water & forestry

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FOR COMMENT
AUGUST 2008

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GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

Environmental Impact Assessment

(DEAT Ref No: 12/12/20/978)

SUMMARY OF THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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AUGUST 2008

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PREFACE

The Department of Water Affairs and Forestry (DWAF) is currently undertaking an Environmental Impact Assessment (EIA) to investigate the environmental feasibility of raising the Tzaneen Dam, the construction of a storage dam in the Groot Letaba River and associated bulk water infrastructure (water treatment works, pipelines, pump stations, off-takes and reservoirs) in the Limpopo Province. The EIA is being undertaken by ILISO Consulting (technical aspects) with Zitholele Consulting providing the public participation support. The EIA is being undertaken according to the EIA Regulations under Section 24 (5) of the National Environmental Management Act (NEMA), (Act No 107 of 1998) as amended in Government Notice R385, 386, 387 – Government Gazette No. 28753 of 21 April 2006.

An EIA must show the authorities and the proponent what the consequences of their decisions will be in environmental, economic and social terms. An EIA is comprised of various phases: Scoping, Impact Assessment and a Decision-making Phase. During the first phase (scoping) potential issues associated with the project are scoped and identified in order that technical specialists can evaluate them during the next phase of the EIA, viz. the Impact Assessment Phase.

In accordance with the Regulations of the NEMA, Interested and Affected Parties (members of the public, the development proponent, technical specialists and the authorities) must have the opportunity to comment on all submissions made to the competent authority. This was the main purpose of the Draft Scoping Report and its Summary Report that was available for comment from Wednesday 3 October 2007 to Wednesday, 31 October 2007. The Final Scoping Report has now been submitted to and approved by the lead environmental authority, the national Department of Environmental Affairs and Tourism (DEAT) who, in close collaboration with the Limpopo Department of Finance and Economic Development[1], considered the scope to be covered by the Specialist Studies, after which these studies have proceeded as part of the Impact Assessment Phase.

The findings of the studies undertaken in the Impact Assessment Phase are captured in the Draft Environmental Impact Assessment Report. Interested and Affected Parties now have the opportunity to verify that all the issues they have raised during Scoping have been considered in the Draft Environmental Impact Assessment Report and the Environmental Management Plans. Stakeholders are invited to comment on the findings, captured in the report, including the measures that have been proposed to enhance positive impacts and reduce or avoid negative ones. The Draft Environmental Impact Assessment Report and the Environmental Management Plans are available for public comment from 13 October 2008 to 10 November 2008.

This report has being prepared in English and translated into the specified languages, as a result any differences between the translated reports and the English reports, the English report would take precedence.

This document is also available in Afrikaans, Sepedi and Xitsonga

[1] Environmental Affairs is housed within these Departments.

YOUR COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PLANS AND ITS SUMMARY

The Draft Environmental Impact Assessment Report, Environmental Management Plans and/or its Summary have been distributed to everyone that requested a copy in response to a letter in September 2008 announcing the availability of the reports for comment. Copies of the full report have also been made available at strategic public places in the project area (see page 12 and 13) and on the web site (www.dwaf.gov.za/Projects/GrootLetaba) of the Department of Water Affairs and Forestry (DWAF).

The following methods of public review of the Draft Environmental Assessment Report, Environmental Management Plans and its Summary are available:

- Completing the comment sheet enclosed with the reports
- Additional written submissions
- Comment by email, fax or telephone
- Comment during two public meetings to discuss the contents of the Draft Environmental Impact Assessment Report, as follows:

Dates and times	Venues
24 October 2008 from 08:30 – 13:00	Tzaneen Lodge
25 October 2008 from 08:30 –13:00	Nwamitwa village

DUE DATE FOR COMMENT

10 November 2008, to the public participation office at :

Anelle Odendaal / Wilheminah Mosupye, Zitholele Consulting

P O Box 6002, Halfway House, 1685

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SUMMARY

1. BACKGROUND

In 1998, the DWAF completed an assessment of various options to improve the management of water available for social and economic development in the Groot Letaba River catchment. Since it was recognised that the water resources of the Groot Letaba River were already heavily committed, a wide range of strategic alternatives were considered to improve the water availability situation in the face of growing needs in the domestic water use sector, deterioration in the conservation status of the river ecology and increasing shortages in the irrigation sector.

The feasibility study indicated that additional storage facilities would provide for a more sustainable solution to the water supply problems. To this end, various alternative storage sites were examined. The outcome of these investigations led to the recommendations that the construction of a new major dam at the site known as Nwamitwa be considered together with improved water management interventions. The raising of the Tzaneen Dam, with the objective of minimising the intensity and consequences of shortages in the irrigation sector, was found to deserve sympathetic consideration. The DWAF is currently reviewing and updating information in this regard and conducting post-feasibility bridging studies to determine whether the recommendations made previously are still relevant and how they should be taken forward.

2. ENVIRONMENTAL AUTHORISATION PROCESS

Environmental authorisation in terms of Section 24 (5) of the NEMA and other legislation is required before the infrastructure components of the project can be implemented. An EIA process commenced in June 2007 and is expected to be completed in the last quarter of 2008.

The DEAT is the lead authority for the EIA, and will make the final decision on whether the proposed project may go ahead or not, and under what conditions. DEAT will use the inputs from other relevant government departments and agencies, for example, the Limpopo Department of Finance and Economic Development, Department of Minerals and Energy (DME), the Department of Land Affairs (DLA), the Roads Agency Limpopo (RAL), the South African Heritage Resources Agency (SAHRA), and district and local municipalities before making a final decision.

The EIA is currently in the Impact Assessment phase, designed to address all issues raised in the Scoping phase, investigate project level alternatives, assess identified impacts and determine the significance of each impact and formulate mitigation measures that will minimise the negative or maximise the positive impacts. These investigations are compiled in a set of draft reports that are made available for public comment. Comments received are considered and incorporated into the final reports for submission to DEAT.

3. MOTIVATION FOR THE PROJECT

The Groot Letaba Valley falls within the Luvuvhu-Letaba Water Management Area (WMA), one of the 19 WMAs into which South Africa is divided. Faced with water shortages of increasing severity and frequency, the main consumptive users of water (irrigation, forestry, domestic and industrial) have from time to time had to compete for limited supplies by taking extraordinary measures to survive. This has resulted in serious degradation of the riverine ecosystems. Historically the environment was not considered a water user and was not allocated any water from available resources. However, in the Letaba River catchment 14.8 million m^3/annum was allocated, on an ad hoc basis, for release from Tzaneen Dam to the Kruger National Park, but little if any of these releases reached the Park with real beneficial effect.

With the advent of the National Water Act (Act 36 of 1998 NWA), a water allocation or Reserve for basic human needs and for sustaining ecological functioning, has placed a new perspective on water resource management in the Groot Letaba River. It now has to be complemented by a strategy for managing the water resources in a sustainable manner. Proposals for augmenting reliable water supplies from the Groot Letaba River include the construction of a dam on the Groot Letaba River at the site known as Nwamitwa just downstream of the Nwanedzi River confluence as well as the possibility of raising the Tzaneen Dam. Bulk infrastructure for the treatment, conveyance and storage of potable water for primary use forms an integral part of the development proposals. Attention is focused on water needs for the increasing human population, for downstream riverine ecosystems (including those in the Kruger National Park) as well as for stabilising commercial irrigation, including the settlement of resource-poor farmers.

The Groot Letaba River Water Development Project (GLeWaP) is a major initiative by the DWAF in support of the Limpopo Provincial Government's economic development strategy for the province. The project will have a positive impact on the regional economics and on alleviating poverty. This will mainly be achieved through:

- Increasing the safe, reliable water supplies for domestic and industrial use;
- Minimizing the frequency, intensity and duration of restrictions on the use of water allocated for irrigation of high value crops;
- An increase in total household income through stabilising the job market; and
- Providing leverage for the equitable distribution of resources.

The proposed infrastructure will make it possible to improve the management of water resources so as to stop degradation of the conservation status of the riverine ecosystem.

4. DESCRIPTION OF THE PROJECT

The Groot Letaba River Water Development Project is aimed at improving the management of the water resources in the catchment and consists of non-infrastructure options to manage the available water as well as the construction of infrastructure components. Although only the

construction of the infrastructure components require authorisation from the DEAT and are subject to this EIA, they must be seen as being complemented by the non-infrastructure components.

4.1 NON-INFRASTRUCTURE OPTIONS

Non-infrastructure options to make more water available, which do not form part of the project for environmental authorisation, include:

- Water conservation and demand management, as well as water recycling and re-use: The aim is to ensure that increased efficiency and effectiveness of water use will decrease the growth in the need for new water supply augmentation
- Local groundwater resources: The conjunctive use of ground and surface water is promoted. Groundwater resources should be developed incrementally to supply growing needs, supported by ongoing monitoring to ensure sustainable yields and good water quality. The Department will make recommendations to local authorities in this regard.
- Removal of invasive alien vegetation: DWAF's Working for Water Programme is actively removing invasive alien vegetation in the Groot Letaba Valley as a means of improving runoff in the river system.

4.2 INFRASTRUCTURE COMPONENTS OF THE PROJECT

The infrastructure components of the project that the EIA is based on include:

- Raising of the Tzaneen Dam would result in increasing the storage from 157.5 million m^3 up to approximately 203 million m^3.
- The general locality of new infrastructure is indicated on **Figure 4.1**.
- Construction of a dam at the site known as Nwamitwa on the Groot Letaba River, downstream of the confluence of the Nwanedzi River. The Environmental Impact Assessment was based on a dam wall which could be up to 36 m high and have a gross storage capacity of 144 million m^3. The catchment area of the proposed dam at the site known as Nwamitwa is up to 1 400 km^2 and the Mean Annual Runoff (MAR) is approximately 122,6 million m^3 under natural undeveloped conditions. The estimated increase in system yield available for domestic use is up to 18 million m^3/a after providing for the Reserve.
- The R529, D1292 and P43/3 roads will have to be re-aligned to accommodate the dam.
- Upgrading of the water treatment works at Nkambako, and construction of bulk water pipelines and pump stations for water supply for domestic use to communities in the area. Pump stations and reservoirs could each occupy an area of about half a football field.
- Construction activities will take approximately 5 years with several construction teams working concurrently in different areas at the proposed dam site and along the pipeline routes.
- Residential accommodation for construction staff will be established in the vicinity of the proposed dam or in established towns. Housing, internal roads, water and electricity supply,

water treatment, solid waste disposal, emergency facilities and recreational amenities will be provided.

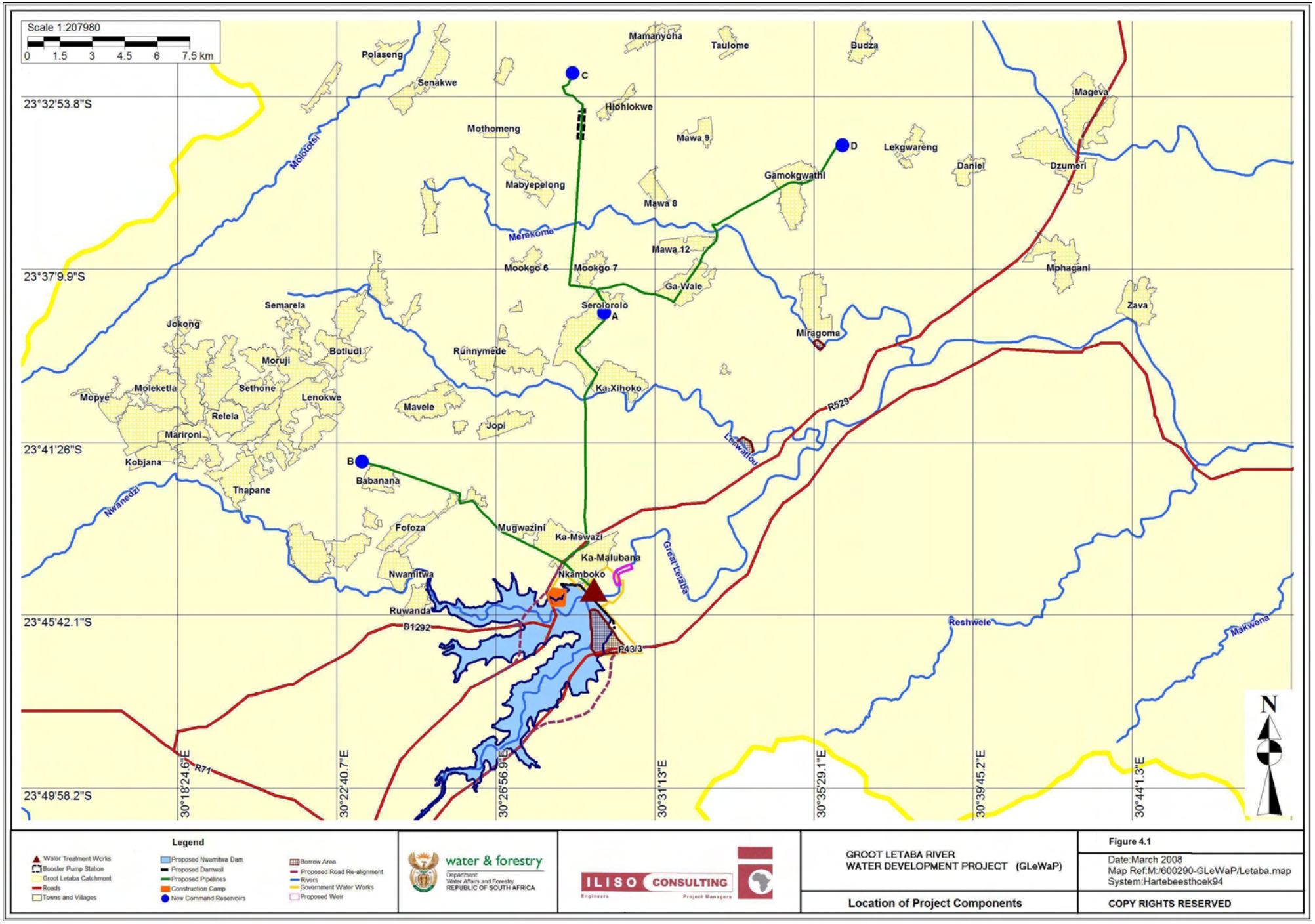
- The construction cost of the infrastructure components of the project is estimated in excess of R1 200 million at 2007 prices.
- Construction sites will include offices, internal roads, water and electricity supply, waste water treatment, solid waste disposal, emergency facilities, areas for the handling of hazardous substances, workshops, washbays, areas for the safe storage or explosives and communication infrastructure.
- Supply of water from the proposed Nwamitwa Dam is expected by 2013 with full yield available around 2014. Implementation activities such as detailed design and land acquisition could commence late in 2009, and construction could start in 2011.

The borrow areas from which material is required will be sourced and assessed in separate reports.

5. ALTERNATIVES

The following alternatives to the project were considered during the Scoping Phase and presented in the Scoping Report:

- The “Do Nothing” approach.
- Replacing commercial afforestation with natural vegetation.
- Ceasing export of water to the Sand River.
- Improve utilization efficiency of irrigation water.
- Decrease irrigation allocations.
- Water Conservation and Demand Management.
- Alternative water storage facilities.


Scale 1:207980
0 1.5 3 4.5 6 7.5 km
23°32'53.8"S
23°37'9.9"S
23°41'26"S
23°45'42.1"S
23°49'58.2"S
30°18'24.6"E
30°22'40.7"E
30°26'56.9"E
30°31'13"E
30°35'29.1"E
30°39'45.2"E
30°44'1.3"E
Polaseng
Senakwe
Mamanyoha
Taulome
Budza
Mageva
Hlohlokwe
Mothomeng
Mabyepelong
Mawa 9
Mawa 8
Mawa 12
Lekgwareng
Daniel
Dzumeri
Gamokgwathi
Merekome
Mookgo 6
Mookgo 7
Ga-Wale
Mphagani
Zava
Seroloroloa
Miragoma
Semarela
Jokong
Botludi
Moruji
Runnymede
Ka-Xihoko
Moketla
Mopye
Sethone
Lenokwe
Relela
Mavele
Jopi
Marironi
Kobjana
Thapane
Babanana
Nwanedzi
Fofoza
Mugwazini
Ka-Mswazi
Ka-Malubana
Nkamboko
Great Letaba
Nwamitwa
Ruwanda
D1292
R71
R529
Letswatlou
Reshwele
Makwena
P43/3
N
Legend
Water Treatment Works
Booster Pump Station
Groot Letaba Catchment
Roads
Towns and Villages
Proposed Nwamitwa Dam
Proposed Damwall
Proposed Pipelines
Construction Camp
New Command Reservoirs
Borrow Area
Proposed Road Re-alignment
Rivers
Government Water Works
Proposed Weir
water & forestry
Department: Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA
ILISO CONSULTING
Engineers
Project Managers
GROOT LETABA RIVER
WATER DEVELOPMENT PROJECT (GLeWaP)
Location of Project Components
Figure 4.1
Date:March 2008
Map Ref:M:/600290-GLeWaP/Letaba.map
System:Hartebeesthoek94
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6. PROJECT SPECIFIC ALTERNATIVES CONSIDERED IN THE EIA PHASE

The following project specific alternatives were investigated in the Impact Assessment Phase (**Figure 6.1**):

6.1 RAISING OF THE TZANEEN DAM

The raising of the Tzaneen Dam is now being considered as a viable option. The raised dam could have a capacity of 203 million $m^{3.}$ This would improve the assurance of supply for irrigation purposes, and decrease water restrictions.

The dam would be raised by a maximum of 3.5 m and would take place simultaneously with the construction of the proposed dam at the site known as Nwamitwa.

The **design alternatives** considered with regards to the spillway were a labyrinth, fuse gate and side channel spillway.

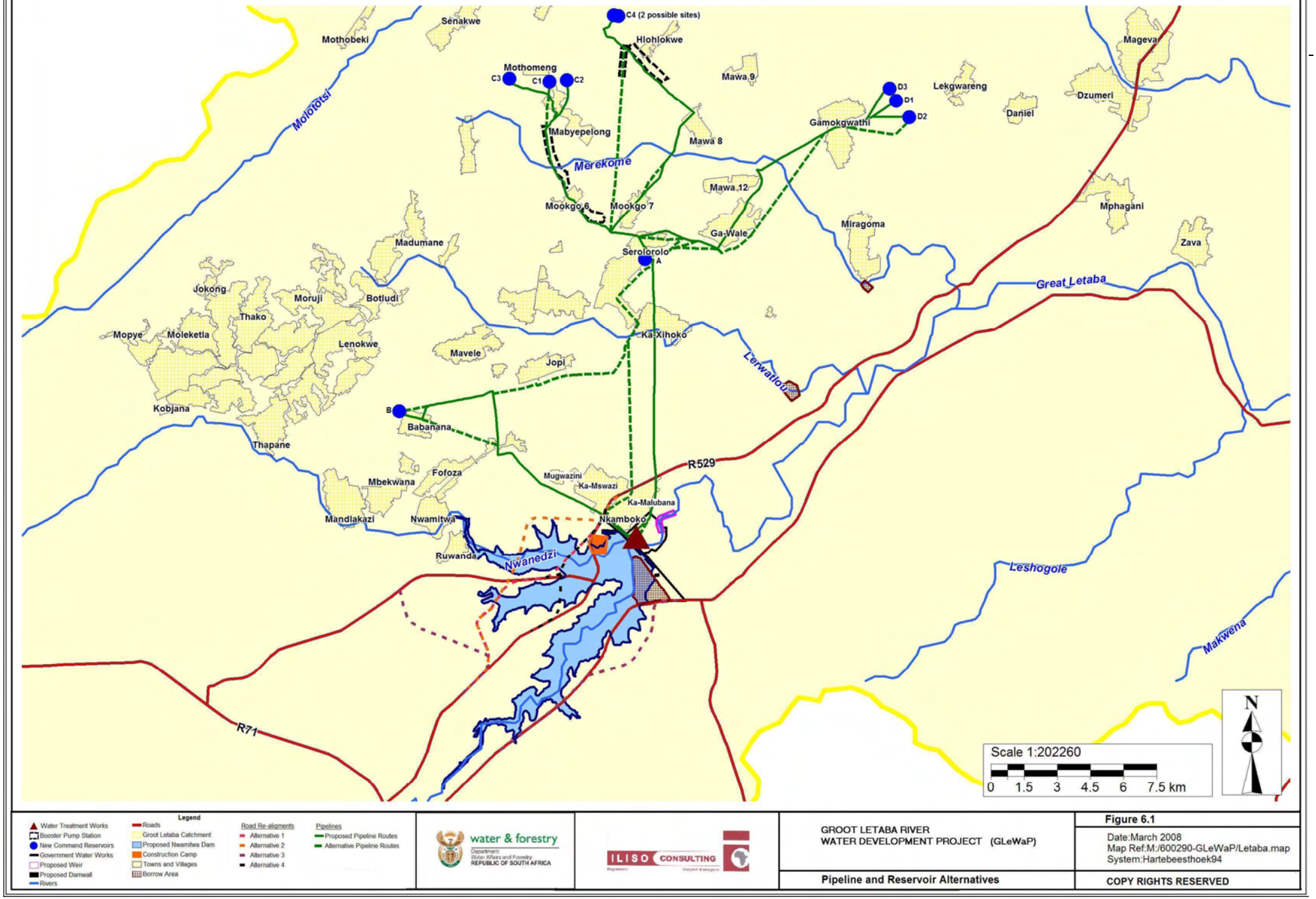
None of the specialist studies found any of these alternatives to be environmentally favourable or not preferred as opposed to any of the others. The main factors influencing the preference are therefore technical and cost, and a final recommendation has not been made.

6.2 A NEW DAM AT THE SITE KNOWN AS NWAMITWA

The sizing of the proposed dam at the site known as Nwamitwa was not final at the time that the EIA commenced. The EAP was therefore able to contribute to this process from an environmental perspective. Comparative impacts of a 0.5 MAR, 1 MAR and 1.5 MAR dams were considered, specifically from social landuse and terrestrial perspectives. No relocation of rural village houses or infrastructure will be required for any of the three size dams.

When considering the houses, irrigation dams, and packing facilities of commercial farmers affected, the difference in loss between the 1 and 1.5 MAR dams are minimal compared to the difference between these two levels and the 0.5 MAR dam. The differences are as follows:

- For the 1.5 MAR dam, 12 houses, 26 irrigation dams and two packing facilities will be affected.
- For the 1.0 MAR dam, 10 houses and 13-16 irrigation dams and two packing facilities will be affected.
- For the 0.5 MAR dam, 6 houses and 12 irrigation dams and only one packing facility will be affected.


C4 (2 possible sites)
Hlohlokwe
Senakwe
Mothobeki
Mothomeng
C3
C1
C2
Mabyepelong
Molototsi
Merekome
Mawa 9
Mawa 8
Mawa 12
D3
D1
D2
Lekgwareng
Gamokgwathi
Daniel
Dzumeri
Mageva
Mookgo 6
Mookgo 7
Ga-Wale
Miragoma
Mphagani
Zava
Madumane
Serolorolo
A
Great Letaba
Jokong
Moruji
Botludi
Thako
Mopye
Moleketla
Lenokwe
Mavele
Jopi
Ka-Xihoko
Lerwatlou
Kobjana
B
Babanana
Thapane
R529
Fofoza
Mbekwana
Mugwazini
Ka-Mswazi
Ka-Malubana
Mandlakazi
Nwamitwa
Nkamboko
Ruwanda
Nwanedzi
Leshogole
Makwena
R71
N
Scale 1:202260
0 1.5 3 4.5 6 7.5 km
Legend
Water Treatment Works
Booster Pump Station
New Command Reservoirs
Government Water Works
Proposed Weir
Proposed Damwall
Rivers
Roads
Groot Letaba Catchment
Proposed Nwamitwa Dam
Construction Camp
Towns and Villages
Borrow Area
Road Re-aligments
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Pipelines
Proposed Pipeline Routes
Alternative Pipeline Routes
water & forestry
Department: Water Affairs and Forestry
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GROOT LETABA RIVER
WATER DEVELOPMENT PROJECT (GLeWaP)
Pipeline and Reservoir Alternatives
Figure 6.1
Date:March 2008
Map Ref:M:/600290-GLeWaP/Letaba.map
System:Hartebeesthoek94
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The number of houses affected is not considered a significant factor in this decision, as the majority of land owners are willing to be compensated for their houses to secure the benefits of the dam. The preferred dam capacity is mainly based on the number of irrigation dams and packing facilities that will be lost. The difference between the number of dams that will be lost for the 1.5 MAR dam and 1 MAR seems significant. There is hardly a difference between the 0.5 MAR and 1 MAR in terms of loss of dams. The 1 MAR is therefore preferable to ensure that local communities benefit optimally. The loss of established irrigated lands was also a key factor influencing the decision on the size of the dam.

Impacts of a larger dam could be minimized or offset by:

- Farmers not forfeiting water rights and allocations, and that water allocations lost will be replaced;
- Job losses be mitigated;
- Surrounding communities benefit (more people getting access to water).

Impacts on the aquatic and terrestrial ecology and the heritage resources in the dam basin are directly related to the size of the area to be inundated. The smaller the dam the less the impact on the natural environment.

6.3 ROAD RE- ALIGNMENT

The construction of the proposed new dam will inundate sections of Road R529, Road D1292 and Road P43/3 that will require re-alignment. There are four alternative alignments that were considered for Road R529**,** see **Figure 6.1**.

- Alternative 1: The new road will deviate westwards from the existing R529 alignment approximately 5 km north of the intersection with Route R71 up to Road D1292, where it turns eastward to follow the alignment of the latter for 1 km where it deviates northwards again to link with the existing Road R529 alignment 1 km south of Ka-Malubana Village.
- Alternative 2: The new road will deviate westwards from the existing R529 alignment approximately 5 km north of the intersection with Route R71 up to Road D1292 (same as Alternative 1), where it turns directly northwards for approximately 3 km, it then turns eastwards to link with the existing alignment of Road R529 just south of Ka-Malubana Village.
- Alternative 3: The new road will deviate westwards from the existing R529 alignment approximately 5 km north of the intersection with Route R71 and will be aligned in a westerly direction up to Road D1292.
- Alternative 4: The new road will deviate northwards from the R529 approximately 8.5 km north of the intersection with Route 71; it will cross over the D1292 until it links with the existing R529 1km south of Ka-Malubane.

There is no additional distance for the R529 after the dam has been constructed if Alternative 4 is used for the re-alignment. Alternative 1 has an additional 780 m, Alternative 2 has an additional 1.6 km and Alternative 3 7.07 km in comparison to the existing alignments if travelling from Letsitele to Nwamitwa. Alternative 3 is the least preferred from the noise perspective due to the close proximity of some noise sensitive receptors along that route. The preferred re-alignment in terms of social, cost, noise, and traffic impact is Alternative 4.

6.4 PIPELINES AND RESERVOIRS

The GLeWaP includes the construction of bulk water supply infrastructure to various communities in the area. The potential impacts on the environment of proposed pipeline routes and alternatives were investigated.

Although no fatal flaws were found with any of the pipeline routes or alternatives, all pipeline routes through untransformed vegetation should be regarded as least favourable options and routes should whenever possible traverse transformed habitats in order to minimise impacts on terrestrial ecology and heritage resources.

Four reservoirs are proposed (A,B,C and D). Reservoirs C and D have alternative sites that were considered. No fatal flaws at any of the alternative reservoir sites were found, however in terms of impacts on terrestrial ecology, C1 and D3 are the most attractive. However, C4 is preferred to C1 because it is closest to the existing Rampepe Reservoir and will enable the Rampepe Reservoir to be served by two sources of supply (the existing source from the Modjadji Dam as a backup and the proposed Nwamitwa Dam), which will increase the flexibility of supply to this sub-system.

6.5 BOOSTER PUMP- STATIONS

No fatal flaws were identified for any of the sites identified for the location of booster pumps. Pump-stations should however be located at least 250 m from residences, school or public facilities in order to maintain acceptable noise levels.

7. DESCRIPTION OF THE RECEIVING ENVIRONMENT

The Tzaneen Dam, proposed new dam at the site known as Nwamitwa and associated bulk water supply infrastructure are located in the Groot Letaba River catchment, in the Mopani District Municipality (MDM), Limpopo Province. The two affected local municipalities are the Greater Tzaneen and the Greater Letaba Local Municipalities.

The catchment is mountaneous in the west where the rainfall, which occurs mostly in summer, is high and decreasing rapidly in the plains areas to the east. The Groot Letaba River is part of the Letaba River Catchment within the Luvuvhu-Letaba Water Management Area (WMA). The catchment is drained by the Groot Letaba River and its major tributaries. From the confluence of the Klein and Groot Letaba Rivers, the Letaba River flows through the Kruger National Park (KNP) until it joins with the Olifants River near the Mozambique border. The proposed dam site falls within the lower Groot Letaba River sub-catchment. The Nwanedzi River is a non-perennial tributary of

the Groot Letaba River which confluences with the Groot Letaba River just upstream of the proposed dam wall site.

The geology at the proposed Nwamitwa dam site consists of Goudplaats Gneiss from the Swazian age. Underlying this is granite gneiss and diabase dykes. The rest of the Groot Letaba catchment is made up of granites that result in shallow weathering (less than 10 m) and the soils formed are sandy.

Thirty four fish species would historically have occurred within the river reach at the site of the proposed new dam, of these 13 species are widespread and abundant, one of the species (Oreochromic mossambrus) is listed as Near Threatened and the remaining 20 are unlisted.

The project area covers two different vegetation types, Granite Lowveld and Tsende Mopaneveld with a wide range in ecosystem status.The main factors of disturbance in the project area are human settlements, agriculture and forestry. Nearly 60 % of the project area is transformed or degraded by such developments.

Applying the precautionary principle, a total of 91 species of Red Data flora and fauna could potentially occur in the project area (18 plant, 36 mammal, 34 bird, 3 reptile & amphibian, and 0 invertebrate). Moreover, at least 21 species could be endemic or near-endemic (locally or regionally), and 115 are likely to be protected.

The Greater Tzaneen Local Municipality (GTLM) and the Greater Letaba Local Municipality (GLLM) have approximately 190 settlements in total, with an average of 2 700 to 3 700 people per village. Approximately 33 settlements have more than 5 000 people. Villages develop outwards, resulting in rural sprawl.

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

- Females are in the majority;
- Up to half of the population falls in the age bracket 0 -19 year olds;
- Educational levels are low;
- The population growth rate can be estimated at 1% per annum;
- Majority Black African; and
- HIV / Aids might impact significantly on population numbers.

The population within close proximity to the construction sites and migratory as well as locally sourced labour are all likely to have a high prevalence of HIV infection and Tuberculosis.

Although the Mopani Distrcit Municipality (MDM) is not considered to be an endemic malaria region, the local climate in the MDM can accommodate the insect vectors (Anophele sp. mosquitoes) necessary for the spread of the malaria parasite (P. falciparum).

The incidence of Schistomiasis (bilharzia) is difficult to estimate as it is not a notifiable disease. It is however recognised that schistosomiasis is second only to malaria in contributing to the disease burden in the developing world. The climate and rainfall characteristics of the MDM make it likely that both S. haemotobium and S. mansoni are endemic to the area, provided that suitable intermediate hosts (pulmonate snails sp) are present. Residents of the villages in the area of the proposed GLeWaP bulk water distribution area are at risk of infection as they currently rely heavily on communal taps, boreholes or river water.

The lack of water borne sewage systems in the proposed GLeWaP bulk water distribution area increases the risk of spread of diarrhoeal diseases as untreated sewage may enter rivers, streams and underground water resources. Latest available information shows that the status of healthcare services within the GTLM and GLLM is inadequate to effectively respond to the community health needs.

The majority of communities within the GTLM and the TLLM are impoverished with generally poor levels of nutrition, especially amongst children. Poor nutritional standards impact adversely on the health satus of populations and significantly increase the risk of disease.

For the Greater Letaba Local Municipality (GLLM) and Greater Tzaneen Local Municipality (GTLM), the agriculture sector (fruit orchards dependant on irrigation) and the associated agro-industries provide the majority of employment opportunities in the area. This is followed by the government and community services sector and the retail and trade sectors. The study area (represented by the four affected municipalities) provides for approximately 17% of the employment within the Limpopo Province. Commercial farms are mainly owned by white farmers, and emerging black farmers are challenged in terms of lack of training, finances, and access to water (amongst others).

The landowners who have land in the proposed dam basin are all commercial fruit farmers with a few who also grow vegetables on a commercial basis. Some also farm with cattle.

12 farmhouses and two packing facilities and approximately 26 small irrigation dams will be affected by the proposed new dam (at 1.5 MAR capacity). No re-location of rural village homesteads or facilities will be required.

8. KEY ISSUES IDENTIFIED DURING THE SCOPING PHASE

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

- River flow (water quantity and quality)
- Terrestrial ecology
- Social processes
- Economy

- Physical infrastructure
- Public health
- Heritage resources
- Relocation of main roads
- Water rights
- Land acquisition.

Specialist studies

During the Scoping Phase the EIA study team, with input from the public participation process, identified key issues that required further in-depth investigation by specialists. Twelve specialist studies were conducted during the EIA phase and are summarised as follows:

8.1 WATER QUALITY

The water quality situation in the catchment of the proposed new dam is such that no water quality problems are expected to occur. The dam will be able to provide water of an acceptable quality to communities that are at present in part reliant on water from boreholes. Some of the water obtained from boreholes is not fit for human consumption.

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

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

In terms of water quality there is therfore expected to be no significant negative effect on the environment from either the construction of the proposed new dam, or the raising of the Tzaneen Dam wall.

8.2 SEDIMENTATION SPECIALIST STUDY

This study investigated the impacts of the proposed Nwamitwa Dam on the sediment transport balance in the Groot Letaba River. The upstream impacts were analysed by analytical and empirical methods while the downstream impacts were assessed by mathematical hydrodynamic modelling. Other aspects of the development such as access roads and raising of Tzaneen Dam were also addressed.

The key findings are:

a) Downstream of Nwamitwa Dam:

- The dam will cause flood peak attenuation, ie. outflow peaks are less than inflow peaks, except for very large floods.
- The post-dam river will become narrower due to flood attenuation caused by the dam. Near the dam the main channel width could decrease by 19 % (22 m reduction on 116 m). In the KNP upstream of the Olifants River confluence the reduction of channel width could be about 17 % (70 m on 411 m channel width).
- The river bed between the dam and the Klein Letaba River tributary will become coarser due to sediment trapping at the dam: from 0.56 mm median diameter to 0.72 mm median sediment diameter.
- Slightly more sediment will be transported down the river in the post-dam scenario due to the narrower river and local bed degradation on the Klein Letaba River near the confluence with the Groot Letaba River.
- Local bed degradation (lower bed level) over a limited area near the dam of at least 2 m is expected.

b) Tzaneen Dam raising

- Small floods will be attenuated more and it is expected that the main channel width downstream of the dam to the first main tributary could decrease by less than 5 % of the current width. The river morphology downstream of Tzaneen Dam is not expected to change significantly.
- Elevated flood levels upstream of the reservoir could be expected due to future sedimentation above the raised full supply level. This has to be considered in the floodline assessment.

c) Construction aspects related to Nwamitwa Dam

- The coffer dam should be designed not to cause river bank erosion or local scour at the dam site. The sediment concentrations 300 m downstream of the dam site should be monitored during construction to ensure present (90 percentile) high sediment concentrations are not exceeded.

d) Treatment plant and water reticulation pipelines

- The upgrading of the treatment plant and construction of water reticulation pipelines should have limited effect on sedimentation as long as proper stormwater drainage is designed at river crossings and during construction the present stream sediment concentrations based on 90 percentile values should not be exceeded. If required, sedimentation basins should be constructed on site.

8.3 TERRESTRIAL ECOLOGY (IMPACT ON FAUNA AND FLORA)

Field visits were conducted from November 2007 to January 2008, focussing on the area likely to be impacted by the Nwamitwa Dam and bulk storage scheme. Two national vegetation types are represented within this area, namely Granite Lowveld and Tsende Mopaneveld. At a finer scale,

three vegetation communities were identified and described: Acacia – Combretum Riparian Woodland, Colophospermum – Dichrostachys Plains Woodland and Combretum – Bridelia Rocky Outcrop Woodland. Fifteen conservation-important plant species were found during fieldwork, of which two have a status of Least Concern (Declining) and the rest are protected under provincial or national legislation. A floristic importance assessment of the three vegetation communities revealed that Plains Woodland and Rocky Outcrop Woodland have Medium-High importance for plants, while Riparian Woodland has Low-Medium importance. Thirty-one plant species were pointed out by local traditional healers as being used by the local communities. Most of these are widespread and common species in the area, although three are protected under the National Forest Act.

Only three conservation-important mammals were recorded during fieldwork, two of which are protected under the Limpopo Environmental Management Act, and one which has a Red Data status of Data Deficient. Two of the 186 bird species recorded in the field have Red Data status of Near Threatened. Fourteen reptiles were recorded, including one Vulnerable species and one Limpopo Province endemic lizard. Fourteen frog species were recorded, although only one has any conservation importance. Thirteen conservation-important invertebrates were recorded in the dam basin and along the bulk supply route. The most significant of these was Dromica oberprieleri, which was only discovered in 1981 and is currently known from very few sites in the Lowveld.

The flora and fauna values of each vegetation community were integrated to provide intrinsic biodiversity values for each community. The vegetation community with the highest intrinsic biodiversity value is Colophospermum – Dichrostachys Plains Woodland, which has High-Medium importance for terrestrial biota, followed by Combretum – Bridelia Rocky Outcrop Woodland (Medium-High) and Acacia – Combretum Riparian Woodland (Medium-Low).

The most influential mitigation measures of the terrestrial Ecology impact assessment report are as follows:

- A major plant rescue operation should be implemented, targeting the rescue and translocation of threatened, endemic and protected species where possible; scientific institutions should also be invited to collect live specimens;
- Establish a holding nursery for local plants suitable for re-planting on rehabilitated surfaces after closure (construction camp, borrow pits);
- A major trapping and relocation operation should be implemented, targeting the rescue and translocation of threatened, endemic and protected species where possible, particularly small mammals and reptiles; scientific institutions should be invited to collect live specimens;
- All pipeline routes through untransformed vegetation should be regarded as least favourable options; routes should whenever possible traverse transformed habitats;
- Conduct annual monitoring of dam surface for invasion by exotic aquatic plants. Any detection of target species to be followed up by rapid remedial action; and

- If dam construction is to proceed, the EMP should include an appropriate invertebrate biodiversity-monitoring programme, for which baseline assessments of selected indicator taxa (e.g. Dromica spp.) must be undertaken prior to any development of the site.

8.4 SOCIAL IMPACT ASSESSMENT

The social impact assessment considered demographic; economic; landuse; socio- cultural; institutional and biophysical change processes that are expected to occur during the various phases of the project.

Overall the demographic, biophysical and socio-cultural processes have a number of negative impacts. However all of these impacts can be mitigated successfully if effectively managed. Negative impacts are for the most part temporary in nature and expected to only last over the construction period. These can be further reduced should local labour be used for the construction.

High expectations from the project are evident amongst the inhabitants of villages. These expectations are focused on job opportunities, not only for individuals, but also for service providers and contractors. Attitude formation against the project can be expected should these expectations not be met.

The one permanent direct impact is on land use. Land will not be lost for the raising of the Tzaneen Dam, but for the construction of the new dam. The loss of land will impact on the activities of the affected parties, and the satisfactory mitigation of these impacts is crucial to ensure that negative attitude formation against the project does not happen. The commercial farmers are positive about the relocation process and the loss of land, mainly because of the expected benefits that the proposed dam will afford, specifically with regard to the security of water supplies for irrigation. Attitude formation against the project can be expected should these expectations not be addressed.

Impacts as a result of the presence of construction workers are more likely to be intensified along the bulk water supply pipelines, the pump stations, and the borrow pits, because of the proximity to local communities, and the fact that these activities will happen away from the dam wall construction site with all the necessary infrastructure and services such as water, and a construction camp.

Of particular concern are the potential health and safety impacts on pedestrians and road users. Impacts might be of high significance, specifically those around the borrow pits at Miragoma and Gamokgwathi and the four proposed water reservoirs that are close to ka-Matubana, Nwanedzi, ka-Mandehakazi, ka-Mavele, Runnymede, Serolorolo, ga-Mookgo, Morapalala, Kadzumeri, Makhwivirini, Ooghoek, Hlohlokwe, Kampakeni, Merekome, and Kharangwani.

The permanent indirect positive impact on Quality of Life (health related and non-health related) is the increase in water supply for domestic use. The successful implementation of water supply to affected communities, emerging farmers, etc. will outweigh the potential negative impacts.

8.5 ECONOMIC IMPACTS

The quantification of economic impacts was done based on the input-output technique which provides the best indication of economic production at a given point in time.

The raising of the Tzaneen Dam and/or the proposed Dam at the site known as Nwamitwa will lead to the following positive economic impacts:

- Stimulation of the economy: with direct, indirect and induced additional GDP generated in the economy during the construction phase to the value of R56 million.

Direct positive impacts

- An estimated 250 jobs will be created during the raising of Tzaneen Dam.
- An estimated R336 million will be created towards the GDP during the construction of the proposed dam at the site known as Nwamitwa.
- Increased standards of living: with new business sales to the value of R206 million during construction.
- R49.8 million is estimated to contribute to the GDP for the GLeWaP infrastructure.
- R2.2 million is estimated to contribute to GDP via operational expenditure.

Indirect positive impacts

- An estimated 630 jobs would be created indirectly predominately through trade and communication, mining and manufacture.
- A total of R307.8 million would be created indirectly via mining, manufacturing, trade and accommodation, and financial and business services during construction of the proposed dam.
- R46.3 million is estimated to contribute to GDP via the GLeWaP infrastructure.
- R4 million would be indirectly created during the operation phase contributing to GDP.

Induced positive impact

- An estimated 113 jobs will be created due to induced effects predominately via the manufacturing and financial and business services.
- A total of R62.9 million would be induced positive impacts. The predominate contribution is via financial and business services and manufacturing during construction of the proposed dam.
- R8.8 million would be created via the GLeWaP infrastructure.
- R0.8 Million would be an induced GDP contribution during the operational phase.

The raising of the Tzaneen Dam is not expected to have any negative impacts due to construction taking place within the dam property.

The following negative economic impacts are foreseen from the proposed Nwamitwa dam and the associated GLeWaP infrastructure:

- Loss of land, improvements and resources: A total of 3,864 ha of land will be lost due to inundation by the proposed Nwamitwa dam with a total of 14,138 m2 buildings. The estimated compensation value of which amounts to R 163,787,584. The estimated land lost as part of the GLeWaP infrastructure which is not within existing servitudes is 350.6 ha with an estimated compensation value of R6,388,800.
- Loss of employment and income: 2 129 jobs of farm labourers (many of which are seasonal) per annum could be affected for the duration of the time that it takes for the orchards to be re-established (should the affected farmers decide to develop new citrus orchards to make up for those inundated by the proposed Nwamitwa dam). This means a estimated loss of income of approximately R15,518,520 per annum over three years.
- Change of movement patterns and potential associated increase in transport costs.
- Change in property values.

8.6 AIR QUALITY

Particulate concentrations and deposition rates due to the proposed project was simulated using the US-EPA approved AERMET/AERMOD dispersion modelling suite. Ambient concentrations were simulated to ascertain highest daily and annual averaging levels occurring as a result of the proposed activities.

Construction of the raising of the Tzaneen dam is considered of low significance to sensitive receptors and maximum dust deposition will be well within the SANS and EC limits, but effective mitigation can be implemented.

For construction activities at the Nwamitwa Dam and road realignment, reservoirs, and pump stations the expected highest daily ground level dust concentrations will exceed the current SA standards as well as the stricter SANS and EC limits. The predicted maximum deposition at the closest sensitive receptor of Ka-Mswazi is 107 mg/m²/day (within SANS target of 600 mg/m²/day for residential areas).

The significance rating without mitigation was Medium for the construction activities at the Nwamitwa Dam and road realignment and the construction of the reservoirs due to short-term PM10 exposure For the transportation of material, laying down of the pipeline, raising of the Tzaneen Dam and activities at the borrow pits, the significance rating was Low. However after mitigation all impacts are of low significance.

8.7 VISUAL IMPACT ASSESSMENT

The visual impact assessment method involved the identification of critical viewpoints / land uses / visual receptors that will overlook the various components of the project as well as the definition of viewshed (lines of sight) lines. The viewshed analysed the full extent of the zone of visual influence and was indicated on a plan. Changes in visual setting for each of the identified points were sketched and analysed.

Results of the study indicate insignificant impacts for the raising of the Tzaneen Dam.

Figure 8.1 shows the existing dam wall and **Figure 8.2** an artist's impression of what the Tzaneen Dam would look like once the wall is raised.

Figure 8.1: Picture of the existing dam wall

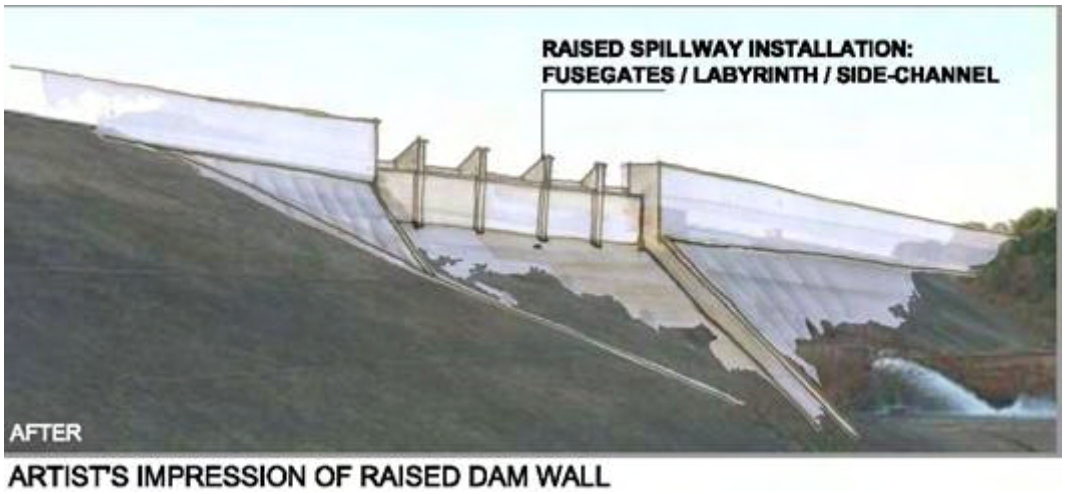

Figure 8.2: Artist impression of raised dam wall

Although construction activities and the resultant water body at the proposed new dam at the site known as Nwamitwa will be visible and noticeable the visual specialist assessment found that the visual impact would be acceptable to inhabitants of the study area or out of character with the

receiving environment. Visual impacts are therefore considered to be of low significance for this project. Some mitigation measures (e.g. screening of construction activities) have however, been recommended and included in the EMP.

Figure 8.3 shows the existing orchards before the erection of the dam wall and **Figure 8.4** shows the construction of a new reservoir in the Babanana area.

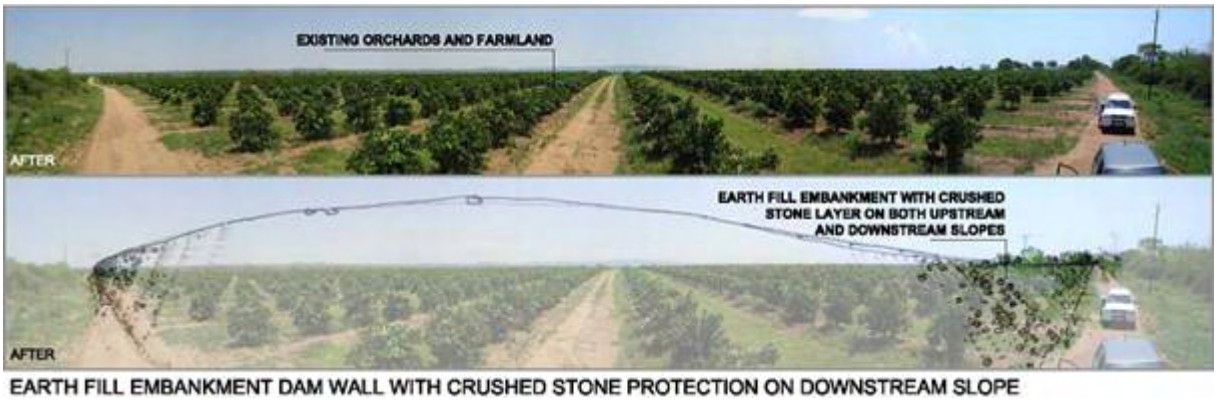

Figure 8.3: Erection of proposed new dam wall

Figure 8.4: Construction of a larger capacity reservoir in Babanana

8.8 AQUATIC ECOLOGY SPECIALIST STUDY

The riverine habitat that falls within the full supply level of the proposed dam will be unavoidably and irrevocably lost due to inundation, siltation, change in flow regime loss of riparian vegetation and the formation of a largely anaerobic epilimnion (bottom layer of water). It is likely that at least 6 of the 17 fish species currently inhabiting the affecting river reach will permanently disappear from the dam basin due to the loss of specific habitat types. In terms of the Reserve Determination (RDS) undertaken in 2006, the loss of 6 species will have a negative impact on the Present Ecological State (PES) and may make the Recommended Ecological Category (REC) unattainable. The significance of potential impacts on aquatic ecosystems within the basin of the proposed new dam at the site known as Nwamitwa was therefore rated as high prior to mitigation, for the construction and operational phases. The level of significance after implementation of the recommended mitigation, however, decreases to medium, for both phases.

The potential significance of impacts on aquatic ecosystems downstream of the proposed new dam at the site known as Nwamitwa was rated as medium for both the construction and operational phases. Shifts can be expected in the natural macroinvertebrate assemblages downstream of the dam due to the changes in the physical and chemical character of streamflow as well as the modified flows and habitats. This may reduce or eliminate certain taxa, while other species, such as Simuliidae sp. (Blackflies), may proliferate. The potential decrease in abundance of 14 fish species and loss or proliferation of certain species within the remaining reach (EWR3) (i.e. is the entire river reach of the Groot Letaba River from the Prieska Weir (DWAF Gauging weir: B8H017) near Hans Marensky to the confluence with the Letsitele River (DWAF Gauging weir: B8H009)) will have a negative impact on the PES and it is uncertain whether the REC and Ecospecs set out mitigation was rated as low for both phases.

The impact of an additional migration barrier on migratory fish species in the Groot Letaba River was identified as a potentially highly significant issue for both the construction and operational phases. Sixteen of the 17 indigenous fish species currently occurring within reach EWR3 could be impacted upon in terms of migration potential. This assessment is based on the precautionary principle in the absence of genetic information about fish species, and habitat suitability and accessibility upstream and downstream of the proposed new dam site.

The likelihood of this impact realising can be confirmed by undertaking additional studies to determine the genetic distribution of species and the availability of spawning habitats in the other accessible sections of the river system. If these studies are not undertaken, or if they confirm the impact will probably occur, then a fishway that enables the migration of the identified fish species should be included in the design of the dam.

The level of significance after implementation of mitigation is rated as medium for both phases.

8.9 NOISE IMPACT ASSESSMENT

The primary source of noise impacting the respective study areas at present is from road traffic. This is likely to remain the case in the future, with the situation worsening as traffic volumes increase. The ambient noise climate at many of the areas where elements of the project are to be built can be defined as being degraded, particularly where these sites are along or close to main roads with attendant high traffic-generated noise levels. The noise situation varies between very quiet when there is no traffic to very noisy when vehicles pass by. Noise impact thus also varies from a situation of being insignificant to one of high significance. The noise climate in the Nwamitwa Dam and Bulk Water Supply infrastructure Area away from the main roads is relatively quiet. The noise from elements of the Project, if unmitigated, has the potential to have a negative impact on some of the noise sensitive areas surrounding the respective project sites. The main impact period will be during the construction phase but noise problems are also possible during the operational phase. There are appropriate noise mitigating measures that can be implemented to reduce to acceptable levels or prevent any noise impact during construction and operation. These have been included in the Environmental Management Plans.

8.10 HERITAGE IMPACT ASSESSMENT

The aim of the heritage resources survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area to be affected by the proposed project.

The survey identified 26 sites of cultural significance, which includes five Stone Age sites, nine Iron Age sites, four sites dating to historic times, and eight sites containing graves.

All of the identified sites are judged, according to Section 7 of the National Heritage Resources Act, No. 25 of 1999, to have Grade III significance. The implication of this is that there are no sites of cultural heritage significance that would prevent the construction of the dam and the associated infrastructure from taking place. However, in accordance with Section 28 of the National Heritage Resources Act, No. 25 of 1999, mitigation measures should be implemented for the identified sites. Recommendations detailed in the Environmental Management Plans include collection of examples of Stone Age Tools, documentation (mapping and photographing) Late Iron Age and historic sites, and relocation of graves.

8.11 HEALTH IMPACT ASSESSMENT

The Health Impact Assessment considered impacts on both the construction workers and surrounding community. Priority potential health risks for construction workers include HIV, STI and TB transmission, exposure to excessive noise levels and exposure to excessive ergonomic stress which have been assessed as having a medium significance after mitigation. Priority potential negative health impacts for surrounding communities include HIV, STI and TB transmission. It is likely that these risks will have a medium significance after mitigation. Effective management of these priority health risks would be required if the impacts on the health of construction workers and community members are to be effectively controlled.

The completion of the project could however impact positively on Malaria (low significance following mitigation), Schistosomiasis (medium significance following mitigation) and Diarrhoeal diseases (medium significance following mitigation).

8.12 TRAFFIC IMPACT ASSESSMENT

All roads were found to have ample spare capacity to accommodate construction traffic associated with the proposed Tzaneen Dam and Nwamitwa Dam construction without any significant impact on other road users.

Local access roads to villages will also be affected by the construction of the bulk water supply infrastructure. However these construction sites will generate very limited additional traffic. The impact on the road network will be more due to construction vehicles, which has to be minimised by traffic accommodation measures.

Due to the extent of the proposed dam basin, D1292, R81, R529 and the P43/3 will have to be realigned and this will have travel time implications. The least effected road alignment is that of the P43/3, which will have a few minor changes which are insignificant. The effect on the local farmers might be additional travel distance and time to transport farm or factory workers to the surrounding villages. The preferred re-alignment of road R529 will not increase the distance when travelling between Letsitele and Nwamitwa.

Some mitigation measures (e.g. additional turning lanes and a monitoring system) have been recommended and included in the EMP.

9. SUMMARY OF SIGNIFICANT IMPACTS AND MITIGATION

The Tzaneen Dam

The construction phase of the Tzaneen Dam is expected to have a positive local and regional economic impact as a result of the expenditure in the economy. The increase in the assurance of water supply in the irrigation sector will lead to increased stability in citrus industry.

Negative environmental impacts are limited to construction related activities such as dust and noise that could impact on the surrounding community and construction workers. These can all be mitigated to acceptable levels.

The proposed dam at the site known as Nwamitwa, and related bulk water supply infrastructure

The construction phase of this component of the project will lead to positive economic impacts resulting from expenditure in the economy, increased income generation, an increased tax base and direct, indirect and induced employment opportunities that in turn improve the standard of living.

The construction activities will, however, have the following negative impacts, all of which can be mitigated to acceptable levels:

- Loss of fauna and flora in the areas to be disturbed and inundated which can be mitigated to acceptable levels by plant and animal rescue programmes, and establishing a holding nursery where plants can be kept for rehabilitation purposes;
- Inundation and disturbance of heritage sites and graves can be mitigated to acceptable levels by recording and excavating archaeological sites and the relocation of graves.
- Impact of construction activities on the movement patterns, social relationships and safety of local communities which can be mitigated by providing safe passage as required;
- Impacts on sense of place and non-health related quality of life (NHQOL) which can be mitigated by implementing noise and dust control measures and liaising with affected people;

- Significant potential noise impacts on both construction workers and surrounding communities are expected. Impacts on construction workers can be mitigated by providing protective equipment. The impacts on the community are only expected to be significant when certain construction activities are in progress during the night time. Noisy construction activities should be limited to day time hours wherever possible.
- Negative impacts on aquatic habitats and biota downstream of the construction activities are predicted if no mitigation is implemented. Mitigation includes limiting the disturbance on the local construction site, stabilising the downstream river bed and banks if necessary, and ensuring that connectivity between upstream and downstream riverine habitats is maintained at critical fish life-cycle periods during the construction phase.

The proposed dam at the site known as Nwamitwa and related bulk water supply infrastructure (water treatment works, pumpstations, pipelines and reservoirs) will result in an increase in the water availability and associated health and economic sustainability and stimulation in the operation phase.

The only potentialy significant negative long term negative impact is that the dam would form a barrier to the migration of fish resulting in an interruption of spawning and a permanent loss of species. The likelihood of this impact realising can be confirmed by undertaking additional studies to determine the genetic distribution of species and the availability of spawning habitats in the other accessible sections of the river system. If these studies are not undertaken, or if they confirm the impact will probably occur then a fishway that enables the migration of the identified fish species should be included in the design of the dam.

Stratification is predicted to occur in the proposed new dam, and the release of cold, anoxic bottom water will have a detrimental effect on the aquatic life up to a distance of about 15 km below the dam wall. To overcome this effect it is recommended that a multiple level outlet structure, with outlets at approximately 5 meter intervals from 6 meters below the fully supply level (FSL), be installed.

Although negative impacts on aquatic habitats and biota downstream of the dam have been predicted these must be evaluated in the context of the Management Class that has been set for the river system in terms of the Reserve. The Present Ecological State (PES) is higher than the REC that has been set, and one of the objectives of the dam is to enable the Department to implement the Reserve. The impact on aquatic habitats and biota should be judged against the implications of not building the dam rather than the present state. The potential decrease in abundance of 14 fish species and loss or proliferation of certain species within the remaining reach (EWR3) will have a negative impact on the PES and it is uncertain whether the REC and Ecospecs set out in the 2006 Reserve Determination Study (RDS) will be attainable. The level of significance after implementation of mitigation was, however rated as low for both phases.

10. ENVIRONMENTAL IMPACT STATEMENT

The Environmental Impact Assessment undertaken for the proposed Groot Letaba River Water Development Project has fulfilled the NEMA regulatory requirements and extensive measures have been taken to provide all interested and affected parties with the opportunity to participate in the identification of project alternatives and issues that require investigation.

Key issues identified in the Scoping Phase (Chapter 8) informed the specialist studies (Chapter 9) from which project alternatives and potential impacts were investigated and mitigation measures recommended.

Construction of the proposed new dam will inundate portions of existing roads. The preferred re alignment (Alternative 4) for Road R529 is recommended after considering the impacts on terrestrial ecology and heritage resources, cost of construction, technical aspects, traffic flow, distance travelled and community choice.

None of the of the alternative pipeline routes and reservoir alternatives would result in high impacts however, all pipeline routes through untransformed vegetation should be regarded as a least favourable option and routes should whenever possible traverse transformed habitats. Reservoir sites C1 and D3 are preferred among the options on the strength of leading to the least environmental impact, although site C4 is preferred to C1 because it is closest to the existing Rampepe Reservoir and will enable the Rampepe Reservoir to retain two sources of supply (the existing source from the Modjadji Dam as a backup and the proposed Nwamitwa Dam), which will increase the flexibility of supply to this sub-system.

All land owners whose property and other rights will be affected will be compensated. The EIA has found that the proposed project, together with supporting non-infrastructure components is the preferred option for providing improved water management to meet increased domestic requirements, socio-economic development and ecological water requirements in the catchment.

The EAP therefore recommends environmental authorisation of the raising of the Tzaneen Dam, the construction of the proposed dam at the site known as Nwamitwa and associated pre-construction activities, road re-alignments, flow gauging weir, water treatment works, pumpstations, pipelines and reservoirs, with the following conditions:

- Compilation of a Compensation and Development Plan (CDP) that includes the prioritisation of the land acquisition process in accordance with the established legal procedures to minimise impacts on citrus farmers that require a lead time to re-establish their landuse, and the procedures to deal with the loss of rights of access to water;
- Labour procurement for construction to be undertaken through a Labour Desk in accordance the Department's procedures and policies and local employment, gender and race targets to be set and measured as stated in the EMP;
- Continued liaison with directly affected landowners and occupiers in the pre-construction and construction phase;

- The implementation of general communication strategy for the implementation phase of the project;
- Continued liaison with authorities responsible for the implementation of water distribution;
- Multiple level outlets to be included in the dam design to mitigate downstream water quality impacts;
- Further investigation of fish genetics and habitat availability to confirm the potential impact on the loss of biodiversity as a result of the barrier that the proposed dam at the site know as Nwamitwa will cause, or the implementation of a fishway to mitigate the potential impact;
- Fauna and flora plant rescue programmes and a holding nursery to be established;
- Confirmation and detailed investigations of archaeological sites to be completed and the required excavation and documentation to be undertaken prior to the impact on the affected sections on the project;
- Implementation of a grave relocation programme in accordance with applicable legislation;
- Baseline studies should be undertaken to be completed as soon as possible before implementation commences in order to provide a benchmark against which impacts resulting from the construction and operation of the project can be measured. Aspects to be included are social, economic, water quality, aquatic ecology, terrestrial ecology, air quality and noise.
- Finalisation and Implementation of the draft Pre-construction Environmental Management Plan (this includes monitoring mechanisms and specifications);
- Finalisation of construction and operation EMPs based on the generic EMP (this includes monitoring mechanisms and specifications).