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GROOT LETABA RIVER WATER DEVELOPMENT PROJECT (GLeWaP)

Environmental Impact Assessment

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

ANNEXURE G: VISUAL IMPACT ASSESSMENT

MARCH 2010

insite
LANDSCAPE ARCHITECTS & ENVIRONMENTAL CONSULTANTS

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DECLARATION OF INDEPENDENCE

Karen James, who is a Landscape Architect from Insite cc. Landscape Architects and Environmental Consultants, is an independent consultant to ILISO Consultanting (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 this specialist performing such work.

REPORT DETAILS PAGE

Project name:	***Groot Letaba River Water Development Project***
Report Title:	***Environmental Impact Assessment Annexure G A: Visual Impact Assessment***
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Approved for Insite Landscape Architects and Environmental Consultants by:

04.03.2009

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Project Director

EXECUTIVE SUMMARY

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

Result so of the study indicate insignificant impacts for the raising of the Tzaneen Dam

***Figure 1** shows the existing dam wall and **Figure 2** demonstrates an artist impression of what the Tzaneen Dam would look like once the wall is raised.*

Figure 1: Picture of the existing dam wall

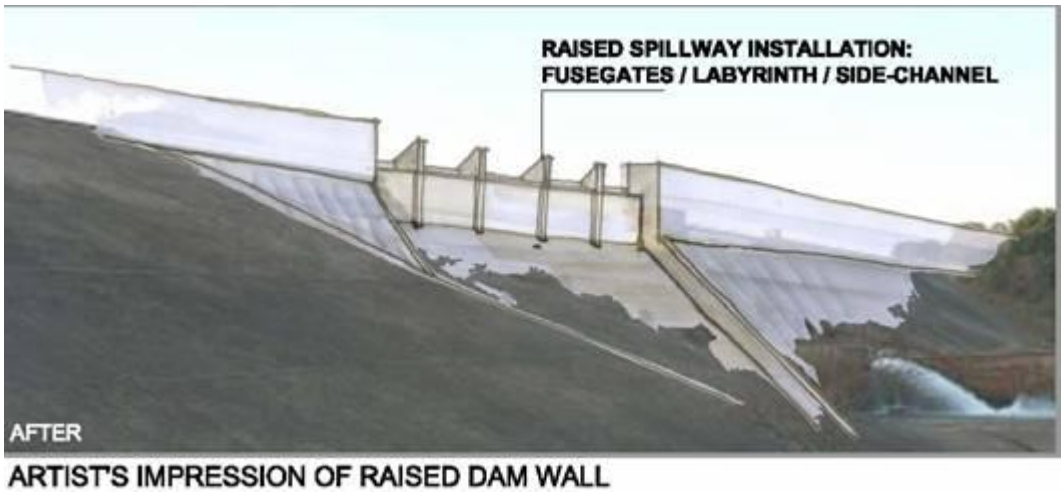


Figure 2: Artist impression of raised dam wall

Although construction activities and the resultant water body at the proposed new dam at the site known as Nwamitwa will be visible and noticeable the visual specialist assessment found that the visual would not be unacceptable to inhabitants of the study area or out of character with the receiving environment. Visual impacts are therefore considered to be of low significance for this project. Some mitigation measures (e.g. screening of construction activities) have however, been recommended and included in the EMP.

Figure 3 *shows the proposed new dam 50% full and* ***Figure 4*** *shows the view from downstream of the dam wall after construction.*

Figure 3: Proposed new dam 50% full

Figure 4: View from downstream of the dam wall after construction

Figure 5: Construction of a larger capacity reservoir in Babanana

TABLE OF CONTENTS

Page

LISTS OF TABLES

Page

ABBREVIATIONS

DWAF	Department of Water Affairs and Forestry
GLeWaP	Groot Letaba River Water Development Project
OA	Options Analysis
PCMT	Project Co-ordination and Management Team
PSP	Professional Service Provider
EIA	Environmental Impact Assessment
VIA	Visual Impact Assessment
VRM	Visual Resource Management
VAC	Visual Absorption Capacity

1. STUDY INTRODUCTION

1.1 BACKGROUND TO PROJECT

The Department of Water Affairs and Forestry (DWAF) has commissioned 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 Gazette No. 28753 of 21 April 2006.

ILISO Consulting has appointed Insite Landscape Architects to undertake the Visual 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 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

Karen James of Insite Landscape Architects will undertake the Visual Impact Assessment. She has a Bachelors degree in Architectural studies as well as an Honours degree in Landscape Architecture and is currently in training to become a professional in her field. The projects that she is involved with or has been exposed to relate to governmental, commercial, retail and industrial developments, master planning, environmental impact assessments (EIAs) and planning, as well as residential estate design.

Karen, on behalf of Insite cc., has compiled a number of Individual Visual Impact Assessments for previous Gautrain EIAs. These assessments were conducted over the proposed Northern and Southern Variants of the Gautrain Rapid Rail Link and included full Visual Analyses, with substantial visual graphics, Study Reports, as well as summaries for Proposed Mitigation techniques.

3. PURPOSE OF REPORT AND SCOPE OF WORK

At times when a 'visual resource' has to compete with the exploitation of the other resources of our country or region, or when infrastructure or development is imposed on the existing landscape, it is very often the scenic quality and character of that landscape that is diminished. There is also a strong co-relation between ecologically healthy landscapes and scenically intact landscapes and it is for this reason that the importance of the quality of our visual environment is of significant concern. It is the therefore the objective of a Visual Impact Assessment (VIA) to investigate and recommend a visual resource management system (VRM) that will identify the significance of and furthermore protect the quality of a visually positive environment.

With the above in mind, it is the purpose of this report is to consider the proposed infrastructure components of the water resource management interventions of the GLeWaP project and evaluate the impact of such against the existing scenic and visual resources in the area of study. The objective of the assessment is to provide sufficient information to the relevant authority to allow them to make decisions regarding authorisation and implementation of the project.

3.1 SCOPE OF ASSESSMENT

Water resources in the Groot Letaba River catchment have long been heavily committed, in utilisation by both the social and economic sectors in the region. In the face of growing needs in the domestic communities, as well as the deterioration in the conservation status of the river ecology and increasing shortages in the irrigation sector, a number of strategic options aimed at improving the management of these water resources have been tabled.

A portion of these strategies investigate the creation of additional storage in the river system aimed at improving water availability and river flow regulation. The scope of this assessment is to identify and evaluate the potential visual impacts of the some of these particular options named in the GLeWaP project:

- The raising of the Tzaneen Dam wall;
- The proposed construction of a dam at the Nwamitwa site;
- Associated bulk water distribution infrastructure.

This specialist study includes the undertaking of a site visit, the review of available secondary data sources and a compilation of photographic and sketched images identifying and evaluating impacted visual scenes. The study will further undertake to recommend measures to avoid or reduce negative impacts and enhance positive impacts on visual quality.

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.

That being said, very few issues were raised in the Scoping Phase with regards to visual or aesthetic impact, with much emphasis and attention being drawn rather to the important issues of social, economic and environmental activities. The visual impact of this project does, however, deserve a fair amount of consideration as visual quality and character will go a long way in influencing the way in which the general area is perceived by both tourists and local communities alike. Also, as stated earlier, there is also a strong co-relation between ecologically healthy landscapes and scenically intact landscapes and it is for this reason that the importance of the quality of our visual environment is of significant concern.

Therefore, this VIA will not necessarily be guided by issues raised in the Scoping Phase but will rather seek to highlight and inform the relevant authority of potentially significant visual impacts that would be brought about by the implementation of this project.

The VIA is as essential a component to the EIA process as the “traditional” specialist studies. It must, however, be stressed that they are different to most of specialist studies in that it is not possible to quantify all aspects in its make-up. The assessment of potential impacts on visual quality and resources is complex in that it is determined through a combination of quantitative and qualitative assessments and evaluations. Within the EIA process, the specific impacts of development activities on landscape consider each situation likely to impact on the landscape elements. The visual

character is assessed and its significance evaluated on the basis of the nature and magnitude of impact and the sensitivity of those elements and characteristics.

This VIA will break the study into various infrastructure components, evaluating the various intervention proposals as separate items:

Part A will assess the visual impacts caused by the *proposed raising of the Tzaneen Dam wall*.

Part B will assess the impact that the *construction of a large dam on the Groot Letaba River at the Nwamitwa site* may have on local and regional visual resources. Part B will also evaluate the realignment of the roads to accommodate the dam, the construction of water treatment works, and proposed bulk water distribution (pipelines and pump stations) from the dam site to communities in the area.

The method of assessment will involve the identifying of critical viewpoints / land uses /visual receptors that will overlook the various components as well as the defining of viewshed lines. Visual receptors include the public or community at large, residents, visitors, and other groups of viewers as well as the visual amenity of people affected. The viewshed analyses the full extent of the zone of visual influence and will be indicated on plan in this study. Changes in visual setting for each of the identified points will be sketched for analysis.

A summary of visual impact significance will then be drawn up and impact ratings allocated to each component of study. The following criteria will be used to evaluate visual impact significance:

Nature

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

Visual Absorption Capacity

The ability of a landscape to accommodate and absorb aesthetic change will be classified as low, medium or high.

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.

Visual Impact Significance Summary

A summary of visual impact significance will be drawn up and ratings given per land use / viewpoint. The ratings will be influenced by the above criterion and allocated in accordance with assessment criteria outlined below:

Table 4.1: Assessment Criteria

Criteria	Rating
Scheme will cause a significant deterioration in the existing view	**Substantial adverse impact**
Scheme would cause a noticeable deterioration in the	**Moderate adverse impact**

Criteria	Rating
existing view	
Scheme would cause a barely perceptible deterioration in the existing view	**Slight adverse impact**
Scheme would cause a barely perceptible improvement in the existing view	**Slight beneficial impact**
Scheme would cause a noticeable improvement in the existing view	**Moderate beneficial impact**
Scheme would cause a significant improvement in the existing view	**Substantial beneficial impact**
No discernable deterioration or improvement in existing view	**No change**

Cumulative Impacts

The possible cumulative impacts will also be considered.

Mitigation

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

5. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

Raising of the Tzaneen Dam

a. It is assumed that the extent of construction work planned will not extend beyond the parameters of the existing Government Water Works.
b. It is assumed that the design for the upgrade of the spillway and raising of the wall will be compatible with the existing structural language.
c. It is assumed that the construction works will take 18 months.

Construction of a new Dam at Nwamitwa Site

a. The final detail design of the dam and outlet works is unknown. Assumptions in dam wall height, length and make-up have still to be finalised. This VIA based on a 1.5 MAR dam.
b. It is assumed that the construction of the dam would take no more than 5 years to complete, with the storage water and storage benefits expected to commence in 2012.
c. It is assumed that farming land, where possible, will remain zoned as such.
d. It is assumed that the dam basin will be cleared prior to the dam filling.

6. FINDINGS

6.1 GENERAL PROJECT DESCRIPTION

The Groot Letaba River Water Development Project is aimed at improving the management of the water resources in a sustainable manner. Faced with water shortages of increasing severity and frequency, the Groot Letaba River is under growing pressure to meet the needs of both the natural environment and the demanding communities that lie within its catchment area. The main consumptive users of water in the area are the irrigation, forestry, domestic and industrial sectors, and the pressure is resulting in serious degradation of the riverine system.

Proposals have been raised for augmenting reliable water supplies from the Groot Letaba River and they include the possibility of raising Tzaneen Dam, thereby increasing its storage capacity, as well as the possible construction of a dam on the Groot Letaba River at Nwamitwa just downstream of the confluence with the Nwanedzi River. Bulk infrastructure for the treatment, conveyance and storage of potable water for primary use forms an integral part of the development proposals (see **Appendix A)**. Attention is focussed on water needs for the increasing human population, for downstream riverine ecosystems (including those in the Kruger National Park) as well as for stabilising commercial irrigation, including the settlement of resource-poor farmers.

Other non-infrastructure proposals form part of the water development project but will not fall under scrutiny in this assessment.

6.2 ANALYSIS

The Groot Letaba River Catchment is located in the Northern Province, about 90km east of Polokwane and covers approximately 2,885km² between Haenertsburg in the west and the western boundary of the Kruger National Park.

6.2.1 PART A: The Raising of the Tzaneen Dam

Part A will assess the visual impacts caused by the *proposed raising of the Tzaneen Dam wall*.

Refer to Annexure A2 – A3.

Description of Landscape Setting / Character

The Tzaneen Dam, located on the Groot Letaba River near the town of Tzaneen, was completed in 1976. At full capacity it can hold up to 159 million m^3 of water.

The dam is located within the Greater Tzaneen Local Municipality but because is located at a slightly higher altitude to the town and because of the naturally rolling topography that characterises the area, there are few to no visual links between the dam and the town. The dam does, however, form a strong visual element in approaching views as one arrives in Tzaneen from the northern and western sides. The open body of water holds a characteristically pleasing aesthetic adding to the already rich scenic quality of the region.

Tzaneen itself is located within the Groot Letaba Valley as one moves down off the damp escarpment towards the hot Lowveld floor. A multitude of crops and plantations are grown here, from citrus fruits, avocadoes and nuts to forests of the timber and paper industries. Found amidst the heavily cultivated lands in the riverine valley are pockets of undisturbed wilderness further increasing visual diversity and scenic quality. The dam is surrounded on the most part by disturbed bushveld and grassland, with shallow embankments that rise up gradually to become part of the gently undulating hills of the region. These hills provide interesting background forms and colours to most regional views.

The dam wall is located on the south-easterly side of the dam and is a vast industrial-type embankment structure with central concrete spillway. The dam height is just under 55m at its deepest point which should give an indication of the size of the dam wall. With this in mind, the dam wall is surprisingly well situated to have a relatively narrow viewshed Figure A2 in (**Appendix A**). At present, the dam wall can only be seen from the banks on the opposite side of the dam or from positions on the slopes of the valley that immediately surround and look down onto the wall. As noted earlier, the topography of the area allows for no visual link between the town and the dam wall.

Nature of Development

The main purpose of the raising of Tzaneen Dam is to increase the assurance of the supply of water, an intervention strongly motivated by the irrigation sector. The proposed construction involves the raising of the existing dam wall up to 3.5m with the upgrading of the spillway to accommodate a flood of 5,100m ^{3}/s. Proposed designs include the use of either a labyrinth spillway, fusegates or side channel spillway (visual examples of each can be found in the supplementary document, **Figure A3** in **Appendix A**). The spillway design is of little concern to the overall visual impact.

The raising of the 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.

The case study of the Ross River Dam Upgrade Project (RRDUP), Australia, can be viewed as an adequate example of the construction procedure and visual implications that are involved in the upgrade of an existing dam wall. Details and visuals of this project are outlined in **Figure A3** in **Appendix A** .

Should the raising of the Tzaneen Dam wall be implemented, construction facilities such as offices, workshops and stores will be required on site, but will be located within the property of the existing GWW having no physical impact on the surrounding private properties.

Identification of Visual Receptors

As a result of the natural topographic landscape features, the viewshed of impacted land use zones is relatively narrow and localised.

Identified visual receptors are listed below and a photo-sketch collage is presented in **Appendix A**.

A1. Technical / Administrative Buildings of GWW Adjacent to Dam Wall

Table 6.1: Impact Assessment Table

Visual Receptor	Technical / Administrative Buildings of GWW adjacent to dam wall	
Description of potential impact	A number of government buildings are situated in the immediate vicinity of the existing dam wall and will have localised views overlooking both the construction works and operational works of the raising of the dam wall. The raising of the wall by 3.5m will obstruct any existing views from the buildings over the dam. The business and administrative activities within the buildings and other associated infrastructure do not, however, require such visual amenities.	
Nature of impact	Negative and direct	
Legal requirements	N/A	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative, direct	Neutral, direct
Extent of impact	Local	Local
Duration of impact	Short term	Permanent
Intensity	Medium	Low
Probability of occurrence	High	High
Confidence of assessment	Medium	Medium
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	Hoarding of construction site facilities to screen views where possible.	Design should respond to the structural language of the existing wall. Repair / rehabilitate all areas damaged during construction.
Level of significance after mitigation	Medium	Low
Cumulative Impacts	Neutral	Neutral
The construction process will have the greatest visual impact on the receptor but due to the nature of the land use activity and the temporary duration, it is of low significance. The visual impact of the raised wall within its surroundings can be perceived as neutral due to that it is purely an extension of the existing structure (compatible with existing).		

A2. Surrounding Residential and Recreational / Tourism Sector

Table 6.2: Impact Assessment

Visual Receptor	Surrounding Residential and Recreational / Tourism Sector	
Description of potential impact	A number of existing residences situated on the valley slopes overlook the dam wall but vegetative screening has been used in some properties. Similarly, visitors / tourists to the dam will experience views on the dam wall and construction site although these may be of a shorter duration and from a more regional level. The raised wall will obstruct views onto the dam for some properties downstream of the wall.	
Nature of impact	Negative and direct	
Legal requirements	N/A	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative, direct	Negativel, direct
Extent of impact	Regional	Regional
Duration of impact	Short term	Permanent
Intensity	Medium	Low
Probability of occurrence	High	High
Confidence of assessment	Medium	Medium
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	Hoarding of construction site facilities to screen views where possible.	Design should respond to the structural language of the existing wall. Screen planting where possible.
Level of significance after mitigation	Medium	Low
Cumulative Impacts	Slight Negative	Neutral
The receptors will experience the greatest visual impact during the construction and decommissioning phase. The visual impact of the raised wall within its surroundings can be perceived as neutral as it is purely an extension of the existing structure (compatible with existing). Properties downstream of the dam wall will be negatively impacted as their views over the dam will be permanently lost.		

Results

Visual receptors within the immediate vicinity of the dam wall will be most impacted by the raising of the Tzaneen Dam wall although long-term / permanent impacts will be of neutral visual significance due to the aesthetic language and position of the existing structure.

Impact Summary

The raising of the Tzaneen Dam wall will increase the extent of the zone of visual influence that the existing structure has at present. The impact is, however, of insignificant measure. The sensitivity of associated visual receptors is relatively low due to the high scenic quality of the surrounds.

Properties and activities within the immediate vicinity of the dam wall will be most impacted by the raising of the dam wall although not severely so. Mitigation techniques should be exercised to decrease the visual impact during the construction and decommissioning phases.

6.2.2 PART B: The construction of a dam at the site known as

Part B will assess the impact that the *construction of a large dam on the Groot Letaba River at the Nwamitwa site* may have on local and regional visual resources. Part B will also evaluate the realignment of the roads to accommodate the dam, the construction of water treatment works, and proposed bulk water distribution (pipelines and reservoirs) from the dam site to communities in the area.

Refer to **Figure A4 – A15 (Appendix A)**.

Description of Landscape Setting / Character

From the Tzaneen Dam, the Groot Letaba River flows through a low mountainous foothills zone to the confluence of the Letsitele River. From here it meanders from across the plains before flowing into the Olifants River in the Kruger National Park. The proposed dam site falls within this “plains” region, at the confluence of the Groot Letaba and Nwanedzi Rivers. This area is characterised by relatively undulating Lowveld and is still fairly natural and undisturbed which lends it a high aesthetic value.

The visual journey from Tzaneen towards the Nwamitwa site follows much the same route as the Groot Letaba River. From the foothills of the mountainous area, one has extensive views over the plains where the scenic value is rich and holds a high absorption capacity to visual change. But the road soon flattens to a gently undulation as one reaches the low-lying plains and the relatively flat topography of the landscape combined with the occurrence of sometimes dense vegetation (cultivated or natural) render the views more localised and short-range. It is in these areas that we could assume much of the proposed dam will have the highest visual impact.

Land use in the area is dominated by irrigated agriculture, afforestation, nature conservation and human settlement. The visual character of the site and its surrounds can be described in general terms by referring to two of these dominant and recognisable vegetation and land use zones in the area, namely agriculture and nature conservation. For much of the visual experience when passing through the study area, one notices the distinct patterns of cultivated land and the soft patches of undisturbed wilderness. The natural vegetation in and around the proposed dam basin consists of natural bushveld with well conserved riparian vegetation and managed groundcover.

The Groot Letaba River Valley is a highly productive mixed farming agricultural area with high value fruit production dominating, complemented by cattle ranching, game farming, dryland crop production and a variety of crops produced under irrigation. Although an increase is evident, the tourism demand is well below that which could be expected from an area with such outstanding natural potential.

Apart from internal gravel roads, a fair tarred road network links most of the areas within the district, rendering much of the region easily traversable. The single-laned tarred roads (R529, D1292, P43/3) meander over the plains providing a sequence of interrupted low-level views over proposed dam basin.

There is a noticeable difference in settlement type in and around the proposed dam basin. Activities of an agricultural nature are generally confined to the riverine valley of the Groot Letaba River. Properties are extensive with formal entrances from the main roads, farm houses, utility yards and line after line of cultivated land. As one moves away from the river, the properties become somewhat more undisturbed and informal with a combination of nature reserves, cultural and informal villages, and

government-owned land. The rural communities to the north of the dam site will become of specific concern when evaluating the visual impacts of borrow pits and bulk water distribution infrastructure as much of this area comprises open grassland and ploughed fields which are visually more exposed with lower absorption capacities.

It must also be noted that there are no strong visual reference points in the proposed dam area or surrounds. The Murchinson Mountain Range in the south is one of the few natural landscape features with which to orientate oneself.

In reference to the scale, harmony and total composition of the study area it can be described as characteristically true-to-type. The aesthetic character of the natural areas, farmlands and villages are appropriately suited and the introduction of an inappropriate type or form could interrupt this scenic continuity. The proposed dam, however, is inline with the associated character-types and its introduction into the composition could thus increase the scenic interest and quality.

Nature of Development

The dam will be located on the Groot Letaba River, downstream of the confluence of the Nwandezi River. The assessment is based on a dam with the capacity size of 218 million but the actual size of the dam may be smaller (see **Figure A4** in **Appendix A**).

For the dam wall, an earth fill embankment on both flanks with a central concrete spillway is envisaged – a structure similar in appearance to other composite construction type dams such as the Tzaneen Dam. The earth embankments will be protected against wave action and erosion on the upstream side by a layer of rock rip-rap (tightly packed stone). The downstream slopes will also be protected but by a layer of mainly crushed stone. The embankments are expected to have a total crest length of up to 3 000 m while the length of the concrete spillway would be about 500 m.

<u>Construction procedure, activities and components</u>

Construction activities, procedures and associated facilities will have been described in the Project Description portion of this EIA.

The project outlines that construction will commence with the stripping of vegetation and topsoil to establish access and construction roads, site offices, dam foundations and crusher and concrete mixer stations.

The river will be diverted to expose the rock foundations for the concrete spillway section and cofferdams will be constructed to protect all foundation activities in the riverbed against flood damage. Excavators, bulldozers and trucks will be engaged to remove all loose material on the foundation of the dam until rock is exposed. Blasting and drilling will be required.

Construction of the central concrete spillway and outlet works will then commence. Earth embankments will be constructed on both banks by compacting material hauled in by large trucks from the approved borrow areas.

After construction activities have been completed, all the crushers, mixers and site offices, etc. will be removed and the construction site rehabilitated. All temporary access roads and other hard surfaced areas will be ripped and covered with topsoil and planted with a suitable grass and tree cover. The aim is to return the whole construction site as close as possible to its original appearance. Areas that will be inundated by water in the dam will be shaped to accommodate storm runoff and no grass will be planted.

Supplementry / associated facilities, procedures and infrastructure

Borrow Areas - Three borrow areas have been identified for the extraction of earthfill material, filter materials and concrete sand. 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.

Weir - A new flow-measuring / gauging weir will be required downstream of the dam in order to measure the flow that is released from the dam.

Local Road Re-alignment – The R529 and the P43/3 will require partial re-alignment to accommodate the proposed dam. Road re-alignment will 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.

Water treatment works – 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 at Nkambako.

Pipelines – Bulk water distribution pipelines will be constructed to augment potable water supplies in the various existing supply zones. It is envisaged that new pipelines will be located adjacent to existing pipelines or along road reserves. Some sectors of pipelines may traverse open land.

Pump Stations – A number of pump stations are envisaged at certain points indicated on **Figure 3.8** in main report.

Reservoirs – New and upgraded reservoirs are envisaged at certain points indicated on the plan.

Identification of Visual Receptors

Refer to **Figure A5** in **Appendix A**.

As a result of the naturally flat topographic landscape in this region and the natural screening of local vegetation, the viewshed surrounding the proposed dam is confined to a relatively narrow boundary. For the purpose of this report, the extent of visual influence has been confined to those affected views that are within short- to medium-range of the proposed dam site. It is considered common knowledge that views overlooking the dam will be seen from high-lying areas in the surrounding landscape, eg. Letsitele, but that they will not be of significant negative impact.

Viewshed lines for pipelines, reservoirs and borrow areas have not been indicated but impacted viewpoints have been indicated.

Identified visual receptors are listed below and a photo-sketch collages are presented in **Figure A6 – A15** in **Appendix A**.

B1. Construction of the Proposed Dam Wall

Table 6.3: Impact Assessment Table

Visual Receptor	Construction of the proposed dam wall	
Description of potential impact **Figure A6- A7** in **Appendix A**	The construction of the dam wall will have a significant impact on its surrounds, both during and post-construction. The envisaged 30m high embankment and concrete spillway are structural forms and character-types that are not typically associated with the existing landscape and land uses. The pure scale of the structural elements are not scenically fitting within the landscape. Over time, once the dam is in full operation, the upstream visual impact of the wall will decrease. Downstream views will, however, will be impacted upon more severely. Those activities which lie within close range to the construction site as well as to the proposed wall (excluding those properties that fall under land acquisitions) will have localised visual impacts of high intensity. Properties further away may receive visual relief due to topographic and vegetative screening.	
Nature of impact	Negative and direct	
Legal requirements	N/A	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative, direct	Neutral, direct
Extent of impact	Local and Regional	Local and Regional
Duration of impact	Medium term	Permanent
Intensity	High	High
Probability of occurrence	High	High
Confidence of assessment	Medium	Medium
Level of significance before mitigation	High	High
Mitigation measures (EMP requirements)	Hoarding of construction site facilities to screen views where possible. Discourage the unnecessary usage of high voltage lights during through-night construction. Lighting should be kept to an acceptable minimum and designed in position and height to minimise negative impact on surrounding inhabitants.	Landscape design should respond to the sensitivity of the scenic continuity. Repair / rehabilitate all areas damaged during construction according to Landscape Plan by accredited Landscape Architect. Landscape interventions should be

Visual Receptor	Construction of the proposed dam wall	
	The extent of unnecessary damage to natural surrounds must be kept to a minimum. All construction facilities should be kept tidy and organised.	utilised to screen / minimise the viewshed, eg. vegetated berming, dense hedges, etc. For example, where direct views over the wall can be seen from the road, a suitably sized vegetated berm, perhaps 3-5m high may be mounded adjacent to the road reserve to permanently screen the view creating an uninterrupted scenic character.
Level of significance after mitigation	Medium	Medium
Cumulative Impacts	High Negative	Moderate Negative
The construction process will have the greatest visual impact on the receptor as the activity is intrusive and incompatible with surrounding land use. The scale and form of the dam wall is not inline with the existing character of the landscape. Properties and viewpoints downstream of and adjacent to the proposed dam wall will be more severely impacted than those upstream. The loss of existing vegetation will have a negative impact on the visual quality of the area, although this may be remedied and marked as temporary.		

B2. Inundated Areas within Dam Basin

Table 6.4: Impact Assessment Table

Visual Receptor	Inundated areas within dam site
Description of potential impact **Figure A8** in **Appenidx A**	The proposed dam basin comprises of natural valley bushveld and cultivated land. Its aesthetic value is considered as exceptional in its current state due to its natural undisturbed quality. The construction of a dam at this site will have a severely destructive impact on the area with partial to complete inundation of the natural vegetation. A high impact is expected considering the size of the dam. Although much of the dam basin will be cleared of vegetation prior to filling, it should also be considered that the dam will not permanently be at its full capacity and much of the proposed dam site will take on a dry bracken and sparse visual character with the decrease in dam level. The dam will inherently be quite shallow due to the relatively flat topography of the site. Large open bodies hold great visual interest. Thus, a 50-100% full dam, once established, could add significantly to the scenic value of the area. The vegetative cover and riverine ecology will take longer than 10 years to re-establish and adapt to the new landscape feature.

Visual Receptor	Inundated areas within dam site	
Nature of impact	Negative and direct	
Legal requirements	N/A	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative, direct	Positive, direct
Extent of impact	Local	Local and Regional
Duration of impact	Short term	Permanent
Intensity	Medium	Medium
Probability of occurrence	High	High
Confidence of assessment	Medium	Medium
Level of significance before mitigation	Low	Medium
Mitigation measures (EMP requirements)	No mitigation measure for inundation. Landscape rehabilitation measures according to Landscape Plan by registered Landscape Architect.	Continued landscape rehabilitation measures according to Landscape Plan by registered Landscape Architect . Ensure and refine flow releases from the dam.
Level of significance after mitigation	Low	Medium
Cumulative Impacts	Moderate Adverse	Moderate Beneficial
The proposed dam basin will undergo severe visual change upon first inundation. In its current undisturbed state, the natural vegetation is considered to be of exceptional aesthetic value, all of which will be lost upon inundation. The newly introduced body of water will, however, add to the scenic diversity of the landscape. Thus the dam may enhance the scenic quality of the area as it establishes itself within the landscape.		

B3. Borrow Areas

Table 6.5: Impact Assessment Table

Visual Receptor	Borrow areas	
Description of potential impact **Figure A9** in **Appendix A**	The existing state of the Letaba Drift borrow area is of poor scenic quality. The area is at present being excavated for the manufacture of oven baked bricks. Although the borrow site will be intensively excavated during the construction period, correct mitigation techniques could rehabilitate. Due to its proximity to a rural settlement, there is a large amount of foot and road traffic passing the site throughout the day. The existing state of the Laborie Farm borrow area is scenically and ecologically intact. The current vegetation is natural and undisturbed. Excavation processes are sure to severely impact this valued landscape. Although the borrow site will be intensively excavated during the construction period, correct mitigation techniques could rehabilitate it back to its current state. Excavation equipment will include heavy loader vehicles, excavators, tipper trucks, etc.	
Nature of impact	Negative and direct	
Legal requirements	N/A	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative, direct	Not operational post construction
Extent of impact	Local	
Duration of impact	Medium term	
Intensity	Medium to High	
Probability of occurrence	High	
Confidence of assessment	High	
Level of significance before mitigation	High	
Mitigation measures (EMP requirements)	Hoarding should be erected to screen the excavation activities as well to prevent local passers-by from entering an unsafe site. The hoarding should be painted in natural colours or can be constructed out of natural materials.	Complete earthfill, reshaping and landscape rehabilitation measures post-construction.

Visual Receptor	Borrow areas	
	Landscape rehabilitation measures. The borrow areas should not be active over night or over Sundays due to the proximity to human settlements.	
Level of significance after mitigation	Medium	
Cumulative Impacts	Moderate Adverse	
During excavation processes borrow areas will be severely visually impacted, undergoing complete landscape change. All proposed borrow areas are situated in zones of high ecological value. Mitigation techniques must therefore be implemented to protect and rehabilitate the areas. Visual quality will inherently follow.		

B4. Surrounding Roads and Infrastructure

Table 6.6: Impact Assessment Table

Visual Receptor	Surrounding roads and infrastructure	
Description of potential impact **Figure A10-A13** in **Appendix A**	Apart from internal gravel roads, a fair tarred road network links most of the areas within the district. The existing single-lane roads (R529, D1292, P43/3) are well-suited to the landscape character of the surrounds. Most of the roads pass through areas of dense vegetation where the properties are lined with trees and large shrubs which screen any wide-angle views over the landscape. As the roads follow the topographic undulations, relatively narrow and localised views are experienced through the dips and slightly more expansive views over the plains are experienced over the rises. It is for this reason that the visual impact of the dam itself will only be experience from the higher-lying portions of the road. There are areas of low-lying road that may be inundated when the dam is at full capacity. It is in these areas that the roads will either be raised onto appropriately sized bridges or diverted away from the dam and new roads will be built. In order to tie in with the existing road character, the new proposed roads should have no sharp turning bends. Where construction activities on the roads and bridges are taking place, traffic will be re-directed over existing roads so avoiding the need for temporary detours. With this in mind, much of the construction activity will not be viewed by the public at close-range. Adjacent properties will be most severely affected during construction. Entrances to farms and properties all display their own unique style adding to the visual diversity and interest of the area.	
Nature of impact	Neutral and direct	
Legal requirements	N/A	
Stage	Construction and decommissioning	Operation
Nature of Impact	Neutral, direct	Neutral, direct
Extent of impact	Local and Regional	Local and Regional
Duration of impact	Medium term	Permanent
Intensity	Medium	Low
Probability of occurrence	High	High

Visual Receptor	Surrounding roads and infrastructure	
Confidence of assessment	Medium	Medium
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	Utilise existing roads to divert traffic away from construction sites. No road work construction should be done at night or over weekends due to the close proximity to residential properties. All new roads and bridges should be designed in a manner that minimises negative visual impact i.e. not dominate the surrounding landscape / horizonline (is low in profile and is simple in design concept and resolution). The use of indigenous vegetation and/or natural materials must be considered on embankments. All new roads routed through untransformed land should be regarded as least favourable.	Re-instating of landscape where existing roads are no longer in use. Planting of indigenous trees and shrubs and grasses along new roads. Comprehensive repair of damages to areas next to roads and bridges. Planting of indigenous plant species to disturbed areas next to roads and bridges.
Level of significance after mitigation	Low	Low
Cumulative Impacts	Slightly Adverse to Neutral	Neutral to Slightly Beneficial
During the construction of the new roads and bridges, traffic will utilise alternate existing roads, minimising the number of new visual receptors. New bridges and roads and associated new landscaping may add to the visual interest of the influenced views if sensitively designed. In a similar way, any view lines over the dam site will increase in visual diversity with the addition of the new landscape feature. There are few views from the different roads with the new dam wall in sight. Because these views are of short duration from a moving vehicle, the negative impact of the road and bridge structures will not be as severe to road users. There is however a small component of pedestrian and cyclist road users that will experience the impacted views over extended durations of time (because they are slower-moving) and will comparitively receive a higher significance of negatively impacted views.		

B5. New / Existing Reservoirs

Table 6.7: Impact Assessment Table

Visual Receptor	New / existing reservoirs	
Description of potential impact **Figure A14-A15** in **Appendix A**	This study considered three of the proposed reservoirs, two on existing reservoir sites and one at a new site. Proposed reservoirs are to be constructed close to rural settlements to the north of the dam site. This area differs significantly in visual character when compared to the more southern regions. The landscape becomes more even with larger patches of open undisturbed grassland rendering it more exposed to visual impact. The reservoirs will be located in high-lying areas in positions, either replacing / upgrading existing reservoirs or as new infrastructural features. On areas where replacements / upgrades are proposed, the construction phase will present the greatest visual impact although existing infrastructural development may absorb this in some instances. The post-construction phase should be visually neutral, with the view remaining relatively similar to the existing reservoir. The construction of new reservoirs will have a significantly greater visual impact. Because reservoirs need to be positioned on high-lying areas, the existing landscape is generally undisturbed. This renders any structural intervention to be even more imposing on the existing natural aesthetic. A positive aspect would be that the natural vegetation would provide partial screening of the structures. Although no reservoirs will be located next to high traffic roads, the proposed positions are located in close proximity to rural settlements and will therefore receive high viewing numbers.	
Nature of impact	Negative and direct	
Legal requirements	N/A	
Stage	Construction and decommissioning	Operation
Nature of Impact	Negative, direct	Neutral to negative, direct
Extent of impact	Local	Local
Duration of impact	Short term	Permanent
Intensity	Low	Low
Probability of occurrence	Medium	Medium

Visual Receptor	New / existing reservoirs	
Confidence of assessment	High	High
Level of significance before mitigation	Medium	Low
Mitigation measures (EMP requirements)	No construction should be done at night or over weekends due to the close proximity to residential settlements. Hoarding or screening of construction work where possible. Circular structures will blend into the natural surrounds better than rectangular forms.	Landscape rehabilitation measures. Planting of vegetative screening.
Level of significance after mitigation	Medium	Low
Cumulative Impacts	Slightly Adverse	Slightly Adverse to Neutral
Vantage points overlooking the reservoirs will be from short to long-range due to the relative flat landscape and low grassland vegetation. Reservoir sites will be most prone to adverse visual impact during the construction phases when large machinery, excavations, etc. are on site. Post-construction, the reservoirs will still have a negative impact in that they are not fitting structures in a natural landscape, but over time as the concrete weathers, they will blend in more wholly into the surrounds.		

Results

Having made the above analyses, it can be found that all construction activities will have will have the greatest visual impact on the visual receptors. In a region that is dominated by agricultural and natural landscapes, the introduction of construction activities will detract from its existing visual quality. The construction of the dam is, however, a temporary situation and will not be of permanent visual influence. Mitigation techniques may go some way to decrease the visual consequence of construction activities although adverse impacts are unavoidable.

The scale and form of the proposed dam wall will change the current landscape to a significant degree. Properties and viewpoints downstream of and adjacent to the proposed dam wall will be more severely impacted than those upstream due to their proximity to the site. The loss of existing vegetation will have a negative impact on the visual quality of the area, although this may be remedied and marked as temporary.

The proposed dam basin will undergo severe visual change upon being cleared of vegetation and first filling. In its current undisturbed state, the natural vegetation is considered to be of exceptional aesthetic value, all of which will be lost upon inundation. The newly introduced body of water will, however, add to the scenic diversity of the landscape. Thus the dam may enhance the scenic quality of the area as it establishes itself within the landscape.

Impact Summary

The sensitivity of the landscape is high on a local level and lower on a more regional level. The existing visual quality and character is high and efforts should be made to conserve these as far as possible. The current scenic intactness is a visual quality worthy of preservation.

The visual impact of the construction activities surrounding the building of the dam and associated infrastructure will be significant and adverse. Properties and activities within the immediate vicinity of the dam wall will be most severely impacted. Mitigation techniques should be exercised to decrease the visual impact during the construction and decommissioning phases.

The addition of a large body of water to the existing visual composition will increase the aesthetic diversity and / or interest, significantly raising the absorption capacity of the landscape.

The relatively flat landscape allows for some visual relief in that many of the activities can only be seen from limited vantage points and areas

7. RECOMMENDED MITIGATION MEASURES

7.1 RAISING OF THE TZANEEN DAM WALL

DURING CONSTRUCTION PHASE

- Hoarding of construction site facilities to screen views where possible.
- Limit route and duration of large machine activities.

OPERATION PHASE

- Design should respond to the structural language of the existing wall.
- Repair / rehabilitate all areas damaged during construction.

7.2 CONSTRUCTION OF THE NEW DAM AT NWAMITWA SITE AND ASSOCIATED WATER DISTRIBUTION INFRASTRUCTURE

DURING CONSTRUCTION PHASE

- Limit areas of invasiveness by construction activities. The extent of unnecessary damage to natural surrounds must be kept to a minimum.
- Hoarding should be erected to screen the excavation and construction activities where possible as well to prevent local passers-by from entering an unsafe site. The hoarding should be painted in natural colours, specifically within the brown to grey tonal range (not green), or can be constructed out of natural materials, ie. woven grass / wattle.
- Integrated landscape rehabilitation measures to all completed construction areas upon completion as according to a Landscape Plan by a registered Landscape Architect.
- Discourage the unnecessary usage of high voltage lights during through-night construction. All lighting to be sensitively designed to minimise negative impact on surrounding areas.
- All construction facilities should be kept tidy and organised.

- The borrow areas should not be active over night or over Sundays due to the proximity to human settlements.
- Utilise existing roads to divert traffic away from construction sites.
- Limit the number and usage of visually intrusive traffic signage. No illuminated signs unless absolutely necessary for road safety during night.
- No road work construction should be done at night or over weekends due to the close proximity to residential properties.
- The design of new road and bridge infrastructure should be designed positively contribute to the sensitive visual environment in both form and materiality.
- All new roads routed through untransformed land should be regarded as least favourable.

OPERATION PHASE

- Design should respond to the sensitivity of the scenic continuity.
- Continued landscape and vegetation rehabilitation measures. A monitoring programme should be drawn up to include all mitigation measures to ensure that mitigation measures are implemented, are having the desired effect and can allow for changes in the EMP. Repair / rehabilitate all areas damaged during post-construction.
- Landscape interventions should be utilised post-construction to screen / minimise the viewshed, eg. berming, dense hedges, etc. as and according to a Landscape Plan by registered a Landscape Architect.
- Ensure and refine flow releases from the dam.
- No mitigation for inundation.

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

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

The Draft Environmental Impact Assessment Report, its summary (translated in four languages), the various specialist studies, the Environmental Management Plans and Programmes were made available for a period of thirty (30 days) for stakeholders to comment. Stakeholder comments were taken into consideration with the preparation of the final documents. The availability of the final documents will be announced prior to submission to the decision-making authority

9. COMMENTS RECEIVED

No issues or comments regarding the visual impacts of the project were received from Interested and Affected parties up until the date of writing this report.

10. OTHER INFORMATION REQUESTED BY THE AUTHORITY

No other information on visual aspects was requested by authority.

11. CONCLUSION

Although the visual intactness of a landscape is commonly considered to hold high influence over the future of a development, the nature of this particular project is weighted more towards the socio-economic and environmental sectors. The devastating effects of the degradation of Groot Letaba River as a water and life resource cannot be undermined on these two functioning communities.

The investigation and implementation of such a major infrastructure project to improve water management in the area is likely to give rise to many development opportunities, lead to change in socio-economic circumstances, cause changes in land use and have other beneficial effects that, in common sense, would far out-weigh any impacts on visual resources, be they positive or negative.

The raising of the Tzaneen Dam wall will not have a significant impact on the visual quality of the landscape in general and should not inhibit the progress of the project.

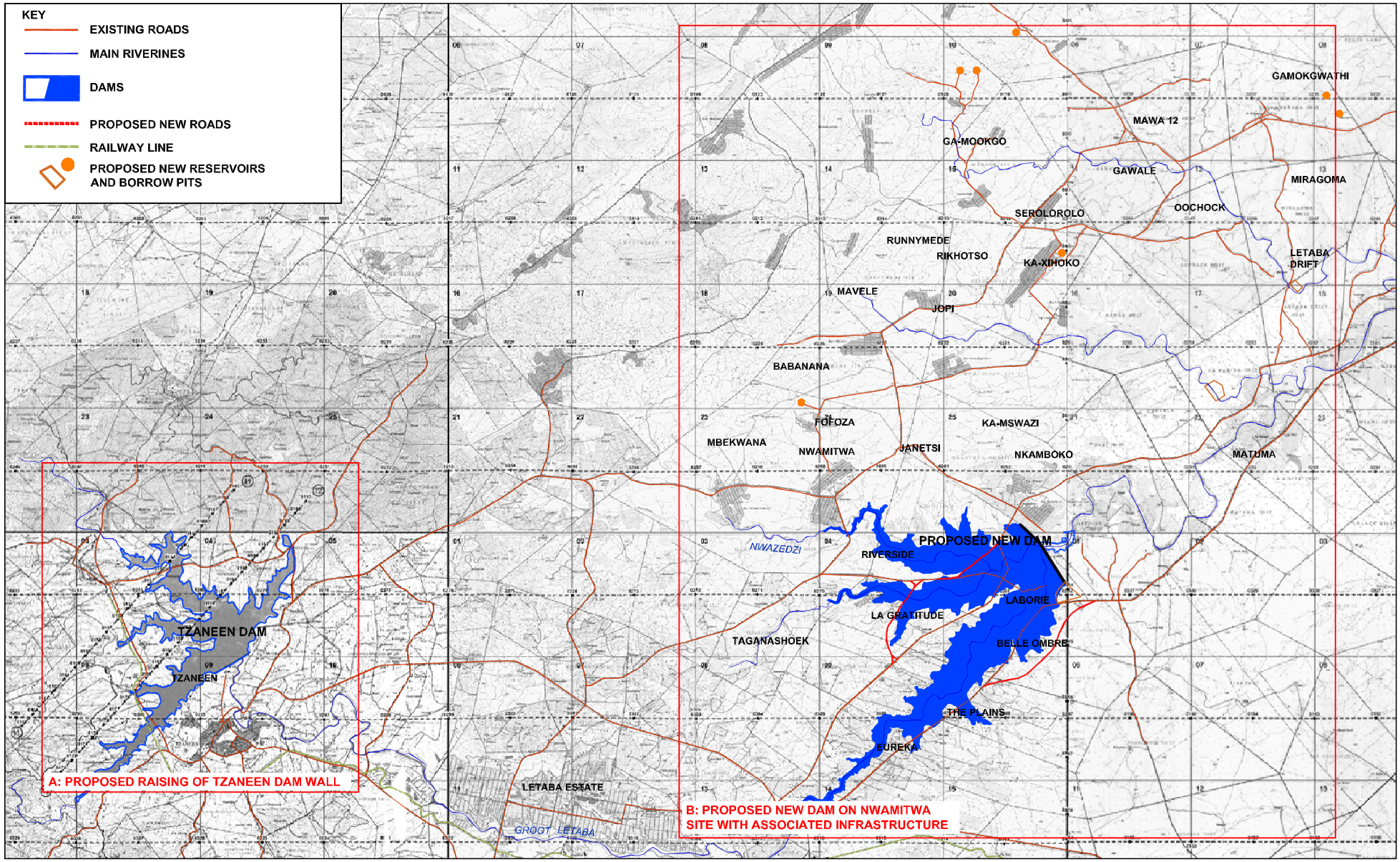
The construction of the new dam at Nwamitwa and associated infrastructure will have an adverse visual influence on the landscape during the construction process. These influences will be of varying degree between moderate and significant. Post-construtions / operational phases will not impose as severe aesthetic change and in some cases may even add to the strong visual quality of the region. It can be presumed that, with correct and comprehensive mitigation, the visual integrity of the area will remain intact should the project be implemented.

The control, implementation and restoration of visual / aesthetic components and the costs thereof should be considered from inception, through operations, closure and ongoing maintenance phases of the project.

12. REFERENCES

Drummond John, and Associates (1987)	*Visual Resource Management*
The Landscape Institute with the Institute of Environmental Management and Assessment (2003)	*Guidelines for Landscape and Visual and Visual Impact Assessment, 2nd Edition*
www.dwaf.gov.za/projects/GrootLetaba	*Groot Letaba Water Development Project - Home*
www.damsafety.org (2004)	*Field Trip to Otter Brook Dam*
www.nqwater.com.au (2007)	*Ross River Dam Upgrade Project*

Appendix A: Visual Impact Assessment Supplement Study



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GROOT LETABA WATER DEVELOPMENT PROJECT

A1

Tzaneen / Nwamitwa: Area of Study

PREPARED FOR:

water & forestry
Department: Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

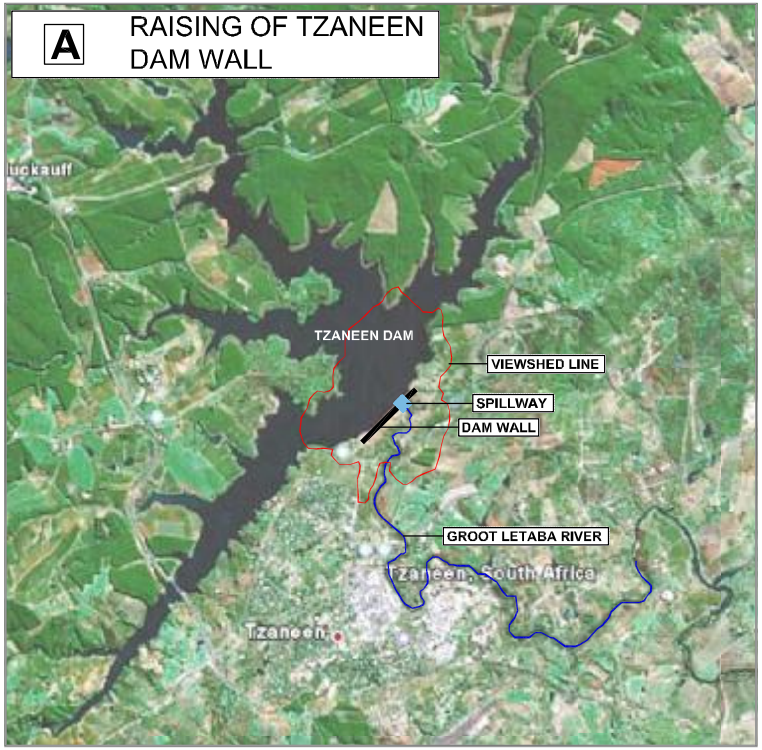
DATE: FEBRUARY 2008

DRWG NO.:

Groot Letaba River
Visual Impact Assessment
Specialist Study

NOT TO SCALE

A RAISING OF TZANEEN DAM WALL



TZANEEN DAM AS VIEWED FROM SATELLITE

TZANEEN DAM WALL

EXISTING WALL SPILLWAY

VIEW OF EXISTING DAM SPILLWAY FROM BELOW

ARTIST'S IMPRESSION OF RAISED DAM WALL

	VISUAL AMENITY IMPACTS	DURING / POST CONSTRUCTION	PREDICTED IMPACT	RECEPTOR SENSITIVITY	SIGNIFICANCE
A	TECHNICAL / ADMINISTRATIVE BUILDINGS OF GOV, WATER WORKS	DURING	ADVERSE	MODERATE	MOD ADVERSE
		POST	NEUTRAL	MODERATE	NEUTRAL
B	SURROUNDING RESIDENTIAL AND RECREATIONAL / TOURISM	DURING	ADVERSE	MODERATE	MOD ADVERSE
		POST	NEUTRAL	MODERATE	NEUTRAL

VIEW FROM THE TOP OF THE DAM WALL

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A2**

Tzaneen Dam: Raising Dam Wall

PREPARED FOR:

water & forestry
Department: Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

DATE: FEBRUARY 2008

DRWG NO.:

Groot Letaba River
Visual Impact Assessment
Specialist Study

NOT TO SCALE

PHOTO OF ROSS RIVER DAM SPILLWAY BEFORE INSTALLATION OF FUSEGATES

PHOTO OFROSS RIVER DAM SPILLWAY DURING INSTALLATION OF FUSEGATES

ARTIST'S RENDERING OF ROSS RIVER DAM FUSEGATES

UPGRADE OF ROSS RIVER DAM, AUSTRALIA

The key components of the Upgrade to Ross River Dam included:

- Lowering and reshaping the existing spillway and installing dam gates to help control downstream flow and water storage level
- Constructing sand filters and supporting earthfill to the 8 kilometre long embankment
- Providing additional rockwork to the dam embankment to protect it from wave erosion

Upgrade Summary Works

Excavation total = 500,00 m3
Filter material placed = 168,000 m3
Embankment fill placed = 1,200,000 m3
Drainage pipe laid = 9000 m
Concrete total = 6,500 m3

REFERENCE: www.nqwater.com.au

Changes to the spillway included:

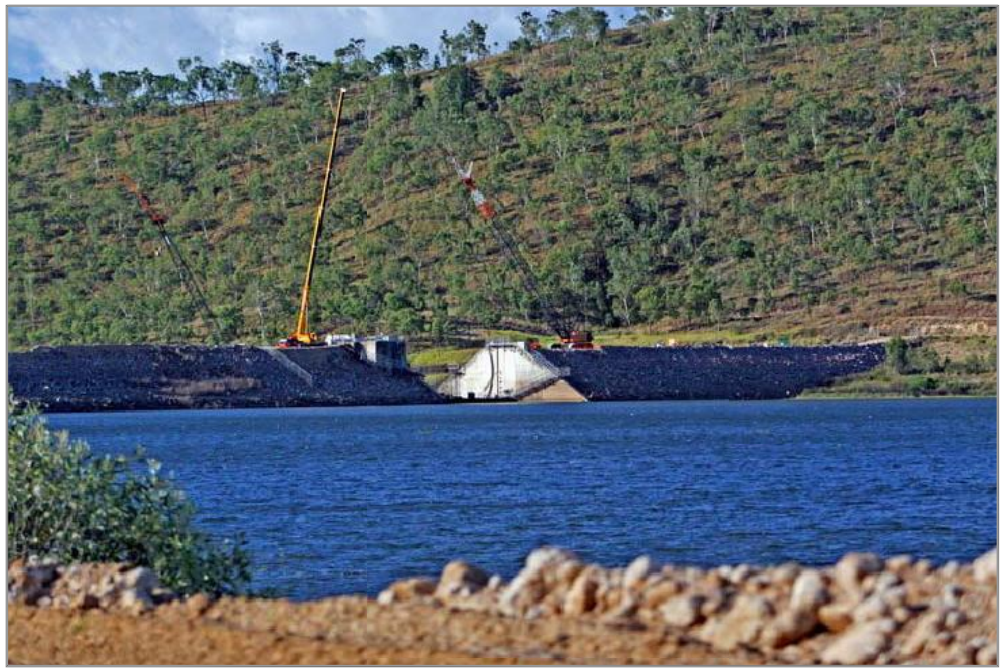
- Concrete strengthening of spillway walls and downstream basin
- New spillway crest shape
- Bridge across spillway
- 3 radial arm gates
- Control building
- Mechanical & electrical systems

VISUAL EXAMPLES OF PROPOSED SPILLWAYS FOR TZANEEN DAM

LABYRINTH SPILLWAY

SIDE-CHANNEL SPILLWAY

FUSEGATES



VIEW FROM ROSS RIVER DAM DURING INSTALLATION OF FUSEGATES

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A3**

Tzaneen Dam: Raising Dam Wall (Case Study)

PREPARED FOR:

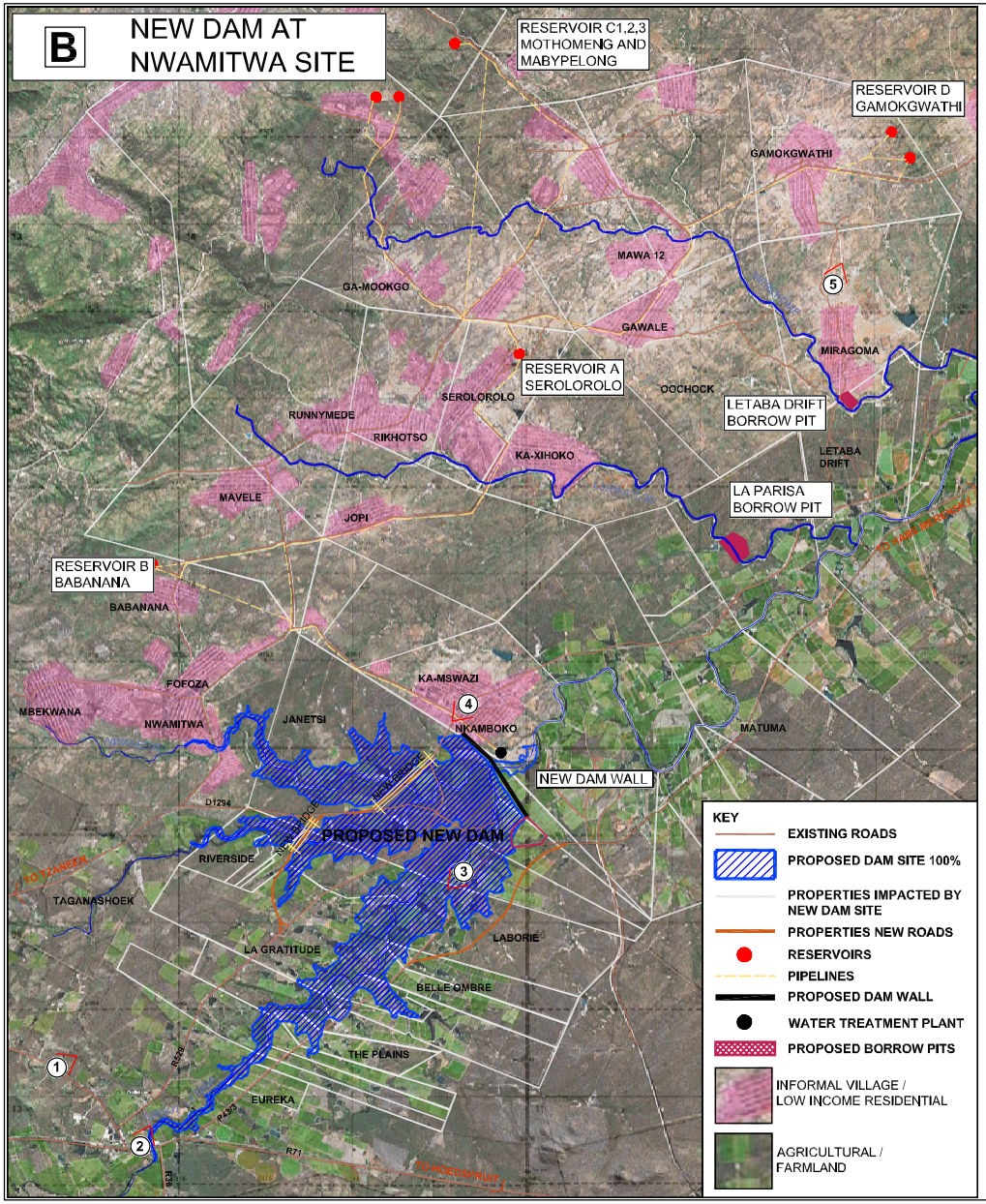
water & forestry
Department: Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

DATE: FEBRUARY 2008

DRWG NO.:

Groot Letaba River
Visual Impact Assessment
Specialist Study

NOT TO SCALE



VISUAL CHARACTER-TYPES

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GROOT LETABA WATER DEVELOPMENT PROJECT

A4

Proposed New Dam at Nwamitwa and Associated Infrastructure

PREPARED FOR:

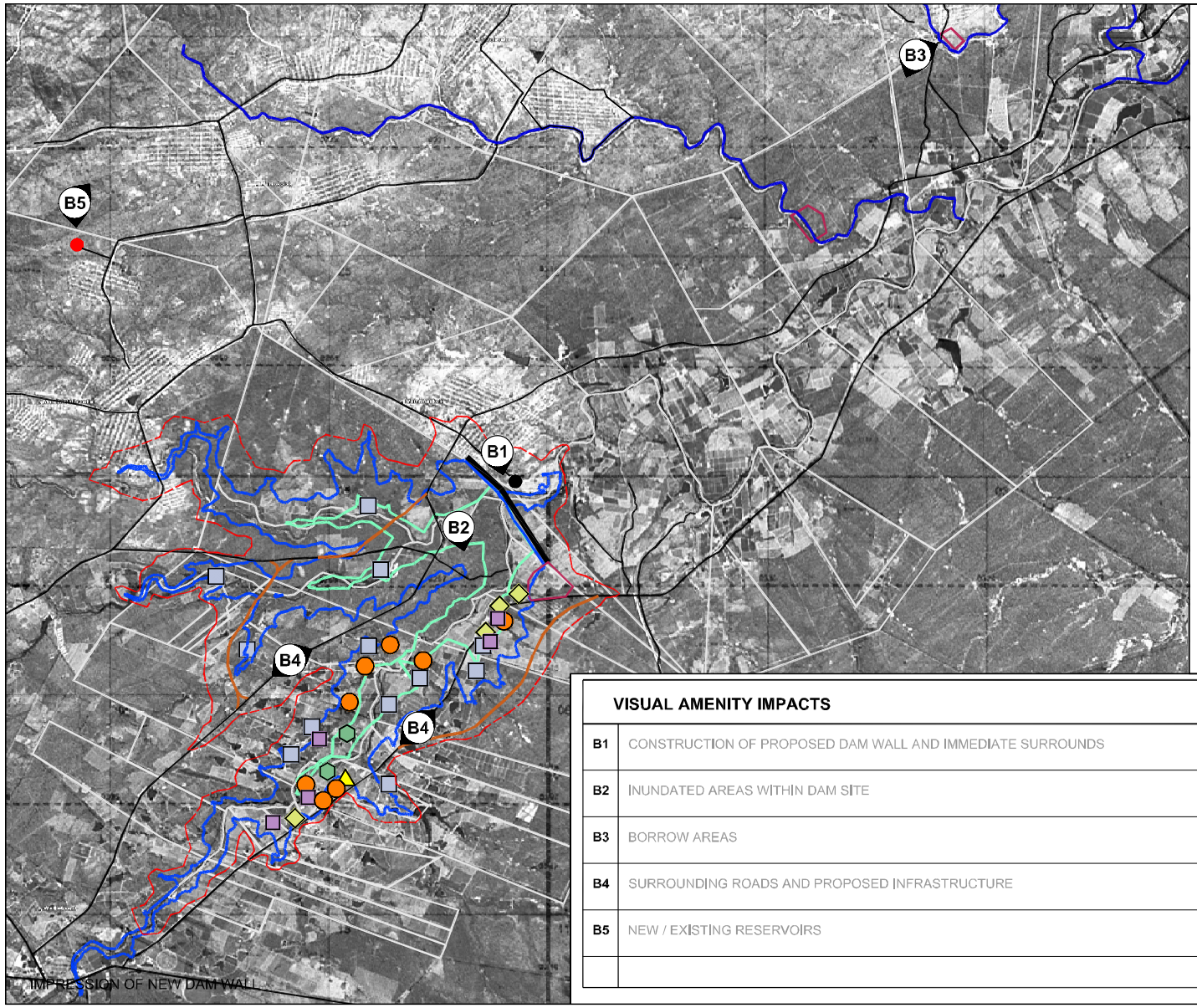
water & forestry
Department: Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

DATE: FEBRUARY 2008

DRWG NO.:

Groot Letaba River
Visual Impact Assessment
Specialist Study

NOT TO SCALE



KEY

- EXISTING ROADS
- PROPOSED NEW ROADS
- PROPOSED DAM SITE 100%
- PROPOSED DAM SITE 50%
- PROPERTIES IMPACTED BY NEW DAM SITE
- RESERVOIRS
- PIPELINES
- PROPOSED DAM WALL
- WATER TREATMENT PLANT
- PROPOSED BORROW PITS

LANDUSES IMPACTED WITHIN PROPOSED NEW DAM SITE

- AERODROME
- HOUSES
- DAMS
- COMPOUND
- PACKING
- STORES

- VIEWSHED LINE

	VISUAL AMENITY IMPACTS	DURING / POST CONSTRUCTION	PREDICTED IMPACT	RECEPTOR SENSITIVITY	SIGNIFICANCE
B1	CONSTRUCTION OF PROPOSED DAM WALL AND IMMEDIATE SURROUNDS	DURING	ADVERSE	HIGH	SIGNIFICANT
		POST	ADVERSE	HIGH	MODERATE
B2	INUNDATED AREAS WITHIN DAM SITE	DURING	ADVERSE	HIGH	MODERATE
		POST	BENEFICIAL	HIGH	SLIGHT
B3	BORROW AREAS	DURING	ADVERSE	HIGH	MODERATE
		POST			
B4	SURROUNDING ROADS AND PROPOSED INFRASTRUCTURE	DURING	ADVERSE	MEDIUM	SLIGHT
		POST	NEUTRAL	LOW	NEUTRAL
B5	NEW / EXISTING RESERVOIRS	DURING	ADVERSE	MEDIUM	SLIGHT
		POST	ADVERSE	LOW	SLIGHT

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GROOT LETABA WATER DEVELOPMENT PROJECT

A5

Proposed Dam at Nwamitwa site: Land Use and Viewshed Identification

PREPARED FOR:

water & forestry
Department: Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

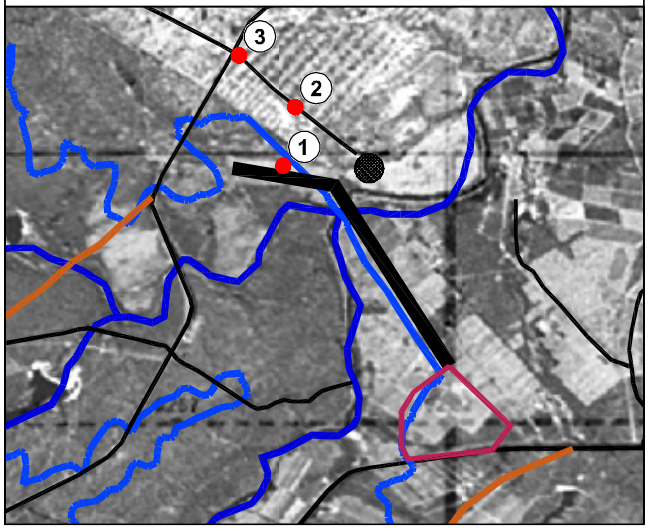
DATE: FEBRUARY 2008

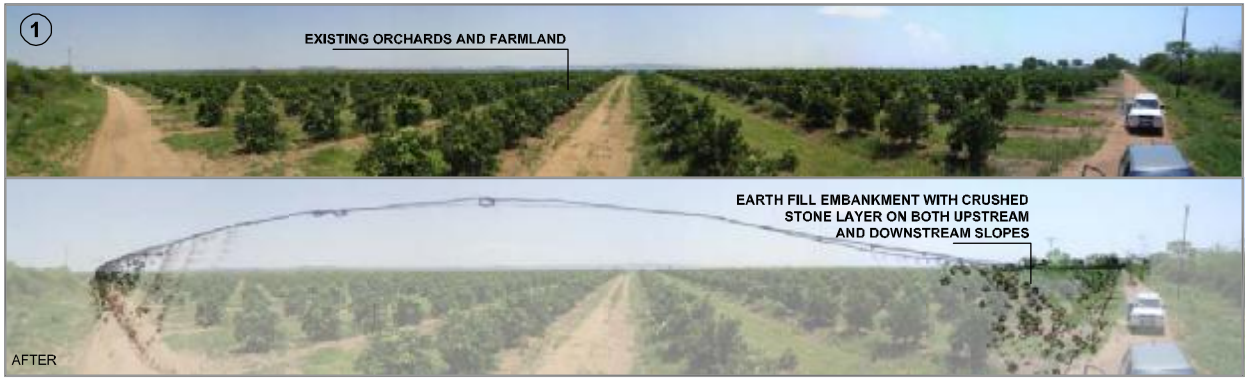
DRWG NO.:

Groot Letaba River
Visual Impact Assessment
Specialist Study

NOT TO SCALE

B1: CONSTRUCTION OF DAM WALL





EARTH FILL EMBANKMENT DAM WALL WITH CRUSHED STONE PROTECTION ON DOWNSTREAM SLOPE

EXAMPLES OF CONSTRUCTION PROCEDURES

EXISTING VILLAGES TO EXPERIENCE LITTLE VISUAL CHANGE AFTER DAM CONSTRUCTION

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A6**

Proposed New Dam at Nwamitwa and Associated Infrastructure

PREPARED FOR:

water & forestry
Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

DATE: FEBRUARY 2008

DRWG NO.:

Groot Letaba River
Visual Impact Assessment
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B1 cont. : CONSTRUCTION OF DAM WALL

VISUAL EXAMPLES OF WIERS AND PUMP STATIONS

③ VIEW FROM DOWNSTREAM OF DAM WALL

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A7**

Proposed New Dam at Nwamitwa and Associated Infrastructure

PREPARED FOR:

water & forestry
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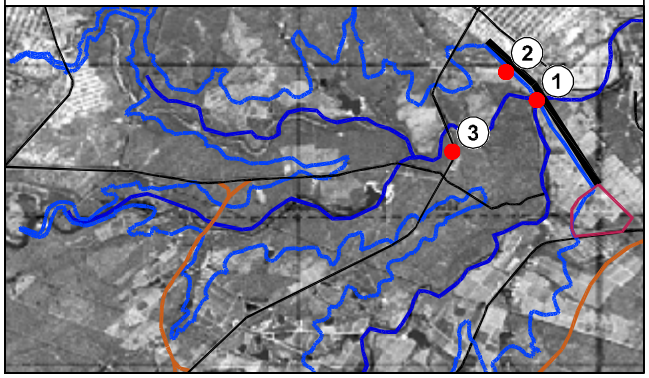
B2: INUNDATED AREAS WITHIN DAM SITE



VIEW TO THE CONFLUENCE OF THE GROOT LETABA AND NWANEDZI RIVERS

SOUTH-WESTERN VIEW WITH PROPOSED WALL BEHIND

THIS PORTION OF THE R529 WOULD BE INUNDATED AT FULL CAPACITY

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A8**

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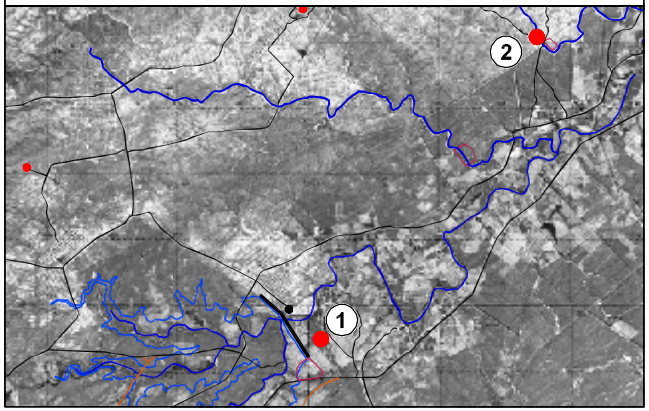
B3: BORROW PITS



PROPOSED BORROW PIT / CONSTRUCTION SITE ON LABORIE FARM

EXISTING VELD RESERVE ON LABORIE FARM

AN EXISTING BRICK-MAKING QUARRY IS IN OPERATION ON THE MEREKOME SITE - EARTH IS EXTRACTED, MOULDED AND BAKED ON SITE

POTENTIAL BORROW AREA IN THE MEREKOME RIVER

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A9**

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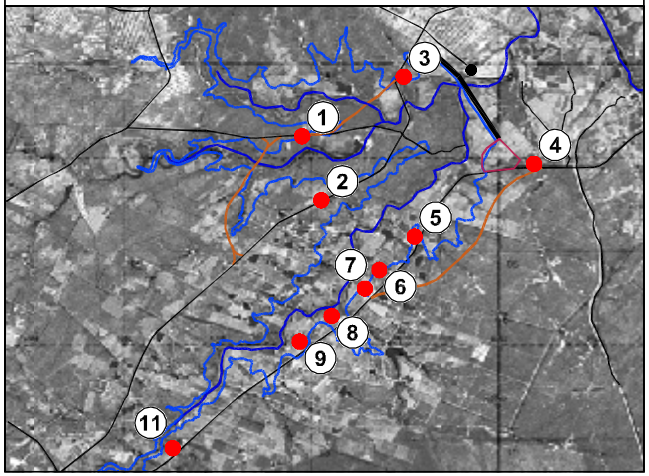
B4: SURROUNDING ROADS AND INFRASTRUCTURE



VIEW ALONG R529 - PORTION OF ROAD TO BE INUNDATED

PROPOSED NEW ROAD DIVERSION WITH BRIDGE ON R529

VIEW FROM R529 TOWARDS SOUTH

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A10**

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B4 cont. : SURROUNDING ROADS AND INFRASTRUCTURE

3

VIEW WEST ON R529

4

NEW ROAD ON P43/3 AS ROAD DIVERSION

ROAD P43/3 TO BE PARTIALLY INUNDATED

5

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A11**

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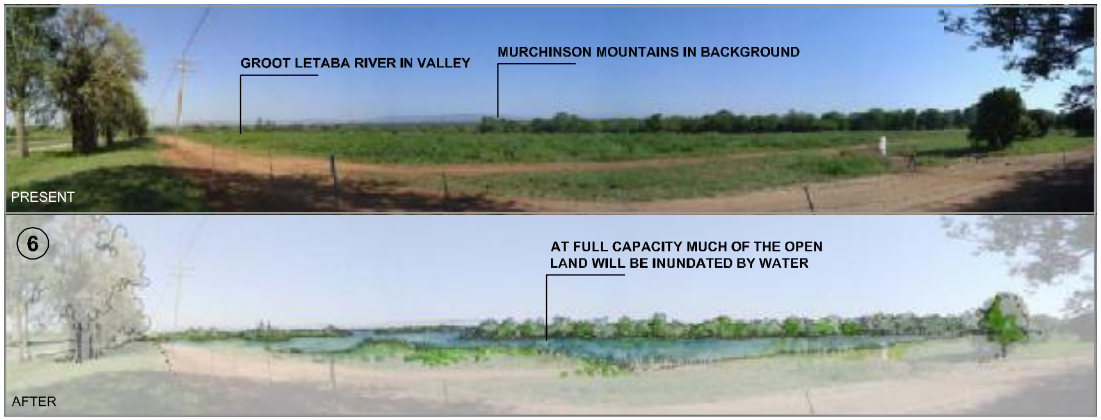
B4 cont. : SURROUNDING ROADS AND INFRASTRUCTURE



VIEW NORTH OVER NAGUDE FARM

NEW DIVERSION IN THE P43/3

VIEW NORTH FROM P43/3 ROAD

VISUAL CHARCATER OF P43/3 CREATING COLONIAL-TYPE VISUAL LANGUAGE

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A12**

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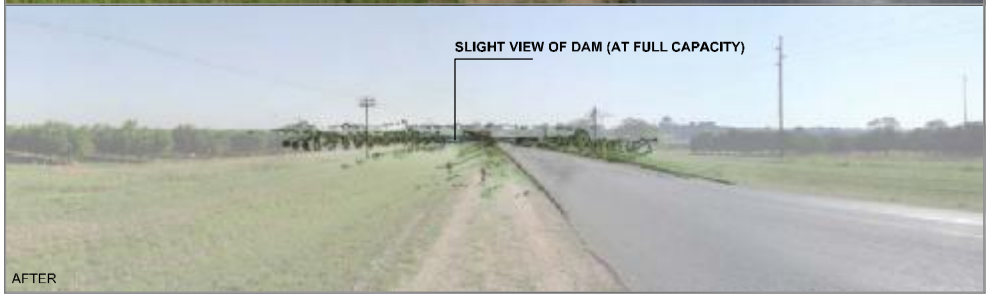
B4 cont. : SURROUNDING ROADS AND INFRASTRUCTURE



EASTERLY VIEW OVER BELLA OMBRE FARM FROM P43/3

VIEW TOWARDS R71 / R36 INTERSECTION

EASTERLY VIEW ALONG P43/3

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A13**

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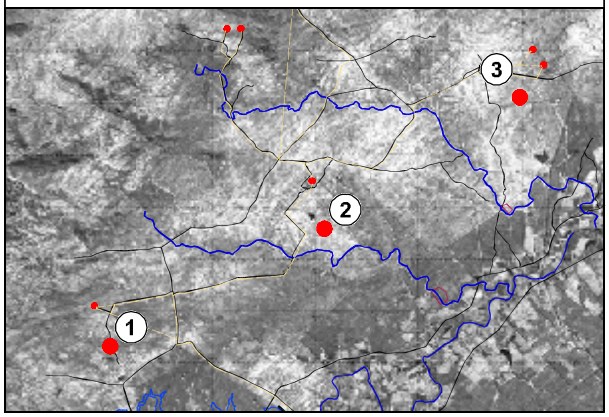
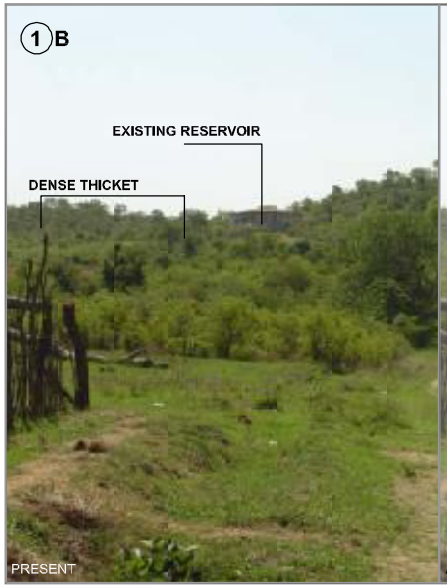
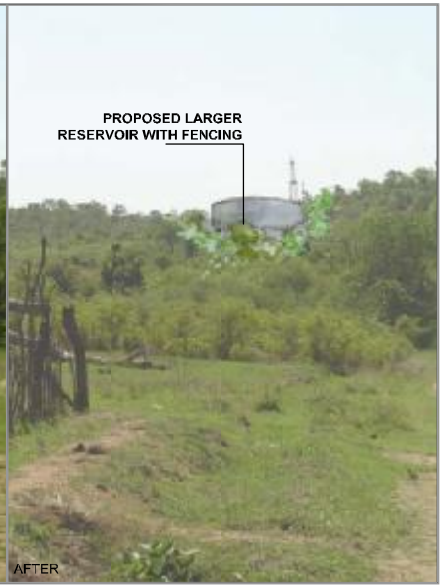
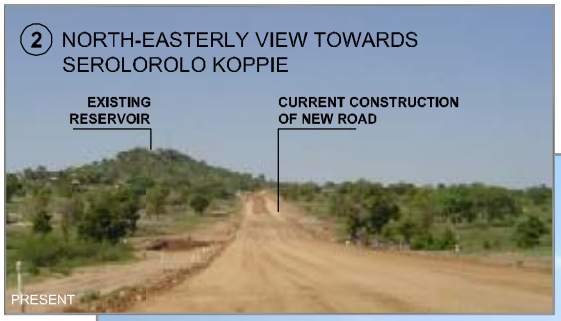
B5: NEW / EXISTING RESERVOIRS



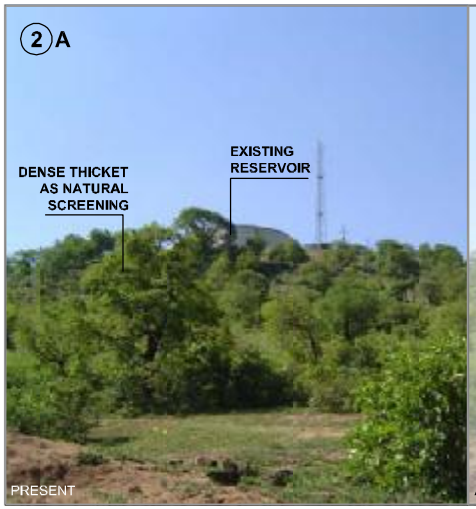




CONSTRUCTION OF NEW RESERVOIR WITH GREATER CAPACITY AT BABANANA



VIEWS AT SEROLOROLO RESERVOIR



CONSTRUCTION OF RESERVOIR C1

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GROOT LETABA WATER DEVELOPMENT PROJECT

A14

Proposed New Dam at Nwamitwa and Associated Infrastructure

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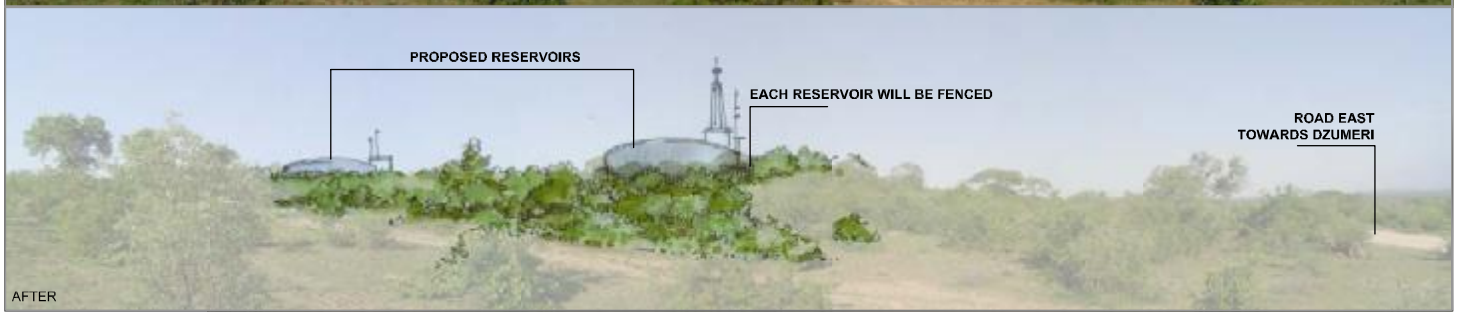
B5 cont. : NEW / EXISTING RESERVOIRS

VIEW FROM MIRAGOMA TOWARDS PROPOSED GAMOGWATHI RESERVOIRS



PROPOSED RESERVOIRS AT GAMOGWATHI

VISUAL CHARACTER OF VILLAGES

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GROOT LETABA WATER DEVELOPMENT PROJECT | **A15**

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