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Department:
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REPORT NO.: P 02/B810/00/0708/Volume 2/Annexure C-D

GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

DRAFT

Environmental Impact Assessment

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

ANNEXURE C-D:
Social Impact Assessment
Economic Specialist Study

ILISO CONSULTING
Engineers Project Managers

AUGUST 2008

ILISO Consulting (Pty) Ltd
P O Box 68735,
Highveld, 0169
Tel (012) 665 3602
Fax (012) 665 1886

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Environmental Impact Assessment

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

ANNEXURE C: SOCIAL IMPACT ASSESSMENT

JULY 2008

MasterQ Research
Combining integrity & skills

Compiled by:

MasterQ Research
49 Muller Street
Yeoville
2198

DECLARATION OF CONSULTANTS' INDEPENDENCE

Anita Bron and Nonka Byker, who are social specialists from MasterQ Research, and Portia Mnisi, who is a trainee social specialist from MasterQ Research 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

Project name:	***Groot Letaba River Water Development Project (GLeWaP)***
Report Title:	***Environmental Impact Annexure C:*** ***Social Impact Assessment***
Authors:	***Ms Anita Bron and Ms Portia Mnisi*** ***Draft Report reviewed by Dr K.U. Brugge***
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SPECIALIST
Approved for MasterQ Research by:

Ms Anita Bron *Date*
Study Leader

ENVIRONMENTAL ASSESSMENT PRACTIONER
*Approved for ILISO Consulting (Pty) Ltd by**:***

Dr Martin van Veelen *Date*
Project Director

EXECUTIVE SUMMARY

The overall objective of this Social Impact Assessment (SIA) was to inform decision making by the Department of Environmental Affairs and Tourism (DEAT) in terms of environmental authorisation for the proposed dam at the site called Nwamitwa and the raising of the Tzaneen Dam. The primary objective of the SIA was to assess the potential social impacts based on issues and concerns raised by I&APs, secondary data sources, and other EIA studies, and to identify measures by way of mitigation.

The assessment of impacts was based on:

- *demographic processes: the number and composition of people;*
- *economic processes: the way in which people make a living and the economic activities in society;*
- *empowerment, institutional and legal processes: the ability of local government to supply and maintain the necessary services, and the ability of people to participate and have an influence on decision-making;*
- *socio-cultural processes: the way in which humans behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions;*
- *geographical processes: land use patterns including settlement patterns and development; current and future agricultural activities; and current and future developments;*
- *bio-physical processes: change processes relating to the bio-physical environment.*

The results of the Ecology, Health, Heritage, Visual and Economic Impact Assessments were scrutinised to assist with the assessment of potential impacts from a social perspective. Relevant literature, interviews and the Rapid Rural Appraisal were conducted to collect information. Rapid Rural Appraisal facilitates a process of rapidly assimilating information about an area. Interviews were conducted with commercial farmers, emerging farmers, farm workers, inhabitants of villages, municipal officials, and project team members.

The demographic, biophysical and socio-cultural change processes all have a number of associated negative impacts. However all of these impacts can be mitigated successfully if effectively managed. Economic impacts as a result of the project are for the most part positive in nature, which is mainly due to the economic investment and development that will take place in the community as a result of the project, which will impact on psychosocial level.

Although the expected construction impacts across all the change processes are mostly negative, these impacts are for the most part only temporary in nature and only expected to last over the construction period. The potential impacts can be significantly reduced should local labour be used as estimated and undertaken by the Department of Water Affairs and Forestry (DWAF).

In comparison to construction impacts, operational impacts are expected to last over the longer term and therefore would have potentially prolonged impacts. The effective management, and regular monitoring and evaluation of both the dams, also in terms of upstream and downstream impacts, would ensure that corrective measures can be taken immediately to prevent adverse impacts on the infrastructure itself, or on the affected areas and people.

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

In terms of water allocations, a licence is not needed to continue with an existing lawful use authorised by previous legislation until the responsible authority requires that a person claiming to have such an entitlement apply for a licence. If a person could not use the water he is entitled to during the qualifying period the National Water Act provides that such a use could under certain circumstances be declared an existing lawful use.

The Department's Water Allocation Reform programme pays particular attention to equitable distribution of water and emerging black farmers who did not receive their water for farming are advised to apply that their allocations are declared as existing lawful use. Allowance was made in the hydrological analyses to include this as a usage. Irrigable land will have to be identified on which this water may be used. Implementation of the project with a new major storage dam will make it possible to better manage the water available for irrigation.

The World Commission of Dams work highlights the issue of social impacts on vulnerable groups and individuals when large dams are constructed. In this project these groups could be individuals with unregistered rights or who currently provide part time labour on citrus farms. Compensation of these groups of people should be dealt with in accordance with the relevant laws that apply.

In terms of the size of the dam, there are three possible water fill scenarios: the maximum fill scenario (1.5 Full Supply Level1), a medium fill scenario (1.0 Full Supply Level) or a low fill scenario (0.5 Full Supply Level). The perceived significance of the social impacts resulting from the number of houses to be lost for each of these scenarios is tempered by the fact that the majority of land owners are willing to be compensated for their houses to secure the benefits of the increase in water supply for agriculture. In light of the available information and the project objective and goal, the medium fill scenario seems preferable.

The preferred road alignments are the alignments which will have the least impact on travelling distance and costs, with minimal intrusion impacts. The preferred routes for the bulk water supply pipes are the routes that skirt settlements and follow existing infrastructure.

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

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

[1] Full supply level is the land that will be aquired for the dam.

The permanent indirect positive impact on Quality of Life (health related and non-health related) is probably the increase in water supply to the different beneficiaries. The successful implementation of water supply to affected communities, emerging farmers, etc. will outweigh the potential negative impacts. The indicators for 'successful' can be derived from implementation conditions and mitigation measures (see EMP and mitigation measures in this document).

In conclusion:

The social issues in the Environmental Management Plan should be communicated in detail to the appointed contractor.

An Environmental Control Officer should be appointed to monitor the implementation of social mitigation measures are. This person should have experience in facilitation, and negotiation, specifically with rural communities. He/she should have excellent communication, listening and problem solving skills. Experience in similar projects and ability to speak local languages should be considered when selecting this person.

Project planning should be drawn through to the Integrated Development Plan to inform land use planning, tourism planning, to avoid conflicts and to leverage mutual resources between the DWAF and local government.

An important aspect related to the successful completion of the project is probably the way in which the DWAF will communicate with and involve the affected parties, also in the mitigation of impacts. The affected parties should be pro-actively involved throughout the process to avoid any misunderstanding. The municipality, Tribal Authorities, land owners, construction company and the DWAF should form part of a forum to navigate the process.

The social impacts as anticipated based on the SIA should be monitored and evaluated to inform future SIAs on dam projects. The impact of the changes on the baseline should be measured.

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ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
DEAT	Department of Environmental Affairs and Tourism
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FSL	Full Supply Level
GLeWaP	Groot Letaba River Water Development Project
HRQOL	Health-related Quality of Life
HIV	Human Immuno-deficiency Virus
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
MAR	Mean Annual Run-off
NHRQOL	Non Health-related Quality of Life
PAYE	Pay As You Earn
QOL	Quality of Life, encompassing NHQOL and HQOL
RDP	Reconstruction and Development Programme
SAMEA	South African Monitoring and Evaluation Association
SIA	Social Impact Assessment
UIF	Unemployment Insurance Fund

DEFINITION OF KEY CONCEPTS

The following served as operational definitions for purposes of assessing relevant social change processes and impacts:

COMMUNITY

"Communities are marked by deep, intimate and co-operative ties between members. In this sense, 'community' is close to Durkheim's idea of social solidarity, which emerges from commitment to a shared set of values. He calls this 'the collective conscience.' Nisbet gives a formal definition. For him, community 'encompasses all forms of relationship which are characterized by a high degree of personal intimacy, emotional depth, moral commitment, social cohesion and continuity in time (Cohen & Kennedy, p. 375)."

"The fact that people live close to one another does not necessarily mean that they have much to do with each other. There may be little interaction between neighbours. It is the nature of the relationships between people and the social networks of which they are a part that is often seen as one of the more significant aspects of 'community' (Lee & Newby, p. 57)."

Based on the interaction with the Interested and Affected Parties in the study area and the assessment of issues and concerns, the social specialists concluded that the following segments were communities: inhabitants of the villages; the commercial farmers; the farm worker communities.

PSYCHOSOCIAL

(also termed PSYCO PSYCHOLOGICAL)

The Oxford English Dictionary (1999) defines 'psychosocial' as *"pertaining to the influence of social factors on an individual's mind or behaviour, and to the interrelation of behavioural and social factors."*

Martikainen, Bartley and Lahelmac (1999) explain *that "macro- and meso-level social processes lead to perceptions and psychological processes at the individual level. These psychological changes can influence health through direct psychobiological processes or through modified behaviours and lifestyles. However, many psychosocial exposures such as*

unemployment (so called 'stressful life-event') and social networks/supports need not necessarily invoke psychosocial processes or require psychosocial explanations. Thus, unemployment that leads to loss of income and an inability to buy material necessities of life does not constitute a psychosocial explanation of health. However, a psychosocial process is operating when unemployment leads to loss of self-esteem and feelings of worthlessness that affect health via direct psychobiological processes or through modified behaviours and lifestyles. Similarly, social networks may provide instrumental and material benefits and opportunities as well as close person-to-person social contacts and emotional support; yet only the latter path seems to qualify as a psychosocial process."

QUALITY OF LIFE

'Quality of life' (QOL) may refer to health-related quality of life (HRQOL); or to non-health or environment-based quality of life (NHRQOL). Teresi (undated) explains the differences as follows:

"HRQOL encompasses domains of life directly affected by changes in physical health. Jaschke and colleagues provide a good thumbnail test of whether a domain falls within the category of health-related QOL. In their view, HRQOL domains are aspects of life that improve when a physician successfully treats a patient. A clinically significant change in HRQOL is indicated by a decline in a domain that leads a physician or health care provider to alter a medication or medical treatment. HRQOL domains minimally include functional status (e.g., whether a patient is able to manage a household, use the telephone, or dress independently), mental health or emotional wellbeing (e.g., depressive symptoms, positive affect), social engagement (e.g. involvement with others, engagement in activities), and symptom states (e.g., pain, shortness of breath, fatigue). These domains represent typical outcomes in medical and social science research.

Non-health-related QOL domains include features of both the natural and the created environment (i.e., economic resources, housing, air and water quality, community stability, access to the arts and entertainment) and personal resources (i.e., the capacity

to form friendships, appreciate nature, or find satisfaction in spiritual or religious life). These factors affect health-related QOL but, unlike health-related QOL domains, are less likely to improve with appropriate medical care."

NHRQL, as opposed to HRQL, is the focus of this report. Measuring NHRQL is not within the scope of this report, as it will differ from person to person and therefore requires a rigorous scientific study to get an indication of the overall NHRQOL experienced by affected parties in the study area. The focus in this report is on the potential impact of changes on the experience of NHRQOL. The assumption is that the better the natural and created environment as well as personal resources, the better the overall NHRQOL. Quality of Life is therefore more than Standard of Living, although increase in living standard might contribute to a better QOL. QOL encompasses NHRQOL and HRQL.

STANDARD OF LIVING

"A minimum of necessities, comforts, or luxuries considered essential to maintaining a person or group in customary or proper status or circumstances (http://www.teachmefinance.com Financial_Terms/standard_of_living.html)."

"The financial health of a population, as measured by the quantity of consumption by the members of that population. The measure most frequently used to estimate standard of living is gross national income per capita. One drawback to the standard of living measurement is that it does not take into account some factors which are important but hard to quantify, such as crime rate or environmental impact (http://www.investorwords.com/4691)."

1. STUDY INTRODUCTION

1.1 BACKGROUND TO THE 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, and the construction of a storage dam in the Groot Letaba River with its 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 Gazette No. 28753 of 21 April 2006.

ILISO Consulting has appointed MasterQ Research to undertake the Social Impact Assessment as part of the EIA.

1.2 STRUCTURE OF THIS REPORT

This specialist study is 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 impact of the proposed activity, including identified alternatives, on the environment	Chapter 6
(g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority	Chapter 7
(h) a description of any consultation process that was undertaken during the course of carrying out the study	Chapter 8
(i) a summary and copies of any comments that were received during any consultation process	Chapter 9
(j) any other information requested by the competent authority.	Chapter 10

2. PROJECT TEAM

Anita Bron of MasterQ Research undertook the Social Impact Assessment (SIA). She has a Masters degree in Research Psychology with a focus on Environmental Psychology. She specialises in Social Impact Assessments, Social Marketing Research and Monitoring and Evaluation. She has completed Social Impact Assessments for developments such as transmission power lines, distribution power lines, pipelines, mines, and substations. She reviewed a SIA for a multi products pipeline.

She is a guest lecturer at the University of Johannesburg and lectures post graduate classes on information gathering and focus groups. She is currently completing a Masters degree in Social Impact Assessment at the University of Johannesburg. She is a member of SAMEA, the South African Monitoring and Evaluation Association.

Anita was assisted by Portia Mnisi. Portia is currently completing a BA Social Sciences; and is a research assistant in the MasterQ Research team. She has approximately one year's experience in doing social research. The aim is to develop Portia to such a level that she is able to conduct SIAs independently. She is skilled in working with rural communities and has a great understanding of the cultural background of such communities and is therefore able to gain valuable information in a respectful manner.

3. PURPOSE OF REPORT AND SCOPE OF WORK

The purpose of this report is informed by the results of the Social Scoping Study. To give background to the purpose of this report and the scope of work, this chapter lists the objectives of the Social Scoping Study, followed by a list of studies that were recommended in the Social Scoping Study to be executed in the EIA Phase, and finally the purpose of this SIA.

3.1 OBJECTIVES OF THE SOCIAL SCOPING STUDY

The overall objective of the Social Scoping Study was to identify issues and concerns related to the construction and operation of the raising of the Tzaneen Dam and the proposed dam at the site called Nwamitwa. This served to focus the detailed assessment to follow in the EIA Phase, and to provide a framework within which the assessment was to be undertaken. To meet these objectives, the project components had to be scoped in the context of the study area.

A number of primary research objectives were derived from the overall objectives. These primary research objectives were as follows:

- Gain an understanding of the proposed project;
- Obtain information on the current and potential future:
    - **Demographic processes**: the number and composition of affected populations;
    - **Economic processes**: the way in which people make a living and the economic activities in society;
    - **Empowerment, institutional and legal processes**: the ability of local government to supply and maintain the necessary services, and the ability of people to participate and have an influence on decision-making;
    - **Socio-cultural processes**: the way in which the people in the study area behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions;

- **Geographical processes**: land use patterns including settlement patterns and development; current and future agricultural activities; and current and future developments;
- **Bio-physical processes**: change processes related to the bio-physical environment..

- Understand how the project might affect these change processes and result in impacts, including in physical and/or cognitive experiences of people impacted;
- Identify gaps in the information available;
- Formulate recommendations regarding more detailed studies to be conducted during the Impact Assessment Phase.

Based on the results, studies to be executed in the EIA Phase were identified. These are listed in **Chapter 3.2.**

3.2 RECOMMENDED STUDIES FOR THE EIA PHASE

To close the gaps in the information that was identified in the Social Scoping Study, studies to be executed in the EIA Phase were identified. The information was needed to ensure that potential impacts which were identified were assessed with high confidence levels in the EIA Phase. The recommended studies were summarised as follows:

- Conduct a Situation Assessment to assess the relative socio-economic impacts of three possible Purchase Lines based on three possible Full Supply Levels (FSL) (0.5 FSL, 1.0 FSL and 1.5 FSL) in order to inform the decision-making, comparatively, regarding the size of the dam;
- Assess the impacts on the demographics of the directly affected communities (those in and around the proposed dam basin site);
- Assess the potential impact of displacement and resettlement;
- Assess information on the construction, and maintenance activities, timeframes, workforce and potential to employ and train local people;

- Assess the service delivery capacity of municipalities during construction and operation;
- Propose a process of implementing local employment mitigation measures;
- Compare the potential impacts of housing workers in the communities vs. a construction village;
- Asses how the project might impact on spatial development plans;
- Assess the loss of agricultural land and changes in agricultural activities during construction and operation;
- Assess potential safety and psychosocial health impacts;
- Assess community attitudes as well as understanding of and expectations from the project;
- Assess the potential impacts of the land acquisition process; and
- Assess impacts on the cultural landscape, sense of place and movement patterns.

The approach and methodologies that were used to execute these studies and gather the necessary information are discussed in **Chapter 4**.

3.3 PURPOSE OF THIS SIA REPORT

The overall objective of this SIA was to inform decision making by the Department of Environmental Affairs and Tourism (DEAT) in terms of environmental authorisation for the proposed dam at the site called Nwamitwa and the raising of the Tzaneen Dam. The primary objective of the SIA was to assess the potential social impacts based on issues and concerns raised by I&APs, secondary data sources, and other EIA studies, and to identify measures by way of mitigation.

The assessment of impacts is considered in the context of (as per **Chapter 3.1**):

- Demographic processes;
- Economic processes;

- Empowerment, institutional and legal processes;
- Socio-cultural processes;
- Geographical processes;
- Bio-physical processes.

The results of the Ecology, Health, Visual, Traffic and Economic Impact Assessments were scrutinised to assist with the assessment of potential impacts from a social perspective. The Heritage Impact Assessment was not available at the time of writing this report.

Impacts were identified by looking at how the change process could result in changes in the physical, emotional or mental experiences of people. An impact can be called an impact only when it is experienced as such. For example, population growth, or influx of construction workers are not impacts, but change processes. They could, however, lead to experiences (impacts) such as fear, displacement, or lack of food as a result of lack of income. Sadler, Verocai & Vanclay (2000) quote Vanclay (1999a):

"Resettlement (relocation of a community), for example, is not a social impact, but causes social impacts such as anxiety and stress, uncertainty, disruption to daily living, potential change to family structure, as well as impacts such as homeliness. Similarly, in an (even rapidly) increasing (or decreasing) population, the presence of seasonal workers, and/or weekend residents, is not an impact per se, but it can cause other impacts, such as breakdown of the social fabric of the community, cause existing residents to experience changed perceptions about their community, and may stress the community physical infrastructure. Alcohol or other drug use are not social impacts, but are processes, which, depending on the context of their use, may cause social impacts such as family violence and economic hardship. All of the variables must be understood in their sociological context, and, of course, in their local cultural context. Homeliness, for example, does not mean the physical quality of the house, but the social relationships among the occupants of the building, and between them and the building. It is a subjective concept relating to the meaning and experience people attach to the place where they live and build their home."

4. METHODOLOGY

Different methods were used to fill the information gaps that were identified in the Social Scoping Study. These methods are discussed in **Chapter 4.1**, which is followed by **Chapter 4.2**. **Chapter 4.2** contains the methodology that was used to assess the identified impacts.

4.1 DATA GATHERING METHODS AND SAMPLES

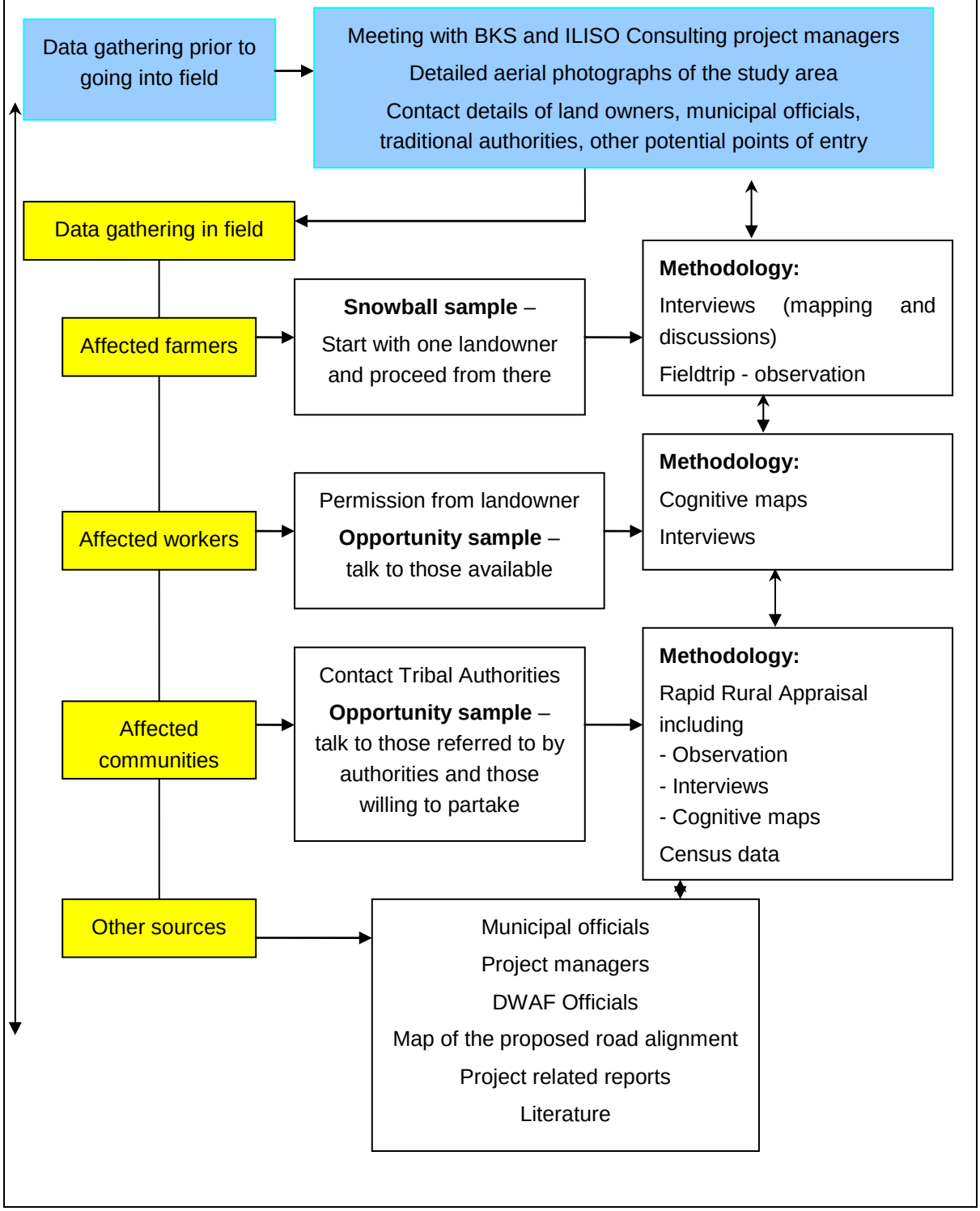
The approach, methodologies and sampling methods that were used to answer the objectives are set out in **Box 4.1** on the next page. The methodologies that were used are then discussed in more detail. A rigid approach was not used in gathering information, but the team followed an action research approach and consistently built on the information they gathered as they progressed with the data gathering process. This approach resulted in the collection of rich, depth data as opposed to strictly quantifiable data. To facilitate this process discussion guides, as opposed to structured interviews, were used to gather information.

The approach was therefore qualitative in nature, and not quantitative. Qualitative research is more in depth, exploratory and open-ended, and small numbers of participants are interviewed individually or in groups. The questions are “what?’ and “why?” in an attempt to understand a complex context which is considered to be dynamic. Communication and observation are used to gather information. Sample size is not the main concern, but the richness of the information gathered. Qualitative research is acknowledged as a valid research process that contributes to depth understanding of a context.

Quantitative research, on the other hand, refers to counts and measures and the aim is to gain results from a sample of people in order to generalise the results, using a structured data gathering instrument. The questions are “how many” and “what is the strength of the relationship?” Cause-and-effect relationships are established. The researcher is not subjectively involved in the research process, but objectivity is maintained by the use of structured questionnaires

http://uk.geocities.com/balihar_sanghera/ipsrmehrigiulqualitativequantitativeresearch.html).

Box 4.1: Information gathering process, samples and methodologies



4.2 RAPID RURAL APPRAISAL

The Rapid Rural Appraisal is a methodology developed in the late 1970's and early 1980's in response to high costs and time intensity of large scale questionnaire

surveys (Chambers, 1994). Rapid Rural Appraisal facilitates a process of rapidly exploring and assimilating information as part of the process of data gathering to gain an understanding of the context of the study area. Data gathering tools for this study included semi-structured interviews with farmers, farm workers and inhabitants of the villages. Whilst conducting interviews with farmers and inhabitants of local villages, the team observed the environment. Specific attention was given to water related contexts, for example how water was collected, where it was collected, and the different water sources.

4.2.1 Interviews

(a) Impacted farmers and farm workers

The *impacted* area is where the project will permanently take land. This is the dam basin up to the purchase level (**Figure 4.1**). The purchase level indicates the area that will be aquired and will become the property of the DWAF. Most of these impacted farmers were interviewed.

The public participation process served to educate/ inform the Interested and Affected Parties (I&APs), and this created a basis for the SIA process. The impacted farmers who were interviewed and had land downstream of the proposed dam, were also interviewed in this regard. Other affected parties downstream of the Tzaneen Dam and proposed dam, such as the Kruger National Park, were not consulted one-on-one by the SIA team. Rather, the issues and responses document were scrutinised to identify the issues and concerns of downstream I&APs.

In total, information was collected from all the impacted commercial farms by conducting face to face interviews with 12 potentially affected farmers. A discussion guide was used to ensure that all the relevant objectives listed in **Chapters 3.2** and **3.3** were achieved. All interviews with farmers, except two, were tape-recorded and analysed. For the two that were not tape recorded, notes were taken and analysed. Each farmer was treated as a separate case study as the issues and potential impacts differed from farm to farm.

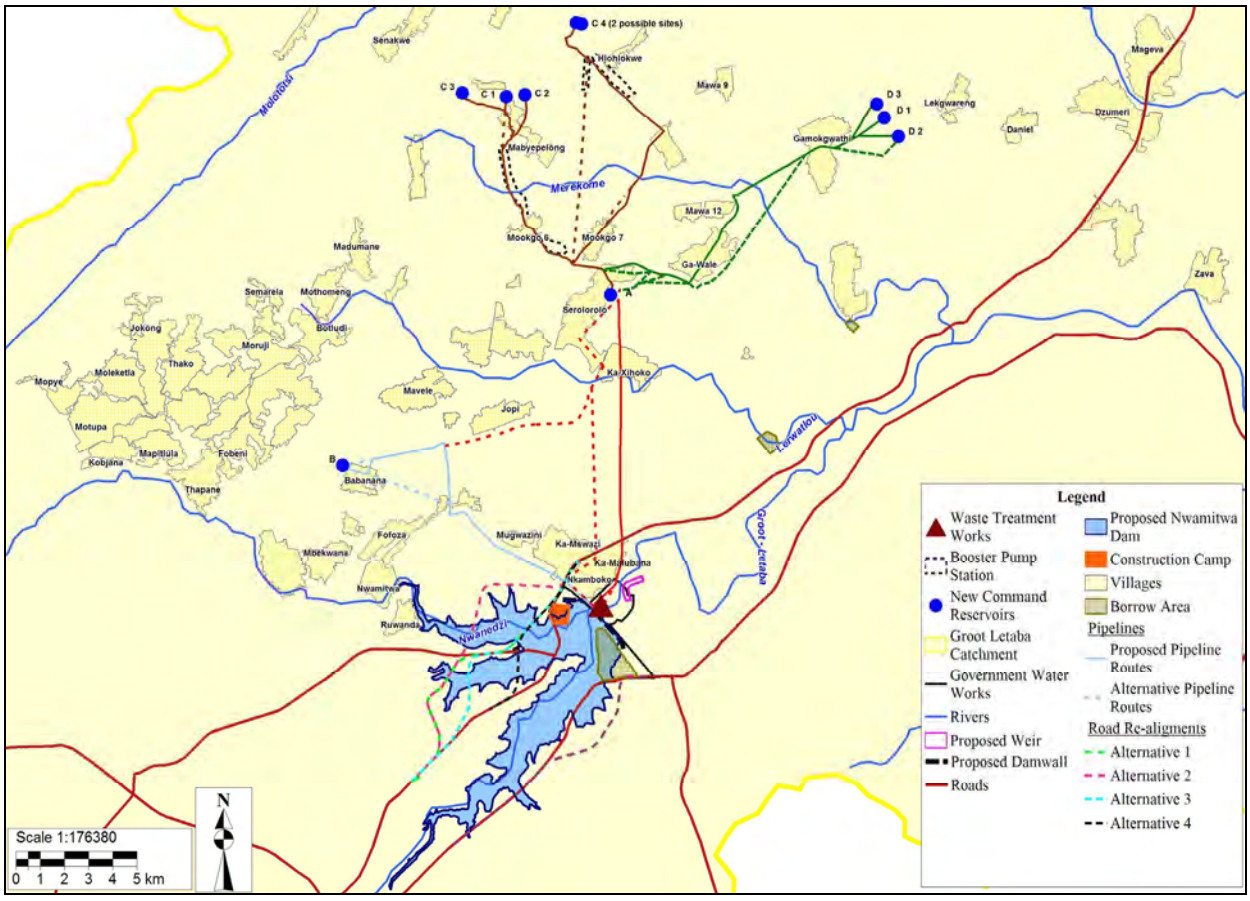
Interviews with farm workers and Kaross workers were conducted separately. Identified issues and concerns were communicated to the public participation consultant. Details of the participants are listed in **Annexure A.**

The sampling method was snowball sampling. The team contacted two farmers, and these farmers provided names and contact details of other farmers in the impacted area. These farmers were contacted and meetings were arranged with those who were available.

(b) Affected communities

The area *affected* by the project includes the surrounding farms, villages and towns that will not be inundated by the dam. The area affected of the proposed dam and related bulk infrastructure, borrow pits and bulk infrastructure was the focus of the research (**Figure 4.1**).

Figure 4.1: Proposed dam at the site Nwamitwa, areas affected and impacted



Two rounds of interaction with the inhabitants of the local villages took place. Notes were taken of interviews, and a member of the local community assisted the trainee social specialist. Identified issues were communicated to the public participation consultant.

Details of the participants are listed in **Annexure A.** For both rounds of interaction with the inhabitants of the local villages, discussion guides were used to ensure that the relevant objectives listed in **Chapters 3.2** and **3.3** were achieved.

The sampling method was opportunity sampling. Those willing and available to partake in the study were interviewed. Although interviews were not conducted with a representative sample, and the information therefore not generalisable, the information which was gathered was rich and in depth and gave a good indication of the context in the villages.

(c) Expert interviews

Details of the participants are listed in **Appendix A**. Discussion guides were used to ensure that the relevant objectives listed in **Chapter 3.2** were achieved. The objectives of a discussion session with project team members were to increase the confidence levels of the impacts assessment by verifying the likelihood and extent to which impacts might occur based on experience from previous projects, and to verify information regarding the pre-construction, construction, and operation phases.

4.3 IMPACT ASSESSMENT 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 direct and indirect impacts, either positive or negative. In the EIA the significance of the potential impacts is considered before and after identified mitigation is implemented.

A description of the nature of the impact and the stage (pre-construction, construction, or operation) is given. Specific legal requirements are listed in **Chapter 4.3**.

The following criteria are used to evaluate significance:

Nature

The nature of the impact is described and classified as positive or negative, and direct or indirect.

Spatial Scale

Spatial scale covers the following:

- **Site:** impacts are limited to the proposed dam / construction site.
- **Local**: the impacts the surrounding, the immediate and the neighbouring properties as per **Figure 4.1**.
- **Regional**: the impacted area extends to the affected municipalities' boundaries.
- **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 social environment, and is classified as:

- **Low**: the change is slight and often not noticeable, and the usual functioning of the social environment is not affected.

- **Medium**: The social environment is remarkably altered, mitigation is required.
- **High**: The affected social environment is disturbed in such a way that significant mitigation measures are required or the impact must be avoided altogether.

Probability

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

- **Low**: during the construction and 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 impact will occur; 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 and may not always be effective.

Cumulative Impacts

Where applicable, the possible cumulative and residual impacts are also considered. Cumulative impacts are impacts added to the existing and foreseeable future changes in the environment.

Mitigation

Mitigation for significant issues was incorporated into the Environmental Management Plan (EMP) for construction.

An example of an Impact Assessment Table is as follows:

Table 4.1: Example of an Impact Assessment Table

Description of potential impact		
Nature of impact		
Legal requirements		
Stage	Construction	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)		
Level of significance after mitigation		
Cumulative Impacts		
Residual Impacts		

Proposed mitigation measures are summarized in the Impact Assessment Tables, and expanded upon in **Chapter 7**.

In order to indicate the applicability of the impacts on the proposed dam and related infrastructure as well as the raising of the Tzaneen Dam, a distinction was made by distinguishing between two impact categories:

- **Category 1**: Impacts that are not expected to differ as a function of project differences, e.g. the impacts as a result of the influx of job seekers are expected to remain the same, irrespective of the project; and

- **Category 2**: Impacts that are expected to only apply to the proposed dam and not to the raising of the Tzaneen Dam, e.g. the resettlement of households is not applicable to the raising of the Tzaneen Dam.

5. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

- The main source of data used for demographic profiles and population growth estimates as per the Social Scoping Study and this study were the 1996 and 2001 census data. The 1996 and 2001 census data should not be regarded as the final say regarding an area, but should be viewed as indicative of broad trends within an area.

- The study was done with the information available to the specialist at the time of executing the study, within the available time frames and budget. The sources consulted are not exhaustive, and additional information which might strengthen arguments, contradict information in this report and/or identify additional information might exist. However, the specialist did endeavour to take an evidence-based approach in the compilation of this report and did not intentionally exclude scientific information relevant to the assessment.

- Impacts and I&APs responses to coping with these can never be predicted with 100% accuracy, even when circumstances are similar and predictions are based on rigorous research results.

- It is assumed that the motivation for and planning of the project were done with integrity, and that information provided by the DWAF is accurate.

- The other specialist reports, except the Heritage Impact Assessment, that were completed as part of this study were scrutinised to inform the SIA. The assumptions, uncertainties and gaps in knowledge listed in those reports therefore impacted on this assessment.

- The results of the situation assessment were verified using an electronic version of the map as provided to the team on 10/10/2007. It seemed as if there were some discrepancies in Full Supply Levels between the maps used to do the analysis and the maps used to verify the data. Information was consequently updated.

- The proposed road re-alignments were not available when the first round of interviews with the land owners was conducted. It would have been useful to have this information available at the time, as it would have ensured a more focused discussion of the potential impacts of the proposed re-alignments. The

suggestions made by I&APs on the preferred alignments were recorded and these were taken into account when the alternative alignments were determined and proposed. I&APs had the opportunity to comment on these proposed alignments at a meeting. Their issues and comments in this regard were included in the Issues and Responses Document.

Cognisance was taken of the following legal requirements and regulatory documents in the assessment:

- Constitution of the Republic of South Africa (Act No. 108 of 1996);
- The Occupational Health and Safety Act (Act No. 85 of 1993);
- Extension of Security of Tenure Act (Act 62 of 1997) (ESTA);
- National Environmental Management Act (NEMA), No. 107 of 1998, as amended and Environment Conservation Act, No. 73 of 1989, as amended;
- The Environmental Impact Regulations of 21 April 2006;
- The Expropriation Act (Act 63 of 1975), subsection 12;
- Relevant Labour Relations legislation.

The description of the project as set out in **Chapter 3** of the main **EIA Report** was used to assess impacts. In summary, the report states that the infrastructure components of the project include:

- The raising of the Tzaneen Dam;
- A proposed new dam at the site known as Nwamitwa which includes:
    - Associated relocation of roads (**Figure 4.1**);
    - Associated temporary housing for construction workers (**Figure 4.1**);
    - Associated permanent administration buildings and staff accommodation (**Figure 4.1** – in the area of temporary housing of construction workers); and
    - Access roads;

- A river flow gauging weir **(Figure 4.1);**
- Upgrading of the existing Water Treatment Works **(Figure 4.1);**
- Pump stations **(Figure 4.1);**
- Pipelines **(Figure 4.1);** and
- Reservoirs **(Figure 4.1).**

6. FINDINGS

This section discusses the social change processes and potential impacts that might occur as a result of the implementation of the project. Change processes are discussed in the following order: demographic, economic, institutional and empowerment, socio-cultural, geographical, and biophysical. The change processes and associated impacts are relevant to the construction and operational phases, respectively.

The pre-construction phase consists of the pre-decision and decision making phases. The pre-decision phase (in the context of this SIA) entails initial consultation by DWAF specialists with the potentially directly and indirectly affected parties and an assessment of the situation; the decision making phase entails the preparation for negotiation and expropriation by DWAF. Negotiation and expropriation may still take place while construction of the dam wall is happening.

To give background to the baseline context within which the assessment is undertaken, a broad socio-economic summary of the area as reported in the Social Scoping Study is provided in **Box 6.1**.

Box 6.1: The context of the study area

The study area falls in four local municipal areas. The two main local municipalities which fall in the study area are the Greater Tzaneen and the Greater Letaba Local Municipalities. The other two municipalities are Greater Giyani, Maruleng, and Ba-Phalaborwa Local Municipalities. These municipalities fall under the Mopani District Municipality. The study area is characterised by rural villages.

The population profile of the people living in the study area is described as (as per the Social Scoping Study):

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

In light of the female majority and high number of under 19 year olds, the communities are vulnerable. Their vulnerability is exacerbated by the high unemployment levels and low household income. About a third of households do not have an income, and one salary might have to provide for a household with an average of five people. Most of the households have services below the Reconstruction and Development Programme (RDP) standard, i.e., no access to enough clean water within 200 meters from the household, as well as no sanitation other than pit latrines without ventilation. The formal employment sector has limited opportunities and will not be able to absorb the economically active. The creation and growth of informal opportunities is therefore considered imperative. The proposed project will contribute to the creation of informal opportunities, e.g. water is needed to grow fruits and vegetables which can be sold.

The government sector is the largest employer in the district followed by the agriculture sector. The agricultural sector encompasses primary agricultural production and also pre-input and input sectors as well as financial, marketing and agro-processing sectors. Commercial farms are mainly owned by white farmers, and emerging black farmers are challenged in terms of lack of training, finances, and access to water (amongst others).

The study area is rural, characterised by a number of commercial farms and rural villages. The landowners who have land in the proposed dam basin are all commercial citrus farmers with a few who also grow vegetables and other fruits on a commercial basis. Some also have cattle as not all the land is suitable for orchards, or available water for orchards is limited.

6.1 POPULATION RELATED CHANGE PROCESSES AND IMPACTS

Population related changes and impacts that can be associated with the proposed dam at the site called Nwamitwa, the raising of the Tzaneen Dam wall, the construction of reservoirs, pipelines and pumps are assessed in the sub-sections below. In determining their significance, they are related to other impacts and baseline conditions (see above).

The demographic change processes are assessed in light of:

- Relocation of households and/or population segments (pre-construction into construction phases);
- Influx of construction workers, job seekers and opportunists (construction phase) and maintenance workers (operational phase);
- Influx of vehicle drivers (construction phase)
- Outflow of labourers (construction into operational phase);
- Influx / Outflow of tourists.

These **change processes** are discussed separately in the order listed above, together with a detailed assessment of the expected impacts as a result of these change processes.

6.1.1 Relocation of households and/or population segments and impacts

The expected demographic change processes and potential impacts as a result of the implementation of the proposed dam, pipelines, reservoirs and pumps for the bulk water supply are discussed below, considering the potentially affected commercial farmers, and the farm workers. It is not expected that people residing in the affected area will have to be relocated.

The significance of the impacts as a result of relocation is difficult to determine on a prospective basis because the impacts might be numerous and might vary between people. The impacts of relocation on a person depends on the level of attachment to a place, which in turn is informed by variables such as age, number of years spent in that particular area, and personality. Where people have been living in a specific area for years, they are used to their surroundings, e.g. the route they travel to work, the amenities (shops, businesses, leisure) they visit, etc. Apart from their surroundings, one could also expect that they are attached to their homes and what it represents.

(a) Commercial farmers

In terms of the size of the dam, there are three possible water fill scenarios: the maximum fill scenario (1.5 FSL[2]), a medium fill scenario (1.0 FSL) or a low fill scenario (0.5 FSL). For the impacted parties in the dam basin the numbers of houses that will be affected by the various fill scenarios are as follows:

- For the maximum fill (1.5 Full Supply Level), 12 houses will be affected.
- For the medium fill (1.0 Full Supply Level), 10 houses will be affected.
- For the low fill (0.5 Full Supply Level), 6 houses will be affected.

The relocation of these households will not lead to significant demographic change processes and economic impacts on the local economy, given that the majority of households will be relocated to a different piece of land on their farm, and will not be moved out of the area. Only one household comprising two people mentioned that they might want to relocate to a different location altogether. Another household, also comprising two people, might have to relocate to a different area altogether,

[2] Full supply level is the land that will be aquired for the dam.

depending on the impact of the dam levels and the road re-alignment on their land and future development plans. These two households will be affected by all the proposed scenarios.

Overall, the perceived significance of the social impacts resulting from the number of houses to be lost is tempered by the fact that the majority of land owners are willing to be compensated for their houses to secure the benefits of the dam. The economic impacts of relocation are perceived to be minimal compared to the economic impacts on farming activities. In summary, farmers expected to be the same or better off once the dam is built, and were therefore willing to relocate. No relocation of villagers are expected.

(b) Farm workers

A total of four farm worker compounds will be affected for all proposed dam levels. An estimated 150 people will be affected in this way. The relocation of the compounds might lead to demographic change processes. This is because inhabitants might be relocated to a farm or a village removed from the current location.

To reduce potential negative impacts of relocation, alternative land should be conveniently located for those living in the compounds to ensure accessibility to roads and services, but the land should also not take up valuable agricultural land.

Where this is not possible, a solution might be to relocate these households to surrounding villages. A move such as this will break up communities with definite patterns of interactions, behaviour, and social support. New social structures might have to be formed with the receiving community. However, currently most of the farm workers who live in the compounds are taken home for the weekend by the farmers, and the social impact of a permanent move might not be significant. The impact might be significant on an economic level as farm workers might have to pay for transport everyday.

In both cases, moving to another section of the farm or moving to the village, the prospect of moving to new houses might be perceived positively, but it might also be perceived in a negative light because of the fear of the unknown, unexpected economic impacts, as well as leaving a familiar area with many memories might.

CATEGORTY 2 IMPACT		
Description of potential impact	The move to a new dwelling may have a negative psycho-social impact.	
Nature of impact	Negative direct	
Stage	Pre construction (but the impacts might be felt into construction and operation)	Operation
Extent of impact	Regional	N/A
Duration of impact	Short term to permanent (depends on individual)	N/A
Intensity	Low to high (depends on individual)	N/A
Probability of occurrence	High	N/A
Confidence of assessment	Medium	N/A
Level of significance before mitigation	Low to high (depends on individual)	N/A
Mitigation measures (EMP requirements)	The implementation of a fair and transparent negotiation process. Negotiations should be approached with the necessary cultural sensitivity. Sufficient compensation and assistance with the relocation process. Formal grievance procedure. Minimum disruption. Develop a Land Acquisition Process and Compensation Assessment and Action Plan. Implement Heritage Resource Specialist Study (Annexure 10) mitigation measures.	N/A
Level of significance after mitigation	Low to medium (depends on individual)	N/A
Cumulative Impacts	The pending Land Claims contributes to stress levels.	N/A
Areas of concern The impacted area.		

6.1.2 Influx of job seekers/opportunists and construction/maintenance workers and impacts

(a) Construction

According to the available information some 50 people will be employed during the 18 month construction of the raising of the Tzaneen Dam wall, and 300 people for the 5 year construction of the proposed dam at the site called Nwamitwa.

An **influx of job seekers**, mostly from the affected municipalities, is likely to occur as news of the project spreads. The affected municipalities are characterized by high unemployment rates, low levels of income, and poverty. Only about 26% of the population between the ages of 15 to 64 years in the affected municipal areas are employed, approximately 21% is unemployed and the remainder include people who are either students, homemakers, or do not want to work. This situation makes it likely that the prospect of employment opportunities will attract job seekers.

The influx of job seekers might lead to settlement as close to economic activity as possible. A construction site or construction activity taking place in the area is typically viewed as an economic activity as it might offer the opportunity of employment. This inflow is expected to be primarily from the villages in the affected area (given their proximity to the site called Nwamitwa), and Tzaneen (given its proximity to the Tzaneen Dam). As word spreads, family members of the inhabitants of the villages living further afield may come to the area in search of work.

This potential inflow of **job seekers** and **construction** workers is not an impact, but merely a *change process*. If job seekers do secure jobs the main positive impact resulting from this change process, is economic. This is discussed in detail in the Economic Specialist Study (Annexure 4). If those that are unsuccessful in securing jobs commit crimes to sustain themselves, settle illegally on surrounding private land or interfere in local community affairs, then the change process result in negative impacts, the main impacts being on safety and security and community cohesion.

The **perceived** potential impact on safety and security is also an impact. Farmers and community leaders shared their concern with the team regarding the fact that they might not have control over who has access to their property/villages and who has not. The perception was that crime (including stock thefts and theft of food) and sexual activities increase in an area the moment that **construction** and **maintenance** workers arrive on site and accessibility to areas surrounding the site increases. Affected parties will therefore have a heightened awareness of potential dangers, although these theft and crime by construction and maintenance might never occur.

The significance of these potential impacts is difficult to determine on a prospective basis and are dependent on the successful implementation of the proposed mitigation measures. The change process and potential impacts are not considered to be of high significance because Traditional Authorities authorise occupation in the area, and employment will go through formal channels which will be managed in collaboration with local authorities,

(b) Operation

No employment opportunities exist once the Tzaneen dam wall is raised. For the operation of the proposed dam at the Nwamitwa site, six employment opportunities will be available. In light of the fact that the job opportunities are minimal, the change process and impacts are not expected to be significant.

CATEGORY 1 IMPACT DURING CONSTRUCTION CATEGORY 2 IMPACT DURING OPERATION		
Description of potential impact	Influx of job seekers and opportunists as well as construction and maintenance workers result in safety and security concerns amongst the impacted on and affected parties.	
Nature of impact	Direct negative	
Stage	Pre-construction and Construction	Operation
Extent of impact	Local	Local
Duration of impact	Short term	Short term
Intensity	Medium	Low
Probability of occurrence	Medium	Low

Confidence of assessment	High	High
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	A recruitment policy and process should be finalised. Identifiable construction workers. Safe and secure construction sites and village. Remove loiterers. Monitor areas where people gather in the field on a regular basis. Aerial photos of the area should be taken to monitor changes. Create awareness that opportunities are limited.	
Level of significance after mitigation	Low	Low
Cumulative Impacts	High crime rates in South Africa.	
Areas of concern Farms in the vicinity of the proposed dam wall and construction village. Villages where the bulk pipelines pass.		

CATEGORY 1 IMPACT DURING CONSTRUCTION CATEGORY 2 IMPACT DURING OPERATION		
Description of potential impact	Job seekers and opportunists who are unsuccessful in securing a job might revert to criminal activities, and impact on safety and security. The construction and maintenance workers might also commit crimes while working on the farms. Actual crime, stock theft and crop theft might occur.	
Nature of Impact	Direct negative	Direct negative
Phase	Construction	Operation
Extent of impact	Local	Local
Duration of impact	Short term	Short term
Intensity	Low	Low
Probability of occurrence	Medium	Low
Confidence of assessment	Medium	Medium

Level of significance before mitigation	Low	Low
Mitigation measures (EMP requirements)	Safety of these landowners should be ensured. Appoint security personnel. Erect fences to increase security. Local people should be employed to increase support for the project and reduce the potential for criminal activities.	
Level of significance after mitigation	Low	Low
Areas of concern Farms in the vicinity of the proposed dam wall and construction village. Villages where the bulk pipelines pass.		

CATEGORY 1 IMPACT DURING CONSTRUCTION CATEGORY 2 IMPACT DURING OPERATION		
Description of potential impact	Job seekers and opportunists who are unsuccessful in securing a job might settle in the area illegally and create conflict with affected parties.	
Nature of Impact	Direct negative	Direct negative
Phase	Construction	Operation
Extent of impact	Local	Local
Duration of impact	Short term	Short term
Intensity	Low	Low
Probability of occurrence	Medium	Low
Confidence of assessment	Medium	Medium
Level of significance before mitigation	Low-medium	Low
Mitigation measures (EMP requirements)	Safety of these landowners should be ensured. Appoint security personnel. Erect fences to increase security. Local people should be employed to increase support for the project and reduce the potential for criminal activities.	

Level of significance after mitigation	Low	Low

6.1.3 Influx of vehicle drivers and impacts

(a) Construction

The influx of construction workers will also entail an increase in the traffic population as construction vehicles will have to go to the construction sites for construction purposes to deliver construction material, and to transport construction rubble.

The increase in the number of road users is not an impact, but merely a *change process*. However, the number of construction vehicle road users may change the movement patterns of other road users in such a way that their movement patterns are disrupted, their safety levels are impacted on, and their stress and/or frustration levels increase.

The findings of the Traffic Impact Assessment (Annexure 12) indicate that there is ample space capacity for construction vehicles on the road network surrounding the **Tzaneen Dam**. In terms of the construction of the proposed dam at the **Nwamitwa** site and associated bulk infrastructure, the Traffic Impact Assessment's findings (Annexure 12) are that there is ample capacity on the R71, the R81, the R529, and the P43/3. Because there is ample space for additional heavy vehicles, the increase in construction vehicle road users will not change the baseline conditions significantly, and mentioned impacts are not likely to occur.

Of concern are the safety of pedestrians, and donkey cart users as construction vehicles will have to travel through villages on secondary roads to the proposed reservoir and the borrow pit sites. The inhabitants of the villages in the area mostly use taxis or walk on foot to reach their destinations. Donkey carts are used to transport people, goods, and water. The increase in construction vehicle road users might impact on the safety of the pedestrians, donkey cart and taxi users. Another concern is the potential impact of an increase in construction vehicle users on the harvesting traffic. In the harvesting season tractors with trailers for citrus and trucks transporting citrus increase.

Statistics about the number of accidents that are caused by construction vehicles and the number and causes of traffic accidents in the study area could not be sourced, which makes it difficult to determine whether and to what degree this change process (presence of the vehicles) will result in impacts. However, because of the potential severity of this impact (accidents and death), this impact is rated.

(b) Operation

No employment opportunities exist once the Tzaneen dam wall is raised. For the operation of the proposed dam at the Nwamitwa site, six employment opportunities will be available. The increase in traffic will therefore be minimal, and the changes in the road user numbers will not change the baseline conditions.

CATEGORY 2 IMPACT – associated bulk infrastructure		
Description of potential impact	Increase in construction vehicles will impact on the likelihood of accidents happening. Accidents may involve pedestrians and/or other vehicles.	
Nature of impact	Direct negative	
Stage	Construction	Operation
Extent of impact	Local	N/A
Duration of impact	Short term	N/A
Intensity	Medium	N/A
Probability of occurrence	Medium	N/A
Confidence of assessment	Medium	N/A
Level of significance before mitigation	High	N/A
Mitigation measures (EMP requirements)	Mitigation measures as discussed in the Traffic Impact Assessment (Annexure 12) and mitigation measures related to the minimisation of the generation of particulate emissions in the Health Impact Assessment (Annexure 11) are applicable.	N/A
Level of significance after mitigation	Low	N/A
Cumulative Impacts	Heavy vehicles as a result of other projects. Should the construction of storm water pipes still be taking place at the time of construction, this will contribute to the probability of the impact occurring.	N/A

Areas of concern

Villages where the bulk pipelines pass, villages in close proximity to reservoirs and borrow pits and reservoirs.

6.1.4 Outflow of local labourers and impacts

(a) End of Construction

Approximately 50% of the locals who secure employment with the contractors will also receive training, thereby enabling them to secure more permanent employment with the contractor, which in turn might cause them to move out of the area, becoming part of the migrant labour force. It is not expected that the number of people who might be employed permanently will lead to significant changes to the baseline migrant labour force numbers and demographics. The potential direct impacts are therefore not assessed. The positive economic impacts of permanent employment are discussed in the Economic Specialist Study (Annexure 4).

A number of secondary impacts will be experienced:

- The local settlements will experience a loss of men who become part of the migrant community, which in turn will impact on the community and family structures, and the cultural landscape.

- Some men might never return home, start a second family, and/or use their income to support their addictions. Other negative impacts include health impacts as discussed in the Health Impact Assessment (Annexure 11).

- The positive impacts might be an increase in living standard and NHQOL. Families who have an income are able to unlock more possibilities and enhance their lives (e.g. their living conditions, education opportunities, etc.).

- The same holds true for skilled workers who will in-migrate to work on the project. They might be away from their families should their families not travel with them, but their families will experience the financial benefits.

6.1.5 Influx / Outflow of tourists and impacts

The potential impacts as a result of possible changes in tourist numbers are category 2 impacts. The Tzaneen dam is considered a tourist destination, and the raising of the dam wall will not result in significant changes in the dam as a tourist destination (also see the Visual Impact Assessment, Annexure 7).

(a) Construction

It is not expected that the construction activities will lead to a reduction in current tourism numbers and demographics of tourists, potentially resulting in negative economic impacts. The construction activities take place away from major tourism routes, and the accessibility to the area will not be affected by the road construction activities. The current roads will be operational until the new roads are ready for use. The economic impact is assessed in the Economic Specialist Study (Annexure 4).

(b) Operation

Downstream changes in tourism numbers and potential impacts

Once the dam is operational, tourism numbers might increase downstream of the catchment. The potential increase in and management of water supply to the Kruger National Park and other tourism destinations, along the river and in the catchment, might open up opportunities for further development and/or enhance the natural environment. The enhancement of these recreational areas will have an economic impact. The economic impact is discussed in the Economic Specialist Study (Annexure 4).

Changes in tourism numbers in the proposed dam area and potential impacts

The Visual Impact Assessment (Annexure 7) discusses the potential tourism value of the proposed dam at the site called Nwamitwa. The tourism numbers in the proposed dam area might not increase significantly, because there are already a number of tourist destinations in the area, and the dam will be only 50% full most of the time.

However, the Tzaneen Local Municipality wants to explore the potential of developing the dam into a tourist destination to increase the economic growth in the area. The influx of tourists might not be highly significant, but it might bring about positive economic impacts as a result of job opportunities that will be created and local businesses that will be supported. The municipality has requested that feedback and further discussions be initiated by the DWAF in this regard. Pending these discussions, the Integrated Development Plan (IDP) will be adapted accordingly. These discussions should take place prior to the clearance of the inundated area, to determine which trees will have to be cleared. The trees will be cleared where tourism activities might take place to ensure that recreational activities can take place in a safe environment, e.g. boats don't get entangled in the tree tops. Impacted on farmers are considering exploring the tourism potential of the dam in this regard, and they should also be timeously consulted.The timber will be available to the communities. Timber will have to be transported to a central place in order to properly manage the distribution of wood to those who are interested in acquiring it.

6.2 ECONOMIC PROCESSES AND IMPACTS

The economic changes are discussed in detail in the Economic Specialist Study (Annexure 4). The study discusses the components:

a. Stimulation of the economy;

b. Increased government income and expenditure (tax revenue);

c. Employment creation;

d. Increased business output and sales;

e. Loss of land, improvements and resources;

f. Loss of employment and income;

g. Change of movement patterns and associated transport costs;

h. Change in property values;

i. Increased water availability and associated economic sustainability and stimulation.

The effects of these components will result in changes and impacts on a social level. For the assessment of the potential social impacts as a result of the economic contribution of the project, the social specialist focuses on two overarching change processes: economic benefit, and loss of income. Economic benefits will result in positive psychosocial impacts, and loss of income will result in negative psychosocial impacts.

6.2.1 Economic losses and psychosocial impacts

The loss of land, improvements and resources; the loss of employment and income during and after construction; the increase in transport costs; changes in property values during operation might all impact negatively on the individual on a psychosocial level. Thus, loss of employment, income, land, lack of money to pay for transport, and devaluation of property may lead to a loss of self esteem and feelings of worthlessness.

The significance of the impacts on a psychosocial level is difficult to determine on a prospective basis because it is dependent on the successful implementation of mitigation measures in the Economic Specialist Study (Annexure 4) and relocation mitigation measures.

CATEGROY 1 IMPACT FOR LOCAL CONSTRUCTION WORKERS CATEGORY 2 IMPACT FOR IMPACTED LANDOWNERS		
Description of potential impact	Economic losses may lead to negative psychosocial impacts.	
Nature of impact	Direct negative	
Stage	Pre construction and construction	Operation
Extent of impact	Local to regional	Local to regional
Duration of impact	Medium to permanent	Medium to permanent
Intensity	Low to high	Low to high
Probability of occurrence	Medium	Medium
Confidence of assessment	Medium	Medium
Level of significance before mitigation	High	High

Mitigation measures (EMP requirements)	Training opportunities. An Economic Displacement Plan should be developed and implemented. Assist farm workers with finding alternative work.	N/A
Level of significance after mitigation	Medium	Medium

6.2.2 Economic Benefits and psychosocial impacts

The stimulation of the economy; increase in income; employment; economic sustainability and stimulation during construction and operation might impact positively on a psychosocial level in that self esteem and feelings of worthiness increase.

The significance of the impacts on a psychosocial level is difficult to determine on a prospective basis because it is dependent on the successful implementation of mitigation measures in the Economic Specialist Study (Annexure 4).

CATEGROY 1 IMPACT FOR LOCAL CONSTRUCTION WORKERS CATEGORY 2 IMPACT FOR IMPACTED LANDOWNERS		
Description of potential impact	Economic benefits may lead to positive psychosocial impacts.	
Nature of impact	Direct positive	
Stage	Pre construction and construction	Operation
Extent of impact	Local to regional	Local to regional
Duration of impact	Medium to permanent	Medium to permanent
Intensity	Low to high	Low to high
Probability of occurrence	Medium	Medium
Confidence of assessment	Medium	Medium
Level of significance before mitigation	High	High
Mitigation measures (EMP requirements)	The implementation of a fair and transparent negotiation process. Negotiations should be approached with the necessary cultural sensitivity. The undertakings in the EMP should also be implemented effectively and with due	

	diligence. Training opportunities. Mechanisms should be developed to provide alternative solutions for creating job security upon completion of the project. Assist farm workers with finding alternative work.	
Level of significance after mitigation	Medium	Medium

6.3 INSTITUTIONAL AND EMPOWERMENT PROCESSES AND IMPACTS

Institutional and empowerment processes relate to the role, efficiency and operation of government sectors and other organisations within the area. It also investigates the ability of people to engage in decision-making processes to such an extent that they have an impact on the way in which decisions are made that would concern them.

This section deals with the expected institutional and empowerment change processes and resultant impacts that can be expected with the introduction of the proposed project to the affected areas. The change processes are as follows:

- Additional demand on municipal capacity;
- Attitude formation against the project.

6.3.1 Additional demand on municipal capacity and impacts

(a) Provision of services

Additional demand will not be placed on municipalities during **construction** of the dam. The contractor will be responsible for providing the necessary services at the construction camp.

The demand will be on the municipalities once the dam is **operational**. According to the available information the majority of households in the affected municipalities lacked efficient municipal services and infrastructure. The water situation of the households in the project area is not ideal (**Annexure B**). The project has raised expectations in communities that their needs in terms of water demand will be met. An analysis of the interviews with inhabitants regarding the project indicated that they were expecting to pay for water, but on condition that the water was fresh, the supply was consistent, water was accessible in the yard, and that there were water meters. The purpose of the dam, of which one is to provide water to the villages in the project area, will have to be met by local government, and not DWAF, by addressing it in the IDPs, and by providing the necessary infrastructure and managing the demand. This will impact significantly on local government capacity.

CATEGORY 1 IMPACT		
Description of potential impact	Impact on local government capacity in terms of service delivery.	
Nature of impact	Direct and indirect positive or negative	
Stage	Construction	Operation
Extent of impact	N/A	Local
Duration of impact	N/A	Medium term
Intensity	N/A	Medium
Probability of occurrence	N/A	High
Confidence of assessment	N/A	Medium
Level of significance before mitigation	N/A	High negative
Mitigation measures (EMP requirements)	N/A	Grow capacity. Cooperative governance between the DWAF, local government, municipalities and water boards.
Level of significance after mitigation	N/A	Low negative

(b) Disaster planning

The disaster plan as such is not a change process, but the implementation of a disaster plan as a mitigation measure to manage potential health and safety impacts of the dam will change the way in which the municipalities manage and plan for delivering emergency services to ensure that the needs of the disaster management plan is met. The need for a the development and implementation of a disaster management plan for the construction site and for the operation of the dam that is in compliance with the Occupational Health and Safety Act (Act 85 of 1993) will place additional stress on the municipal emergency services. The plan should be seen as a support structure to the affected municipalities' emergency response team and should be developed in consultation with these municipal services. The baseline information about health and emergency services in the area indicate that the municipalities are already over burdened (Health Impact Assessment, Annexure H)

CATEGORY 1 IMPACT		
Description of impact	The implementation of an effective disaster management plan will put additional pressure on municipal capacity.	
Nature of Impact	Indirect positive	
Stage	Construction	Operation
Extent	Regional	Regional
Duration of impact	Short term	Short term to long term
Intensity	Medium	Medium
Probability of occurrence	Medium	Medium
Confidence of assessment	Medium to high	Medium to high
Level of significance before mitigation	Medium	Medium
Mitigation measures (EMP requirements)	Train first aid officers on site (levels 1 to 3). Consult with private ambulance services and/or hospitals. Implement and maintain actions aimed at preventing disasters, or mitigating their impact if they do occur. Integrate risk management programmes with the IDP.	

	Consider the most vulnerable communities. Establish pro-active media liaison. Educate and inform surrounding communities and/or households on the standard operating procedures to follow during accidents.	
Level of significance after mitigation	Low	Low

6.3.2 Attitude formation against the project

Attitudes are formed by means of people's perception, the way they interpret and assess the project. In this case attitude formation refers to the perception that people in the local community might form about the proposed project, which in turn would influence their attitude and behaviour towards the project. If the project had negative impacts or didn't offer benefits, attitude formation will result. Negative attitudes may result in interest group activity. No interest group activity has yet formed as a result of the project. The I&APs are part of an EIA process, which includes a public participation process and gives them the opportunity to partake and give input.

Based on an analysis of the interviews conducted with the farmers, the majority has a positive attitude towards the project - even those who will experience the most significant loss of orchards and impact on farming activities.

Positive attitudes might change should an arrangement which enables irrigators to continue to use their present water allocations on adjacent land, outside the footprint of the project, not be mitigated, and a specific water allocation and licensing policy not be available for this purpose. Reasonable access to water should be possible, and water lost as a result of submerged boreholes should be replaced to ensure a sustained positive attitude.

A licence is not needed to continue with an existing lawful use authorised by previous legislation until the responsible authority requires that a person claiming to have such an entitlement apply for a licence. If a person could not use the water he is entitled to during the qualifying period the National Water Act provides that such a use could under certain circumstances be declared an existing lawful use.

The Department's Water Allocation Reform programme pays particular attention to equitable distribution of water and emerging black farmers who did not receive their water for farming are advised to apply that their allocations are declared as existing lawful use. Allowance was made in the hydrological analyses to include this as a usage. Irrigable land will have to be identified on which this water may be used. Implementation of the project with a new major storage dam will make it possible to better manage the water available for irrigation.

While the GLeWaP Bridging Studies deal with water availability for the different uses in each reach of river, licensing and monitoring of abstractions (such as for irrigation) is a responsibility and function that must follow in the operation of the project.

Reviewing of water use authorisations is a major undertaking that has commenced under the direction of the DWAF Regional Office, Polokwane. The licencing processes include validation and verification of present lawful uses, implementation of the Reserve, implementation of planning for the GLeWaP and attention to the relevant policies consistent with the National Water Act, Act 36 of 1998. A number of factors specifically relevant to the GLeWaP such as the accommodation of emerging, resource-poor farmers and the replacement of productive citrus orchards (and other irrigated crops) affected by the proposed new dam, have important policy implications. Policy proposals are being formulated for approval to enable the GLeWaP to be implemented as planned.

Based on an analysis of the interviews conducted with the community leaders, attitude formation might occur should local employment opportunities and procurement not materialise.

Attitude formation might also occur as a result of the perceived low compensation for houses and / or land. In an interview with project managers, it was confirmed that affected parties sometimes expected a higher standard house than what they were given, despite the fact that the replacement house was a better house that the one that they lived in.

People sometimes move into the basin to ensure they benefit from compensation. For the same reason subsistence farmers might enlarge their plots, and Traditional Authorities might move their boundaries. This matter might be resolved in an unsatisfactory way for these affected parties in that they might not get compensated

as expected, and this might lead to negative attitude formation, and even potential court cases.

It might also happen that people **opportunistically** settle in an area which they think will be inundated by the dam, in the hope of receiving compensation. It is therefore essential that an inventory of all households which may possibly be affected is carried out during the pre-construction phase (expert interviews).

A concern about the potential effect of the project on Land Claims was evident amongst those who might benefit from Land Claims. They were concerned about the way in which the project might impact on the land they have claimed (and related infrastructure and orchards). They were concerned that negotiated benefits will not be transferred to them. Again, perceived unsatisfactory resolution of this process might lead to negative attitude formation, and even potential court cases.

Attitude formation is a change process, and not an impact. Attitude formation might result in delays in project implementation, which might result in secondary impacts such as economic impacts.

CATEGORY 2 IMPACT	
Description of impact	Attitude formation might result in delays in project implementation, which will have economic impacts.
Nature of Impact	Indirect negative
Stage	Construction into operation
Extent	Regional
Duration of impact	Short term to long term
Intensity	Low to high
Probability of occurrence	Medium
Confidence of assessment	Medium
Level of significance before mitigation	Medium
Mitigation measures (EMP requirements)	The implementation of a fair, transparent and culturally sensitive negotiation process. A photographic and written history as early as the pre-decision phase. It should be made clear that job opportunities will be limited and temporary.

	Employment opportunities should be given to locals. Deliver on undertakings with the community. Establish a project steering committee.
Level of significance after mitigation	Low

6.4 SOCIO-CULTURAL CHANGE PROCESSES AND IMPACTS

Socio-cultural processes relate to the way in which humans behave, interact and relate to each other and their environment, as well as the belief and value systems which guide these interactions.

Socio-cultural change processes and impacts that are associated with the construction and operation of the proposed development might be set off as a result of the;

- Changes in culture;
- Changes in movement patterns; and
- Changes in sense of place.

6.4.1 Changes in culture and impacts

(a) Construction

The study area includes tribal land, and adherence to the Shangaan and Sotho cultures were observed whilst in field more so by the older generation, for example: older women wore matshekas; where men were present at households that were visited, women kept quiet; polygamy occurred (**Plate 6.1**).

Plate 6.1: Women in the project area

If construction workers were from a different cultural background than locals, conflict can be expected should different cultural backgrounds are not respected. Although a small percentage of the workforce will be from elsewhere, conflict as a result of cultural differences or community disintegration as a result of the acceptance of construction workers' culture might still occur – should the demographic profile of these construction workers be different, and should it matter to communities. The significance of this impact is difficult to determine on a prospective basis and are dependent on the demographic profile of these workers, and whether the differences mattered to those involved.

CATEGORY 1 IMPACT		
Description of potential impact	The behaviour of construction, operation and maintenance workers might go against cultural norms.	
Nature of impact	Direct negative	
Stage	Pre-construction and Construction	Operation
Extent of impact	Regional	N/A
Duration of impact	Short term to long term (the impact of the presence might be felt long after construction workers have left).	N/A
Intensity	Low to medium	N/A
Probability of occurrence	Medium	N/A

Confidence of assessment	Medium	N/A
Level of significance before mitigation	Medium to high	N/A
Mitigation measures (EMP requirements)	Raise awareness amongst workers about local traditions and practices. Ensure that the local community communicate their expectations of construction workers' behaviour with them. See mitigation measures in the Economic Specialist Study (Annexure 4) and the Health Impact Assessment (Annexure 11) and the economic and health EMP measures. To ensure that the local traditions and cultures are respected, local residents should play an active participatory role in the planning process. This could be achieved by means of establishing a community forum that meet once a month to discuss issues and progress surrounding the project.	
Level of significance after mitigation	Medium to low	Low
Cumulative Impacts	A negative attitude can further be intensified if construction workers are viewed as a group that took job opportunities away from locals, thereby creating an underlying conflict over limited resources. Already antagonism was evident towards a road construction company in the area, as it was claimed that local service providers (irrespective of race) did not benefit from the project.	
Areas of concern Villages along the bulk water supply pipeline and the borrow pits.		

(b) Operation

The planning of sustainable water resources development schemes should take into account the way in which infrastructure reflects culture and social organisation. Within the project area people live together in villages with land for subsistence farming on their plot next to the house or further away. Emerging and commercial farmers live on large farms with their immediate families and cultivate the land on the farms.

When the baseline social profiles of the affected areas are filtered through Maslow's hierarchy of needs (**Figure 6.1**), it becomes evident that high poverty levels necessitate people in the study area spend a lot of time to meet their own physiological needs. To gain an understanding of the challenging circumstances of the vulnerable sector in the project area, refer to **Appendix C** to gain a better understanding of this sector's situation.

People living in poverty as a result of high unemployment rates, low income levels and a poor education, struggle to survive on a daily basis and are therefore functioning on physiological needs level. According to Maslow, the type of need fulfilment that a person focuses on is dependent on the satisfactory fulfilment of other needs. The various categories of needs are organised in a hierarchy, which indicates which level of need has to be fulfilled before the next level of need would be focused on (refer to **Figure 6.1**). The provision of water at an acceptable standard will allow people to focus on other needs such as knowledge and understanding and the need for an environment that is aesthetically appealing. Access to quality water will open up time to explore the fulfilment of other needs, and water can be utilised to fulfil other needs as water is not a basic human need but also an economic resource (e.g. crops need water to grow and be sold).

Should the municipalities succeed in successfully providing water infrastructure to households, access to water resources will improve, which will impact on NHRQOL.

Figure 6.1: Maslow's Hierarchy of Needs

Source: www.arrod.co.uk

CATEGORY 1 IMPACT		
Description of potential impact	The provision of water to some of the villages in the study area will have a positive impact on NHQOL.	
Nature of impact	Indirect positive	
Stage	Construction	Operation
Extent of impact	N/A	Local
Duration of impact	N/A	Long term
Intensity	N/A	Medium to high positive
Probability of occurrence	N/A	High
Confidence of assessment	N/A	Medium
Level of significance before mitigation	N/A	Medium
Mitigation measures (EMP requirements)		Effective utilisation of bulk water supply. Cooperative governance between the DWAF, local government, municipalities and water boards.
Level of significance after mitigation	Low	High

6.4.2 Movement patterns and impacts

Any new development has the potential to change the movement patterns of local communities, thereby potentially impacting on their relationships / social networks.

(a) Construction

During construction, movement patterns might have to change as a result of the physical space taken up by construction activities at the sites, the re-alignment of the roads, and as a result of construction vehicles moving through the area to the sites.

The R529 and the P43/3 will require partial re-alignment to accommodate the proposed dam. Road P43/3 will not require major bridges to be built. Although the re-alignment of this road will lead to additional loss of land of the affected land owners (apart from land inundated by the dam), it will not lead to a change in movement patterns or additional travel time.

The road re-alignment of the R528 would require the construction of at least two major bridges and the upgrading of two existing bridges. It is envisaged that the longest proposed alternative road re-alignments will affect relationships significantly. The shorter the re-alignment, the easier it will be to maintain relationships on a 1:1 level - for farmers, workers, and villagers. Alternative 3 is therefore the preferred alternative, followed by alternatives 1, then 2 and then 4. Should alternative 3 not be selected, the level of significance after mitigation stays medium.

Alternative 1 will also ensure that the Kaross workers will be able to from their villages to Kaross to deliver their embroidery work. Longer travel distances will have an economic impact in terms of travel fees. Longer travel distances will also apply to farmers who have farms on either side of the proposed crossing (see Economic Specialist Study (Annexure 4).

(b) Operation

The presence of the proposed dam will change the movement patterns between farms. Farmers who rely on the low water bridge between farms 10 and 18 (**Appendix C**) for easy access to farms either side of the river, may have to change their movement patterns. The impact on maintaining relationships will depend on the way the farmers handle this, but it is not expected to change relationships significantly. Social networks need not require being in the physical presence of a person / community, but the mere perception of still “belonging” and being able to draw on social support maintains a social network.

The main concern for farmers, rather, was the potential economic impact of changes in movement patterns as a result of longer travel distances. The potential economic impact of travelling longer distances between packing facilities, farms, houses, and between villages and farms are discussed in the Economic Specialist Study (Annexure 4) and findings of MasterQ Research in this regard are addressed in the economic EMP.

CATEGORY 2 IMPACT		
Description of impact	Impact of construction activities on movement patterns of local communities, potentially impacting on the maintenance of social relationships. Impact of road re-alignment on movement patterns of local communities, potentially impacting on the maintenance of social relationships.	
Nature of Impact	Direct negative	
Stage	Construction	Operation
Extent of impact	Regional	Regional
Duration of impact	Medium term	Long term
Intensity	Medium	Medium
Probability of occurrence	High	High
Confidence of assessment	Medium	Medium
Level of significance before mitigation	Medium	Medium
Mitigation measures (EMP requirements)	Provide a safe passage way for community members. Road rehabilitation. Monitor movement patterns of school children and adults and implement the mitigation measures should it be necessary.	Refer to mitigation measures listed for the negotiation process. Monitor movement patterns of school children and adults and implement the mitigation measures should it be necessary. Construct road re-alignment alternative 3.
Level of significance after mitigation	Low	Low
Areas of concern Villages along the bulk supply pipeline routes. Those who use roads and pedestrian routes along the construction village and Nwamitwa construction site.		

6.4.3 Sense of place

The presence of the proposed dam as well as the presence of construction workers and construction activities, including the presence of construction vehicles, may impact on the sense of place on two levels:

- the way affected parties perceive their environment;
- the way affected parties physically experience their environment.

Of interest in this section is people's **perception** of the how the changes in the environment will impact on their sense of place. Changes in noise, dust and pollution levels may be experienced as **intrusion impacts**, which impact on the experience of sense of place.

(a) Construction

Intrusion impacts and proposed mitigation measures are discussed in the Noise Impact Assessment (Annexure 9), and the Health Impact Assessment - dust (Annexure 11). The changes in the landscape may also impact on sense of place. Changes in the landscape and potential impacts are discussed in the Visual Impact Assessment (Annexure 7). These specialist impact assessments concluded that negative intrusion and visual impacts would not be highly significant post mitigation.

For the raising of the Tzaneen Dam wall, the construction facilities will be located within the current Government Water Works. For the construction of the dam at the site called Nwamitwa, the presence of construction workers, equipment, and the construction camp will be different from what people are used to (orchards, rural landscape, little development), and therefore impact on affected people's sense of place. The clearance of the footprint of the proposed dam will also negatively impact on the sense of place. These impacts will be temporary, as construction activities will cease, and the footprint will be filled with water which will enhance the sense of place.

(b) Operation

Intrusion impacts and proposed mitigation measures are discussed in the Noise Impact Assessment (Annexure 9), and the Health Impact Assessment (Annexure 11). The changes in the landscape may also impact on sense of place. Changes in the landscape and potential impacts are discussed in the Visual Impact Assessment (Annexure 7). These specialist impact assessments concluded that negative intrusion and visual impacts would not be highly significant post mitigation.

An assessment of the responses of the landowners that were interviewed, the majority did express concern about the loss of the natural vegetation on the banks

of the river, the way in which the landscape will be changed by the dam, and features that will be lost. These concerns relate to sense of place.

However, interviewees also felt that a dam brought its own aesthetic qualities to a landscape. Some impacted landowners mentioned that they were considering establishing tourist facilities, something they had not considered before. The expected "sense of place" that the dam will create, is perceived to include opportunities for recreational activities, more so than the river. The dam is not perceived as negatively affecting the sense of place of the area.

These responses are in line with research which shows that *people rapidly discount a landscape as soon as the first scar occurs, rather like a stain ruining a favorite garment*. *Thereafter, any additional impacts on the landscape have a correspondingly smaller effect (Petrich 1993, p. 249-267. Cited by Bron, 2006).*

Furthermore, according to Zadik (1985), *"people seem to respond to environments as natural if the areas are predominantly vegetation and do not contain human artefacts such as roads or buildings."*

CATEGORY 2		
Description of potential impact	Impact of the proposed dam on sense of place	
Nature of impact	Direct negative	Direct negative
Stage	Construction	Operation
Extent of impact	Regional	Regional
Duration of impact	Short term	Long term
Intensity	Medium	Medium
Probability of occurrence	Medium	Low
Confidence of assessment	High	High
Level of significance before mitigation	Low	Low
Mitigation measures (EMP requirements)	Manage construction activities to reduce noise. Consult property owners as far as possible. Refer to the Visual Impact	Refer to the Visual Impact Assessment (Annexure G), the Noise Impact Assessment (Annexure I), and the Health Impact Assessment (Annexure K)

	Assessment (Annexure 7), the Noise Impact Assessment (Annexure 9, and the Health Impact Assessment (Annexure 11).	
Level of significance after mitigation	Low	Low

6.5 GEOGRAPHICAL PROCESSES AND IMPACTS

Geographical processes relate to land use patterns and infrastructure in the area. This section therefore describes the land use in the study area from a social perspective.

Land use is defined as

"the way land is developed and used in terms of the types of activities allowed (agriculture, residences, industries, etc.) and the size of buildings and structures permitted. Certain types of pollution problems are often associated with particular land uses, such as sedimentation from construction activities (www.soil.ncsu.edu/publications/BMPs/glossary.html)."

Another definition of land use is as follows:

"Patterns of land use arise naturally in a culture through customs and practices, but land use may also be formally regulated by zoning, other laws or private agreements such as restrictive covenants www.wikipedia.org/wiki/Land_use.html)."

For this project, the change processes experienced, such as economic and socio-cultural change processes, is as a result of a land use change process. Changes not directly associated with land, such as employment opportunities, population change, and traffic flow are influenced by the way land use will be changed. As a result of the land use change, jobs are created, people are displaced and income is generated.

The economic impact of land use change is discussed in detail in the economic specialist report. The report lists the sizes of different land uses that will be impacted on, as well as the farm portions in the dam basin.

Permanent and temporary loss of land

This section assesses the social impact of the permanent loss of land for cultivation as a result of the dam basin and the pipelines. For the dam, land will be permanently lost as no development or habitation in the Full Supply Level is permitted.

(a) Pre-construction

For the **bulk infrastructure**, grazing land will be affected temporarily. Grazing is allowed in the pipeline servitude. Orchards, irrigated fields, grazing/veld, farm houses, labour houses, outbuildings and packing houses will be inundated by the **dam**. Impacted landowners will be compensated for the loss of land, crops, buildings and infrastructure.

The preference is to plant new orchards elsewhere, as opposed to giving financial compensation. This will ensure that workers are not retrenched, that impacts on macro and micro economic level will be kept to a minimum (Economic Specialist Report, Annexure 4). The sustainability of this option is dependent on the availability of water, the suitability of soil for orchards, and productivity. Mr. E. Vorster (portion 4/518) might not have sufficient land available to replace all the orchards he will have to forfeit. Mr. P Faul (portions12 & 14/514) will no longer be able to develop his planned lodges because the sites lie in the purchase level of all three fill scenarios. On the 0.5 level it may still be a viable venture, if he developed a lodge in the corner which falls outside the fill level.

The implementation of changes will take up time, energy and careful planning. The farmers will need time, time schedules, financial and practical aid to complete this massive task within the given time periods, with as little disruption as possible. The preparation of the land, and the planting and growing of the trees until they are in production will take many years with a significant loss of income and additional expenses over these years.

MasterQ Research did an inventory of the houses and dams that will be lost. The inventory, a map of the inventory, and a list the owners, are attached to **Appendix D.**

When considering the houses, dams, and packing facilities affected, the difference in loss between the high and medium fill scenario is minimal compared to the difference between these two scenarios and the low fill scenario. The differences are as follows:

- On the high fill scenario, 12 houses, and 26 dams will be affected. Two packing facilities will be affected.
- On the medium fill scenario, 12 houses, and 16-19 dams will be affected. Two packing facilities will be affected.
- On the low fill scenario, 6 houses, and 12 dams will be affected. One packing facility will be affected.

The packing facility that will be lost for all three fill scenarios is that of Mr. E. Vorster (portion 4/518). Although Mr. Gubitz and sons (portions 463 LT & 1-3/463) will not have to relocate a packing facility, their packing facilities will be under-utilized and uneconomical to run until the new orchards are in full production (less so on the low fill scenario, and to a similar extent for the medium and high fill scenarios).

In light of the available information, the medium fill scenario seems preferable. The number of houses to be lost is not considered in this decision, as the majority of land owners are willing to forfeit their houses to reap the benefits of the dam. The difference between the approximate number of dams that will be lost for the high fill scenario and medium fill scenario seems significant. There is a less significant difference between the low fill scenario and the medium fill scenario in terms of loss of dams.

Other reasons for not selecting the low fill scenario as the preferred option is because the landing strip will be affected on all levels, the difference in the number of stores that will be affected between the low and medium fill scenarios is minimal (5 on the medium fill, and four on the low fill), the same number of compounds will be affected, the low water bridges will be affected for all scenarios, and the road re-alignments will have similar impacts for all three scenarios.

Also, the attention is focused on water needs for the increasing human population, downstream riverine ecosystems as well as for establishing commercial irrigation, including the settlement of resource-poor farmers. In light of the difference between

the low and medium fill scenarios, the medium fill scenario is more likely to address the needs of the target populations.

This scenario will fulfill the objective of GLeWaP: to maximize the social and economic benefits from the available water resources with the minimum social and environmental impacts, that is, to develop the smallest dam which can serve its purpose.

CATEGORY 2 IMPACT		
Description of potential impact	Change in land use will result in a loss of land and impact on cultivation activities.	
Nature of impact	Negative direct	
Stage	Construction – permanent loss of land	Construction – temporary loss of land
Extent of impact	Local	Local
Duration of impact	Permanent	Medium term
Intensity	Low to high (depends on farm and farming activities)	Medium
Probability of occurrence	High	High
Confidence of assessment	High	High
Level of significance before mitigation	Low to high (depends on farm and farming activities)	Medium
Mitigation measures (EMP requirements)	Compensation should be such that landowners are able to implement their plans elsewhere (e.g. a tourist facility). Water allocations and licenses should be verified. Compensation should take into account the time, energy that will have to go into planning. The preparation of the land, and the planting and growing of the trees until they are in production, the moving of packing facilities, additional travel distances, loss of infrastructure, implementation of infrastructure, etc. should be taken into account. Land owners will have the choice to either move their buildings themselves but get no compensation for it, or leave it for DWAF to remove and auction for which compensation will be given. Income will also be lost during construction activities should be compensated for. The Economic Specialist Study (Annexure 4) and Economic EMP input discuss	

	the applicable mitigation measure in detail, quoting from MasterQ Research's in Situation Analysis. The DWAF or its appointed contractor(s) should assist with the temporary relocation of livestock, as well as relocating cattle back to their original grazing area. Grazing areas should be rehabilitated to its original grazing conditions to ensure that cattle can continue to graze in the area once they are returned to the area. Where the area cannot be rehabilitated to its original condition within a short space of time, DWAF or its appointed contractor(s) should provide alternative food sources to the farmer for the time period required for natural rehabilitation to occur within the grazing area. The temporary loss of cultivated land should be included in the negotiation process with the landowner. The clearing of an area on a farmland for the construction process should take place after the harvesting season. Landowners should be compensated for the loss of cultivated land. The area should be rehabilitated upon completion of the construction activities to ensure that the land is returned in the same condition as prior to the construction activities.	
Level of significance after mitigation	Low to high (depends on farm and farming activities))	Low

6.5.2 Operation

The change in land use, i.e. the presence of the dam, will ensure that emerging farmers downstream of the dam will have access to the water that already has been allocated to them (but was not available). The access to water for crops will have a positive economic impact.

6.6 BIOPHYSICAL PROCESSES

The biophysical environment can lead to indirect social impacts for example the presence of the dam presents a safety risk. Should a disaster occur as a result of the dam, people's health and safety will be impacted on. Heath and safety impacts as a result of biophysical changes are discussed in the Health Impact Assessment (Annexure K).

7. MITIGATION MEASURES

The mitigation measures listed in this section were used to develop the EMP, which includes objectives, targets, and method statements.

(a) Relocation of households and/or population segments

- Residents should be sufficiently compensated and assisted with the relocation process.
- A formal grievance procedure should be implemented and communicated to land owners to ensure a fair and transparent process.
- The site for relocation should be chosen to ensure that the minimum disruption to current farming activities and to families is caused.
- A land acquisition process should be developed and adhered to. A Compensation Assessment and Action Plan and a Economic Displacement Plan should be developed and implemented.
- Requests to remove items from the house prior to auctioning and demolishing should be adhered to (e.g. windows, doors). Land owners will have the choice to either move their buildings themselves but get no compensation for it, or leave it for the DWAF to remove and auction for which compensation will be given.

(b) Influx of construction workers

- Raise awareness amongst construction workers about local traditions and practices.
- Inform local businesses that construction workers will move into the area to enable local businesses to plan for the extra demand.
- Ensure that the local communities communicate their expectations of construction workers' behaviour through the forum.

(c) Influx of job seekers

- A recruitment policy and process should be finalised in consultation with the municipalities and Traditional Authorities. Ensure that employment procedures /

policy are communicated to local stakeholders, especially community representative organisations and ward councillors.

- Have clear rules and regulations for access to the construction village / site office to control loitering. Consult with the local SAPS to establish standard operating procedures for the control and/or removal of loiterers at the construction site.
- Construction workers should be clearly identifiable by wearing proper construction uniforms displaying the logo of the construction company. Construction workers could also be issued with identification tags.
- The contractor should monitor areas where people gather in the field on a regular basis as this is normally the first indication that (informal) settlement might take place in the area. These people should be removed in co-operation with the local Traditional Authorities/ SAPS to prevent the formation and/or expansion of informal settlements in such an area, especially if it encroaches upon the dam basin.
- The construction site should be fenced and access should be controlled by means of a security access point.

(d) <u>Outflow of labourers</u>

- Implement methods (posters, talks, etc.) to create HIV and STI awareness amongst construction workers.
- Develop skills transfer plans (e.g. portable skills training) that would enable a worker to move from one project to another project within the same area.
- Payment should comply with applicable Labour Law legislation in terms of minimum wages.
- Where local labourers are employed on a more permanent basis, cognisance should be taken of the Labour Law in terms of registering the worker with the Unemployment Insurance Fund (UIF), Pay as you earn (PAYE), workman's compensation and all other official bodies as required by law. This would enable the worker to claim UIF as a means of continuous financial support when the worker's position on the construction team has either become redundant or once the construction phase comes to an end.
- Move the families of the workers with them.
- Give basic financial training about budgeting.
- Launch development projects, such as farming projects or a cultural centre.

(e) Compensation for land acquisition

- The land valuator should be experienced in valuating the land in question.
- The process should be conducted with the necessary respect, and the negotiator should be transparent about the process and expectations (do not engage in "empty promises").
- Contracts should be reviewed by an independent body.
- Land owners should be made aware that a pre- and post evaluation of their land value is possible.
- In the case of tribal authorities, the project proponent and/or appointed contractor should consider establishing a trust fund in consultation with the tribal authority (as a form of compensation) for the community that is jointly administrated by DWAF and the tribal authority. Community development projects can then be funded from the trust fund, which would aid sustainable development in the area.

(f) Direct formal employment opportunities to local individuals

- Unskilled job opportunities should be afforded to local residents. Local trade unions could assist with the recruitment process to counteract the potential for social mobilisation.
- Equal opportunities for employment should be created to ensure that the local female population also has access to these opportunities. Females should be encouraged to apply for positions.
- Individuals with the potential to develop their skills should be afforded training opportunities. The DWAF or its appointed contractors should be involved in this process.
- Mechanisms should be developed to provide alternative solutions for creating job security upon completion of the project. This could include formal and/or informal training on how to look for alternative employment, information on career progression, etc. to ensure that people are equipped to seek other jobs with the skills that they have gained.
- Payment should comply with applicable Labour Law legislation in terms of minimum wages.
- Where local labourers are employed on a more permanent basis, cognisance should be taken of the Labour Law **(see section d).**

(g) Indirect formal and/or informal employment opportunities to local individuals

- Develop a procurement policy that is easy to understand and ensure that local subcontractors also comply with the procurement policy and any other applicable policies.
- Ensure that local subcontractors receive the necessary support in terms of resources.
- Agree on specific performance criteria prior to appointment.
- Identify the segment that might benefit from informal indirect opportunities, and assist them with skills development and subsidise initiatives that are sustainable.
- Encourage construction workers to use local services.
- Compensation for the land should not be restricted to financial compensation. The DWAF should enter into negotiations with the tribal authority to determine their needs and the most appropriate form of compensation, which should rather be in the form of development projects.

(h) Temporary loss of cultivated land

- The temporary loss of cultivated land should be included in the negotiation process with the landowner.
- The area should be rehabilitated to the same condition as prior to the construction activities.

(i) Temporary loss of grazing land

- Mitigation measures should be implemented to avoid any negative impact on animals (e.g. fencing off the construction area).
- DWAF or its appointed contractor(s) should assist with the temporary relocation of livestock, as well as relocating cattle back to their original grazing area.
- Grazing areas should be rehabilitated to its original grazing conditions to ensure that cattle can continue to graze in the area once they are returned to the area.

- Where the area cannot be rehabilitated to its original condition within a short space of time, DWAF or its appointed contractor(s) should provide alternative food sources to the farmer for the time period required for natural rehabilitation to occur within the grazing area.

(j) Integration with local communities

- Raise awareness amongst workers about local traditions and practices.
- See mitigation measures in the economic and health specialist reports and the economic and health EMP measures.
- To ensure that the local traditions and cultures are respected, local residents should play an active participatory role in the planning process. This could be achieved by means of establishing a community forum that meets once a month to discuss issues and progress surrounding the project. The commercial farm landowners, construction company, the municipality and the DWAF should also be represented on this board. Community members should be given the opportunity to communicate in their own language.

(k) Physical splintering

- Provide a safe passage way for community members to minimise the impact on movement patterns.
- Fence off the construction site to prohibited unauthorised access by community members, thereby placing themselves in potential unnecessary danger.
- During operation, the movement of the adults and school children around the dam should be monitored, and any negative impacts on movement patterns should be mitigated.

(l) Increase in traffic and movement of construction vehicles

- Road rehabilitation should take place during and once construction is completed.
- Construction traffic should only make use of an approved route.
- The number of trucks that pass through communities should be kept to a minimum and should be restricted to certain times of the day, i.e. avoid peak hours when community members are on their way to or from school and work.

- Traffic signs should warn construction vehicles of the presence of pedestrians and school children along the road. Likewise, traffic signs should warn community road users of the presence of construction vehicles.
- General road rules should be enforced.
- Implement traffic flow controls where road closure or partial road closure is unavoidable. This can either be in the form of providing alternative access routes via detours and/or the use of 1-way traffic flow control.
- In the event of 1-way traffic flow control, trained personnel should be used to regulate the traffic to prevent severe delays at waiting points.

(m) Safety and security

- Construction workers should be clearly identifiable. Overalls should display the logo of the construction company and/or construction workers should wear identification cards.
- The construction site should be fenced and access should be controlled by means of a security access point.
- Loitering of outsiders at the either the construction site or at the construction village should not be allowed. Loiterers at the site should be removed in cooperation with the local South African Police Service (SAPS) and Community Policing Forums (where available).
- The low water bridge downstream from the proposed dam wall is also seen as a potential vehicle for criminal activities. This bridge serves as a link between farms on either side of the river. Safety of these landowners should be ensured, and safety measures should be determined in consultation with landowners and the SAPS.
- Appoint security personnel, during day and night times.
- Erect fences to increase security.
- Local people should be employed to increase support for the project and reduce the potential for criminal activities.

(n) Attitude formation against the project

- The implementation of a fair and transparent negotiation process.
- Negotiations should be approached with the necessary cultural sensitivity.
- An approved interpreter should be present during the negotiation process to ensure that there are no misunderstandings as a result of language barriers.
- An Environmental Control Officer should be appointed to ensure that social mitigation measures are implemented. This person should have experience in facilitation, and negotiation, specifically with rural communities. He/she should have excellent communication, listening and problem solving skills. Experience in similar projects should be considered when selecting this person.
- Issues and concerns raised during the public participation process should be addressed.
- A photographic and written history as early as the pre-decision phase should be kept to minimise the risk of mobilisation as a result of unfulfilled expectations.
- It should be made clear that job opportunities will be limited and temporary.
- Transparent information should be supplied to the community from the outset of the project.
- The local residents should play an active participatory role in the planning process, especially landowners of neighbouring properties. This could be achieved by means of establishing a community forum that meets quarterly or once a month to discuss issues and progress surrounding the project.
- Employment opportunities should first be offered to the local community if the skills are available within the community.
- DWAF or its appointed contractor(s) should deliver on their undertakings with the community in terms of employment creation, etc. (tangible benefits to the community).
- The undertakings in the EMP should also be implemented effectively and with due diligence.

(o) Additional demand for municipal services

- Construction workers should be made aware of the limited capacity of the municipal services network.
- Sufficient portable chemical toilets should be provided on site.
- Contractors should ensure adequate sanitation services (e.g. showers) at the construction village with effective drainage facilities to ensure that used water is carried away from the site.
- Sufficient fresh water should be available to the construction workers, with specific attention to those working along the pipeline routes.
- Where possible, construction camps should be located away from areas of concern.
- Bulk water supply should be utilised supply water to some of the villages in the area.
- Maintenance activities should be planned carefully.
- Cost recovery should be implemented and applied.
- Unauthorised water connections should be managed.
- Water supply systems should be linked to ensure consistent supply to all villages.
- Cooperative governance between the DWAF, local government, municipalities and water boards, and responsibilities should be clearly stipulated.

(p) Disaster planning

- Develop and implement a disaster management plan for implementation during the construction phase.
- Identify suitable individuals that can be trained and used as first aid officers on site (levels 1 to 3). Training of these individuals should ideally take place during this phase of the project to ensure that qualified first aid officers are on site once construction commences.
- Consult with private ambulance services and/or hospitals so that they are aware of the project and would be able to provide emergency and/or medical services if needed.

(q) Sanitation

- Ensure a healthy environment at the construction site and the construction village – see health impact assessment.

8. 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 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 availability of the Draft Environmental Impact Assessment Report, its summary (translated in four languages), the various specialist studies, the Environmental Management Plans and Programmes will be announced by way of personalized letters to stakeholders and the placement of advertisements in regional and local newspapers. The draft documents will be made available to I&APs for the inputs and comments. Two stakeholder meetings are planned to present the contents of the documents and to discuss the findings of the study.

A public review period of thirty (30 days) will be available for stakeholders to comment on the Draft Environmental Impact Assessment Report, its summary (translated in four languages), the various specialist studies, the Environmental Management Plans and Programmes. Stakeholder comments will be 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.

9. 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 the social environment:

- That the social impacts that the project might have on the traditional structures as a result of the proposed project, for example the proposed relocation process be investigated.
- That clarity must be provided whether the proposed dam will affect the "Tambaka" tribe.
- 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.
- 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.

Issues raised by stakeholders regarding water allocations included the following:

- That clarity must be provided whether present water allocations will be affected.
- That water for irrigation is currently being sourced from the river and that clarity is needed on how water rights will be handled in future?
- That clarity is needed on how sources of ground water will be compensated for that might possibly be under water should the proposed dam continue.
- That clarity is required in terms of water allocation to farmers: how will emerging black farmers get water rights because there was no water provision for them? Will water rights or licences be accompanied by a farm acquired in future? Land without water does not help emerging farmers.

10. OTHER INFORMATION REQUESTED BY THE AUTHORITY

No other information was requested.

11. CONCLUSION

11.1 PREFERRED DAM FILL SCENARIO

In light of the information in this SIA, the medium fill scenario seems preferable. The number of houses to be lost is not considered in this decision, as the majority of land owners are willing to be compensated for their houses to secure the benefits of the dam. The decision is mainly based on the number of irrigation dams and packing facilities that will be lost, as well as the effect on social relationships and benefits to the local communities.

11.2 PREFERRED ROAD RE-ALIGNMENT

The order of preference is alignments 3, 1, 2 and 4. The preferred road alignment (**Figure 4.1**) is alignment 3 at the Nwanedzi river crossing. Although it goes through 1.5km orchards and close to a house (1.5km from the house), this crossing is the shortest and will therefore have the least impact on movement patterns, maintaining relationships, travelling distance and costs. A detailed assessment of the significance of intrusion and traffic impacts on the household should be done. Should these impacts be significant, the owner should be given the option to relocate.

11.3 PREFERRED BULK WATER SUPPLY

The preferred routes for the bulk water supply pipes are the routes that skirt settlements and follow existing infrastructure.

- In terms of the red routes (**Figure 4.1**), the dotted red route is preferred. It follows existing infrastructure and does not cut through villages but rather follow the outskirts of villages.

- In terms of the green routes (**Figure 4.1**), the southern most dotted green route is preferred. Although it does not follow existing infrastructure, fewer households are affected, and movement patterns of people and traffic will be least affected.

- In terms of the **brown** routes (map attached to **Figure 4.1**), the eastern route is preferred as fewer houses are be affected.

- In terms of the blue routes (map attached to **Figure 4.1**), the solid blue route is preferred, except for the last part before reaching the reservoir. It should preferably follow existing infrastructure, and therefore follow the power line along the dotted blue line unless the solid blue line follows an existing pipeline of which the social specialist is unaware.

11.4 BORROW PITS AND RESERVOIRS

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

Of concern are the potential health and safety impacts on pedestrians and road users, specifically those around the borrow pits at Miragoma and Gamokgwathi and the proposed water reservoirs close to ka-Matubana, Nwanedzi, ka-Mandehakazi, ka-Mavele, Runnymede, Serolorolo, ga-Mookgo, Morapalala, Kadzumeri, Makhwivirini, Ooghoek, Hlohlokwe, Kampakeni, Merekome, and Kharangwani. The impacts may be significant (e.g. accidents) and the proposed mitigation measures to reduce the likelihood of impacts occurring should be implemented.

11.5 RAISING OF THE TZANEEN DAM WALL AND THE PROPOSED DAM AT THE NWAMITWA SITE

In light of the demographic, economic, land use, institutional, socio-cultural and bio-physical change processes that are expected as a result of the changes prior to construction, during construction, and during the operational phase of the project, the social specialist identified and assessed potential impacts and recommended mitigation measures. The significance of the impacts per change process is listed in the tables ahead. A distinction was made between category 1 and category 2 impacts.

Category 1: Impacts that are not expected to differ between the projects (proposed dam and raising of the Tzaneen Dam) , e.g. the impacts as a result of the influx of job seekers are expected to remain the same, irrespective of the project; and

Category 2: Impacts that are expected to only apply to the proposed dam and not to the raising of the Tzaneen Dam, e.g. the resettlement of households is not applicable to the raising of the Tzaneen dam wall.

(a) Population related change processes and impacts

CATEGORTY 2 IMPACT		
Change process	Relocation of households	
Description of potential impact	The move to a new dwelling may be experienced negatively.	
Nature of impact	Negative direct	
Stage	Pre construction (but the impacts might be felt into construction and operation)	Operation
Level of significance before mitigation	Low to high (depends on individual)	N/A
Level of significance after mitigation	Low to medium (depends on individual)	N/A

CATEGORY 1 IMPACT DURING CONSTRUCTION CATEGORY 2 IMPACT DURING OPERATION		
Change process	Influx of job seekers/opportunists and construction/maintenance workers.	
Description of potential impact	Influx of job seekers and opportunists as well as construction and maintenance workers result in safety and security concerns amongst the impacted on and affected parties.	
Nature of impact	Direct negative	
Stage	Pre-construction and Construction	Operation
Level of significance before mitigation	Medium	Low
Level of significance after mitigation	Low	Low

CATEGORY 1 IMPACT DURING CONSTRUCTION CATEGORY 2 IMPACT DURING OPERATION		
Change process	Influx of job seekers/opportunists and construction/maintenance workers.	
Description of potential impact	Job seekers and opportunists who are unsuccessful in securing a job might revert to criminal activities. The construction and maintenance workers might also commit crimes while working on the farms. Actual crime, stock theft and crop theft might occur.	
Nature of Impact	Direct negative	Direct negative
Phase	Construction	Operation
Level of significance before mitigation	Low	Low
Level of significance after mitigation	Low	Low

CATEGORY 1 IMPACT DURING CONSTRUCTION CATEGORY 2 IMPACT DURING OPERATION		
Change process	Influx of job seekers/opportunists and construction/maintenance workers.	
Description of potential impact	Job seekers and opportunists who are unsuccessful in securing a job might settle in the area illegally and create conflict with affected parties.	
Nature of Impact	Direct negative	Direct negative
Phase	Construction	Operation
Level of significance before mitigation	Low-medium	Low
Level of significance after mitigation	Low	Low

CATEGORY 2 IMPACT – associated bulk infrastructure	
Change process	Influx of construction vehicles
Description of potential impact	Increase in construction vehicles will impact on the likelihood of accidents happening. Accidents may involve pedestrians and/or other vehicles.

Nature of impact	Direct negative	
Stage	Construction	Operation
Level of significance before mitigation	High	N/A
Level of significance after mitigation	Low	N/A

(b) Economic Processes and impacts

CATEGROY 1 IMPACT FOR LOCAL CONSTRUCTION WORKERS CATEGORY 2 IMPACT FOR IMPACTED LANDOWNERS		
Change process	Change in economic situation.	
Description of potential impact	Economic losses may lead to negative psychosocial impacts	
Nature of impact	Direct negative	
Stage	Pre construction and construction	Operation
Level of significance before mitigation	High	High
Level of significance after mitigation	Medium	Medium

CATEGROY 1 IMPACT FOR LOCAL CONSTRUCTION WORKERS CATEGORY 2 IMPACT FOR IMPACTED LANDOWNERS		
Change process	Change in economic situation.	
Description of potential impact	Economic benefits may lead to positive psychosocial impacts	
Nature of impact	Direct positive	
Stage	Pre construction and construction	Operation
Level of significance before mitigation	High	High
Level of significance after mitigation	Medium	Medium

(c) Institutional and empowerment processes and impacts

CATEGORY 1 IMPACT		
Change process	Additional demand on municipal capacity to provide services.	
Description of potential impact	Impact on local government capacity in terms of service delivery.	
Nature of impact	Direct and indirect positive or negative	
Stage	Construction	Operation
Level of significance before mitigation	N/A	High negative
Level of significance after mitigation	N/A	Low negative

CATEGORY 1 IMPACT		
Change process	Additional demand on municipal capacity as part of the disaster management plan.	
Description of impact	The implementation of an effective disaster management plan will put additional pressure on municipal capacity.	
Nature of Impact	Indirect positive	
Stage	Construction	Operation
Level of significance before mitigation	Medium	Medium
Level of significance after mitigation	Low	Low

CATEGORY 2 IMPACT	
Description of impact	Attitude formation might result in delays in project implementation and may have economic impacts.
Nature of Impact	Indirect negative
Stage	Construction into operation
Level of significance before mitigation	Medium
Level of significance after mitigation	Low

(d) Socio-cultural change processes and impacts

CATEGORY 1 IMPACT		
Change process	Different culture of workers.	
Description of potential impact	The behaviour of construction, operation and maintenance workers might impact on culture.	
Nature of impact	Direct negative	
Stage	Pre-construction and Construction	Operation
Level of significance before mitigation	Medium to high	N/A
Level of significance after mitigation	Medium to low	N/A

CATEGORY 1 IMPACT		
Change process	Change in water use.	
Description of potential impact	The provision of water to some of the villages in the study area will have a positive impact on NHRQOL.	
Nature of impact	Indirect positive	
Stage	Construction	Operation
Level of significance before mitigation	N/A	Medium
Level of significance after mitigation	Low	High

CATEGORY 2 IMPACT		
Change process	Change in movement patterns.	
Description of impact	Impact of construction activities on movement patterns of local communities, potentially impacting on the maintenance of social relationships. Impact of road re-alignment on movement patterns of local communities, potentially impacting on the maintenance of social relationships.	
Nature of Impact	Direct negative	
Stage	Construction	Operation
Level of significance before mitigation	Medium	Medium

Level of significance after mitigation	Low	Low

CATEGORY 2		
Change process	Change in landscape.	
Description of potential impact	Impact of the proposed dam on sense of place	
Nature of impact	Direct negative	Direct negative
Stage	Construction	Operation
Level of significance before mitigation	Low	Low
Level of significance after mitigation	Low	Low

(e) Geographical Processes

CATEGORY 2 IMPACT		
Change process	Change in land use.	
Description of potential impact	Change in land use will result in a loss of land and impact on cultivation activities.	
Nature of impact	Negative direct	
Stage	Construction – permanent loss of land	Construction – temporary loss of land
Level of significance before mitigation	Low to high (depends on farm and farming activities)	Medium
Level of significance after mitigation	Low to high (depends on farm and farming activities))	Low

Although the expected construction impacts across all the change processes are mostly negative, these impacts are for the most part only temporary in nature and are expected to last over the construction period. The potential impacts can be significantly reduced should local labour be used as estimated and predicted by the DWAF.

In comparison to construction impacts, operational impacts are expected to last over the longer term and therefore would have potentially prolonged impacts. The effective management, and regular monitoring and evaluation of both the dams, also in terms of upstream and downstream impacts, would ensure that corrective measures can be taken immediately to prevent adverse impacts on the infrastructure itself, or on the affected areas and people.

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

High expectations from the project are also evident amongst the inhabitants of villages. These expectations are focused on job opportunities, not only for individuals, but also for service providers and contractors. Information campaigns should be developed to temper expectations, which local governments have a major role in fulfilling, via IDPs, etc.

The permanent indirect impact on QOL (health related and non-health related) is probably the potential increase in water supply to the different beneficiaries. The successful implementation of water supply to affected communities, emerging farmers, etc. will outweigh the potential negative impacts. The indicators for 'successful' can be derived from implementation conditions and mitigation measures (see the separate EMP and mitigation measures in this document).

This chapter concludes with recommending the underlying principles which should guide the implementation of mitigation measures and / or development projects (quoted from Sadler, Verocai & Vanclay, 2000), followed by final conclusions.

- Consider the needs of vulnerable groups and/or ethnic minorities and/or indigenous peoples;

- Focus on poverty reduction and always seek to improve the position of the worst off members in society;
- Recognise and preserve the existence of social diversity;
- Maintain community integrity and viability;
- Develop enhancement programmes that stimulate a range of activities in the community and encourage diversity of economic, cultural and social activity even if it requires cross-subsidisation from other activities;
- Develop mechanisms for capacity development and use project planning as an opportunity to foster civil society;
- Avoid development of a dependency syndrome or hand-out mentality among affected groups by providing compensation in a form that ensures that meaningful activity is undertaken – do not provide compensation in the form of cash payments;
- Plan for the community in the future after the proposed/current project ceases;
- Recognise that SIA should be a process of navigation rather than prediction.

In conclusion:

- The EMP should be communicated in detail to the appointed contractor;
- An Environmental Control Officer should be appointed to monitor the implementation of social mitigation measures are. This person should have experience in facilitation, and negotiation, specifically with rural communities. He/she should have excellent communication, listening and problem solving skills. Experience in similar projects and ability to speak local languages should be considered when selecting this person.
- The social impacts as anticipated based on the SIA should be monitored and evaluated to inform future SIAs on dam projects. The impact of the changes on the baseline should be measured;

- Project planning should be drawn through to the Integrated Development Plan to inform land use planning, tourism planning, to avoid conflicts and to leverage mutual resources between the DWAF and local government;

- An important aspect related to the successful completion of the project is probably the way in which the DWAF will communicate with and involve the affected parties, also in the mitigation of impacts. The affected parties should be pro-actively involved throughout the process to avoid any misunderstanding. The municipality, Tribal Authorities, land owners, Construction Company and the DWAF should form part of a forum to navigate the process.

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Appendix A: Details of Interviewees

Farmers (males unless stated otherwise) :	Villagers /farmers (Females unless stated otherwise):
Phone numbers not relayed here, but available.	
Barnard, J. & J. (Mrs.) Denysschen, K. & D. Du Toit, J. Erasmus, K. Faul, P. en C. (Mrs.) Gubitz, H. & P. Muller, W. Van Rooyen, B. & I. Van Rooyen, L. Venter, D. & C. (Mrs.) Vorster, E. Vorster, P.	Emerging farmer, Rabalele D. Mabunda, C. (Mr.) Mabunda, J. (Mr.) Mabunda, S. Mafumu, M. Maphale, E. Masia, R. Mathe, S. Mathebula, J. Matswale, M. Mawela, D. Mlambo, C. Mnisi, A. Mukeri, M. Ngobeni (Mr. and Mrs.) Nukeri, Z. Phephenyana, O. Ramatapa (Nurse) Seabela, S. Senama, B. Shikange, N. Shikweni, B. Shilowa, S. Sisa, P Sithwana, M. Others preferred to be anonymous.

Farm workers on the farm of Mr. van Rooyen were interviewed, and affected residents of Dzumeri, Gamokgwathe, Hlohlokwe, Mageba, Makhwashane, Mawa, Nkambako, Mphakana, Nwamitwa, Rwanda, and Tape.

Lady Chief Nwamitwa and Chief Rababalela were consulted as well as Mrs. F. Mashianoke, Manager of Planning and Economic Development of the Greater Tzaneen Local Municipality.

A focus group discussion conducted with BKS project team members on 25 January with Mr. B. Pullen, Mrs. A. Combrinck, Mr. O. van den Berg, Mr. E. Mashau. Farmers in the dam basin were interviewed.

Appendix B: Water Access

Overview of the quality and quantity of water of the affected villages in the study area. The overview is interpreted based on the information gathered on the field trip through the interviews with the community members and site observation.

	Pipe water in dwelling	Pipe water in yard	Pipe water <200m	Pipe water>200m	No access to pipe	Borehole	Rain	River	Water vendor
Ga mokwathi				Once a week per household	√	Not all residents		√	R1.50 for 25 litre
Gawale						Not all residents		√	
Mphakwana						Not all residents		√	R1 for 20 litres
Maranga			√		√	Not all residents		√	R1 for 25 litres
Ndambe			√	√		Not all residents	√	√	R1 for 25 litres and R50 for 1 jojo tank.
D. Rabalele			√	√		Not all residents			R1 for 25 litres
Tape					√	Not all residents	√	√	R1 for 25 litres
Nkamboko	√	√	√	√		Not all residents			
Mawa			√	√		Not all residents		√	
Mawa new stands					√	Not all residents		√	R1 for 25 litres
Mavela				√		Not all residents		√	
Mandlakazi				Opened once a week		Not all residents			R3 for 25l

Mbekwana					√	Not all residents			R3 for 25l
Xihoko		√	√	√		Not all residents			R1 for 25 litres
Serolorolo		√	√	√		Not all residents			R1 for 25 litres
Rikghotso					√	Not all residents		√	R1.50 for 25 l
Runnymede						Not all residents		√	
Mageba					√	Not all residents		√	R1.50 for 25 l
Hlohlokwe			√	√		Not all residents			
Nwamitwa old			√	√		Not all residents			R1.50 for 25l
Nwamitwa new					√	Not all residents			R1.50 for 25l

Appendix C: Narrative Analysis

A day in the life of a village woman (by P. Mnisi, based on interviews with villagers)

It is one of those sunny, hot mornings in Ndambe village and as usual the women are calling each other from their traditional houses as they walk down the dusty roads of the village. They all carry 25l plastic cans, some by hand and others by pushing at least 3 in a wheelbarrow. As they walk they chat and laugh, yet they hope that each morning can be a better one. They hope to get what they call 'life' from the river. Among them is Mrs. Mageba. Clothed in one of her beautiful, multi- coloured motsheka she knows that she has to get to Molotozi River quickly and as early as possible to avoid a queue.

The Mageba family consists of 5 members, like most families Limpopo Province. Living among the Tsonga and Sepedi speaking, they themselves are Tsonga and governed by the "hosi", chief, and maintain the traditional values. Mr. Mageba is unemployed and is regarded as the head of the household who makes all the decisions.

Mrs. Mageba has to wake up every morning at least at 4:00 to fetch water from the river in order to prepare her children in time for school. Her 2 daughters are still in primary school therefore she has to fetch the water alone and hopefully her son will help until he is old enough to be called a man.

While on her way to the river she ponders about the long distance her children have to walk to school. Will an education help them escape the distance she is now traveling to fetch the water? Mrs. Mageba knows that a lot of children had to quit school because they needed to help their parents fetch water and generate income.

Older children are left with no time for homework because they have to run around with wheelbarrows or donkey carts after school to draw water from the river and other villages - not only for their families but for the neighbours who are willing to pay at least R3 for 3×25 liter plastic cans. Mrs. Mageba desires to have her own wheelbarrow so her trips to the river may be decreased. Her children's help is appreciated, but she wants to give them the opportunity to be educated in order to have chances for a brighter future.

Teachers and nurses around the nearby village with nicely built brick houses enjoy their sleep longer. There are more opportunities for them. Most were able to save money and now have boreholes within their yards. How will she ever be able to get a minimum amount of R6000 in order to do the same? Even if she tries what is the guarantee that she will know the right place where the water is?

Today she arrives early at the Molotozi river, earlier than the women who come here to do laundry, earlier than the little boys, little girls and sometimes grown ups who use the river as a latrine or a bathing area. They use the same water her family drinks, yet she still says water is life. She can't live without taking a bath, drinking water, cleaning, cooking, and clean laundry. Water is vital for all of this. When she gets home she will boil the water if there is enough wood and time. If there is Jik she might use it for purification. In any case, this is the only kind of water that she, her family and neighbours know that they don't have to pay for.

She sometimes wishes to buy water from the nearby community water project, from the neighbours with boreholes or the vendors that usually sell on the roads but it is difficult to spare R1 for a 25l can especially when she needs at least 5 of those per day with the laundry day excluded. Like most of the women in the villages she will place buckets outside on the rainy day to get more water.

However, in the previous week she had to buy water because for some days the river was flooded and the water was dirtier and red in colour. Her family once again had to settle for the black tea because no matter how much the salty water from the borehole is boiled, the water still curdles the milk. She buys powder soap or foam bath in order to make the borehole water soft for bathing. As the water she bought drips on her plastic cans, they remained covered with the whiteness of salt. She looked at that and believed that there was little she could do. This has been happening as far as she can remember.

Hurrying back home Mrs. Mageba prepares herself to get to work. Today she managed to go to the river 4 times because she can only afford to carry one 25l can at a time on her head. Her work is to sell mangoes, apples and other types of fruit by the roadside. Though she owns a big yard she finds it hopeless to farm anything because the crops depend on rain only, as there is no water to spare for watering the crops. She therefore depends on the farmers to get her stock. Sometimes this kind of dependence does not make her confident because of the inconsistency of the quality of fruit she has to buy. One of her suppliers of mangoes, citrus, cabbage, tomatoes and spinach, Mr. Nukeri, has 4 boreholes on his farm, but one of the machines he uses to draw water has been broken for some time now. He is therefore sometimes forced to neglect his trees because of the limited water available.

In addition, Mr. Nukeri has to deal with hawkers and kids who come and steal form his farm. For a husband of 2 wives with more than 10 kids to provide for daily, the worry is endless. The nearby river is only allowed to be used for the community's cattle and talks with councilors, premiers or representatives of those in authority have proven to be unfruitful.

Mrs. Mageba arrives at her spot at an accepted time after a long walk. It is important to be early because there are a lot of other women who sell on the same street, intensifying the competition. Miss Shikweni, one of the hawkers from Tape village, did not pitch today. It's Wednesday today, the day that she chooses to do her household laundry. Single with 3 kids, she needs to use at least eight of 25 liter tanks for the laundry. Though she has an option of doing the laundry at the river she doesn't use it. She is one of the ladies around the village who is against that or any use of a river as a latrine or for bathing purposes. Nevertheless other residents use the river for such. For the sake of her health and that of her kids she rather goes 8 times to the river for the water. The Shikweni family also tries to help the old aged couple next door with water. Their legs do not allow them to go any further anymore and yet they need water for their daily medicine.

Miss Shikweni has been complaining about the stomach ache but she is not sure what causes the pain. Of course she suspects the water she uses like all the other women she works with, but no one wants to talk or think more about that. Who will want to dwell on the consequences while they are currently in desperate need of daily water supply?

There are a lot of people passing by on the streets to the tribal offices, police station, taxi rank and clinic. Residents from approximately 20 different small villages make use of the Dzumeri Health Care Centre each day. Among these are those who suffer from diarrhoea, mostly kids. The clinic comes in

handy also for those in maternity need and support. However, most casualties have to bring their own bottles of water from home because they might not get anything form the clinic. Preferably water is reserved for those admitted. Though there are taps in the clinic the borehole hasn't been working for nine months and it is only now that they are starting to do something about it. Only water from the 'Jo-Jo' tank is filled when empty by the Giyani Municipality. This water is used for all the cleaning, washing of used linen, cooking and consultations.

For Mrs. Baloyi, the only matron of the clinic, these working conditions are not desirable and soothing. It seems hypocritical to give information to the community about the importance of washing hands every time while her staff is unable to do that even between consultations. They try to fill the buckets of water in each ward and consultation room but this is still not enough. The problem is experienced more at night by the patients in maternity because they can only use the pit latrines outside for the flush toilets inside are without water. It's even difficult for mothers of the new born babies to take a bath after delivery. Patients are sometimes encouraged by the clinic staff to take the used linen home for washing because of limited water available at the clinic.

However, with a well functioning clinic borehole, Mrs. Baloyi and her staff have to worry a bit less about the flush toilets and washing of hands and yet more about the resources that are slowly damaged by the salty water. Already geysers and kettles need replacement adding to the concern of their minimum resources.

Some of Mrs. Mageba's customers from the Nkambako and north of Hlohlokwe villages have little worries about the availability of water. They have pipes nearer to their homes where water is always available. They also do not have to pay any money to get the water, unlike Mrs. Maphale, Mrs. Mabunda and Miss Vuma from Xihoko, Rabalele and Maranga villages respectively. The villages of Nkambako and north of Hlohlokwe have so much water that Nwamitwa and south of Hlohlokwe are able to benefit a bit from them.

Mrs. Maphale does embroidery for Kaross, which is run by Mrs. van Rooyen. Mrs. Maphale delivers her embroidery work at Kaross every 6 weeks. She is one of 1000 women who does embroidery for Kaross, and manages to feed her family with the money she earns this way. What is even better is that she may embroider at home. There are talks that the proposed dam will cut embroiderers off from Kaross, and that the new road will be such a detour that the taxi money will be very expensive. Mrs. Maphale is very concerned about how this might affect her income.

A new hope dawns in Mrs. Mageba's mind as she looks at these women. If these women are uneducated and have water nearer to where they stay then maybe the same can happen for her and her family. Her hope grows everyday when she thinks about them and, like most people, she also believes that there is light at the end

Appendix D: Inventory

			SCENARIOS					
No.	PORTION	FARMER	HOUSES			DAMS		
			HIGH	MIDDLE	LOW	HIGH	MIDDLE	LOW
1	Portion	Unknown						
2	4 & 9/519	E Vorster						
3	3/519	TMT						
4	7/519	L L						
5	828 LT	J du Toit	1[1]	0	0			
6	2/518	P Vorster	2	1	0	1	1	0
7	4/518	E Vorster	1	1	0	1	1	0
8	3/518	J du Toit						
9	0/518	TMT						
10	5/517 & 6/517	E Vorster	1	1	1	5	3/4	3
11	1 & 2/515	K Erasmus	1	1	1	2	2	2
12	3 & 4/515	W Muller						
13	0/515	K Venter	1	1	1			
14	2, 4 & 8/520	Gubitz				1	0	0
15	3/513	E Vorster						
16	15/514	L v Rooyen						
17	5/513 to R/514	B van Rooyen	2	2	1	8	3/5	2
18	1/514 and 2/514	P Vorster	1	1	0	3	2	1
19	464 LT	Denysschen				2	2	2
20	4-12/514 except 10	Denysschen				1	0	0

[1] Not sure whether this is Du Toit's or Vorster's house, property will be on an island.

21	463 LT & 1-3/463	Gubitz	1	1	1	2	2	2
22	12 & 14/514	P Faul	1	1	1			
	Piece for tourism developmenT	P Faul						
23	10/514	L van Rooyen						
		TOTAL	12	10	6	26	16	12

PORTION	No.	FARMER	BOREHOLES	STORES ETC.			PACKING FACILITY			COMPOUND			AERODROME
			HIGH	HIGH	MIDDLE	LOW	HIGH	MIDDLE	LOW	HIGH	MIDDLE	LOW	ALL SCENARIOS
Unknown	1			0	1	1							
828 LT	5	J du Toit	14							1	1	1	
827 LT	6	P Vorster	8	1	1	0							
4/518	7	E Vorster	5				1	1	1				1
3/518	8	J du Toit	5										
5/517 & 6/517	10	E Vorster	5										
1 & 2/515	11	K Erasmus	5	2	2	2				2	2	2	
3 & 4/515	12	W Muller	8							1	1	1	
R 515	13	K Venter	8										
2,4 8/520	14	Gubitz	1										
1/513	15	E Vorster	6										
15/514	16	L v Rooyen		1	1	1							
5/513 to R/514	17	B van Rooyen	4	1	0	0	1	1					
12 & 14/514	22	P Faul	2										
		TOTAL	71	5	5	4	2	2	1	4	4	4	1

water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

REPORT NO.: P 02/B810/00/0708/ Volume 2 Annexure D

GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

Environmental Impact Assessment

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

ANNEXURE D: ECONOMIC SPECIALIST STUDY

JULY 2008

Kayamandi
Development Services (Pty) Ltd
Reg No. 1999/12439/07

Compiled by:

Kayamandi Development
Services (Pty) Ltd
Hatfield Gardens
Block F
Unit 2

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

Project name:	***Groot Letaba River Water Development Project***
Report Title:	***Environmental Impact Assessment Annexure D: Economic Specialist Study***
Author:	***Nanja Churr***
DWAF report reference no.:	***P02/B810/00/0708/Volume 2. Annexure D***
Kayamandi project reference no.:	
Status of report:	***Draft***
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SPECIALIST
Approved for Kayamandi Development Services (Pty) Ltd by:

Russell Aird *Date*
Study Leader

ENVIRONMENTAL ASSESSMENT PRACTIONER
Approved for ILISO Consulting (Pty) Ltd by:

Dr Martin van Veelen *Date*
Project Director

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.

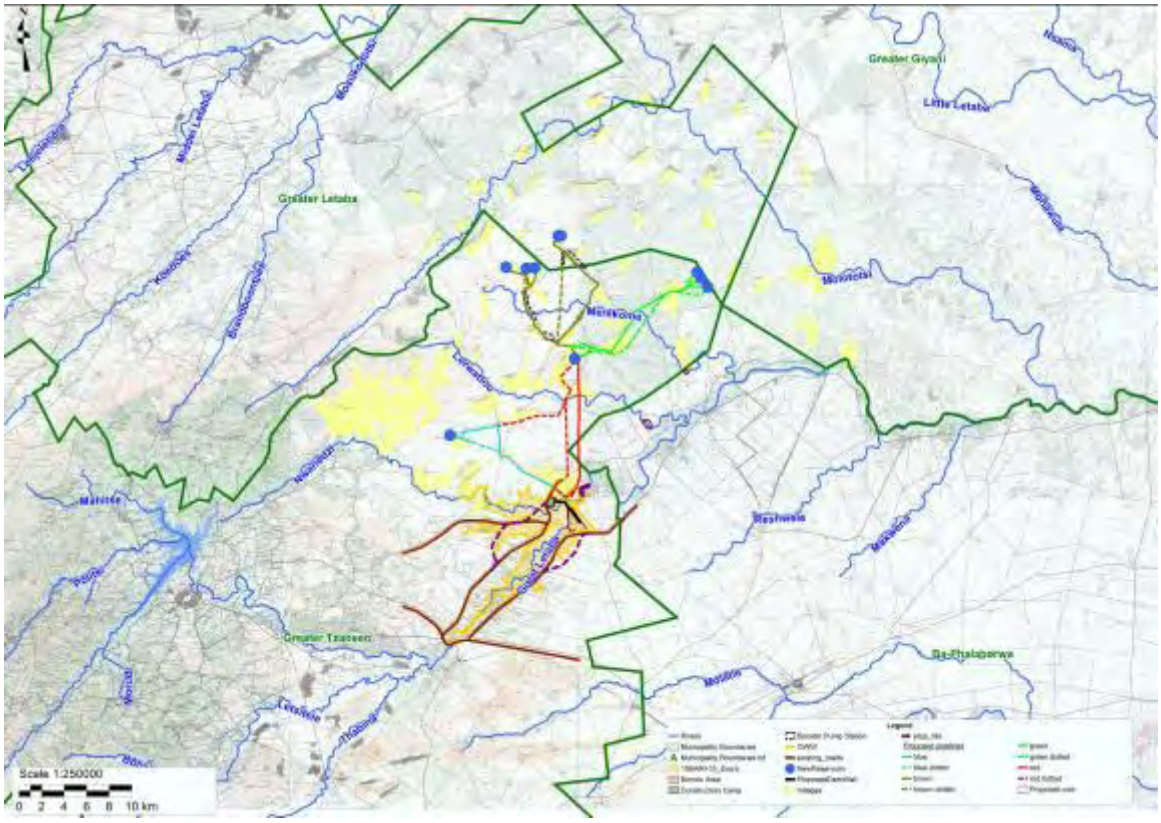
The relevant components of the **raising of the Tzaneen dam wall** are:

- Tzaneen dam with a height of 54.9m a fully supply capacity of 158 million m3 and a yield (high assurance) of 58 million m3/annum will be raised by a maximum of 3.5m with a supply capacity of approximately 203 million m3.
- 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 m^3 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: Six 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 R1200 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 is 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.

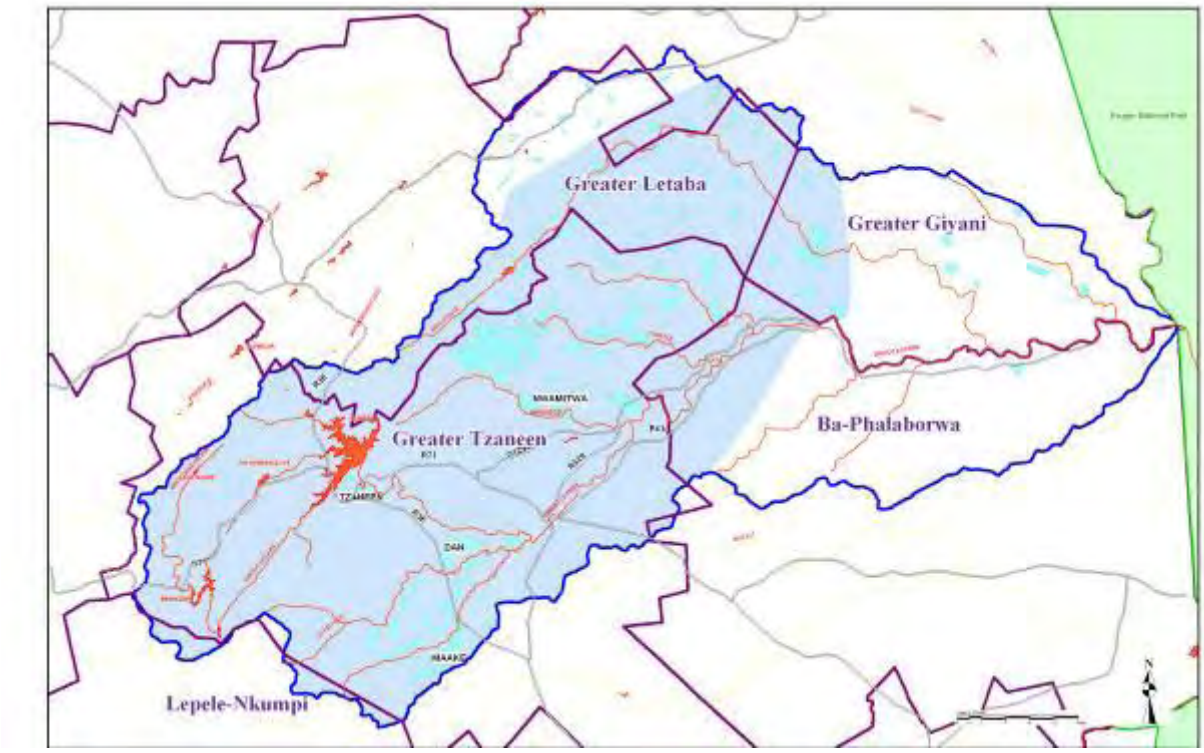
The project area, namely the Groot Letaba catchment, is located within the Mopani District Municipality of the Limpopo Province and is mostly covered by the Greater Tzaneen, and Greater Letaba Local Municipalities as well as smaller portions of Greater Giyani and the Ba-Phalaborwa local municipalities (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 5000km^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, 40km north-east of Tzaneen and 20km west of Hans Merensky Nature Reserve. This site is just downstream of the Nwanedzi/GLR confluence.

Figure 6.1: Groot Letaba River Water Development Project



Source: ILISO Consulting, 2008

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

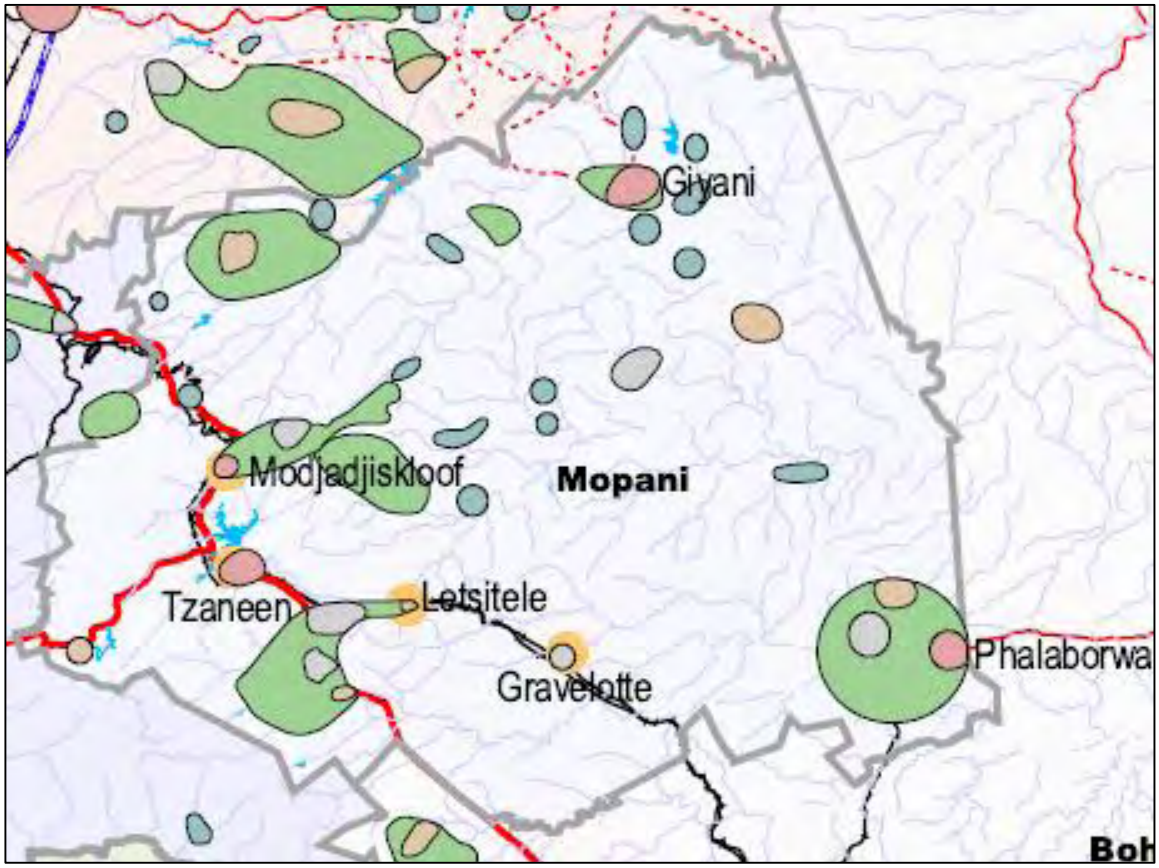
Within the four Local Municipalities, the Limpopo Provincial Rationale identified 16 growth points. The Growth Points are identified as being located within first order settlements. The First Order Settlements (Growth Points) are individual settlements or a group of settlements located relatively close 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;

Figure 6.2: Growth points in Mopani District, 2002



Source: Pieterse du Toit and Associates, 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.

Table 6.3: Labour Force per sector, 2004

	Affected municipalities					Limpopo Province	South Africa
Industry	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

[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.

Industry	Affected municipalities					Limpopo Province	South Africa
	Greater Giyani	Greater Letaba	Greater Tzaneen	Ba-Phalaborwa	Total		
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

Industry	Affected municipalities					Limpopo Province	South Africa
	Greater Giyani	Greater Letaba	Greater Tzaneen	Ba-Phalaborwa	Total		
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, 40km 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 4214.6ha of land is permanently lost, of which 3864 ha accounts for the farm land to be directly inundated by the proposed dam and 350.6ha 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 2129 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.

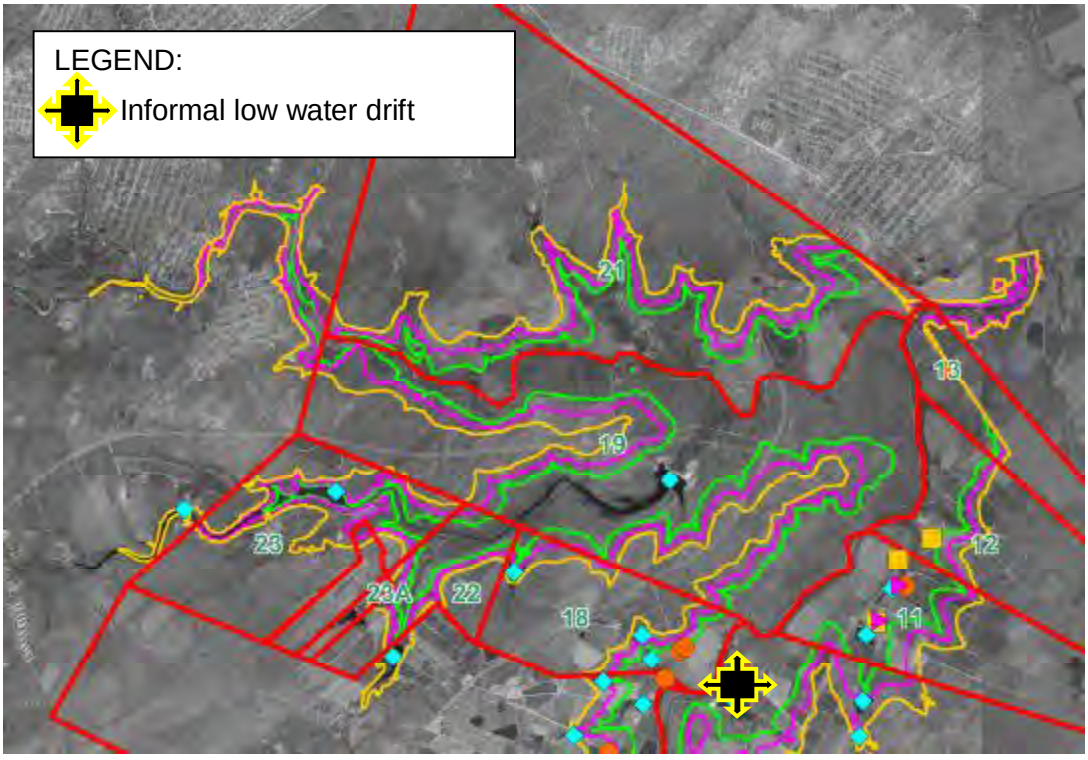
According to the social impact assessment, the inhabitants of Nkambako, Rwanda and Nwamitwa villages will be affected the most by the road re-alignment.

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 kilometres 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 31,334,834m^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 availability of the Draft Environmental Impact Assessment Report, its summary (translated in four languages), the various specialist studies, the Environmental Management Plans and Programmes will be announced by way of personalized letters to stakeholders and the placement of advertisements in regional and local

newspapers. The draft documents will be made available to I&APs for the inputs and comments. Two stakeholder meetings are planned to present the contents of the documents and to discuss the findings of the study.

A public review period of thirty (30 days) will be available for stakeholders to comment on the Draft Environmental Impact Assessment Report, its summary (translated in four languages), the various specialist studies, the Environmental Management Plans and Programmes. Stakeholder comments will be 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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