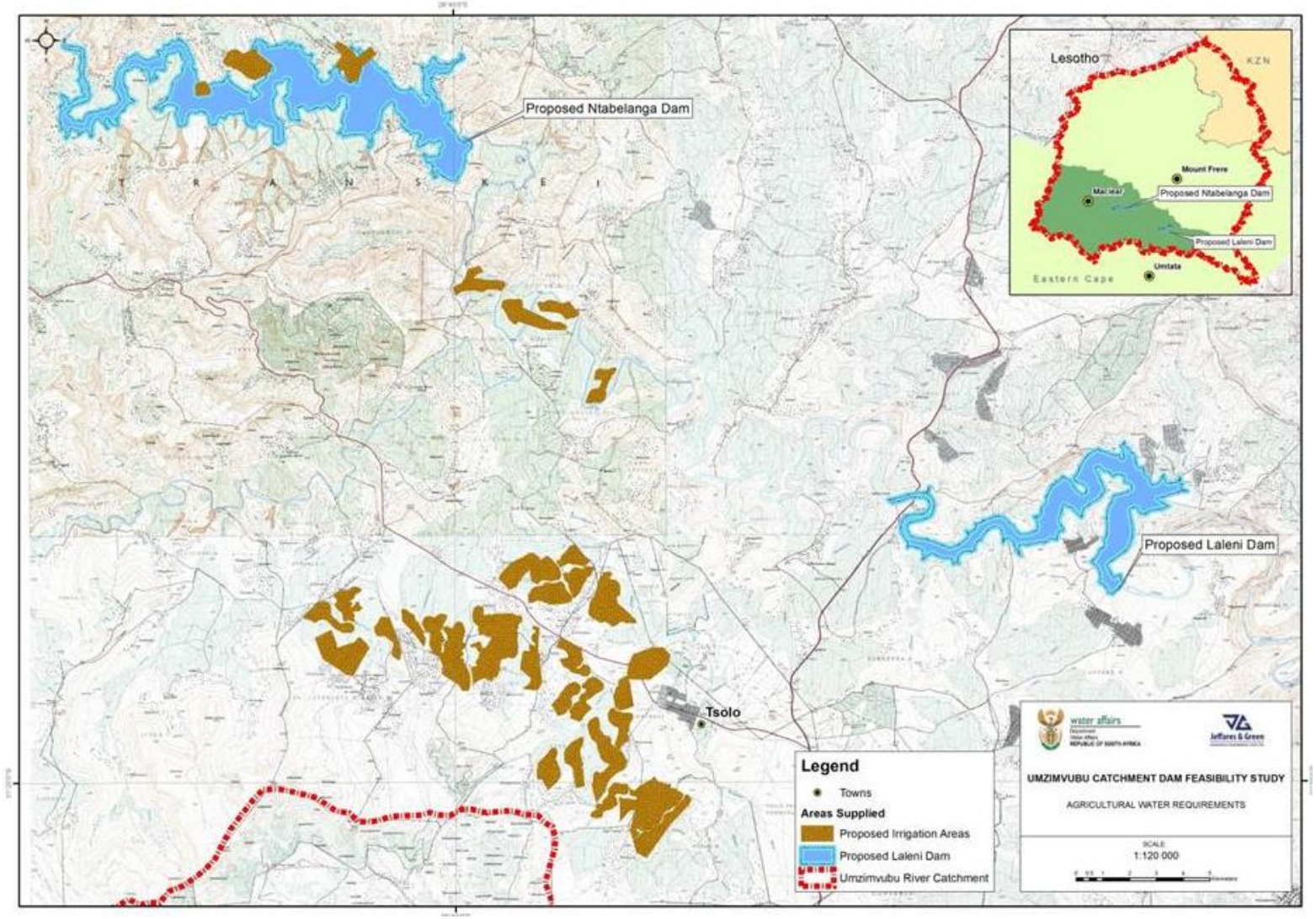

Figure 16: Proposed irrigation areas

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. 45 rationalised farming units of between 40 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 to the farming units will be mostly gravity based, with booster stations for higher lying areas.

3.5 POWER

The feasibility study results 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 Laleni site, also on the Tsitsa River upstream of the Tsitsa Falls, is considered to be a viable hydropower generation scheme (**Figure 17**).

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 Laleni Dam and tunnel (used conjunctively with the Ntabelanga Dam) will generate an average output of 35 MW when operated as a base load power station and up to 180 MW when operated as a peaking power station. The power plant will require a tunnel of approximately 7 km linking the dam to the power plant downstream of the dam and below the gorge. Neither the Laleni Dam nor the hydropower plant will be visible from the Falls.

The high voltage power line to link the Laleni power station to the existing Eskom grid will be approximately 18.5 km and the power line linking Ntabelanga dam to the Eskom grid will be approximately 13 km. Power lines will be constructed to supply power for construction at the two dam sites and for operating five pumping and booster stations along the bulk distribution infrastructure.

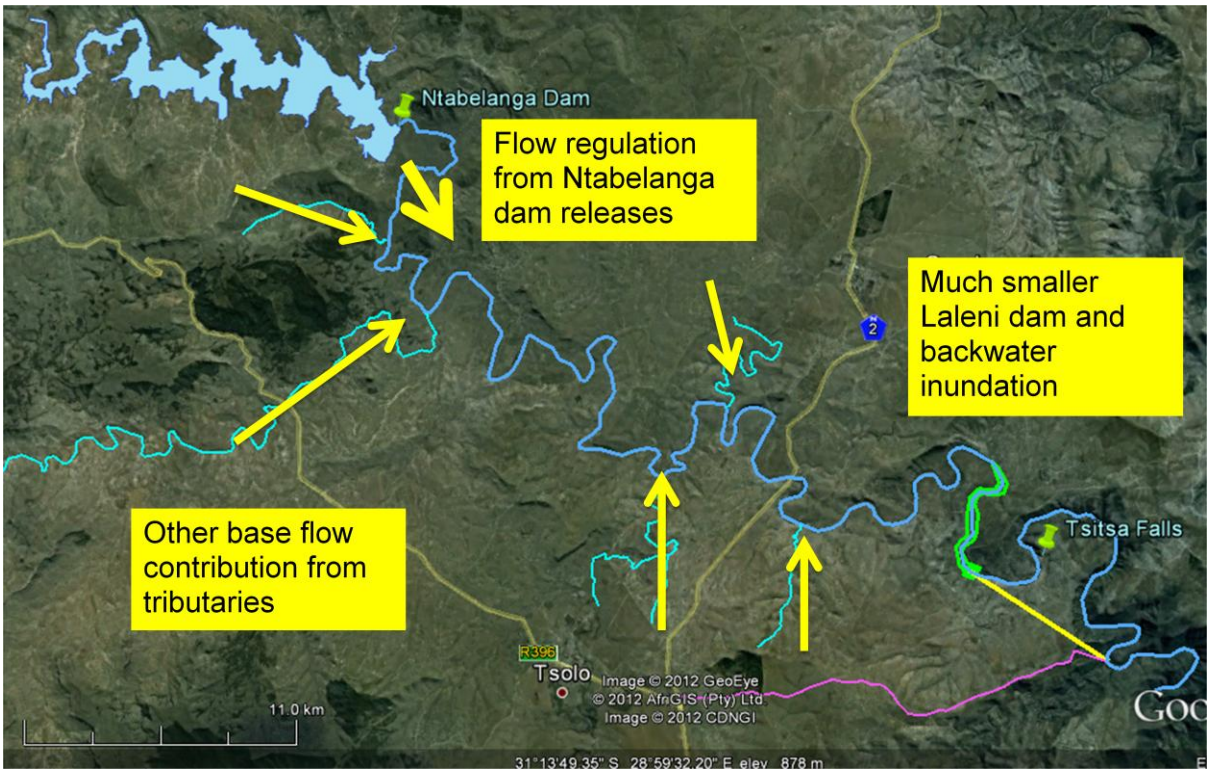

Figure 17: Proposed Ntabelanga-Laleni Conjunctive Scheme

3.6 AFFECTED INFRASTRUCTURE

The area to be inundated by the dams will submerge some roads. Approximately 80 km of local roads will therefore be re-aligned (indicated in magenta in **Figure 18**). Additional local roads will also be upgraded to support social and economic development in the area (indicated in red in **Figure 18**). The road design will be very similar to the existing roads as well as 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; so avoiding the need for temporary detours during construction.

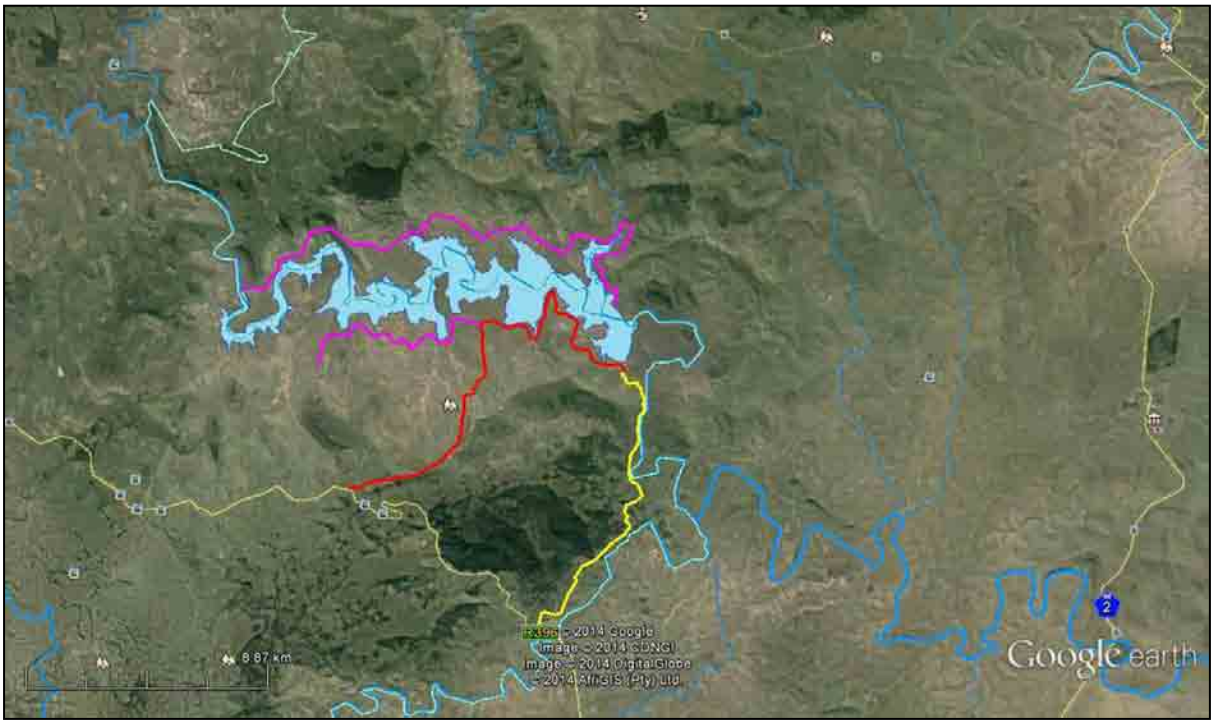

Figure 18: Re-alignment of inundated roads and upgrading of access road

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.

3.7 EXPENDITURE, INCOME AND EMPLOYMENT

Expenditure, income and employment anticipated by the project is summarised in **Table 5**.

Table 5: Projected Expenditure, Income and Employment

Anticipated CAPEX value of the project on completion	R12.45 billion
What is the 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	3 880 minimum
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

What is the expected value of the employment opportunities during the development and construction phase?	R 376 million/year during construction R 268 million/year during operation
What percentage of this value that will accrue to previously disadvantaged individuals?	At least 30% during construction
What percentage of this value that will accrue to previously disadvantaged individuals?	At least 30% during construction
The expected current value of the employment opportunities during the first 10 years	R 3.33 billion

4. NEED AND DESIRABILITY

4.1 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 affect 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), Companion to the EIA Regulations 2010, Integrated Environmental Management Guideline Series 9, Department of Environmental Affairs (DEA), Pretoria, South Africa ISBN: 978-0-9802694-4-4) it is required that spending on economic infrastructure is focused in priority areas with potential for economic development that serves the broader societies 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).

4.2 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.

4.3 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).

4.4 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.

4.5 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.

4.6 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.

4.7 INTEGRATED DEVELOPMENT PLANS (IDP)

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.