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GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

Environmental Impact Assessment

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

ANNEXURE D: ECONOMIC SPECIALIST STUDY

MARCH 2010

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DECLARATION OF CONSULTANTS' INDEPENDENCE

Russell Aird and Nanja Churr, who are development economists from Kayamandi Development Services (Pty) Ltd are independent consultants to ILISO Consulting (Pty) Ltd, (for the Department of Water Affairs and Forestry), i.e. they have no business, financial, personal or other interest in the activity, application or appeal in respect of which they were appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of these specialists performing such work.

REPORT DETAILS PAGE

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EXECUTIVE SUMMARY

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 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.
- Increased government income (tax revenue).
- Employment creation: with direct, indirect and induced jobs (a job is defined as one person employed for one year) during the construction phase of 992 jobs.
- Increased standards of living: with new business sales to the value of R206 million during construction.
- Higher stability in the agriculture industry due to increased water surety.

The proposed Nwamitwa dam site and associated GLeWaP infrastructure is associated with the following positive economic impacts:

- Stimulation of the economy: with additional direct, indirect and induced GDP generated as follows:
  a) Proposed Nwamitwa Construction: R706 million during phase.
  b) Proposed construction of GLeWaP infrastructure: R104 million during phase.
  c) Operation: R7 million per annum.
- Increased government income and expenditure (tax revenue).
- Employment creation: with direct, indirect and induced employment generated as follows:

a) Proposed Nwamitwa Construction: 11,097 jobs during phase.

b) GLeWaP infrastructure Construction: 1,728 jobs during phase.

c) Proposed Operation: 30 jobs per annum.

- Increased direct, indirect and induced business output and sales to the value of:

a) Proposed Nwamitwa Construction: R2342 million during phase.

b) Proposed construction of GLeWaP infrastructure: R370 million during phase.

c) Operation: R23 million per annum.

- Increased water availability and associated economic sustainability and stimulation.

The following negative economic impacts are also 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 m^2 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 350.6ha with an estimated compensation value of R6,388,800.

- Loss of employment and income: 2129 jobs of farm labourers (many of which are seasonal) per annum will 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.

- Change of movement patterns and associated increase in transport costs.

- Change in property values.

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ABBREVIATIONS

DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
GLeWaP	Groot Letaba River Water Development Project
GLLM	Greater Letaba Local Municipality
GTLM	Greater Tzaneen Local Municipality
GWW	Government Water Works
IDP	Integrated Development Plan
MAR	Mean Annual Runoff
MDM	Mopani District Municipality
OA	Options Analysis
PCMT	Project Co-ordination and Management Team
PSP	Professional Service Provider
GLR	Groot Letaba River

1. STUDY INTRODUCTION

1.1 BACKGROUND TO PROJECT

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, pipelines, pump stations, off-takes and reservoirs) in the Limpopo province. The EIA is being undertaken by ILISO Consulting 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

ILISO Consulting has appointed Kayamandi Development Service (Pty) Ltd to undertake the Economic Impact Assessment as part of the EIA.

1.2 STRUCTURE OF THIS REPORT

This specialist study will be undertaken in compliance with regulation 33(2) of GN 385. **Table 1.1** indicates how Regulation 33 of GN385 has been fulfilled in this report.

Table 1.1: Indication of compliance with Regulation 33 in this report

Regulatory Requirements	Section of Report
(a) The person who prepared the report; and the expertise of that person to carry out the specialist study or specialised process.	Chapter 2
(b) a declaration that the person is independent	Page i
(c) an indication of the scope of, and the purpose for which, the report was prepared	Chapter 3
(d) a description of the methodology adopted in preparing the report or carrying out the specialised process	Chapter 4
(e) a description of any assumptions made and any uncertainties or gaps in knowledge	Chapter 5
(f) a description of the findings and potential implications of such findings on the	Chapter 7

impact of the proposed activity, including identified alternatives, on the environment	
(g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority	Chapter 8
(h) a description of any consultation process that was undertaken during the course of carrying out the study	Chapter 9
(i) a summary and copies of any comments that were received during any consultation process	Chapter 10
(j) any other information requested by the competent authority.	Chapter 11

2. PROJECT TEAM

Kayamandi (Pty) Ltd will undertake the economic processes specialist study.

Russell Aird is the Managing Director of Kayamandi Development Services (Pty) Ltd. He has 20 years experience in the fields of urban economics, economic development, rural development, housing development, industrial sector expansion, and socioeconomic development and water transfer schemes. Russell has been involved in numerous water related projects, especially water augmentation schemes, where his speciality has been determining the social and economic impacts of dams and pipelines as well as the impact on the donor and receiving populations and economy. Projects he has been involved in include the Orange Vaal Augmentation Planning Study (VAPS), Vaal River Eastern Sub-System Augmentation, Orange River Replanning, Olifants River Water Resources Development Project and Hartebeestpoort Industrial Water Pipeline. Russell is also the project manager for a multiyear project, to provide Business Support to DWAF for the Development of Management Interfacing and Socio-Economic Systems. Due to the multi dimensional nature of development projects Russell has evolved into a competent project manager and has successfully undertaken numerous studies and coordinated various projects of a multi-sectoral nature.

Nanja Churr has a degree in Town and Regional Planning and has done training in Canada in the fields of Regional Planning and Economic Investment Analysis, the Theory of Economic Development, and the Practice of Economic Development. She has extensive experience in the field of socio-economic development of communities, inclusive of the dynamic impacts associated with urban frameworks and infrastructure development/upgrading, as well as in conducting economic profiles and complimentary analysis and interpretation. Nanja has been involved with numerous economic frameworks, development plans, urban revitalisation studies, integrated development planning, local economic development plans, socio-economic research, macro-economic analysis, feasibility studies and business plan development and economic impact studies. Her experience in socio-economic impact studies includes impact studies for mines, pipelines, dams, roads and other infrastructure.

3. PURPOSE OF REPORT AND SCOPE OF WORK

The purpose of the economic impact assessment study is to:

- Define and describe the receiving environment (local, regional, broader, etc) from an economic perspective, and to identify, analyse and in detail to assess the opportunities and constraints arising from or potentially limiting the proposed project;

- Assess the development impact of the proposed project on the economy of the region (including the improvement of the tax base), which will form an important component for establishing the overall feasibility of the Project; and quantify the impact of the proposed project on GGP, new business sales, employment, income generation; loss of resources, and personal income.

The various measures of direct economic impacts include:

- Total employment which reflects the number of additional jobs created by economic growth. This is the most popular measure of economic impact because it is easier to comprehend than large, abstract Rand figures. The total employment can be interpreted in terms of generally accepted definitions of job creation.

- Aggregate personal income rises as pay levels rise and/or additional workers are hired. Either or both of these conditions can occur as a result of business revenue growth. As long as nearly all of the affected workers live in the study area, this is a reasonable measure of the personal income benefit of a project or program.

- Value Added (which is normally equivalent to Gross Domestic Product or Gross Regional Product) is a broader measure of the full income effect. This measure essentially reflects the sum of wage income and corporate profit generated in the study area. However, in today's increasingly global economy, value added can be an overestimate of the true income impact on a local area, insofar as it includes all business profit generated there.

- Business Output (also referred to as revenue or sales volume) is the broadest measure of economic activity, as it generates the largest numbers. It includes the full (gross) level of business revenue, which pays for costs of materials and costs of labour, as well as generating net business income (profits).

Information required was largely accessed from site inspections, interrogation of maps and aerial photographs, technical discussions and meetings with local role players and stakeholders.

Inception and delineation of study area:

An assessment was made of the current state of the economy in the project area which included the undertaking of a site visit in order to obtain key primary data and to delineate the study area.

For the purpose of economic analysis, a delineation of the study area was required. The study area and areas of impact were delineated into primary (local), secondary (surrounding area of impact) and tertiary area of investigation. The primary area refers to farm areas and settlements directly affected by the dam and the length of area on which the proposed pipeline and related dam infrastructure will be located. The surrounding areas and communities/villages refer to the secondary area of investigation and the tertiary area of investigation refers to the broader area, major towns, municipal areas, District and country that will be economically impacted.

Base profile:

To determine the potential economic impact that the proposed project will have on the region, it was necessary to compile a base profile of the study area. The data attained here was utilised as the base for the input/output model. The profile included economic structure, identification of sectoral development opportunities according to the SIC, sectoral production, economic base, employment, growth, potential, trends per sector (especially agriculture and tourism), specialisation, linkages and comparative advantages.

Impact Modelling and assessment:

The input-output model was utilised to quantify the impact. The model took cognisance of all the economic gains and losses. An assessment (quantitative and qualitative) was therefore undertaken of the economic impacts. The identified

impacts were assessed in terms of nature, extent, duration, intensity, frequency of occurrence, probability, and included reference to both positive and negative impacts during both operation and construction. The current values of the impacts were calculated as well as the exact location and timing of the impacts. The techniques to be used to calculate the current value depended on the nature of the particular element.

Cognisance was also taken of direct growth expectations and indirect growth expectations.

Impact and management measures reporting:

Management and mitigation options that identify alternative ways of meeting needs, bringing about changes in plans, improving monitoring and management, and improving negative perceptions was included in a separate EMP report.

The study included:

- Economic baseline data (qualitative and quantitative);
- Positive and negative quantification of economic impacts, issues and aspects covering nature, extent, duration, intensity, frequency of occurrence, and probability; and
- Management plan and recommendations to guide the development and maximize positive economic impacts and minimize negative economic impacts.

4. METHODOLOGY

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

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

The following criteria will be used to evaluate significance:

Nature

The nature of the impact will be classified as positive or negative, and direct or indirect.

Extent and location

Magnitude of the impact and is classified as:

- **Local:** the impacted area is only at the site – the actual extent of the activity
- **Regional:** the impacted area extends to the surrounding, the immediate and the neighbouring properties.
- **National:** the impact can be considered to be of national importance.

Duration

This measures the lifetime of the impact, and is classified as:

- **Short term:** the impact will be for 0 – 3 years, or only last for the period of construction.
- **Medium term:** three to ten years.

- **Long term:** longer than 10 years or the impact will continue for the entire operational lifetime of the project.
- **Permanent:** this applies to the impact that will remain after the operational lifetime of the project.

Intensity

This is the degree to which the project affects or changes the environment, and is classified as:

- **Low**: the change is slight and often not noticeable, and the natural functioning of the environment is not affected.
- **Medium**: The environment is remarkably altered, but still functions in a modified way.
- **High**: Functioning of the affected environment is disturbed and can cease.

Probability

This is the likelihood or the chances that the impact will occur, and is classified as:

- **Low:** during the normal operation of the project, no impacts are expected.
- **Medium:** the impact is likely to occur if extra care is not taken to mitigate them.
- **High:** the environment will be affected irrespectively; in some cases such impact can be reduced.

Confidence

This is the level knowledge/information, the environmental impact practitioner or a specialist had in his/her judgement, and is rated as:

- **Low:** the judgement is based on intuition and not on knowledge or information**.**
- **Medium**: common sense and general knowledge informs the decision**.**

- **High:** Scientific and or proven information has been used to give such a judgement.

Significance

Based on the above criteria the significance of issues will be determined. This is the importance of the impact in terms of physical extent and time scale, and is rated as:

- **Low**: the impacts are less important, but may require some mitigation action.
- **Medium:** the impacts are important and require attention; mitigation is required to reduce the negative impacts.
- **High:** the impacts are of great importance. Mitigation is therefore crucial.

Cumulative Impacts

The possible cumulative impacts will also be considered.

Mitigation

Mitigation for significant issues will be incorporated into the EMP for construction.

Table 4.1: Example of Impact Assessment Table

Description of potential impact		
Nature of impact		
Legal requirements		
Stage	Construction and decommissioning	Operation
Nature of Impact		
Extent of impact		
Duration of impact		
Intensity		
Probability of occurrence		
Confidence of assessment		

Level of significance before mitigation		
Mitigation measures (EMP requirements)		N/A
Level of significance after mitigation		N/A
Cumulative Impacts		
Comments or Discussion		

5. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

5.1 INPUT OUTPUT MODELLING TECHNIQUE AND INTERPRETATION

In terms of quantifying the impacts on the economy an input-output model is utilised. An input-output model has various analytical applications that can be used to determine the direct, indirect and induced impact of the proposed transformation process on the economy. The approach takes into account the interdependence between different sectors (i.e. agriculture, mining, manufacturing, government, etc) in the local economy as well as economic flows of goods and services to and from the economy.

The input-output model to be applied in this impact analysis is based on the internationally recognised econometric technique known as Input-Output modelling. Input-output tables show the production function of a specific geographic area (in this instance the national economy of South Africa) in terms of the value of transactions that have taken place between different sectors and sub sectors in the economy.

The input-output technique provides a snapshot of economic production at a given point in time and, as such, has numerous application possibilities. The most prominent application of this technique involves modelling the impact of changing production functions on general economic equilibrium. In other words, the sectoral impacts that increased expenditure in the economy resulting from the construction and operation of GLeWaP on the economy were modelled.

Economic impacts are those impacts that affect the level of economic activity in a region either positively or negatively. For instance they directly affect the economic well-being of area residents and businesses by changing employment levels and retail expenditures. An economic impact assessment traces spending through an economy and measures the cumulative effects of that spending. The impact region is determined by the nature of the proposal and can be the entire country, province, an individual municipality or a combination of municipalities.

Estimating the economic impact of a project or development is very helpful in understanding the potential benefits of various forms of growth. It should be noted, however, that the means of estimating these benefits are more useful in understanding the likely order of magnitude of impacts rather than specific amounts.

Economic impact assessment generates an estimate of the economic consequences of a particular project on the local economy. However, this provides only one piece of the puzzle in a broader evaluation or decision-making process. For example, there may be social benefits and ecological consequences that need to be taken into account, which would require a different methodology.

The goal of input-output analysis is 1) to describe the linkages between sectors in an economy and 2) to analyze the impact of exogenous economic shocks to an economy – specifically demand changes and their influence on income and employment.

The impacts of demand changes are tabulated through detailed sector multipliers that are based on inter-industry linkages and flows.

Typically the effects of the input/output analysis are identified as:

- The **direct effects:** this takes into account direct purchases made within the economy by the project, the number of people employed, etc. This effect is the initial, immediate economic activities (jobs and income) generated by a project or development. Direct impacts associated with the development coincide with the first round of spending in the economy.

- The indirect effects (backward linkages): this takes into account the fact that the supplying industries (such as construction related industries, catering industries, transport industries, etc) will also have to purchase more inputs, employ more labour and pay more wages, and that there will be a chain reaction or multiplier of effects as a result of increased spending in the economy. In other words indirect impacts are the production, employment and income changes occurring in other businesses/industries in the community that supply inputs to the project industry.

- The induced effects (forward linkages): this takes into account the fact that the increased household income leads to an increase in household expenditure and to increases in national production. Furthermore, the project will pay large amounts of revenue to the different tiers of government, which in turn will increase overall government expenditure in the economy. For instance, the induced effects arise when employees who are working for the project spend their new income.

- The sum of the direct, indirect and induced effects is the total effect.

- It is important to note that the input/output analysis is not based on local population figures, but on additional expenditure in the economy during the construction and operation phase.

An **input-output model** provided by the Limpopo Department of Financing, Economic Affairs and Tourism was utilised to construct a **Social Accounting Matrix** (SAM) to determine the impact of both the raising of the Tzaneen Dam and the construction and operation of the proposed Nwamitwa dam and related GleWaP infrastructure. The input-output analysis utilised focused on the effect on employment creation, GDP contribution and new business output/sales.

By utilising the SAM, it was possible to incorporate the household sector in to the production regime of the transaction table of the input-output model. The SAM is built within the basic framework of an input-output table with each entry expanded into a sub-matrix where the rows and columns identify groups of transactions or categories of transactions. By using the totals of the input-output model as control totals, the expansion provides a coherent set of sub-matrices where the accounting of the transactions is shown.

Transactions in the SAM are simultaneously shown as an income in one account and an expenditure of another, and these are usually cross-classified. This provides a clear indication as to who paid what to whom.

The model additionally provides **multipliers** that are estimates of local spending impacts, assuming the continuation of current inter-industry trade patterns and local flows of money into and out of the area. Their magnitudes vary depending on the technology of the industry in which spending occurs and the size of the area economy – which affects the portion of these impacts that remains in the local economy and the portion that "leaks out" to outside areas.

5.2 IMPACT ASSESSMENT ASSUMPTIONS

GLeWaP is aimed at improving the management of the water resources in the catchment. Provision is made for non-infrastructure management interventions (not forming part of the EIA) as well as construction of the following infrastructure components (see **Figure 5.1**):

- Raising of Tzaneen Dam wall
- A new dam at the site known as Nwamitwa with associated relocation of roads, temporary housing for construction workers, permanent administration buildings
- A riverflow gauging weir;
- Upgrading of the existing Water Treatment Works;
- Pump stations;
- Pipelines; and
- Reservoirs.

The economic impact assessment is based on the knowledge of the proposed development at this stage and relevant economic assumptions for each of the above indicated infrastructure components.

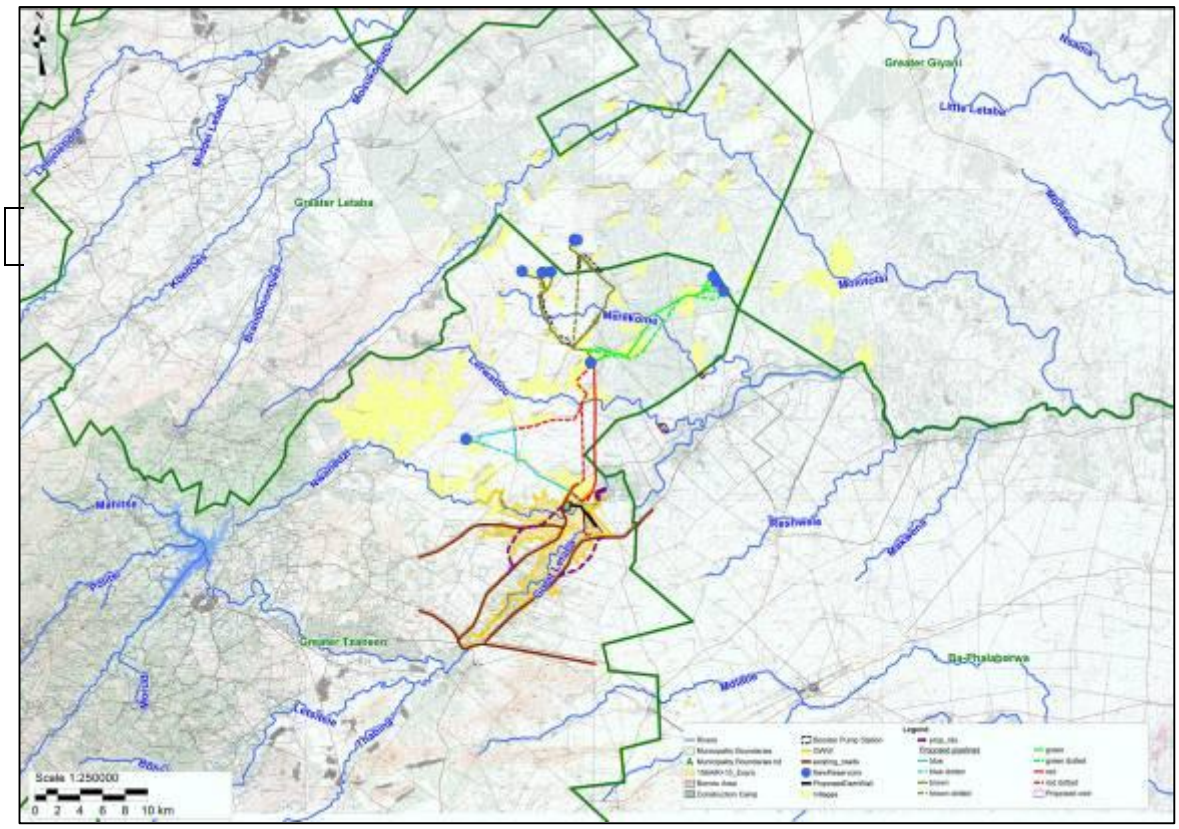
The relevant components of the **raising of the Tzaneen dam wall** are:

- Tzaneen dam with a height of 54.9 m a fully supply capacity of 158 million m^3 and a yield (high assurance) of 58 million m^3/annum will be raised by a maximum of 3.5 m with a supply capacity of approximately 203 million m^3.
- The main purpose of raising the Tzaneen Dam is to increase the assurance of the supply of water for irrigation of high value permanent crops, mainly citrus.
- The raising of the Tzaneen dam will not require acquisition of additional land as the design flood level remains within the area purchased for the existing dam. The size of the downstream flood will also not be affected.
- Some construction workers will be accommodated at Letsitele and some will be sourced from the local community through the labour desk.
- Construction facilities such as offices, workshops and stores will be required on site, and will be located within the property of the existing Government Water Works (GWW).
- Construction is expected to start in 2010 for a duration of 18 months.

- A total of 50 employment opportunities will be required for the construction phase. No new employment is required for the operation.

- The estimated capital expenditure for the raising of the Tzaneen Dam wall is R100, 000,000.

Figure 5.1: GLeWaP infrastructure components



Source: ILISO Consulting, 2008

The relevant components involved with the construction of the **proposed Nwamitwa dam** and the remainder of the GLeWaP study area based on:

- A dam with a storage capacity of 218 million m³ and a full supply level of 479.5 masl. This capacity is 1,5 times the Mean Annual Runoff (MAR) at the site increasing the system yield by about 120 million m^3 per year.

- The optimum size of the dam may however be smaller. The catchment area of the proposed Nwamitwa Dam is 1 400 km^2.

- Construction is expected to commence approximately in October 2009, and take 5 years to complete, with the storage of water and associated benefits expected to commence in 2012. Several construction teams will work concurrently in different areas at the proposed dam site and along the pipeline routes.

- The site of the construction camp for the dam will be on the left bank of the Groot Letaba River, just upstream of the dam wall.

- The construction camp will require approximately 35.6 ha excluding access roads (including two office blocks, parking, a taxi rank, laboratory, workshops and stores, reinforcing steel bending yard, permanent housing (for operating personnel), a weather station, and sand and crushed stone stockpile areas. 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, powerlines, a small-scale sewage treatment plant and a temporarily licensed solid waste disposal facility will also be provided.

- Various temporary access roads, low level river crossings and haul roads will be required in and around the dam wall and borrow pits and quarry sites will be located within the dam basin. Drill rigs will be in operation 24 hours a day. Blasting will be required, on average, every 14 days, and will be scheduled to take place only during daylight hours. A crusher will also be erected. Concrete production at the batching plant will occur 24 hours a day, seven days a week.

- 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, estimated to be in 2013, all the crushers, mixers and site offices, etc. will be removed and the construction site rehabilitated.

- All temporary access roads and other hard surfaced areas 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 original appearance.

- Two permanent houses will be erected within the project area to accommodate operation and maintenance staff.

- The labour force for construction of the proposed dam will be approximately 300. Approximately 50 people will be skilled workers and be housed with their families in Letsitele. 200 workers will be recruited locally and approximately 100 of these workers will acquire a new skill by the end of this project. The remaining 50 workers will be experienced in dam construction and will be transferred from elsewhere and be housed at Letsitele in single quarter's accommodation. Approximately 50 workers would be female and 250 male.

- The labour force for the operation of the dam is estimated at 6 jobs.

- The proposed borrow area for the earthfill material is on the right flank (looking downstream) immediately upstream of the embankment. Two potential borrow areas for filter materials and concrete sand have been identified in the Merekome River on the farm Letaba Drift and in the Phatle/Lerwatlou River on the farm La Parisa. Coarse aggregates for concrete and rock for the rip-rap and rock toe zones of the embankment will be sourced from existing permitted quarries or commercial sources.

- A riverflow gauging weir will be constructed as part of the dam construction contract. The weir will take about 3 months to construct.

- Local road realignment: Parts of the R529 and the P43/3 will be inundated by the proposed dam and lost permanently. Partial re-alignment is thus required to accommodate the proposed dam. Road re-alignment would require the construction of at least two major bridges and the upgrading of two existing bridges. The existing roads will be utilised whilst the new realigned roads are constructed so avoiding the need for temporary detours during construction. The minimum road reserve width is expected to be 40 m but may have to be wider in places to accommodate earthworks required for cuts and fills.

- Upgrading of the existing Water Treatment Works: At present the Nkambako Water Treatment Works draws water from the Groot Letaba River about 1 km downstream from the Nwamitwa Dam site. After completion of the project, water will be abstracted from the dam and treated at the existing and new treatment works extensions located adjacent to the existing works.

- Pipelines: Bulk water distribution pipelines will be constructed to augment potable water supplies in the various existing supply zones. Final configuration

and sizing is not known at this stage. Pipeline route alternatives link existing and new command reservoirs with the enlarged water treatment works at Nkambako. It is envisaged that new pipelines will be located adjacent to existing pipelines or along road reserves. Some sectors of pipeline will traverse open land. A ten meter wide strip would be impacted during construction per pipeline.

- Pump stations: Currently 4 booster pump stations are envisaged along the pipeline routes. An area of approximately 1 – 2 ha will be fenced for each pump station. Construction of a single pump station will take approximately 24 months. A new raw water pump would be constructed to pump water to the WTW.

- Reservoirs: Four new reservoirs are being considered at ten alternative sites within close vicinity to the following villages: Sorolorole (Reservoir A), Babanana (Reservoir B), Mothomeng (Reservoir C1 and C3), Hlohlokwe (Alternative Reservoir C1 and C2), Mabyepelong (Reservoir C2), and Gamokgwathi (Reservoir D1, D2 and D3). Shape and height will be determined during the detail design stage but usually circular up to 8m high. Area required is approximately 1 – 2 ha per reservoir. Each reservoir will be fenced. No permanent security staff will be present on site.

- A Sustainable Utilisation Plan will be developed during the implementation phase of the project. At this stage it is not known what utilisation will be allowed by DWAF. Tourism opportunities directly associated with the dam are expected to be minimal, largely because the water level will often be low and there are already many competing tourist attractions in the vicinity.

- The GLeWaP project does not include water reticulation directly to the community but provides local municipalities with bulk water to distribute further.

- The construction of the infrastructure for the proposed Nwamitwa Dam is estimated to cost approximately R1 200 million during construction and R3 million per annum during operation. Funding would be obtained from the private sector and the public sector through the Treasury.

- The construction of the bulk infrastructure is estimated to cost approximately R200 million for an estimated construction phase of 2 years. The operation phase is estimated to cost R1 million per annum for the maintenance and operation of the bulk infrastructure.

- The base period is 2008.

5.3 IMPACT ASSESSMENT LIMITATIONS AND DATA GAPS

The following input-output model constraints should be noted:

- Input-output modelling provides a view of the national economy in equilibrium at a specific instant in time and it therefore assumes fixed output production and pricing at 2008 Rand prices.
- Calculations are linear in two respects, firstly in terms of pricing and secondly, in terms of production. Production functions are fixed for all output ranges.
- Input-output tables are sophisticated, costly and have extensive data requirements. The results are therefore dependent on data availability and quality.
- The model does not anticipate structural economic changes.
- The model is based on quantifying direct, indirect and induced impacts in construction sector of the National economy.

In spite of the limitations of input-output modelling, it is an empirical, internationally recognised econometric technique that has been, and still is, widely applied in South Africa as well as in the rest of the world.

The following data limitations/omissions should be noted:

- All aspects related to the provision of bulk electricity do not form part of this EIA.
- Total jobs man days (permanently) during operation is not known.
- Total labour cost (salaries and wages) per annum during construction and operation phase is not available.
- Average salaries and wages per skills level during construction and operation phase has not yet been identified.
- Average annual operating expenditure during the operation phase is not known.

- Existing water sales, demand and allocation (water users and quotas) from Tzaneen Dam and proposed Nwamitwa Dam are not known.

6. EXISTING ENVIRONMENT

6.1 INTRODUCTION

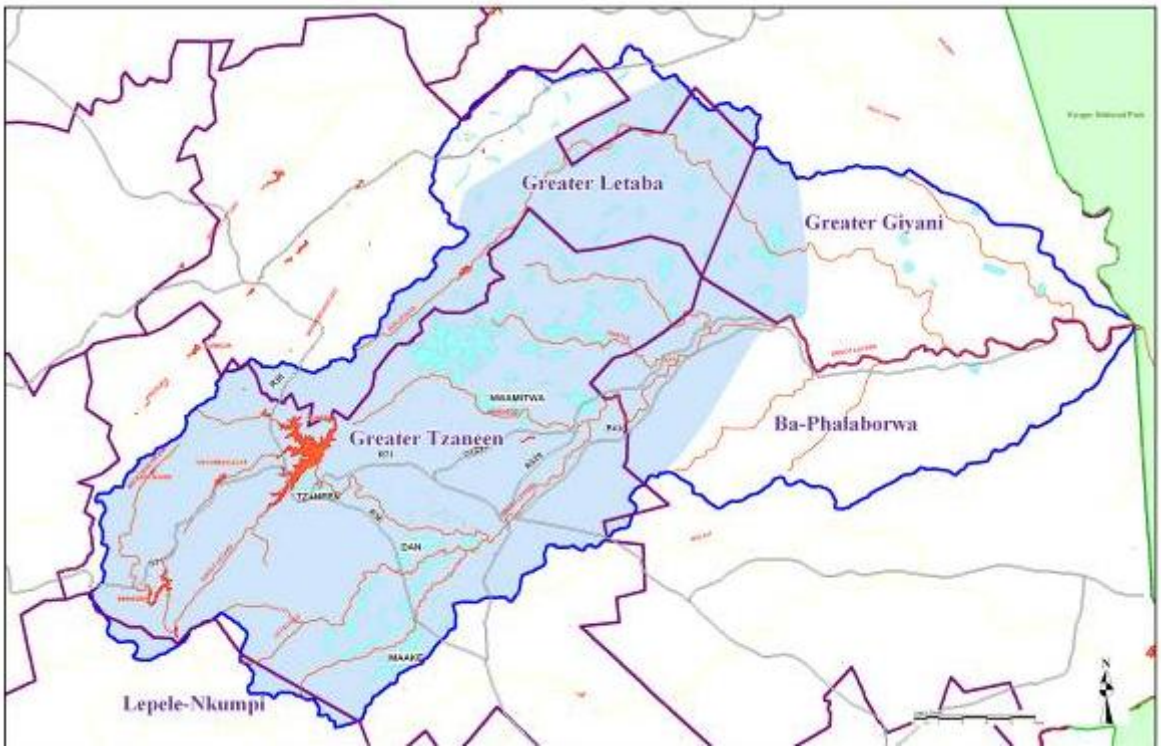
The GLeWaP will have an influence on the local and regional economy of the study area. It is thus essential to ensure a clear understanding of the current economic context that prevails.

The project area, namely the Groot Letaba catchment, is located within the Mopani District Municipality of the Limpopo Province and is mostly covered by the Greater Tzaneen, and Greater Letaba Local Municipalities as well as smaller portions of Greater Giyani and the Ba-Phalaborwa local municipalities (see **Figure 6.1**). For the purpose of this study, data (where available) is provided at a municipal level for the whole of the Mopani District.

The catchment area of the Groot Letaba River up to the Klein Letaba confluence is about 5 000 km^2 including Haenertsburg and Magoebaskloof which generates a significant portion of the total runoff in the river. The study area is located between Haenertsburg in the west and the western boundary of the Kruger National Park.

Tzaneen Dam, located on the Groot Letaba River close to the town of Tzaneen, mainly serves the irrigation demand along the Groot Letaba River valley, domestic and industrial water supply to Tzaneen, Nkowakowa, Letsitele, Consolidated Murchison Gold Mine, several other small industrial users, and a large number of rural villages. Water has, however, emerged as a pressing need for the area, with the result of the proposed raising of the Tzaneen dam wall as part of GLeWaP.

The proposed Nwamitwa dam site on the Groot Letaba River is situated on various farms with the dam wall on the farm Laborie 515LT, 40 km north-east of Tzaneen and 20 km west of Hans Merensky Nature Reserve. This site is just downstream of the Nwanedzi/GLR confluence.



Source : ILISO Consulting (Pty) Ltd

Figure 6.1: Groot Letaba River Water Development Project

The following sub-section provides an indication of the:

- Population and settlement pattern.
- Employment profile.
- Economic profile.
- Development perspective.

6.2 POPULATION AND SETTLEMENT PATTERN

The current and future estimated population for the local municipalities in the Mopani District Municipality (as noted in Pieterse du Toit and Associates, 2002) is shown in **Table 6.1** below.

In terms of the calculated growth rates for the municipal areas it is envisaged that the total population for affected municipalities will increase from 993 605 people in 2001 to 1 091 881 people by the year 2008 (as in Pieterse du Toit and Associates, 2002). This means that the population growth rate will decrease from approximately 1.570% in the year 2002 to 1.150% in the year 2008. In terms of the growth rates the estimated future population for the Mopani District Municipality will increase with approximately 82 706 people over the next 6 years.

Table 6.1: Projected population, 2001 to 2008

MUNICIPALITY	No. of Settle-ments	Census 2001	Projected population based on amended Census Population and Growth Rates					
			YEAR	RATE	YEAR	RATE	YEAR	RATE
			2004	%	2006	%	2008	%
Greater Tzaneen	110	411350	429579	1.391	440640	1.235	450424	1.06
Greater Letaba	80	222239	232021	1.382	237954	1.227	243202	1.053
Greater Giyani	89	234882	245434	1.41	251839	1.252	257507	1.075
Ba-Phalaborwa	22	125134	132365	1.806	136798	1.604	140748	1.377
Maruleng	24	99472	103714	1.339	106285	1.190	108556	1.021
TOTAL	301	993605	1039399	1.45	1067231	1.33	1091881	1.15

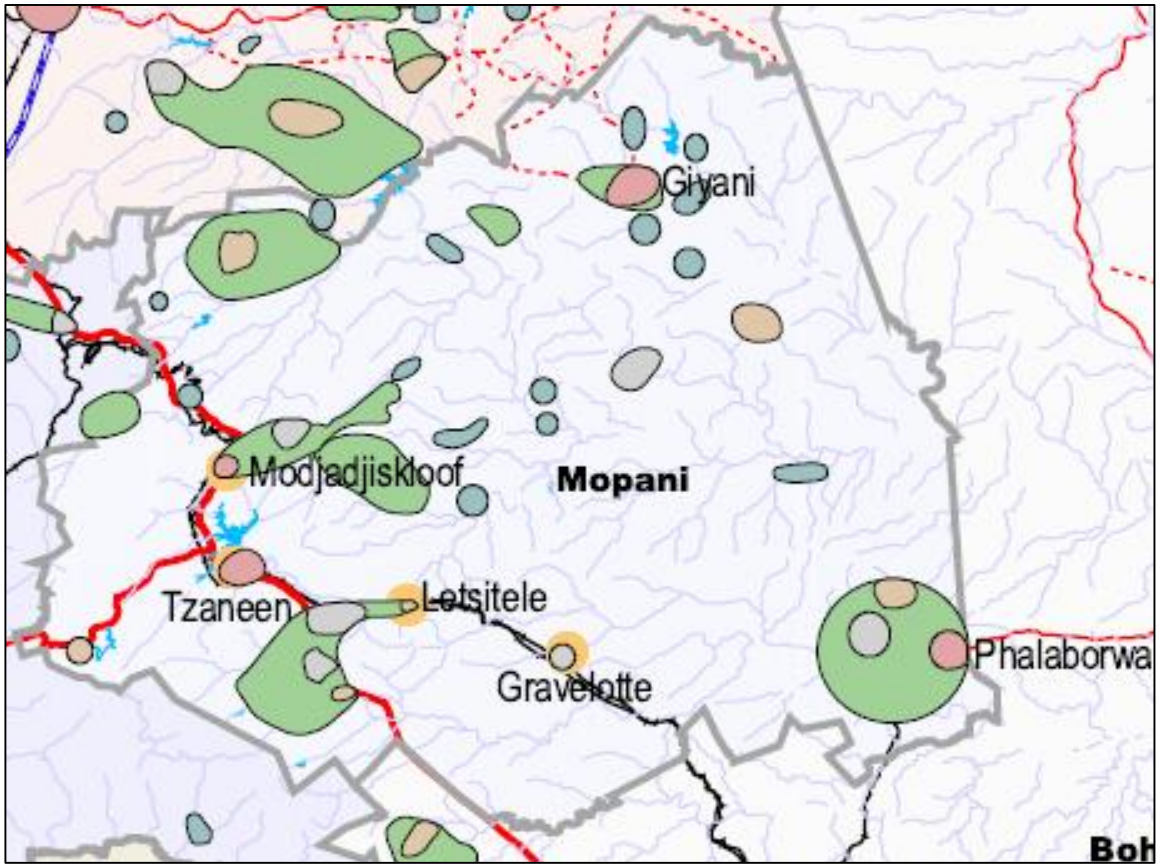
Source: Bureau for Market Research (BMR) as in Pieterse du Toit and Associates, 2002

Within the four Local Municipalities, the Limpopo Provincial Rationale identified 16 growth points. The Growth Points are identified as being located within first order settlements. The First Order Settlements (Growth Points) are individual settlements or a group of settlements located relatively close to each other where meaningful economic, social and institutional activities and a substantial number of people are grouped together. The growth point settlements are further classified as Provincial, District and Municipal Growth Points.

The 16 growth points are as follows (See **Figure 6.2**):

- 4 provincial growth points namely Phalaborwa, Giyani, Tzaneen and Duiwelskloof.

- 6 district growth points namely Namakgale, Gravelotte, Mageva, Kgagapane, Nkowankowa and Lenyenye;
- 6 municipal growth points namely Lulekani, Xawela, Senwamokgope, Haenertsburg, Burgersdorp and Letsitele;



Source: Pieterse du Toit and Associates, 2002

Figure 6.2: Growth points in Mopani District 2002

Most of the growth points are situated in the Greater Tzaneen Local Municipality (6 growth points), followed by Ba-Phalaborwa Local Municipality (4 growth points). Nearly a quarter of the total population resides within settlements which form part of the 3 types of growth points mentioned above. The affected municipalities also have a total of 8 population concentration points which accommodate approximately nearly a third of the total population.

The essential features of the current settlement pattern can be summarised as follows:

- Political interventions mainly between 1960 and 1980, have resulted in a polarised and unnatural settlement pattern where most of the poor people live in small rural settlements (villages).
- Settlement patterns in the area are dominated by small densely populated rural villages.
- High population growth rates, low per capital income and low literacy rates characterise communities in this major portion of the population.
- Low levels of income and lack of skills inhibit the development of local economic activity at the village level, which confines the potential for sustainable growth within settlements (villages).
- People survived by migrating to work in other areas or by commuting while leaving their families in the village.

The implication of this settlement pattern is that the vast majority of settlements are economically unsustainable, but they accommodate people who are desperately in need of improved infrastructure and improved social services.

It is envisaged that inter-municipal migration will most probably take place from lower order settlements to higher order settlements with better social and municipal infrastructure, better access to public transport, etc. First order settlements (growth points) and second order settlements (population concentration points) are most likely to experience an increase in population, higher than the expected average growth rate for local municipalities (Pieterse du Toit and Associates, 2002).

A more detailed overview of demographics is available from the specialist Social Impact Assessment (**Appendix A** of the EIA report).

6.3 EMPLOYMENT PROFILE

A person that is employed receives remuneration and a part of that remuneration is regarded as disposable income. Disposable income can be defined as the net income available to a particular person to either save or spend. Employment within an area

can therefore be translated into disposable income, which impacts directly on household consumption. Additionally, the level of unemployment prevalent in an area is also a very good indicator as to the intensity of the demand for job creation.

Table 6.2 below indicates the employment status of the population for each of the local municipalities within the Mopani District.

Table 6.2: Percentage distribution of employment status, 1996 and 2001

Local Area	Employed		Unemployed		Not Working/Other	
Year	1996	2001	1996	2001	1996	2001
Greater Giyani	19%	17%	19%	24%	62%	59%
Greater Letaba	18%	23%	18%	16%	65%	61%
Greater Tzaneen	30%	30%	17%	21%	53%	49%
Ba-Phalaborwa	41%	37%	17%	25%	42%	38%
Total	26%	26%	18%	21%	56%	52%

Source: Census 1996, 2001

In the affected municipalities, nearly 26 % of the population with the age of 15 to 64 years is employed, approximately 21 % is unemployed and more than half include people who are either students, homemakers, or do not want to work. If employment is provided as a percentage of the labour force[1], it is clear that approximately 55 % is currently employed, while almost 45 % is unemployed (Census 2001).

This rate seems to be growing each year while the provincial and local economy's ability to create jobs has not kept pace.

Table 6.3 provides an indication of the labour force (economically active population) per sector.

[1] The Labour Force refers to the total number of workers in an area plus the total number of people looking for work; the number of people believed to be available to work. It includes an estimate or count of all potential applicants for jobs available; therefore, it is the total number employed, assumed to be underemployed, plus the unemployed.

Table 6.3: Labour Force per sector, 2004

Industry	Affected municipalities					Limpopo Province	South Africa
	Greater Giyani	Greater Letaba	Greater Tzaneen	Ba-Phalaborwa	Total		
Agriculture	1 171	8 167	14 800	2 487	26 627	98 551	815 264
Mining	86	64	586	6 206	6 942	36 990	436 179
Manufacturing	674	1 232	7 438	2 800	12 145	48 538	1 248 761
Electricity and water	107	150	169	110	536	3 878	44 118
Construction	866	691	1 649	1 033	4 240	24 090	323 093
Wholesale and retail trade	2 455	3 361	7 301	2 788	15 906	107 752	1 292 243
Transport and communication	253	218	740	285	1 496	11 825	206 175
Financial and business services	1 434	838	4 322	2 627	9 221	48 739	1 166 993
Community, social and personal	2 643	2 035	6 887	3 897	15 462	95 078	1 341 724
Government services	6 211	3 213	7 344	4 303	21 071	174 594	1 441 063
TOTAL	15 901	19 971	51 236	26 537	113 645	650 035	8 315 612

Source: Quantec, 2007

The agricultural sector (fruit orchards dependant on irrigation) and the associated agro-industries provide the majority of employment opportunities in the area (see **Plate 6.1).** This is followed by government and community services sector and the retail and trade sectors. The study area (represented by the four affected municipalities) is responsible for approximately 17 % of the employment within the Limpopo Province.

Plate 6.1: Citrus orchards within the study area

Competition for the limited jobs is fierce and unemployment in the area is high and many people rely on income from family members working in the cities.

The natural resource base and economy does not have the capacity to support the total population, forcing a large percentage of the labour force to seek employment opportunities outside of the district municipality (e.g. Gauteng). The effect of this migration labour includes high levels of male absenteeism and therefore also a leakage of buying power. The high levels of unemployment and resultant low levels of income (from the formal sector) forced a portion of the population still residing in the area to enter and participate in informal and marginal activities (e.g. subsistence farming).

The low levels of income also imply low levels of buying power and, therefore, few opportunities for related activities such as trade. This in turn also supports the leakage of buying power since there are fewer local outlets to buy from.

A second implication of the low levels of buying power is the inability of the community to pay taxes (e.g. property tax) and for even the most basic level of services. The end result is that a very few of the settlements located can at the present levels of disposable income, generate the threshold required to establish an economic base of some sorts.

6.4 ECONOMIC PROFILE

The Gross Domestic Product (GDP) contribution per sector for each of the affected municipalities is represented in **Table 6.4** below. GDP is defined as the "total value of final production of goods and services produced within the boundaries of a country in a given period".

Table 6.4: GDP contribution (in R million) per sector, 2004

Industry	Affected municipalities					Limpopo Province	South Africa
	Greater Giyani	Greater Letaba	Greater Tzaneen	Ba-Phalaborwa	Total		
Agriculture	82. 3	214.5	640.8	122.7	1 060.3	6 289.7	78 986.5
Mining	64.5	29.9	409.9	7 643.7	8 148.1	36 185.1	159 480.6
Manufacturing	184.2	217.4	1 174.5	1 028.3	2 604.5	13 482.6	1 010 092.8
Electricity and water	146.6	76.6	270.7	242.3	736.3	5 156.0	58 372.7
Construction	160.9	78.4	923.3	211.6	1 374.3	5 711.9	122 002.6
Wholesale and retail trade	376.4	287.7	1,217.2	599.6	2 481.1	20 682.2	340 378.3
Transport and communication	205.7	235.4	444.1	333.3	1 218.7	14 473.4	298 054.7
Financial and business services	658.9	198.8	1 688.2	1 335.9	3 882.0	25 176.5	445 527.6
Community, social and personal	146.4	100.7	411.4	354.1	1 012.8	8 205.1	150 086.3
Government services	753.4	322.2	789.1	559.8	2 424.7	24 620.7	289 401.0
TOTAL	**2 779.0**	**1 762.0**	**1 969.7**	**12 431.8**	**24 943.2**	**159 983.6**	**2 961 373.4**

Source: Quantec database, 2007

The combined contribution to GDP from the four affected local municipalities amounts to approximately R25 000 million which represents approximately 15% of the GDP generated in the Limpopo Province. Within the four affected municipalities the mining sector (most related to Ba-phalaborwa local municipality) produced the highest value of final products, followed by finance and business services, manufacturing and retail and trade services.

The agriculture sector used to be one of the drivers of the local economy, and although its relative contribution has decreased somewhat in recent years, the activity still managed to generate a positive growth in real terms. The area however remains one of the most important production areas for horticulture produce in the Limpopo Province.

6.5 ECONOMIC DEVELOPMENT PERSPECTIVE

The Groot Letaba River catchment is a highly productive agricultural area with mixed farming including cattle ranching, game farming, dryland crop production and a wide variety of crops produced under irrigation. Citrus and sub-tropical fruit are most widely produced under irrigation together with vegetables and other high-value crops. Agriculture and the irrigation sector in particular is the main base of the economy of the region and provides the major portion of local employment opportunities.

Most of the roads in the area are poorly maintained. Apart from internal gravel roads, a fair tarred road network links most of the areas.

Greater Tzaneen also has numerous areas with exceptional natural beauty, with considerable untapped tourism potential. Although an increase is evident, the tourism demand is well below that which could be expected from an area with such outstanding natural potential.

Irrigation is by far the largest water user and will remain so for the foreseeable future. Numerous irrigation schemes and irrigation boards exist in the catchment, some of which are supplied from storage and others depend on run-of-river abstractions.

The area has a dualistic economy comprising a “commercial” and a “non-commercial” component. The commercial component is largely driven by the economic activities of mining, tourism and agriculture. The non-commercial component comprises informal and marginal activities such as subsistence farming and hawking (see **Plate 6.2**).

Plate 6.2: Informal hawking in study area

Economic growth stimulation within the communities is confined to those villages where the residents reflect an adequate range in the distribution of their income and skills and where local resources can be converted to consumer and manufactured goods, such as the informal sale of water (see **Plate 6.3**) and the illegal excavation of clay for the manufacturing of clay bricks (see **Plate 6.4**).

Plate 6.3: Donkey cart with water containers

Plate 6.4:Informal manufacturing of clay bricks

Clay bricks are produced alongside many parts of the Groot Letaba River or its tributaries. In many cases five such one-man operated businesses can be found together in one location, such as at Bambana shown in **Plate 6.4** above. Discussions with the local clay brick manufacturers have revealed, that weather permitting, each person can produce approximately 2000 bricks per month. The bricks are sold in

batches of 1000 bricks for approximately R650, with monthly incomes of approximately R1300.

Another key income activity for some village members is the collection of water from the river in water containers and the sale of the water to community members (See **Plate 6.3** above). This is profitable income for some, with the only expense being time and care for the donkeys. The sale of water seems to peak at R7.5 per 5 litre containers with an average daily income of R75. This practice does not appear to be undertaken on a daily basis as it is only limited to times when insufficient water is available from the communal taps for collection (see **Plates 6.5**). On average water is sold approximately 3 times per week, which amounts to an average monthly income of R900 for the individuals involved in the sale of water.

Other forms of business activity identified within the communities are spaza shops, shebeens, formal brick manufacturers (such as Merekome brickyard), bakeries such as Mmabatho bakery, the odd petrol station, subsistence agriculture, and the Karros embroidery project (which provides employment for about 1000 women). Some of these activities are shown in **Plates 6.7)**.

Plate 6.5: Collection of water from communal water taps

Plate 6.7: Business activities

7. FINDINGS: RAISING OF TZANEEN DAM WALL

7.1 INTRODUCTION

The Tzaneen Dam, located on the Groot Letaba River close to the town of Tzaneen, mainly serves the irrigation demand along the Groot Letaba River valley, domestic and industrial water supply to Tzaneen, Nkowankowa, Letsitele, Consolidated Murchison Gold Mine, several other small industrial users, and a large number of rural villages. Water has, however, emerged as a pressing need for the area with the result of the proposed raising of the Tzaneen dam wall.

Since the raising of Tzaneen dam will require only a few construction related facilities located within the property of the Government Water Works (GWW), it does not require acquisition of additional land, and will not affect the sizes of the downstream floods. The foreseen economic impacts identified for the proposed raising of the Tzaneen Dam wall are limited to:

- Stimulation of the economy
- Increased government income (tax revenue)
- Employment creation
- Increased standards of living
- Higher stability in the agriculture industry

These are detailed upon hereunder.

7.2 IMPACT: STIMULATION OF ECONOMY

One of the most important economic indicators used to indicate economic growth and value is the Gross Domestic Product. GDP is defined as the total value of final production of goods and services produced within the boundaries of a country in a given period. GDP is the most commonly used measure of total domestic activity in an area and is also the basis for the national accounts. Changes in the local economy can therefore be expressed as an increase in GDP. In many instances goods do not reach the consumer via the market and it is also difficult to calculate the value of

these goods. As a rule therefore only the results of the activities, which are intended to satisfy the needs of other people through trade, are considered to form part of the GDP. If this is to be stated by way of formula, taking into account the concept of value added, it can be put as follows: Gross Value of Production less value of intermediate goods and services equates to gross value added. If the gross value added of all the trading sectors is added together the GDP is obtained.

Change in Gross Domestic Product essentially reflects the sum of wage income and corporate profit generated in the study area as a result of an exogenous change in the economy, in this case the raising of the Tzaneen Dam.

In order to determine the increased financial spending of the raising of the Tzaneen Dam wall, in the economy, the current estimates of expenditure during construction were obtained. The operational expenditure remains the same as before.

Table 7.1 provides a quantification of the impacts expected during the construction and operation phase on the sectors in the national economy in terms of the GDP due to the increased investment in the economy.

Table 7.1: National economic impacts on GDP (R million) during construction

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	-	0.6	0.4	0.9	1.7%
Mining	-	5.5	0.2	5.8	10.3%
Manufacturing	-	6.4	1.0	7.4	13.2%
Electricity & water	-	0.4	0.2	0.6	1.1%
Construction	21.7	3.0	0.1	24.8	44.2%
Trade & accommodation	-	5.3	0.8	6.1	10.8%
Transport & communication	-	2.9	0.7	3.5	6.3%
Financial & business services	-	4.4	1.4	5.8	10.4%
Community services	-	0.7	0.4	1.2	2.1%
Total	21.7	29.2	5.2	56.1	100.0%

The additional GDP arising from the capital investment during the construction phase is approximately R56 million, R21.7 million of which is due to the direct impact, R29.2

due to the indirect impact and R5.2 million due to the induced impacts. Approximately 25 % of the total impact will accrue to the Limpopo Province.

It is important to realise that the R56 million impact outlined above is experienced during the construction period. Thus, it is only sustainable for the duration of the development of the raising of the Tzaneen Dam wall. Once the development phase nears its end, the construction impact diminishes.

The local area and its activities (businesses and shops, etc) mostly in Tzaneen are expected to be stimulated economically, due to the increased spending expected from the increased salaries and wages paid to employees during construction and service industries in the region will thus benefit from the activity. This will have a knock-on effect on suppliers of goods and services in other areas.

The capital investment during the construction of the proposed raising of the Tzaneen Dam wall is thus expected to have a positive impact on the economy resulting in increased financial spending in the economy in terms of construction related activities, the increase infrastructure investment as well as increased expenditure from the construction workers. This positive impact is likely to be experienced in terms of the increased markets for the sale of local goods to construction staff and direct employment by construction contractors.

The exogenous change in the economy will impact different sectors in different ways, with some sectors such as manufacturing, trade and finance and business services benefiting more than others.

Table 7.2 provides a summary of the impact related to the stimulation of the economy.

Table 7.2: Impact Assessment: Stimulation of economy

Description of potential impact	Increase expenditure in the economy will lead to increased GDP generation in the economy which in turn will stimulate the economy.
Nature of impact	Positive, direct and indirect
Legal requirements	None

Stage	Construction and decommissioning	Operation
Nature of Impact	Positive, direct and indirect	N/A
Extent of impact	National	N/A
Duration of impact	Short-term	N/A
Intensity	High	N/A
Probability of occurrence	High	N/A
Confidence of assessment	High	N/A
Level of significance before mitigation	High	N/A
Mitigation measures (EMP requirements)	Ensure as much as possible local or at least National purchases of input requirements to maximise impact on local economy.	N/A
Level of significance after mitigation	High	N/A
Cumulative Impacts	High	
Comments or Discussion	None	

7.3 IMPACT: INCREASED GOVERNMENT INCOME (TAX REVENUE)

The economic impacts will lead to fiscal impacts, which are changes in government revenues and expenditures. For example, economic impacts on total business sales, wealth or personal income can affect government revenues by expanding or contracting the tax base. Due to the direct, indirect and induced jobs that will be created as a result of the proposed construction of the raising of Tzaneen dam along with the increased turnover of the companies can be translated into increased personal and business income tax.

In other words, Government income will be increased as result of the increase in tax in the form of:

- Company tax
- PAYE

- UIF
- Skills development Levy (SDL)
- Rates and taxes

Quantification of the tax effects that accrue to the National Government and the local municipality's revenue (from rates and taxes) are excluded due to insufficient available information at this stage.

The increased income received by the government will enable increased spending on government services.

Table 7.3 provides a summation of the Impact Assessment.

Table 7.3: Impact Assessment: Increased Government Income

Description of potential impact	Increase expenditure in the economy will lead to increased income generation and increased tax generation or government income.	
Nature of impact	Positive, direct and indirect	
Legal requirements	None	
Stage	Construction and decommissioning	Operation
Nature of Impact	Positive, direct and indirect	N/A
Extent of impact	National	N/A
Duration of impact	Short-term	N/A
Intensity	Medium	N/A
Probability of occurrence	High	N/A
Confidence of assessment	Medium	N/A
Level of significance before mitigation	Medium	N/A
Mitigation measures (EMP requirements)	N/A	N/A
Level of significance after mitigation	Medium	N/A

Cumulative Impacts	Medium	
Comments or Discussion	None	

7.4 IMPACT: EMPLOYMENT

The unemployment rate of the economically active population within the communities in the affected municipalities is currently at 45 %. The proposed raising of the Tzaneen Dam will bring some relief to the high unemployment figures in the area during the construction phase.

Total employment generation reflects the number of jobs created or lost as a result of the exogenous change in the economy. A job is defined as one person employed for one year.

The quantification of the national economic impact on employment creation during the construction phase is indicated in the below Table.

Table 7.4: National economic impacts on employment during construction

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	12.1	8.3	20.4	2%
Mining	0.0	119.0	5.2	124.2	13%
Manufacturing	0.0	138.9	21.2	160.2	16%
Electricity & water	0.0	7.8	5.4	13.1	1%
Construction	250.0	63.8	2.5	316.3	32%
Trade & accommodation	0.0	114.4	16.9	131.3	13%
Transport & communication	0.0	62.2	14.1	76.3	8%
Financial & business services	0.0	95.8	29.7	125.4	13%
Community services	0.0	15.6	9.2	24.9	3%
Total	250.0	629.6	112.5	992.2	100%

The raising of the Tzaneen dam wall will lead to the creation of an approximate additional 993 jobs across all sectors during the construction phase with 250 of these

jobs accounting for the direct effect, 630 jobs due to the indirect effects and 113 jobs due to the induced effects. In other words the per annum direct temporary employment opportunity during the construction phase is approximately 250 jobs. At least 20 % of the impact will accrue to the Limpopo Province.

Most of the indirect and induced jobs will be created in the manufacturing, finance and business sector, mining, trade and accommodation sectors and transport sectors.

During the construction phase, temporary employment will be created. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed direct jobs required for the construction will be created due to economic spin-offs that will result. During the construction phase, local contractors and service providers will be utilised as far as practically possible.

The benefit of increased jobs in the area can also be translated into economic terms, and the additional jobs would in essence result in additional income creation. This increase in income in the area can be translated in a specific impact ranging from Black Economic Empowerment (BEE) to poverty alleviation depending on the procurement policy and the construction technology applied. More previously disadvantaged people could be provided with an opportunity to become involved in the formal economy and also provided with an annual income that would place them in the financial position to acquire all the goods and services that are required to maintain a basic level of living.

Table 7.5 provides a summation of the Impact Assessment.

Table 7.5: Impact Assessment: Employment

Description of potential impact	Increase expenditure in the economy will lead to direct, indirect and induced employment creation both during construction and operation phase.	
Nature of impact	Positive, direct and indirect	
Legal requirements	None	
Stage	Construction and decommissioning	Operation

Nature of Impact	Positive, direct and indirect	N/A
Extent of impact	National	N/A
Duration of impact	Short-term	N/A
Intensity	Medium	N/A
Probability of occurrence	High	N/A
Confidence of assessment	High	N/A
Level of significance before mitigation	Medium	N/A
Mitigation measures (EMP requirements)	See SIA	N/A
Level of significance after mitigation	Medium	N/A
Cumulative Impacts	Medium	
Comments or Discussion	None	

7.5 IMPACT: INCREASED STANDARDS OF LIVING

The increased employment expected will impact positively upon the national, regional and local economy. Increased employment is associated with increased income and consequently with increased buying powers in the area, thus raising the standards of living of the area.

With the increased employment and a subsequent increase in monthly incomes, increased business opportunities can be experienced. The economic benefits mostly include an increase in trade such as local shops, restaurants, accommodation and transport services. These increases in businesses are as a result of the following factors:

- Increased market size,
- Higher disposable incomes,
- Satisfaction of identified needs (such as building materials, or foodstuffs),
- Increased consumer spending.

New business sales refers to the value of all inter- and intra-sectoral business sales generated in the economy as a consequence of the introduction of an exogenous change in the economy. Explained more simply, new business sales equates to additional business turnover as a result of the introduction of a change in the economy.

Table 7.6 below provides an indication of the quantification of the impact of new business sales during construction due to the raising of the Tzaneen Dam wall.

Table 7.6: National economic impact on new business sales (in R million) during construction

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	1.7	1.2	2.9	1%
Mining	0.0	17.0	0.7	17.7	9%
Manufacturing	0.0	19.8	3.0	22.9	11%
Electricity & water	0.0	1.1	0.8	1.9	1%
Construction	100.0	9.1	0.4	109.5	53%
Trade & accommodation	0.0	16.3	2.4	18.8	9%
Transport & communication	0.0	8.9	2.0	10.9	5%
Financial & business services	0.0	13.7	4.2	17.9	9%
Community services	0.0	2.2	1.3	3.6	2%
Total	100.0	89.9	16.1	206.0	100%

From the above **Table 7.6** it is clear that the direct investment in the construction sector during the construction phase will yield new business sales to the value of approximately R200 million. The direct impact of this investment in the economy is measured at R100 million whereas the knock-on effects (indirect and induced) is an additional R100 million. It is anticipated that at least 30 % of the impact will accrue to the Limpopo Province.

As such it is evident that over and above the originally invested money during the construction phase, large amount of revenue is generated due to the multiplier effect in the different sectors of the economy.

Table 7.7 provides a summation of the Impact Assessment.

Table 7.7: Impact Assessment: Increased standards of living

Description of potential impact	Increase expenditure in the economy will lead to new direct, indirect and induced business sales that will increase standards of living.	
Nature of impact	Positive, direct and indirect	
Legal requirements	None	
Stage	Construction and decommissioning	Operation
Nature of Impact	Positive, direct and indirect	Positive, direct and indirect
Extent of impact	National	National
Duration of impact	Short-term	Permanent
Intensity	Medium	Low
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	Utilisation of local construction companies for subcontracting work Maximum utilisation of local suppliers Entice employees to spend income locally	N/A
Level of significance after mitigation	Medium	N/A
Cumulative Impacts	Medium	
Comments or Discussion	None	

7.6 IMPACT: HIGHER STABILITY IN THE AGRICULTURE INDUSTRY

Water surety is a pressing need for the irrigation sector as without it, fruit farming is impossible.

In order to improve water surety, the raising of the Tzaneen Dam is proposed which will increase the supply capacity of the Tzaneen Dam to approximately 203 million m^3 of water.

The main purpose of raising Tzaneen Dam is to increase the assurance of the supply of water for irrigation of high value permanent crops, mainly citrus. The raising of the Tzaneen Dam will improve the availability of water for irrigation and reduce the variability of supply. This also applies to a lesser extent to domestic and environmental supplies. The reason why the latter two user groups receive a smaller benefit is because they get first and second preference on any water available respectively and since their demands were almost fully met before the main advantage is for irrigation.

Irrigation allocations are currently, and have for the past few years, been set at 50% of the annual quota as a result of the current drought conditions and low levels of water in storage. To maintain a certain number of fruit trees, the full water quota is needed. As only approximately 50% of the allocated quota is currently delivered, the shortfall in the water quota is replenished with water from boreholes. The irrigation sector in the area already relies on modern technology and has invested heavily in management and sophisticated equipment to improve water use efficiency. In other words inefficient flood irrigation methods are rarely encountered in the study area and there is thus limited scope for improvement in this sector other than increasing the storage capacity of the Tzaneen Dam.

The agricultural sector (fruit orchards dependant on irrigation) and the associated agro processing industries provide the majority of employment opportunities in the area. Competition for the limited jobs is fierce and unemployment in the area is high and many people rely on income from family members working in the cities. Decreasing allocations to the irrigation sector will negatively impact on fruit production, which will affect employment rates and the socio-economy of the region. It is therefore recommended that the storage capacity of the Tzaneen dam be increased.

Higher surety of water allocations to this sector will also assist in protecting the high investments made in the irrigation sector with regards to citrus plantations, technology, etc. The higher water sureties will thus lead to higher security within the

citrus industry and the level of of production as well as employment created in the sector.

Increasing water allocation sureties within this sector will also take risks away from disasters such as drought periods, etc in which event level of allocations would decrease if insufficient water is stored in the Tzaneen Dam.

This is thus seen as a highly positive economic impact to the citrus industry in the area.

Table 7.8 provides a summation of the Impact Assessment.

Table 7.8: Impact Assessment: Increased stability in the citrus industry

Description of potential impact	Increased water surety in the irrigation sector will lead to increased stability in the citrus industry.	
Nature of impact	Positive direct	
Legal requirements	None	
Stage	Construction and decommissioning	Operation
Nature of Impact	N/A	Positive, direct
Extent of impact	N/A	Regional
Duration of impact	N/A	Permanent
Intensity	N/A	High
Probability of occurrence	N/A	High
Confidence of assessment	N/A	Medium
Level of significance before mitigation	N/A	Medium positive
Mitigation measures (EMP requirements)	N/A	The positive impact is a given no mitigation is needed.
Level of significance after mitigation	N/A	N/A
Cumulative Impacts		
Comments or Discussion	None	

8. FINDINGS: PROPOSED NWAMITWA DAM AND GLEWAP INFRASTRUCTURE

8.1 INTRODUCTION

The proposed Nwamitwa Dam site on the Groot Letaba River is situated on various farms with the dam wall on the farm Laborie 515LT, 40 km north-east of Tzaneen and 20km west of the Hans Merensky Nature Reserve. This site is just downstream of the Nwanedzi confluence.

The following economic impacts (described hereunder) are anticipated for the proposed Nwamita Dam and the additional GleWaP infrastructure requirements:

- Stimulation of the economy
- Increased government income and expenditure (tax revenue)
- Employment creation
- Increased business output and sales
- Loss of land, improvements and resources
- Loss of employment and income
- Change of movement patterns and associated transport costs
- Change in property values
- Increased water availability and associated economic sustainability and stimulation

8.2 STIMULATION OF THE ECONOMY

The following **Tables 8.1 and 8.2** provide a summary of the impacts expected during the construction phase on the sectors in the national economy in terms of the GDP generated due to the increased investment in the economy brought about by the development of the proposed Nwamitwa Dam and the GLeWaP infrastructure requirements.

Table 8.1: National economic impacts on GDP (R million) during construction of proposed Nwamitwa dam

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	6.4	4.7	11.1	2%
Mining	0.0	71.7	2.9	74.6	11%
Manufacturing	0.0	72.0	11.9	83.9	12%
Electricity & water	0.0	4.3	3.0	7.3	1%
Construction	336.0	36.7	1.4	374.1	53%
Trade & accommodation	0.0	34.0	9.5	43.5	6%
Transport & communication	0.0	27.2	7.9	35.0	5%
Financial & business services	0.0	46.5	16.5	63.0	9%
Community services	0.0	9.0	5.1	14.1	2%
Total	336.0	307.8	62.9	706.7	100%

Table 8.2: National economic impacts on GDP (R million) during construction of proposed GLeWaP infrastructure

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	0.5	0.7	1.1	1%
Mining	0.0	7.1	0.4	7.5	7%
Manufacturing	0.0	13.3	1.7	15.0	14%
Electricity & water	0.0	0.7	0.4	1.1	1%
Construction	49.8	7.3	0.2	57.3	55%
Trade & accommodation	0.0	4.6	1.3	5.9	6%
Transport & communication	0.0	4.5	1.1	5.6	5%
Financial & business services	0.0	7.3	2.3	9.7	9%
Community services	0.0	1.0	0.7	1.7	2%
Total	49.8	46.3	8.8	104.9	100%

The additional GDP arising from the capital investment during the construction phase of the proposed Nwamitwa Dam is approximately R700 million, R330 million of which

is due to the direct impact, and the remainder due to the indirect and induced impacts. At least approximately 30 % of the total impact is likely to occur in the Limpopo Province.

The additional GDP arising from the capital investment during the construction phase of the GLeWaP bulk water supply infrastructure is approximately R105 million, R50 million of which is due to the direct impact, R45 million due to the indirect impacts and R10 million due to the induced impacts. At least approximately 30 % of the total impact is likely to occur in the Limpopo Province.

The additional GDP arising from the operating expenditure during the operational phase is approximately R7 million per annum. This means that the economy will experience a direct growth effect during the expenditure period of approximately R2.2 million, an indirect growth effect of approximately R4 million and an induced growth effect of approximately R0.8 million. Approximately 25 % of the total effect is likely to accrue to the Limpopo Province.

The proposed Nwamitwa Dam will have a positive impact on the economy of the country as a whole. The potential economic benefits that are perceived include:

- Increased financial spending in the economy
- Increase infrastructure investment
- Increased expenditure by employees

The local area and its activities (businesses and shops, etc) are expected to be stimulated economically, due to the increased spending expected from the increased salaries and wages paid to employees. During construction and operation, contractors, and service industries in the region will thus benefit from the activity. This will have a knock-on effect on suppliers of goods and services in other areas.

The multiplier or spin-off effects associated with this economic contribution (namely capital expenditure, salaries and wages, etc) include improved standards of living, decreased dependence on pensions, increased disposable income and ability to purchase additional goods and/or establish other business enterprises. Apart from having the potential to create occupational opportunities, the proposed development could also stimulate economic growth in the region by attracting other commercial activities. If this is the case, indirect local benefits may accrue in the form of job

opportunities in other sectors and industries. The proposed development may also serve as a catalyst for the improvement of services and infrastructure in the longer term.

The capital investment during the construction is thus expected to have a positive impact on the economy, resulting in increased financial spending in the economy in terms of construction related activities, the increase infrastructure investment as well as increased expenditure from the large amount of construction workers. This positive impact is likely to be experienced in terms of increased markets for the sale of local goods to construction staff and direct employment by construction contractors.

The exogenous change in the economy will impact different sectors in different ways, with some sectors such as manufacturing and finance and business services benefiting more than others.

Once construction is completed an additional impact could be expected. This impact represents the longer term sustainable benefit arising from the operation phase. This benefit is however far smaller in size than that of the construction. The operation for the proposed Nwamitwa Dam is estimated to cost approximately R3 million per annum during operation, while the operation and maintenance of the bulk infrastructure is estimated to cost approximately R1 million per annum.

Table 8.3: Provides a summary of the impact related to the stimulation of the economy.

Table 8.3: Impact Assessment: Stimulation of economy

Description of potential impact	Increase expenditure in the economy from the proposed Nwamitwa Dam will lead to increased GDP in the economy which in turn will stimulate the economy.	
Nature of impact	Positive, direct and indirect	
Legal requirements	None	
Stage	Construction and decommissioning	Operation
Nature of Impact	Positive, direct and indirect	Positive, direct and indirect
Extent of impact	National	National

Duration of impact	Medium	Permanent
Intensity	High	Low
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	High	Low
Mitigation measures (EMP requirements)	Increase local spending Increase local job opportunities	N/A
Level of significance after mitigation	High +	Low
Cumulative Impacts	High	
Comments or Discussion	None	

8.3 INCREASED GOVERNMENT INCOME AND EXPENDITURE

The economic impacts will lead to fiscal impacts, which are changes in government revenues and expenditures. For example, economic impacts on total business sales, wealth or personal income can affect government revenues by expanding or contracting the tax base. Due to the jobs that will be created as a result of the proposed development as well as the increased business activity levels, the salaries and wages of those jobs along with the increased turnover of the companies can be translated into increased personal and business income tax.

In other words, Government income will be increased as result of the increase in tax it will receive from the proposed Nwamitwa dam and the construction of the GLeWaP infrastructure. The increased government income from tax, will mostly be as a result of increased economic activity. Increased tax received by the government will be in the form of:

- Company tax
- PAYE
- UIF

- Skills development Levy (SDL)
- Rates and taxes.

During the operation phase, the expected permanent jobs per annum will bring in a constant income to the government in the form of personal tax. In addition company tax and VAT, other indirect taxes and services will also be a sustained income for the government during the operation.

The proposed Nwamitwa dam and GLeWaP bulk infrastructure can thus be seen as an economic injection to the area as it would lead to increased government income. The development could thus lead to the creation of other economic spin-offs that benefit the entire region. Local benefits could accrue to the government through an increased tax base increasing the capacity of the local municipality and other social and service support actions. In other words, the increased income received by the government will enable increased spending locally. This means that increased government services such as community facilities, could be provided by the increased income generated.

Table 8.4 provides a summary of the impact related to the increased government income and expenditure.

Table 8.4: Impact Assessment: Increased government income and expenditure

Description of potential impact	Increase expenditure in the economy brought about by the proposed Nwamitwa Dam and related infrastructure will lead to increased income generation and increased tax generation or government income which will enable increased government expenditure.	
Nature of impact	Positive, direct and indirect	
Legal requirements	None	
Stage	Construction and decommissioning	Construction and decommissioning
Nature of Impact	Positive, direct and indirect	Positive, direct and indirect
Extent of impact	National	National

Duration of impact	Medium	Short-term
Intensity	Medium	Low
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	N/A	N/A
Level of significance after mitigation	Medium	Low
Cumulative Impacts	Medium	Low
Comments or Discussion	None	

8.4 EMPLOYMENT CREATION AND DECREASE IN UNEMPLOYMENT LEVEL

The proposed Nwamitwa Dam will lead to the employment creation during the construction of the proposed dam.

It is the intention of the proposed Nwamitwa Dam to employ local labourers (unskilled and semi-skilled), approximately half of which would acquire a permanent skill obtained from practical experience after the end of the construction period, namely 2013.

The unemployment rate of the economic active population within the four affected municipalities is currently at 45%. The proposed development will thus bring some needed relief to the high unemployment figures in the area. Unemployment will also be decreased due to the expected spin-off developments that will take place and the related increased job creation. The women that will be employed during the construction phase will lead to increased household incomes for the duration of the construction period.

Tables 8.5 and 8.6 provide an indication of the total jobs generated as a result of the exogenous change in the economy. Note, a job is defined as one person employed for either one year, which is based on the total man days of work available per year since some people could be employed for the entire length of the

project while others only for a few months at a time. This does thus not mean that new job opportunities arise per year, but that new man days of work arise each year some of which could be fulfilled by existing employees others requiring new temporary employment, etc.

Table 8.5: National economic impacts on number of jobs during construction from the proposed Nwamitwa Dam

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	138.8	101.0	239.8	2%
Mining	0.0	1547.0	63.1	1610.1	15%
Manufacturing	0.0	1552.3	257.7	1810.0	16%
Electricity & water	0.0	93.7	64.8	158.5	1%
Construction	3100.0	792.6	29.6	3922.2	35%
Trade & accommodation	0.0	733.2	204.4	937.6	8%
Transport & communication	0.0	585.8	170.2	756.1	7%
Financial & business services	0.0	1003.8	355.0	1358.8	12%
Community services	0.0	193.3	110.6	303.9	3%
Total	3100.0	6640.7	1356.3	11097.0	100%

Table 8.6: National economic impacts on number of jobs during construction from the proposed GLeWaP infrastructure

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	10.2	14.2	24.3	1%
Mining	0.0	152.8	8.8	161.7	9%
Manufacturing	0.0	286.9	36.2	323.1	19%
Electricity & water	0.0	14.5	9.1	23.6	1%
Construction	540.0	157.3	4.2	701.4	41%
Trade & accommodation	0.0	99.0	28.7	127.7	7%
Transport & communication	0.0	97.2	23.9	121.1	7%
Financial & business services	0.0	158.5	49.9	208.3	12%

Sector	Direct	Indirect	Induced	Total	Percentage
Community services	0.0	21.6	15.5	37.1	2%
Total	540.0	997.9	190.4	1728.2	100%

The proposed Nwamitwa Dam and related GLeWaP infrastructure will lead to the creation of additional jobs to the approximately amount of 11 100 jobs and 1 700 jobs respectively during the construction phase. The direct temporary employment opportunity during the construction phase is approximately 3100 jobs for the proposed Nwamitwa dam and approximately 550 jobs for proposed GLeWaP infrastructure. Approximately 25 % of the national employment effect will accrue to the Limpopo Province.

During the operation phase the project will lead to the creation of an additional approximately 30 jobs per annum. Approximately 16 of these jobs are created due to the direct effect of the additional investment in the economy, whereas 14 of these jobs are due to the indirect and induced effects. Approximately 30 % of the national employment effect will accrue to the Limpopo Province. It is relevant to note here that the operating expenditure impact is expected to be relatively small and will most probably be absorbed by the existing management and maintenance personnel. It is also assumed that most of the operating expenditure will be spent on the maintenance of the facilities/infrastructure.

The profile of direct jobs can be expected to be approximately 33% for professionals, technical and associate workers, and the rest in service workers, plant, machine and elementary occupations.

Employment opportunities created by the Nwamitwa Dam and related infrastructure is regarded as having an important impact on the local communities.

During the construction phase, temporary employment will be created for the duration of the construction phase, namely up until 2013. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed direct jobs required for the construction will be created due to economic spin-offs that will result. During the construction phase, local contractors and service providers will be utilised as far as practically possible.

The benefit of increased jobs in the area can also be translated into economic terms, and the additional jobs would in essence result in additional income creation. This increase in income in the area can be translated in a specific impact ranging from Black Economic Empowerment (BEE) to poverty alleviation depending on the procurement policy and the construction technology applied. More previously disadvantaged people could be provided with an opportunity to become involved in the formal economy and also provided with an annual income that would place them in the financial position to acquire all the goods and services that are required to maintain a basic level of living.

Full-time employment during the operation will be far less, although this will have a substantial effect on the economy in that lasting and sustainable jobs are created. Apart from the long-term directly created jobs there will be scope for other entrepreneurial jobs to be created by the local population. The increased employment expected with the development, will impact positively upon the regional and local economy. Increased employment is associated with increased income and consequently with increased buying powers in the area, thus raising the standards of living of the area.

Apart from the permanent directly created jobs there will be scope for other entrepreneurial jobs to be created by the local population. The majority of the indirect and induced employment will be in the retail and trade sector. E.g. women can engage in economic activity rather than spend time and energy collecting water – opportunity benefits of piped water.

Table 8.7 provides a summation of the impact on employment.

Table 8.7: Impact Assessment: Employment

Description of potential impact	Increase expenditure in the economy will lead to direct, indirect and induced employment creation both during construction and operation phase.	
Nature of impact	Positive, direct and indirect	
Legal requirements	None	
Stage	Construction and decommissioning	Operation

Nature of Impact	Positive, direct and indirect	Positive, direct and indirect
Extent of impact	National	National
Duration of impact	Medium	Permanent
Intensity	Medium	Low
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	See SIA	N/A
Level of significance after mitigation	Medium	N/A
Cumulative Impacts	Medium	Low
Comments or Discussion	None	

8.5 INCREASED BUSINESS OUTPUT AND SALES

The increase in employment, will impact positively upon the national, regional and local economy as increased employment is associated with increased income and consequently with increased buying powers in the area, thus raising the standards of living of the area.

With the increased employment and a subsequent increase in monthly incomes, increased business opportunities can be experienced. The economic benefits mostly include an increase in trade such as local shops, restaurants, accommodation and transport services. These increases in businesses are as a result of the following factors:

- Increased market size,
- Higher disposable incomes,
- Satisfaction of identified needs (such as building materials, or foodstuffs),
- Increased consumer spending.

New Business Sales refers to the value of all inter- and intra-sectoral business sales generated in the economy as a consequence of the introduction of an exogenous change in the economy. Explained more simply, new business sales equates to additional business turnover as a result of the introduction of a change in the economy.

Tables 8.8 and **8.9** provides an indication of the quantification of the impact of new business sales due to the proposed Nwamitwa Dam and related infrastructure.

Table 8.8: National economic impact on new business sales (in R million) during construction of proposed Nwamitwa dam

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	19.8	14.4	34.3	1%
Mining	0.0	221.0	9.0	230.0	10%
Manufacturing	0.0	221.8	36.8	258.6	11%
Electricity & water	0.0	13.4	9.3	22.6	1%
Construction	1200.0	113.2	4.2	1317.5	56%
Trade & accommodation	0.0	104.7	29.2	133.9	6%
Transport & communication	0.0	83.7	24.3	108.0	5%
Financial & business services	0.0	143.4	50.7	194.1	8%
Community services	0.0	27.6	15.8	43.4	2%
Total	1200.0	948.7	193.8	2342.4	100%

Table 8.9: National economic impact on new business sales (in R million) during construction of proposed GLeWaP infrastructure

Sector	Direct	Indirect	Induced	Total	Percentage
Agriculture	0.0	1.5	2.0	3.5	1%
Mining	0.0	21.8	1.3	23.1	6%
Manufacturing	0.0	41.0	5.2	46.2	12%
Electricity & water	0.0	2.1	1.3	3.4	1%
Construction	200.0	22.5	0.6	223.1	60%

Sector	Direct	Indirect	Induced	Total	Percentage
Trade & accommodation	0.0	14.1	4.1	18.2	5%
Transport & communication	0.0	13.9	3.4	17.3	5%
Financial & business services	0.0	22.6	7.1	29.8	8%
Community services	0.0	3.1	2.2	5.3	1%
Total	200.0	142.6	27.2	369.7	100%

From **Table 8.9** it is clear that the direct investment in the construction sector during the construction phase will yield new business sales to the value of approximately R2350 million for the construction of the proposed Nwamitwa Dam and approximately R370 million for the bulk infrastructure. Approximately 30% of the total national effect is likely to accrue to the Limpopo Province.

During the operating phase the investment in the economy will generate New Business Sales to the approximate value of R23 million of which R10 million is a direct impact and the remaining R13 million is due to indirect and induced effects. Approximately 30 % of the total national effect is likely to accrue to the Limpopo Province.

As such it is evident that over and above the originally invested money during the construction and operation phases, large amount of revenue is generated due to the multiplier effect in the different sectors of the economy.

The construction phase will thus lead to the expansion of business sales for existing and potentially new businesses, locally and mostly within the Gauteng Province. The sectors that will experience the highest demand for additional output is manufacturing (i.e. manufacturing and supply of building materials, trade (i.e. supply of final goods and services), financial, real estate and business services (i.e. professional services).

It is also anticipated that a positive local impact will be felt at Eiland, Letsitele and at the Letaba Junction due to more local shopping. Currently in Letsitele there is 1 petrol station, 3 churches, 700 houses in town, 1 police station, 1 grocer, 2 bottle stores and light industrial area with steel works, ground works and an insectarium. The guesthouses such as the Tzaneen Country Lodge are currently 85% full during weekdays and during weekends 50% occupancy rates are experienced. This shows

that the majority of the business and support to the area is from business visitors during the weeks.

During the construction phase the increased standards of living in the area will rise substantially due to the increased employment in the area. The increased buying powers will however also indirectly lead to new business sales that will raise the standards of living of the local community.

Table 8.10 provides a summation of the Impact Assessment.

Table 8.10: Impact Assessment: Increased business sales and output

Description of potential impact	Increase expenditure in the economy will lead to new direct, indirect and induced business sales that will increase standards of living.	
Nature of impact	Positive, direct and indirect	
Legal requirements	None	
Stage	Construction and decommissioning	Operation
Nature of Impact	Positive, direct and indirect	Positive, direct and indirect
Extent of impact	National	National
Duration of impact	Medium	Permanent
Intensity	Medium	Low
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	Utilisation of local construction companies for subcontracting work Maximum utilisation of local suppliers Entice employees to spend income locally	Utilisation of local construction companies for subcontracting work Maximum utilisation of local suppliers Entice employees to spend income locally
Level of significance after mitigation	Medium	Low

Cumulative Impacts	Medium	Low
Comments or Discussion	None	

8.6 LOSS OF LAND, IMPROVEMENTS AND RESOURCES

Due to the proposed Nwamitwa Dam and the GLeWaP infrastructure, the following land is expected to be lost:

- Farm land to be inundated directly by the proposed Nwamitwa Dam
- Land to be affected by the construction camp
- Land affected by road realignments
- Land to be affected by the pipelines
- Land to be affected by the 4 pump stations
- Land to be affected by the 6 new reservoirs
- Land to be affected by the borrow areas

With regards to the farm land directly inundated by the proposed Nwamitwa Dam, Schoeman and Vennote undertook a desktop study in December 2007 to determine the expropriation costs of the land and other structures that will be inundated when the proposed Nwamitwa Dam is built for the 1.5 Mean Annual Runoff (MAR).

The actual farms (farm numbers and portions) to be affected directly by the area to be inundated by the proposed Nwamitwa Dam are:

- 461LT/0
- 462LT/0
- 463LT/0
- 463LT/1
- 514LT/0
- 514LT/1
- 514LT/10
- 514LT/11
- 517LT/6
- 518LT/0
- 518LT/2
- 518LT/3
- 521LT/2
- 521LT/22
- 521LT/3
- 521LT/5

- 463LT/2
- 463LT/3
- 464LT/0
- 465LT/6
- 513LT/0
- 513LT/1
- 513LT/2
- 513LT/29
- 513LT/3
- 513LT/30
- 513LT/35
- 513LT/4
- 513LT/5
- 513LT/56
- 513LT/6
- 513LT/7
- 514LT/12
- 514LT/14
- 514LT/17
- 514LT/2
- 514LT/3
- 514LT/4
- 514LT/5
- 514LT/6
- 514LT/8
- 514LT/9
- 515LT/0
- 515LT/1
- 515LT/2
- 515LT/3
- 515LT/4
- 517LT/5
- 519LT/2
- 519LT/3
- 519LT/4
- 519LT/6
- 519LT/7
- 520LT/1
- 520LT/2
- 520LT/3
- 520LT/4
- 520LT/5
- 520LT/6
- 520LT/7
- 520LT/8
- 521LT/13
- 521LT/18
- 521LT/19
- 521LT/8
- 563LT/0
- 563LT/1
- 563LT/3
- 564LT/11
- 564LT/15
- 564LT/2
- 564LT/3
- 564LT/7
- 733LT/19
- 733LT/4
- 733LT/70
- 827LT/0
- 828LT/0

Schoeman and Vennote used the following land use and improvement categories for the affected area together with guideline values provided by a professional valuer.

Table 8.11: Land use and improvement valuations

Category	Notes	Guidelines values
Grazing/Veld	Generally small pieces of uncultivated land but including grazing for livestock and game farms.	R4,000 – R8,000/ha

Category	Notes	Guidelines values
Dry/cultivated land	Generally pieces of dry or cultivated land mostly in Tribal areas.	R4,000 – R8,000/ha
Irrigation	Land equipped with infrastructure for irrigation purposes, e.g. mother lines, etc. but excluding surface irrigation systems, e.g. pivots. Water rights are included.	R30,000 to R50,000/ha
Orchards (irrigated)	Mostly comprises citrus orchards equipped with micro/drip irrigation. Compensation includes surface irrigation equipment and dams solely used for water storage as well as the water right.	R30,000 to R120,000/ha
Improvements	Generally farm related improvements including: Dwellings Sheds and pack houses (equipment excluded) Labour housing Compensation will depend on degree of depreciation and application of the Held principle.	Replacement cost / m^2 R3,000 to R5,000 R500 – R2,000 ±R2,000

Source: Schoeman and Vennote, 2007 and professional valuer

A SPOT satellite image of 6 May 2006 was utilised by Schoeman and Vennote as a backdrop to identify the different land uses. The affected areas were digitised and their areas electronically calculated using a GIS.

Table 8.12 provides a breakdown of the different land use categories and the total identified land to be affected within the 1.5 MAR as well as allowance for flood lines, etc.

Table 8.12: Land use area to be inundated by proposed Nwamitwa dam

Category	Area
Orchards (ha)	887
Irrigated fields (ha)	41
Grazing/Veld (ha)	2 936
Farm houses/Dwellings (m^2)	1 185

Category	Area
Labour housing (m^2)	2310
Sheds/Outbuildings (m^2)	**10 643**

Source: Schoeman and Vennote, 2007

The landowners who will be affected by the dam basin are all commercial fruit farmers with a few who also grow vegetables on a commercial basis. Some also have cattle as not all the land is suitable for orchards, or available water for orchards is limited.

The following sheds and outbuildings (as in MasterQ Research (2007), are affected on the 1.5MAR:

- 12 houses
- 26 dams
- Two packing facilities
- Farm worker compounds

In addition to the approximately 3,864 ha lost and buildings with an area of 14,138 m^2, **Table 8.13** provides an indication of the estimated land lost due to the remainder of the GLeWaP infrastructure.

Table 8.13: Quantification of size of land affected by GLeWaP infrastructure

Category	Assumptions	Estimated size
Existing roads inundated by Nwamitwa Dam	Included in land affected in Schoeman and Vennote calculations	N/A
Land affected by construction camp	Portion included in land affected in Schoeman and Vennote calculations in that part of the construction camp is to be located within the dam basin.	25ha
Land affected by road realignments	Partial re-alignment of R529. Minimum road reserve 40m. New land affected totals 12km. Partial re-alignment of P43/3. Minimum road reserve 40m. New land affected total 8km.	32ha

Category	Assumptions	Estimated size
Land affected by borrow areas	Borrow area 1 area for earth fill material Borrow area 2 for filter material and concrete sand. Borrow area 3 for filter material and concrete sand.	194.5ha 43.6ha 13.5ha
Land affected by pipeline routes	Estimated length not within existing pipeline servitudes or along road reserves. Pipeline 1: 4km Pipeline 2: 6km Pipeline 3: 6km Pipeline 4: 8km	 4ha 6ha 6ha 8ha
Land affected by four pump stations	1-2ha fenced for each pump station.	8ha
Land affected by six reservoirs	Area required is approximately 1-2ha per reservoir.	10ha
Total		**350.6ha**

Source: Kayamandi Development Services calculations, 2008

It should be noted that the servitude for the proposed construction components and bulk infrastructure of GLeWaP will mostly be next to existing roads. However, not all of the secondary infrastructure (pipelines, pump stations, etc) always follow existing servitudes and where new servitudes are needed this will result in loss of existing land use. It is important to note that the length of the pipelines and proposed road realignments are calculated estimates as the final configuration and sizing of the related infrastructure is not finalised at this stage. This will be finalised during the detailed design phase.

As is evident from the above, a total of approximately 4214.6 ha of land is permanently lost, of which 3864 ha accounts for the farm land to be directly inundated by the proposed dam and 350.6 ha accounts for land lost as part of the remainder of the GLeWaP infrastructure. This loss of land will have a direct impact on resources and production.

The farm land to be lost due to the proposed Nwamitwa Dam as well as other portions of land to be lost due to the remainder of the GleWaP infrastructure will result in a loss of production. In other words, there will be a loss of good agricultural

land and its associated potential agricultural produce with the development. The loss of the high value agricultural land is a significant negative impact in that this land is lost permanently and can never be utilised for agricultural production again. Even if the farmers are able to transfer their water rights to other available suitable land nearby, the loss of land and current production volumes remains a permanent real loss. Inundation will have a high impact on the commercial citrus farmers in the dam basin but an even higher impact is expected on the farmers downstream (such as the Letaba Estate) due to the reduction of flow and thus available water for irrigation if appropriate releases from the dam are not made during operation.

The economic value of a resource is most commonly determined by willingness to pay for gain or improvement in a resource, it is also theoretically valid to use willingness to accept compensation for loss or degradation of the resource. Theoretically, there should be no significant difference in the value of the two measures.

Furthermore it could be expected that production during the construction period for certain farm portions could possibly be completely halted as construction activities would take precedence over the affected portions of land.

According to Schoeman and Vennote, the upper values provided by the professional valuer for each of the categories were used to do an initial estimation of compensation payable. A summary is provided in **Table 8.14**. It should be noted here that while the citrus farmers will all be able to establish replacement orchards on other parts of their land using their water quota, compensation of the land and production value lost needs to be taken into consideration. It remains the individually affected farmers decisions whether or not they want to replace the orchards lost of not.

Table8.14: Initial estimated compensation for land and improvements inundated by Nwamitwa dam

Category	Cost (in Rand)
Orchards	R 106 409 680
Irrigated fields	R 2 061 205
Veld	R 23 487 998

Category	Cost (in Rand)
Farm houses	R 5 922 935
Worker houses	R 4 620 000
Sheds/Outbuildings	R 21 285 766
Total Cost	**R 163 787 584**

Source: Schoeman and Vennote, 2007

Table 8.15 provides an indication of the existing land use and land type to be affected by the remaining GLeWaP infrastructure.

Table 8.15: Estimated land affected by GleWaP infrastructure

Category	Land use	Size
Land affected by the construction camp	Cultivated land	25ha
Land affected by road realignments (only portions not within area to be inundated to not ensure double counting for land affected by proposed Nwamitwa dam.	Orchards and some cultivated land	32ha
Land affected by borrow areas	Cultivated land Grazing	100ha 151.6ha
Land affected by pipeline routes (only maximum length of options not within existing servitudes)	Grazing Grazing Cultivated land Grazing	Pipeline 1: 4ha Pipeline 2: 6ha Pipeline 3: 6ha Pipeline 4: 8ha
Land affected by four pump stations	Grazing	8ha
Land affected by six reservoirs	Grazing	10ha

As is evident from the above **Table 8.15**, the total land affected due to the remainder of the GLeWaP infrastructure is 350.6 ha. The land use affected by the pipelines and the construction area will be compensated for, although these areas will be made available for grazing again after the construction period. The pipeline areas

will have permanent servitudes although these areas will not be fenced and will be available for grazing areas again.

Many of the pipeline routes pass through or nearby existing communities such as Ka-Mswazi, Nkambako, Babanana, Jopi, Ka Xihoko, Serolorolo, GA-Mookgo, Ga Wale, Ga Mokwathi, etc. The preferred pipeline routes from an economic point of view are those that are mostly within or parallel to existing servitudes so that land lost (see **Table 8.15** above) is kept to a minimum, cost of compensation of land is decreased, loss of agricultural land is decreased and impact on surrounding communities are minimized.

The same upper values provided by the professional valuer in the Schoeman and Vennote compensation estimates have been used to do an initial estimation of compensation payable.

Table 8.16 provides an indication of the existing land use and estimated production loss of the land to be affected by the remaining GLeWaP infrastructure.

Table 8.16: Initial estimated compensation of loss of resources affected by GleWaP infrastructure

Category	Size	Cost (in Rand)
Cultivated land	131ha	1,048,000
Grazing/Veld	187.6ha	1,500,800
Orchards	32ha	3,840,000

Although the Department of Agriculture is concerned about the loss of land due to the proposed project, the Department has revealed that it positively supports the project in anticipation for the sustainable development of agriculture in the area.

During construction the 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. Trees are used for a range of purposes which should be taken into account with compensation such as making furniture, building material or agricultural implements, especially in the affected tribal areas where this resource needs to be accounted for in the compensation. The compensation should be defined and decided through a consultative process between DWAF, and the

affected community. If the wood is currently used for fuel a switch to other sources of energy might be needed.

The loss of natural resources cannot be re-established during the operation phase and is thus a permanent loss to the economy.

Increased poaching (theft of fruit on surrounding farms) and stock theft also could result from construction workers who will have 'access' to surrounding farms during the construction period. This could have a substantial negative economic impact on the surrounding farms during the construction timeframe. Productivity of existing farming operations could also be affected if farm workers who might be keen to earn higher wages paid by the construction industry are "poached" from existing farming enterprises.

A key concern of the farmers was whether or not their existing water allocations will be affected alongside their loss of land. The intention is that the water rights will remain. Previously water was attached to land, now it is per licence. DWAF's regional office is responsible for the verification of existing use and validation of lawfulness.

Table 8.17 provides a summation of the Impact Assessment.

Table 8.17: Impact Assessment: Loss of land, resources and production

Description of potential impact	The proposed Nwamitwa Dam and GLeWaP infrastructure will lead to a loss of land.	
Nature of impact	Negative, direct	
Legal requirements	Expropriation Act	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative , direct	Negative, direct
Extent of impact	Local	Local
Duration of impact	Permanent	Permanent
Intensity	Medium	Medium

Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Medium
Mitigation measures (EMP requirements)	Determine compensation in manner prescribed by legislation. Compensation should seek to make individuals or affected parties as well off as they were prior to the development. Minimise temporary disturbance to properties and land owners/residents during construction such as with pipeline construction Communicate disturbances properly and timeously.	N/A
Level of significance after mitigation	Medium	N/A
Cumulative Impacts	Medium	
Comments or Discussion	None	

8.7 LOSS OF EMPLOYMENT AND INCOME

Temporary loss of access to agricultural land and grazing land will lead to loss of employment and income. It should be noted that all land affected will be compensated for as indicated previously. During construction, houses will be built for labourers and lost infrastructure will be replaced. However, citrus production cannot be replaced immediately and will take approximately 6 years for new fruit trees to start bearing fruit of sufficient economic production value. The loss of citrus production may lead to a loss of employment.

The loss of jobs however will not lead to long-term impoverishment of families as during the operation more jobs may be created if a sustainable water source is provided in this area. If handled correctly, this project will thus be a development injection for this area. In other words the positive impacts on the sustainability of the citrus industry will be greater than the short term loss of jobs.

The majority of the community members in the surrounding areas currently work on farms. Most of these jobs are seasonal, from April to September, and only a few people are hired permanently. Job opportunities seem to be limited in the study area and jobs are sought far from home.

The number of seasonal workers fluctuates between farms, although an industry standard is that approximately 2.4 labourers are employed in the citrus production and packing industry per 1ha of orchards. During the construction phase, the demand for packers and pickers will decrease because land and citrus orchards will be lost to the economy, which will affect the number of jobs. The approximate number of jobs (both permanent and temporary) that will be lost as a result of the loss of land is 2 129 jobs 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 that inundated by the proposed Nwamitwa Dam). Farm wages are set at R980 per month. This means that the loss of income by the job losses will amount to approximately R15 518 520 million per annum over the seasonal time of employment.

On the other hand, labourers will be needed for land clearing, ploughing, planting, laying of infrastructure, etc in the areas where the farmers will be replanting their land in order to maximise on their water rights and potential income.

During the operational phase, possible negative impacts on income levels are also foreseen where income is derived from the farms or from the natural resources that will be inundated, such as the sale of water. This industry will collapse when water is made available in taps. On average income to the approximately value of R900 per month is obtained from the sale of water. It is estimated that at least one such water sale operator is established within each village. This means that for the approximate 18 villages within the bulk water distribution area, approximately 18 informal water selling entities will collapse when water is made available in taps. This represents an approximate R200 000 to the economy per annum. However, this will simultaneously mean less expenditure by communities for water purchases. Currently women and children are actively involved on a day to day basis with water collection which takes up significant amounts of women and children's time, preventing them from attending to other activities like education, income generation and household chores.

Table 8.18 provides a summation of the Impact Assessment.

Table 8.18: Impact Assessment: Loss of employment and income

Description of potential impact	The proposed Nwamitwa Dam and GLeWaP infrastructure will lead to a loss of farm land and subsequent loss of production, employment and income.	
Nature of impact	Negative, direct	
Legal requirements		
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative , direct	Negative, direct
Extent of impact	Local	Local
Duration of impact	Permanent	Medium term
Intensity	High	Medium
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Medium
Mitigation measures (EMP requirements)	Align employment opportunities to farm workers directly impacted Communicate loss of employment to farm workers from affected farms well in advance	N/A
Level of significance after mitigation	Medium	N/A
Cumulative Impacts	Medium	
Comments or Discussion	None	

8.8 CHANGE OF MOVEMENT PATTERNS AND ASSOCIATED TRANSPORT COSTS

Parts of the R529 and the P43/3 will be inundated in the vicinity of the dam basin and lost permanently. Partial re-alignment is thus required to accommodate the proposed dam. Road re-alignment would require the construction of at least two major bridges (on farm portions 463 LT and 514 LT) and the upgrading of two

existing bridges on existing roads. The existing roads will be utilised whilst the new realigned roads are constructed so avoiding the need for temporary detours during construction. The minimum road reserve width is expected to be 40 m but may have to be wider in places to accommodate earthworks required for cuts and fills.

This will have significant impacts on traffic flow routes and increased travel distances and associated costs, particularly between residential areas and places of work in the agricultural sector but also for the transportation of agricultural products to markets.

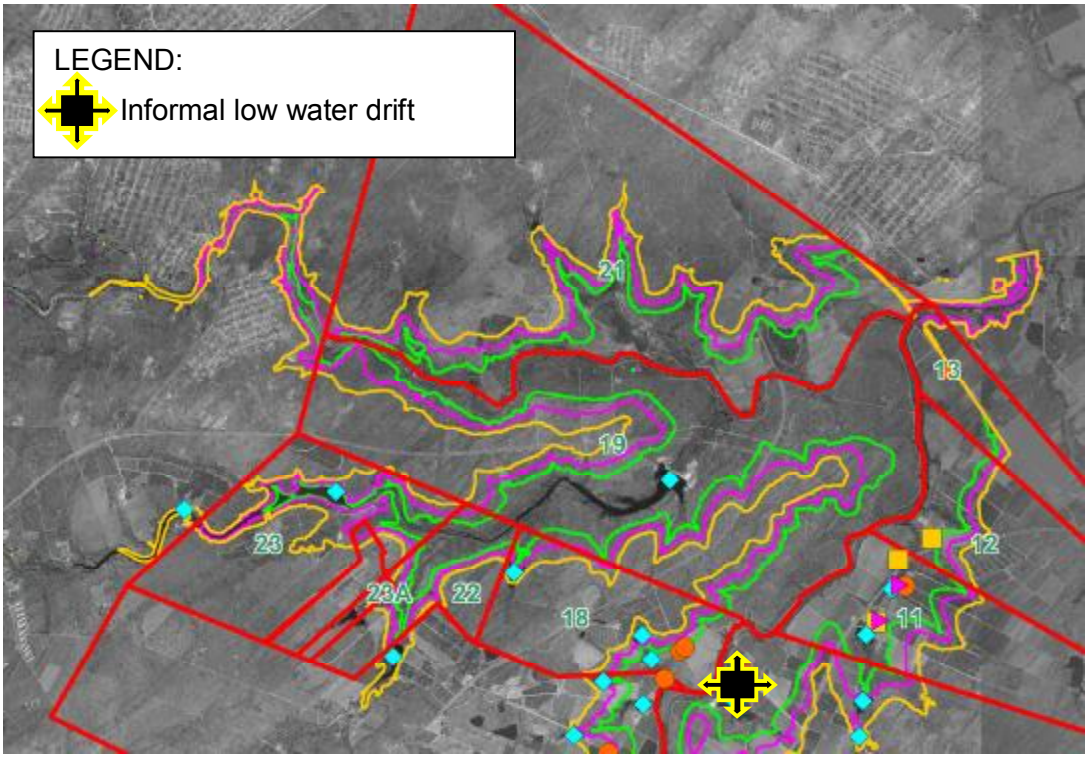
According to the social impact assessment, the inhabitants of Nkambako, Rwanda and Nwamitwa villages will be affected the most by the road re-alignment.

Many farm workers reside on the farms during the week and go home over the weekends. Farmers charge these labourers between R30 to R50 per person for accommodation per month. These labourers will thus be affected by increased travel costs during weekend travel. The farm workers that travel to work on a daily basis are foreseen to be affected due to increased travel times and increased travel costs.

The potential loss of one low water informal drift which is essential for farming activities needs to been taken note of in the design of the proposed road relocations. The low water informal drift is upstream from the proposed dam wall (see **Figure 8.1**). Farmers and workers use this crossing to access farms that are divided by the river. If this crossing was to be lost, the farmers using this crossing would have to make a detour of 25 km and may have to replace tractors with trucks to transport their fruit, because tractors are economically viable only when they travel less than 20 km. In order to mitigate this local landowner's loss of access to its land, an additional bridge should be included in the proposed road relocations.

Some farmers will however be affected by increased travelling distances, times and costs due to the loss of pack houses and the relocated roads. Some farmers will now have to travel longer distances between farms, from farms to pack houses, from farms to the town of Tzaneen for weekly/monthly shopping, etc. Taking into account the average tons per hectare (i.e. 26 tons of citrus per ha) and depending on the capacity of the trucks, this can add up to thousands of kilometres during the harvesting season.

Figure 8.1: Low water informal drift



Local workers also use this crossing to get access to farms across the river or to visit family and friends. This rerouting will lead to a detour of approximately 30 km to reach the other side of the river, which means a total of 60 km there and back.

In other words, the routes offer a short increase in distances themselves, which is why from a best route perspective in terms of distances for labourers to travel all of the alternatives are virtually the same. However the proposed Nwamitwa dam serves as a need for complete rerouting travelled by some workers to get to work opportunities on the other side of the dam.

It is not anticipated that travel time or costs will increase for communities travelling to Tzaneen for weekly/monthly shopping since the nearby communities to the proposed Nwamitwa dam are located between the proposed dam and the town of Tzaneen.

Table 8.19 provides a summation of the Impact Assessment.

Table 8.19: Impact Assessment: Change of movement pattern and associated transport costs

Description of potential impact	The proposed Nwamitwa dam and GleWaP infrastructure will lead to rerouting of transport routes with associated increased transport costs.	
Nature of impact	Negative, direct	
Legal requirements	Expropriation Act	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative , direct	Negative, direct
Extent of impact	Local	Local
Duration of impact	Permanent	Permanent
Intensity	Medium	Medium
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Medium
Mitigation measures (EMP requirements)	Undertake final road relocations in consultation with those affected.	Additional river crossings to compensate for loss of low water informal drifts
Level of significance after mitigation	Medium	Medium
Cumulative Impacts	Medium	
Comments or Discussion	None	

8.9 CHANGE IN PROPERTY VALUES

Property values and the sale of property during the pre-construction and construction period could be affected. Property prices could be perceived to increase due to anticipated positive impacts of the proposed Nwamitwa Dam to the economy of the area during pre-construction. Local indications exist that property purchases and speculations in the area are already taking place. Local indications are that undeveloped land is now going at a retail price of between R5 000 and

R20 000 per ha, orchards at R100 000 per ha, and irrigated land at R30 000 to R60 000 per ha.

It is thus noted that property values are increasing in the area, although it should be clearly communicated that the proposed Nwamitwa Dam will seldom be full, a sustainable utilisation plan for the dam still needs to be developed and no new water licences will be provided. The speculations taking place currently are thus only based on a perceived value increase.

It is however anticipated that during construction, potential new property owners could be deterred from purchasing property or farm land that is near to the site due to the perceived negative impacts of the construction such as safety and security, increased crime, increased population, workers camps, etc.

It is not foreseen that property values will be affected as a direct result of the proposed development during the operation/maintenance phase.

It is however also important to note that the creation of expectations of downstream users could however stimulate further development in a catchment where the demand already exceeds the supply.

Table 8.20 provides a summation of the Impact Assessment.

Table 8.20: Impact Assessment: Change in property values

Description of potential impact	The proposed Nwamitwa dam could lead to perceptions of both property price increases due to perceived positive benefits as well as property price decreases due to perceived social ills during construction.	
Nature of impact	Negative, direct	
Legal requirements		
Stage	Construction and decommissioning	Operation
Nature of Impact	Positive and negative, direct	N/A
Extent of impact	Local	N/A
Duration of impact	Short-term	N/A

Intensity	Low	N/A
Probability of occurrence	Medium	N/A
Confidence of assessment	Medium	N/A
Level of significance before mitigation	Medium	N/A
Mitigation measures (EMP requirements)	Keep interested and affected parties informed of the project outcomes.	N/A
Level of significance after mitigation	Medium	N/A
Cumulative Impacts	Medium	
Comments or Discussion	None	

8.10 INCREASED WATER AVAILABILITY AND ASSOCIATED ECONOMIC SUSTAINABILITY AND STIMULATION

The catchment area of the proposed Nwamitwa Dam is approximately 1 400 km^2. Human settlement, agricultural production and tourism between the Drakensberg escarpment and the Kruger National Park have placed demands on the water resources of the Groot Letaba River which can no longer be met within reasonable risks of shortages from the existing infrastructure.

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 the Tzaneen Dam to the Kruger National Park but little if any of these releases reached the Park with real beneficial effect. DWAF is however, legally obliged to implement the Reserve, which includes water for ecological functioning, in the catchment. One of the motivations for the proposed new dam is to improve the Department's ability to exercise this responsibility. The Reserve requirements will be considered in the design of the proposed dam, the allocation of water, and the operation of the system as a whole. A new flow measuring weir will be required downstream of the proposed Nwamitwa dam in order to measure and monitor the implementation of the flow that is released from the dam.

With regards to the agriculture sector, water surety is a pressing need for the irrigation sector as without it, fruit farming is impossible. The proposed Nwamitwa Dam will increase the assurance of the supply of water for irrigation of high value permanent crops, mainly citrus. In short, the proposed Nwamitwa Dam will assist with stabilising commercial irrigation. The variability of supply will thus also be decreased. Higher surety of water allocations to this sector will also assist in protecting the high investments made in the irrigation sector with regards to citrus plantations, technology, etc. The higher water sureties will thus lead to higher security within the Citrus industry and the level of of production as well as employment created in the sector. Increasing water allocation sureties within this sector will also take risks away from disasters such as drought periods, in which event level of allocations would decrease if insufficient water is stored in the proposed Nwamitwa Dam.

Commercial agriculture is the main economic driver in the area. If water sustainability cannot be maintained, a loss of ability to produce crops for commercial purposes will influence income generation negatively. There will only be a temporary loss of ability to produce crops for commercial purposes. The proposed Nwamitwa Dam will enhance this ability in the long term. In short, secure water supply will stabilise the total farming labour market and reduce cyclical trends. The project will thus contribute to stabilising the job market and increasing household incomes.

Attention is focused on water needs for the increasing human population. Although this project will not be directly responsible for community water supply, it will make more water available for this purpose to local water service providers, such as municipalities. Provision will be made for off-takes from the bulk water distribution system or alternatively water will be delivered into reservoirs at agreed locations. This is seen as a positive impact on the economy as collecting water can also use up significant amounts of women and children's time, preventing them from attending to other activities like education, income generation and household chores.

The proposed Nwamitwa Dam will also assist with higher water sureties for resource-poor farmers. Total land for emerging farmers with existing water rights and allocations currently not utilised (due to financial constraints, inexperience, etc) is 2 925 ha with a water allocation of 31 334 834 m^3 from the Tzaneen Dam. If farming gets activated on this land, which is currently being strived for by local

commercial farmers and the Department of Agriculture, the construction of the proposed Nwamitwa dam will lead to higher surety of the emerging farmer's water allocations.

The proposed Nwamitwa Dam will thus increase the safe, reliable water supplies for domestic and industrial use, minimise the frequency, intensity and duration of restrictions on the use of water allocated for irrigation of high value crops, lead to an increase in total household income through stabilising the job market, and provide leverage for the equitable distribution of resources.

The catchment downstream of the proposed dam site is an extremely important recreation area. Three very important National tourist destinations are found in this area, namely the Hans Merensky Nature Reserve, Letaba Ranch (visited by international hunters) and Kruger National Park. There are also a number of existing recreational resorts and facilities, public nature reserves, private nature reserves, forest reserves, botanical reserve, wilderness areas, etc. None of these are situated directly on the Groot Letaba River, although this serves to emphasize the importance of the area as a tourist attraction. The sub-tropical climate of the area also enhances the area as a popular tourist destination.

The improved ability to manage the water resources in the catchment during operation could stimulate the development of recreational opportunities and tourism related development especially to the nearby communities of Nwamitwa, Nkambako and Rwanda. However the Nwamitwa Dam is not an attractive dam site and would mostly be half full. Nonetheless, the dam could still stimulate increased recreation from the community such as fishing, relaxing, etc. It should be noted that a sustainable utilisation plan still needs to be developed during the implementation phase of the project. At this stage it is not known what utilisation will be allowed by DWAF at the proposed Nwamitwa dam. Tourism opportunities directly associated with the dam are thus expected to be minimal, largely because the water level will often be low and there are already many competing tourist attractions in the vicinity as mentioned previously.

A temporary impact on tourism in terms of the inundation of primary and secondary roads while new roads are constructed is not foreseen. The construction phase might even lead to increased tourism brought about by increased curiosity due to the scope of the study. Existing roads will be utilised whilst the new realigned roads

are constructed to avoid the need for temporary detours during construction. The attributes that make this area a popular tourist destination however, need to be kept intact as far as practically possible during construction.

Table 8.21 provides a summation of the Impact Assessment.

Table 8.21: Impact Assessment: Increased water availability and associated economic sustainability and stimulation

Description of potential impact	The proposed Nwamitwa Dam and the GleWaP infrastructure will lead to increased water availability and associated economic sustainability and stimulation.	
Nature of impact	Positive, direct	
Legal requirements		
Stage	Construction and decommissioning	Operation
Nature of Impact	N/A	Positive, direct
Extent of impact	N/A	National
Duration of impact	N/A	Long-term
Intensity	N/A	High
Probability of occurrence	N/A	High
Confidence of assessment	N/A	Medium
Level of significance before mitigation	N/A	High
Mitigation measures (EMP requirements)	N/A	N/A
Level of significance after mitigation	N/A	High
Cumulative Impacts	N/A	High
Comments or Discussion	None	

9. CONSULTATION PROCESS

Engagement with Interested and Affected Parties (I&APs) forms an integral component of the EIA process. I&APs have an opportunity at various stages throughout the EIA process to gain more knowledge about the proposed project, to provide input into the process and to verify that their issues and concerns have been addressed.

The proposed project was announced in July 2007 to elicit comment from and register I&APs from as broad a spectrum of public as possible. The announcement was done by the following means:

- the distribution of Background Information Documents (BIDs) in four languages,
- placement of site notices in the project area,
- publishment of advertisements in regional and local newspapers,
- publishment of information on the DWAF web site,
- announcement on local and regional radio stations; and
- the hosting of five focus group meetings in the project area.

Comments received from stakeholders were captured in the Issues and Response Report (IRR) which formed part of the Draft Scoping Report (DSR). The DRS was made available for public comment in October 2007. A summary of the DSR (translated into four languages) was distributed to all stakeholders and copies of the full report at public places. Two stakeholder meetings were held in October to present and discuss the DSR. The Final Scoping Report was made available to stakeholders in December 2007.

The Draft Environmental Impact Assessment Report, its summary (translated in four languages), the various specialist studies, the Environmental Management Plans and Programmes were made available for a period of thirty (30 days) for stakeholders to comment. Stakeholder comments were taken into consideration with the preparation

of the final documents. The availability of the final documents will be announced prior to submission to the decision-making authority

10. COMMENTS RECEIVED

The issues within this Section were obtained from the Issues and Responses Report Version 2 that accompanied the final Scoping Report that was submitted to DEAT.

The following comments were received regarding issues related to employment creation:

- That it is expected that the proposed project will create many job opportunities for local stakeholders to alleviate poverty in the area.
- That people interested in job opportunities during the construction of the proposed dam should have a valid building certificate, security certificate and a driver's license.
- That job opportunities should be created for the Nwamitwa inhabitants.
- That the socio-economic issues such as job creation, unemployment should be investigated.
- That contract workers be monitored carefully to avoid issues such as an increase of HIV/AIDS in the area.
- That concerns were raised whether existing farm workers will lose their jobs, if the proposed dam may result in taking away productive farm lands.
- That the larger part of the affected area to be covered by the proposed project was originally inhabited by the members of the BaKgaga MaMaupa tribe or community who were dispossessed of their land, removed and or resettled from the area by the previous white governments. These resettled members still have important sacred and heritage places they adore, e.g. graves, ancestral places, places of worship.

The following comments were received regarding issues related to the development of the local/socio economy:

- That the availability of water in the area will assist in commercialising some opportunities such as the establishment of a car washing facility.

- That the Limpopo Province has commissioned a socio-economic assessment that may feed into the investigations of the project.

The following comments were received regarding issues related to livelihoods and socio-economics:

- That communities should be made aware of the proposed opportunities this project might have so that they can participate in the tendering for contracts when the proposed dam is constructed.

- That landowners need to farm continuously to stay economically alive and to maintain the full capacity of for example their factories.

- That the project should improve the livelihood of communities directly affected by the proposed construction of the dam – especially the previously disadvantaged.

- That the resettlement of people that might be directly affected by the diversion / alignment of roads, etc should be investigated.

- That people are now regarding the dam as being positive for the area after they were initially negative. However it is important for them to know in advance how they will be affected. They need to make the necessary arrangements in order for the farming activities not to suffer, e.g. they need to assess the impact on transport of workers as well as production.

- That the people's livelihoods be considered if they are relocated.

- That farming with cattle takes place on the farm. Will the grazing fields be bought from us and if so may we hire it back? We will have to find new grazing for our cattle.

- That the following of the landowners will be inundated should the proposed dam be constructed: houses of landowners and farm workers, boreholes, surface dams, water distribution and irrigation networks, storage areas and warehouses, power lines, pump stations established garden and orchards.

- That clarity must be provided whether loss of income for the time to re-establish new orchards will be considered

11. OTHER INFORMATION REQUESTED BY THE AUTHORITY

No other information was requested.

12. CONCLUSION

The raising of the Tzaneen Dam only requires a few construction related facilities located within the property of the Government Water Works thus no acquisition of additional land is required nor will the higher dam wall affect the size of the downstream flood. Only positive economic impacts are foreseen as a result of the raising of the Tzaneen dam.

The proposed Nwamitwa dam site and associated GLeWaP bulk water supply infrastructure will result in both positive and negative economic impacts. The negative economic impacts associated with the loss of land and loss of jobs will not lead to impoverishment of families as during the operation far more positive impacts can be created if a sustainable water source is provided in this area. Ultimately this project, if handled correctly, will lead to a development injection for this area. In other words the positive impacts on the long-term sustainability of the citrus industry and sustainable job creation will be greater the temporary losses and/or negative impacts during the construction phase.

13. REFERENCES

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