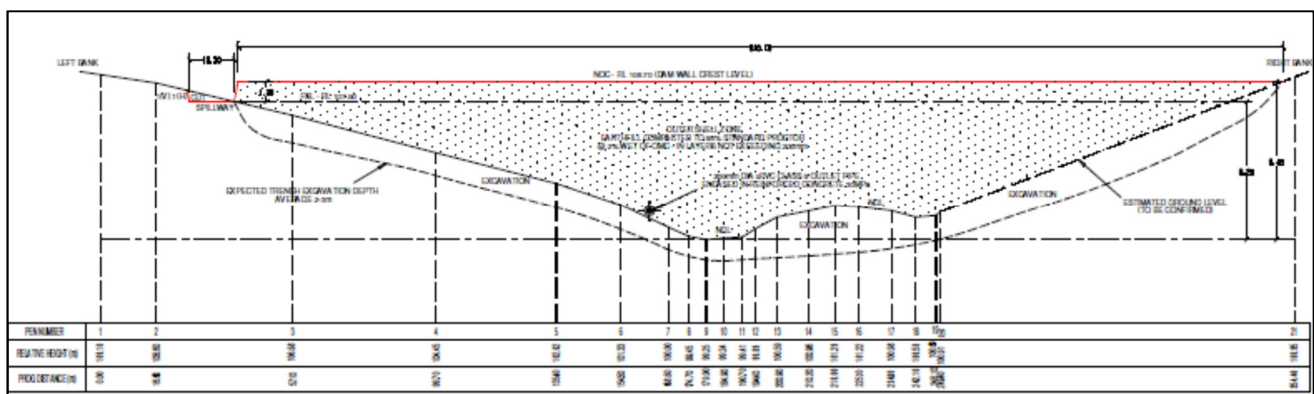
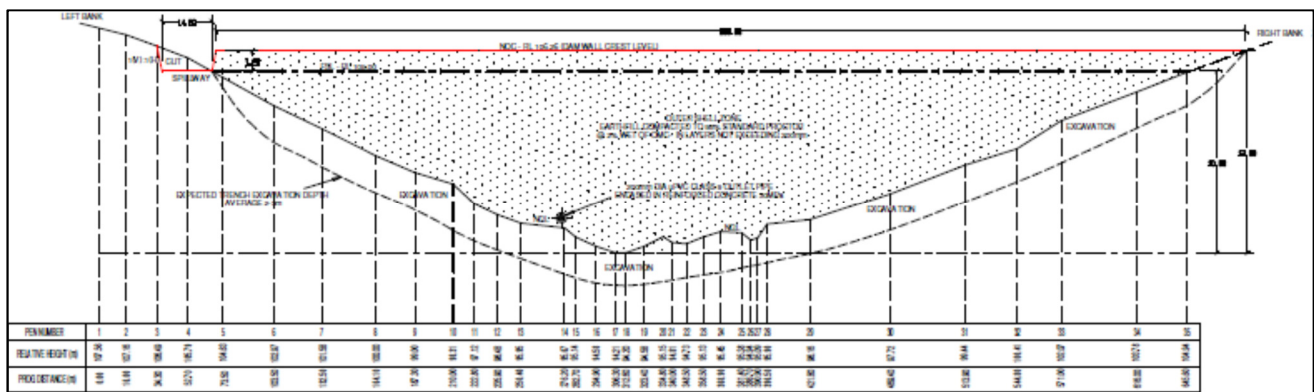




**AFRICAN REALTY TRUST**

**CONSULTATIVE ENVIRONMENTAL IMPACT ASSESSMENT REPORT:**  
**PROPOSED ESTABLISHMENT OF TWO BALANCING DAMS ON THE**  
**REMAINING EXTENT OF THE FARM LETABA ESTATES 525-LT NEAR**  
**TARETAALRAND, GREATER TZANEEN MUNICIPALITY, LIMPOPO PROVINCE**



**2 MARCH 2018**

**POLYGON**  
**ENVIRONMENTAL PLANNING**



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## **ACRONYMS AND ABBREVIATIONS:**

<b>DWS</b>	Department of Water and Sanitation
<b>EAP</b>	Environmental Assessment Practitioner
<b>EC</b>	Ecological Category
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EIAR</b>	Environmental Impact Assessment Report
<b>EMPR</b>	Environmental Management Programme
<b>ESR</b>	Environmental Scoping Report
<b>FSL</b>	Full Supply Level
<b>GTM</b>	Greater Tzaneen Municipality
<b>Ha</b>	Hectare
<b>HIA</b>	Heritage Impact Assessment
<b>I&amp;AP</b>	Interested and/or Affected Party
<b>LDEDET</b>	Limpopo Department of Economic Development and Environmental Tourism
<b>LEMA</b>	Limpopo Environmental Management Act (2003)
<b>MAE</b>	Mean Annual Evaporation
<b>MAMSL</b>	Metres Above Mean Sea Level
<b>MAP</b>	Mean Average Precipitation
<b>NEMA</b>	National Environmental Management Act (1998)
<b>NOC</b>	Non-Overspill Crest
<b>NWA</b>	National Water Act (1998)
<b>QHI</b>	Quick Habitat Integrity assessment
<b>REC</b>	Recommended Ecological Category
<b>VEGRAI</b>	Riparian Vegetation Response Assessment Index
<b>WUL</b>	Water Use Licence
<b>WULA</b>	Water Use Licence Application

## **ASSUMPTIONS AND LIMITATIONS**

The EIA process and this EIAR are based on the assumption that all information supplied by the applicant and project team members is correct and complete.

Specialist studies were conducted in one season (summer 2017). Although a more complete picture of the receiving environment can be obtained by multi-season surveys, the studies that have been undertaken are felt to be sufficient given the extent of the proposed project, the significance of the anticipated impacts, and the sensitivity of the receiving environment.

The EIA focused on the proposed dams, which require Environmental Authorisation. Potential impacts of the associated agricultural activities which would be supported by the establishment of the dams have only been touched upon but not investigated in detail.



## CONTACT DETAILS

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- BSc Environmental Sciences (*cum laude*), University of Pretoria
- Certificate in Environmental Management Systems (ISO14001:2004), North-West University, Potchefstroom campus
- Completed short courses in Water Use Authorisation, Alien Invasive Management and Project Management
- 13 years' experience in environmental impact assessment and management (2005 to current), 11 of which at management level (2007 to current)
- Member of IWMSA (Institute of Waste Management of Southern Africa) and IAIAAs (International Association for Impact Assessment, South African chapter)

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## 1. INTRODUCTION

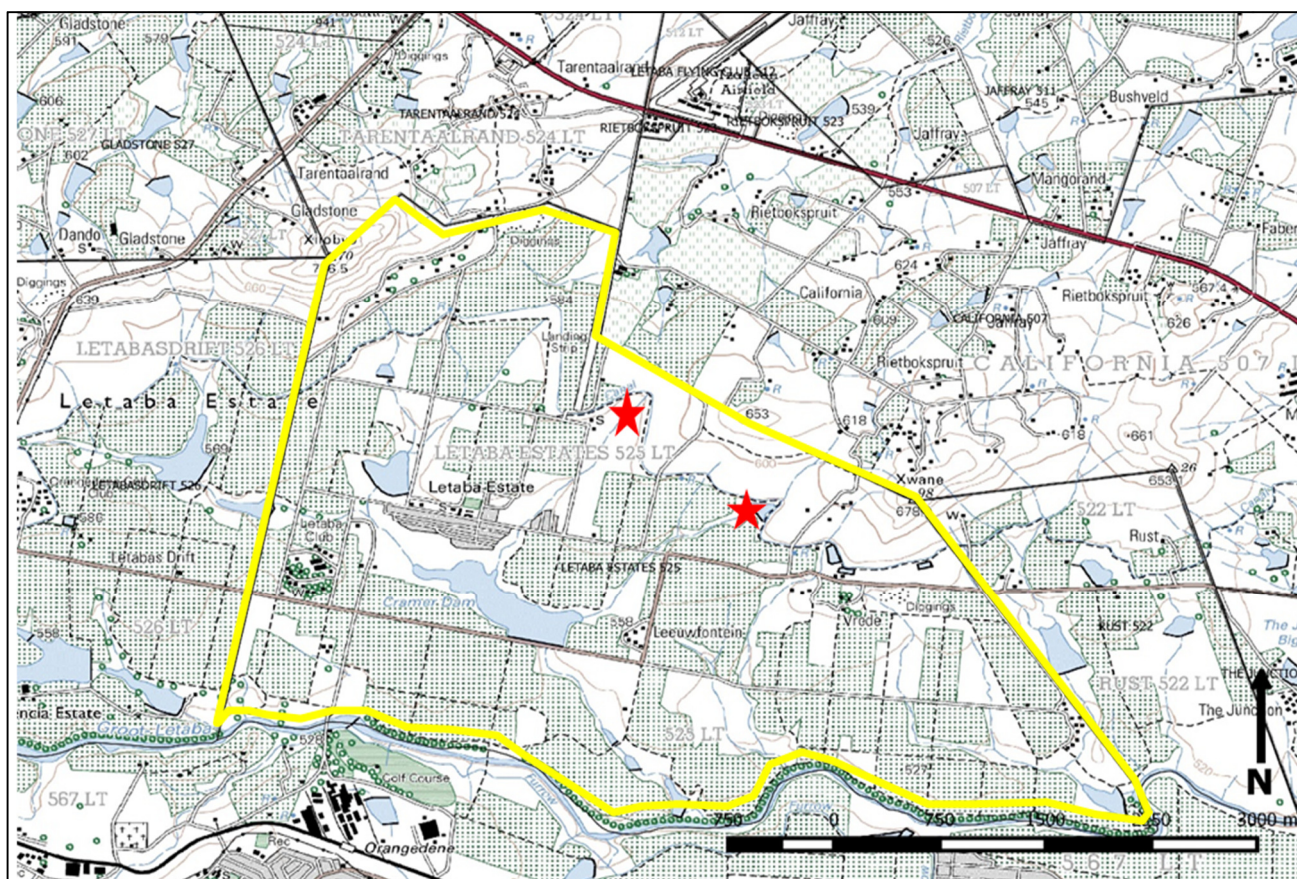
Polygon Environmental Planning has been appointed by African Realty Trust (Pty) Ltd to conduct an Environmental Impact Assessment (EIA) for the proposed establishment of two balancing dams on the Remaining Extent of the farm Letaba Estates 525- LT near Tarentaalrand, in the Greater Tzaneen Municipality, Limpopo Province. This Environmental Impact Assessment Report (EIAR) was compiled following various investigations and public participation.

## 2. SITE LOCATION AND DESCRIPTION

### 2.1. Location

The proposed dam sites are located on the Remaining Extent of the farm Letaba Estates 525- LT near Tarentaalrand, approximately 21 km south-east of Tzaneen, in the Limpopo Province (Figure 2.1).

**Figure 2.1:** 1:50 000 topocadastral map of the location (proposed dam sites indicated with red stars)



The approximate coordinates for the two proposed dams are as follows:

- Dam 1: 23° 51' 2.42" S 30° 19' 6.33" E
- Dam 2: 23° 51' 24.27" S 30° 19' 39.36" E

The site is under the jurisdiction of the Greater Tzaneen Municipality. The property is 1906,45ha in extent.

### 2.2. Description

The property currently consists mostly of citrus orchards, with some natural areas remaining close to the water bodies on the property. The property has been cultivated for more than 100 years.

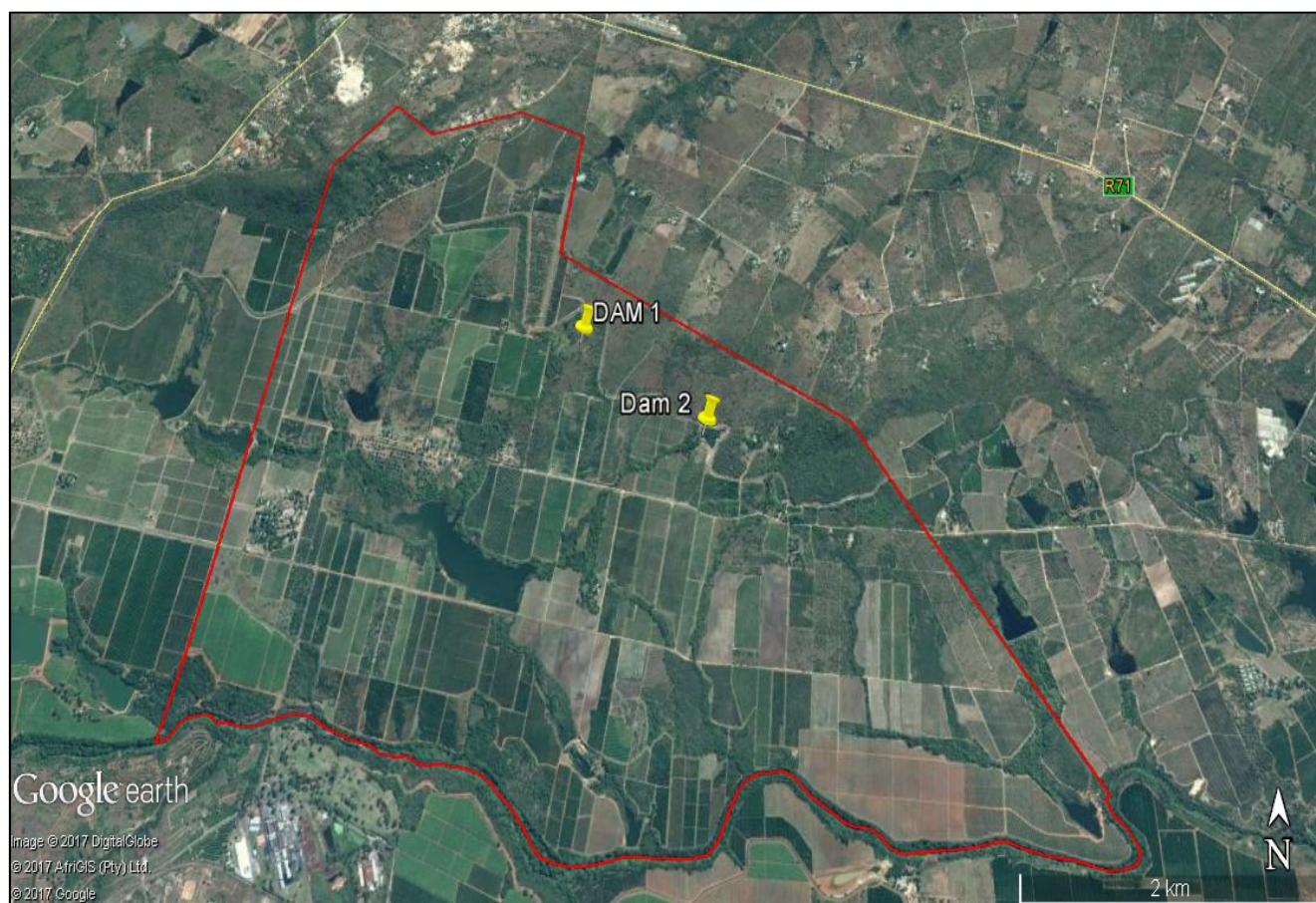


Staff housing is clustered in certain parts of the property, and an office complex is located in the western section. A juicing facility is also operated in the southern part of the property. Farm roads criss-cross the site, consisting of the main tarred road through the central part of the site, and a number of gravel farm roads providing access to all parts of the farm.

One large dam and a number of smaller dams (mostly in-stream) are located on the farm and are used for irrigation. The drainage lines and streams on the property drain roughly south-eastward, toward the Great Letaba River. An irrigation canal, which is operated by the Letaba Water Users Association and draws water from the Great Letaba River, furthermore traverses the site, and the applicant abstracts water from the canal in terms of their existing allocation, for use in irrigation.

Properties in the vicinity of the subject property are predominantly utilised for commercial agriculture.

**Figure 2.1:** Aerial photograph (Google Earth, accessed 2017) showing the location and boundaries of the property and proposed dam sites.



The following table provides general information pertaining to the site.

**Table 1.1:** General site information

<b>District</b>	Mopani District
<b>Local Municipality</b>	Greater Tzaneen Municipality
<b>Property description</b>	Remaining Extent of the farm Letaba Estates 525-LT
<b>Extent / size</b>	1906.4532ha
<b>Surveyor-General code</b>	T00LT0000000052500000
<b>Nearest town</b>	Tzaneen

<b>Coordinates</b>	Dam1: 23° 51' 2.42"S 30° 19' 6.33"E Dam2: 23° 51' 24.27"S 30° 10' 39.36"E
<b>Current land use</b>	Agriculture Pockets of indigenous vegetation
<b>Surrounding land use</b>	Agriculture Natural areas Residential areas

### 3. PROJECT DESCRIPTION

The applicant proposes the establishment of two balancing dams in the upper reaches of non-perennial tributaries of the Letaba River, for the storage of water from the irrigation canal for use in irrigation of citrus orchards. The applicant currently has insufficient water storage capacity. Without the storage, it becomes a challenge to irrigate over the weekends when the canal is closed, or in dry periods when allocations from the canal are restricted. It is proposed that water abstracted from the canal in terms of the applicant's existing allocation (from the Letaba Water Users Association) be stored in these dams for use when the canal is closed or when flows and allocations are reduced.

- (a) **Dam 1** is expected to be classified as a small-size, Category II dam with a significant hazard potential rating. It is proposed to have a dam wall of maximum 12m high, a maximum base width of 63m and an embankment length of 305m (including spillway). The surface area will be approximately 14.38ha at full supply level and gross storage capacity  $\pm 647\,200\text{m}^3$ . An open side channel spill-way is proposed on the left bank.
- (b) **Dam 2** is expected to be classified as a small-size, Category I dam with a low hazard potential rating. It is proposed to have a dam wall of maximum 9.5m high, a maximum base width of 51m and an embankment length of 310m (including spillway). The surface area will be approximately 3.29ha at full supply level and gross storage capacity  $115\,000\text{m}^3$ . An open side channel spill-way is proposed on the right bank.

The dams are proposed to consist mainly of zoned earthfill embankments. The work is proposed to be carried out as follows:

- Excavation and backfilling of cut-off core trenches
- Forming of new embankments using suitable material from within the dam basin
- Excavation and forming of flood spillways (open side channels)
- Installation of 200mm / 315mm diameter uPVC outlet pipes encased in reinforced concrete, equipped with closing mechanisms on the downstream sides
- Installation of toe drains with V-notch measuring structures
- Grass establishment through hydro-seeding on the entire embankments after construction

### 4. PROJECT MOTIVATION, NEED AND DESIRABILITY

#### 4.1 Motivation, need and desirability of the project

The success of commercial agriculture is in a large way dependent on a secure irrigation source. The applicant has a sufficient water allocation from the Letaba Water Users Association for abstraction from the irrigation canal that runs along the proposed dam sites for the dams, but current storage capacity for irrigation water

onsite is insufficient. It becomes a challenge to irrigate during weekends when the canal is closed; the applicant would therefore like to have dams in which to store some of the water taken during the week, so that they can use this over weekends. They would also like to have sufficient storage capacity so that they can take and store water in terms of their allocation during wetter / high-flow seasons, for use during drier / lower-flow seasons in order to sustain their orchards. It is important to note that the applicant does not intend increasing the volume that they abstract, but only wish to increase storage capacity to be better able to utilize their existing water allocation.

Construction of the dams is anticipated to create 6 jobs during the construction phase, and to contribute to supporting jobs in companies supplying services related to the design and construction of the dams. 4 permanent new jobs are anticipated to be created in new orchards that can be supported by the additional water storage capacity. In addition, 120 permanent workers and approximately 1 200 annual seasonal workers are employed on the farm and depend partially on the availability of irrigation water (less water leads to a smaller crop, which requires fewer seasonal workers for picking). The project will also indirectly contribute to the local economy, which in a large way is based on agriculture, for instance by making use of locally based supporting services such as transport, fruit cartons, agricultural chemicals, etc.

#### **4.2 Motivation for selected preferred alternatives**

The selection of the dam sites on the property was based on the following considerations:

- **Dam 1:** The preferred position provides a large undeveloped surface area to accommodate a large storage capacity and it is located directly adjacent to the canal from which its water will be abstracted. The natural topography favours the construction of a dam embankment here, and clayey material which can be used for dam construction is found within the proposed dam basin. The position is furthermore on a clearly defined watercourse, and suitable foundation conditions were found at this position.
- **Dam 2:** A small dam is already situated at this position. It is also located adjacent the canal that will be used to fill it up, and the undeveloped surface area is adequate to accommodate sufficient storage capacity. The natural topography favours the construction of a dam embankment here, and clayey material which can be used for dam construction is found within the proposed dam basin. The position is furthermore on a clearly defined watercourse, and suitable foundation conditions were found at this position.

The type of dam – earthfill – was selected for both of the proposed dams, because due to the length and shape of the wall and the restricted area, only an earthfill embankment would be feasible. Suitable material for construction of the earthfill dam walls is also found within the basins of both proposed dams. No other technologies were investigated.

##### *4.2.1 Technology alternatives*

The type of dam – earthfill – was selected for both of the proposed dams, because due to the length and shape of the wall and the restricted area, only an earthfill embankment would be feasible. Suitable material for construction of the earthfill dam walls is also found within the basins of both proposed dams. No other technologies were investigated.



## 5 INVESTIGATION OF ALTERNATIVES

### 5.1 Project Alternatives

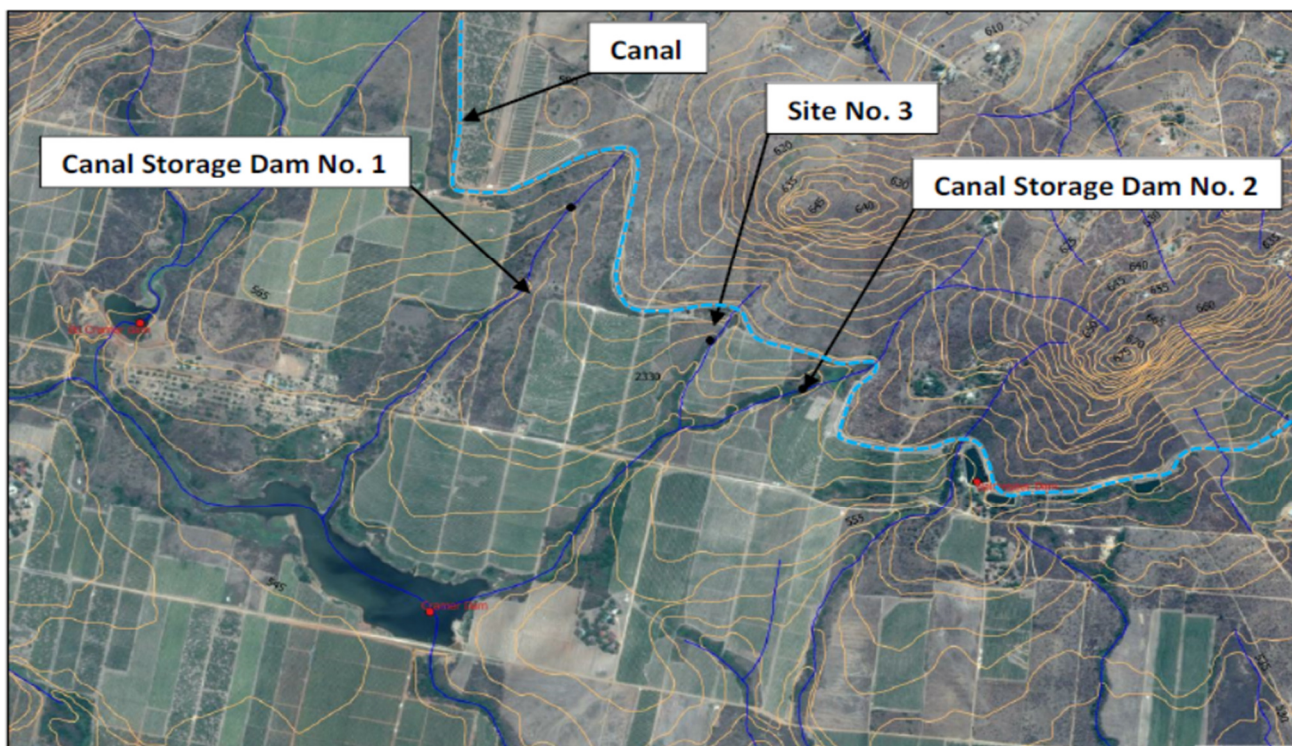
No project alternatives were investigated within the ambit of this EIA, as the applicant's purpose with the project is to establish sufficient water storage for irrigation of his proposed orchards.

### 5.2 Site Alternatives

No alternative properties were investigated, as the water is required on this property, where the applicant has existing orchards which need to be irrigated. The irrigation canal from which the water will be abstracted, is also on this property.

Initially 3 locations on the property were investigated; however, it was later determined that the third position (marked as Site No. 3 on the aerial photo below) would not be suitable, as only a relatively small surface area is available for dam construction and the site is not situated on a clearly defined watercourse. The dam would be very expensive in relation to the amount of water that could be stored. Sites 1 and 2 hold more advantages, as these two positions are on clearly defined watercourses, have sufficient undeveloped surface area available, contain clayey material within the basins to be used for construction of the dam walls, and the natural topography favours dam construction.

**Figure 5.1:** Alternative dam positions



### 5.3 Technology Alternatives

The type of dam – earthfill – was selected for both of the proposed dams, because due to the length and shape of the wall and the restricted area, only an earthfill embankment would be feasible. Suitable material for construction of the earthfill dam walls is also found within the basins of both proposed dams. No other technologies were investigated.

## 5.4 No-go Alternative

The 'no-go' alternative refers to the scenario in which the proposed activity does not take place and the site remains as it is.

If the no-go alternative is taken, the impacts that can be anticipated to be associated with the proposed dams would not come to pass and the conditions and trends on the property can be expected to remain as per the status quo. Impacts that can be expected to be experienced in case of the no-go alternative being selected include the following:

**Table 5.1:** Potential impacts that may be associated with the no-go option

POTENTIAL IMPACT	STATUS	EXTENT	MAGNITUDE	LIKELIHOOD	SIGNIFICANCE
<b>Bio-physical aspects</b>					
Soil erosion and siltation rates and trends remain unchanged	Neutral	Local	Medium	Highly probable	Low
No alteration of topography within dam basins	Neutral	Local	Low-Medium	Highly probable	Very low
No contribution to unlocking the agricultural potential of the property	Neutral	Local	Medium	Highly probable	Medium
No increase in water abstraction	Neutral	Local	Low	Highly probable	Low
No loss and disturbance of watercourse habitat and fringe vegetation	Neutral	Local	Low	Highly probable	Low
No intercepting sediment load	Neutral	Local	Low	Definite	Low
No creation of habitat for water-loving birds and other fauna.	Neutral	Local	Low-medium	Definite	Medium
Water quality trends remain unchanged	Neutral	Local	Unknown	Highly probable	Low
No change in quantity and fluctuation properties of watercourse	Neutral	Local	Low	Highly probable	Low
No construction-related veld fire risk	Neutral	Local	Very low	Definite	Very low
No habitat destruction	Neutral	Local	Medium	Highly probable	Medium
No further spreading of alien plant species or bush encroachment by indigenous trees due to disturbance of natural vegetation	Neutral	Local	Low	Highly probable	Very low
No reduction in infestation by alien invasive plants due to improved management thereof	Neutral	Local	Low	Highly probable	Low
In-stream flow regime remains unchanged	Neutral	Local	Low	Highly probable	Low-Medium



No construction-related disruption of the activities of fauna on and around the site	Neutral	Local	Very low	Definite	Very low
No creation of habitat for water-dependent fauna, e.g. certain fish, amphibians and bird species	Neutral	Local	Low	Definite	Low-Medium
Faunal species composition onsite remains unchanged	Neutral	Local	Low	Highly probable	Low
<b>Socio-economic aspects</b>					
No supporting local businesses through local procurement of materials, equipment & services (construction phase)	Neutral	Local	Low	Definite	Low
No direct or indirect job creation (construction phase)	Neutral	Local	Low	Definite	Low
No contribution to job creation and job security by buffering the farm against drought (operational phase)	Neutral	Local	Low	Definite	Low
Contribution to local economy (operational phase)	Neutral	Local	Low	Definite	Low
No visual impact of construction activities and site clearing	Neutral	Local	Medium	Definite	Very low
No visual impact of the new dams	Neutral	Local	Medium	Definite	Very low
No noise associated with construction activities and heavy vehicles during construction	Neutral	Local	Very low	Definite	Very low
No heritage impacts if sites or objects of heritage-related significance are found	Neutral	Local	Unknown	Definite	Very low

## 6 APPLICABLE LEGISLATION

### 6.1 Environmental Legislation

#### 6.1.1 National Environmental Management Act, EIA Regulations (2014)

The EIA Regulations (2014, as amended 2017), published in terms of section 24(5) read with section 44 of the National Environmental Management Act (NEMA, Act No. 107 of 1998), stipulate that a full scoping and EIA process is required to be undertaken for the proposed project.

**Table 6.1:** Listed activities triggered by the proposed project in terms of the EIA Regulations.

ACTIVITY NR.	ACTIVITY DESCRIPTION
<b>Listing Notice 1</b>	
12(i)(a)	The development of dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres

	<i>For the establishment of two instream dams, taking up a total area of approximately 18ha.</i>
19	<p>The infilling or depositing of any material of more than 10m<sup>3</sup> into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10m<sup>3</sup> from a watercourse.</p> <p><i>For removal, infilling or moving of material – mainly soil, sand and rock – within a watercourse as part of dam construction.</i></p>
27	<p>The clearance of an area of 1ha or more, but less than 20ha of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity or maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p><i>For clearance of approximately 15.5ha of indigenous vegetation for the construction of two dam walls and inundation of the associated dam basins.</i></p>
<b>Listing Notice 2</b>	
16	<p>The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5m or higher or where the high-water mark of the dam covers an area of 10ha or more.</p> <p><i>For the establishment of two dams with walls of maximum 12m and 9.5m high, respectively. The water surface area will be approximately 17.7ha in total.</i></p>
<b>Listing Notice 3</b>	
12(e)ii	<p>The clearance of an area of 300m<sup>2</sup> or more of indigenous vegetation, except where such clearance of indigenous vegetation is required for the undertaking of a linear activity or maintenance purposes undertaken in accordance with a maintenance management plan, where such clearance takes place within a critical biodiversity area identified in bioregional plans.</p> <p><i>For clearance of approximately 14.5ha of indigenous vegetation within a CBA1 in terms of the Limpopo Conservation Plan, for the construction of “Dam 1” dam walls and inundation of the associated dam basin.</i></p>
14(i)(a)(e)i(ff) 14(ii)(a)(e)i(ff)	<p>The development of dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 10m<sup>2</sup>, where such development occurs within a watercourse, in Limpopo, outside urban areas, in critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p><i>For development of “Dam 1” within a CBA1 in terms of the Limpopo Conservation Plan version 2, which will take up approximately 14.5ha, along with a pump house next to the dam, with a physical footprint which may slightly exceed 10m<sup>2</sup>.</i></p>

### 6.1.2 National Water Act (1998)

A water allocation is already in place from the Letaba Water Users Association for water abstraction from the irrigation canal, and the authorised volume is sufficient for the proposed new dams.

A Water Use Licence Application (WULA) will be submitted to DWS in terms of the National Water Act (NWA, Act No. 36 of 1998) for the Section 21(b), (c) and (i) water uses triggered by the proposed dams, as highlighted below:

**Table 6.2:** Applicable water uses in terms of the National Water Act (1998)

Section	Description of Water Use	Relevant Activity
21(b)	Storage of water	The storing of water in the dams.
21(c)	Impeding or diverting the flow of water in a watercourse.	Establishment of the dams.
21(i)	Altering the beds, banks, course or characteristics of a watercourse.	Establishment of the dams.

Please refer to Appendix K for documentation relating to the water use and WULA.

The engineers will also submit an application to DWS's Dam Safety Office for registration for Dam Safety purposes in terms of Section 120 of the National Water Act. Dam 1 is expected to be classified as small size, Category II-dam with a significant hazard potential rating and Dam 2 is expected to be classified as a small size, Category I dam with a low hazard potential rating.

## 6.2 National Forests Act (1998) and Limpopo Environmental Management Act (2003)

Should specimens be destroyed of any plant species that are protected in terms of the National Forests Act and/or the Limpopo Environmental Management Act (LEMA), permits will be required from the Department of Agriculture, Forestry and Fisheries (DAFF) and/or LDEDET for the destruction of these plants. This will include plants within the dam basin, as well as plants in other areas that will be disturbed, such as the dam wall, material lay-down areas, or other areas used during construction.

Protected species should be preserved as far as possible. For instance, material lay-down areas or vehicle / machinery access routes should be selected away from identified protected species and large trees.

## 6.3 Other Legislation

**Table 6.3:** Other applicable legislation

LEGISLATION	RELEVANT SECTIONS	PERTAINS TO
The Constitution Act (No 108 of 1996)	Chapter 2, Section 24	Bill of Rights: Environmental rights
Conservation of Agricultural Resources Act (1983)	Section 5	Prohibition of the spreading of weeds
Fencing Act (No 31 of 1963)	Section 17	Clearing of bush for fencing
Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act (No 36 of 1947)	Sections 3 – 10	Control of the use of pesticides, herbicides and fertilizers, and precautions to protect workers in this regard
Limpopo Environmental Management Act	Schedule 2, 3, 11 and 12	Lists of protected animals and plants
National Environmental Management Act (No 107 of 1998) and regulations (2014)		
National Environmental Management: Air Quality Act (No 39 of 2004)	Section 32	Control of dust
	Section 34	Control of noise
	Section 35	Control of offensive odours
	Section 57	Restricted activities involving listed threatened or protected species

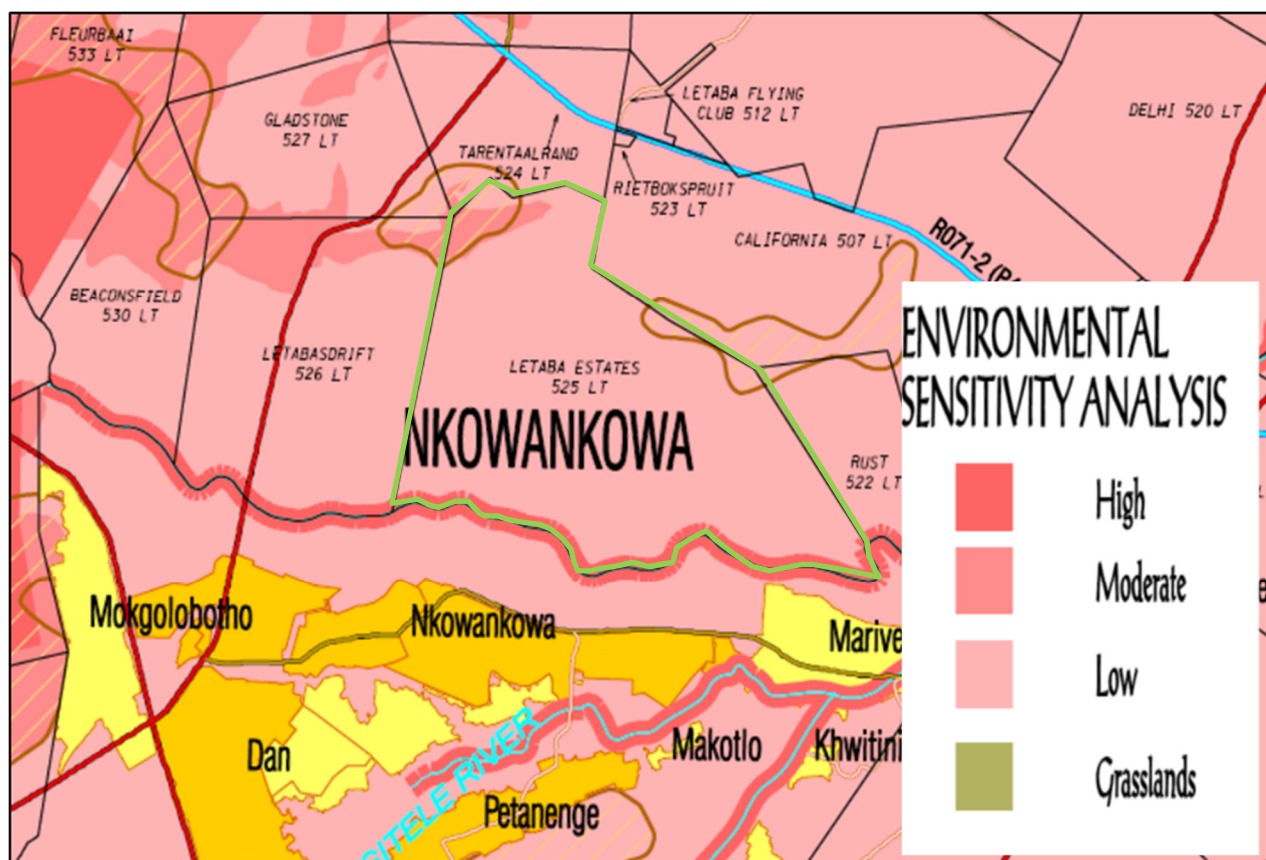
National Environmental Management: Biodiversity Act (No 10 of 2004)	Sections 65–69	Regulation of activities involving alien species
	Sections 71, 73 and 75	Regulation of activities involving invasive species
National Environmental Management: Waste Amendment Act (No 26 of 2014)	Chapter 4, Part 4	Waste management activities
	Chapter 5	Licensing of waste management activities
	Chapter 5	Institutional and planning matters
	Chapter 7	Compliance and enforcement
National Heritage Resources Act (No 25 of 1999)	Section 34	Protection of structures older than 60 years
	Section 35	Protection of archaeological and palaeontological sites and material as well as meteorites
	Section 36	Conservation of burial grounds and graves
National Forests Act (No 84 of 1998), as amended by the Forestry Laws Amendment Act (No 35 of 2005) and Regulations (GN466 of 2009)	Section 7	Prohibition on destruction of trees in natural forests
	Sections 12–16	Declaration of trees, groups of trees, woodlands or tree species as protected
	Section 17	Declaration of controlled forest areas
National Water Act (No 36 of 1998)	Section 19	Prevention and remedying effects of pollution, particularly where pollution of a water resource occurs or might occur as a result of activities on land
	Section 20	Control of pollution of water resources following an emergency incident
	Chapter 4 (Sections 21–55)	Governs water use
Occupational Health and Safety Act (No 85 of 1993)	Section 8	General duties of employers to their employees
	Section 9	General duties of employers and self-employed persons to persons other than their employees

## 6.4 Municipal and provincial planning tools

### 6.4.1 Greater Tzaneen Municipality – Integrated Development Plan and Spatial Development Framework

The GTM Spatial Development Framework (SDF, 2008) indicates the site as containing areas of low environmental sensitivity. It is also indicated as having areas with slopes between 1:5 and 1:20.

**Figure 6.1:** Extract from GTM SDF (2008)



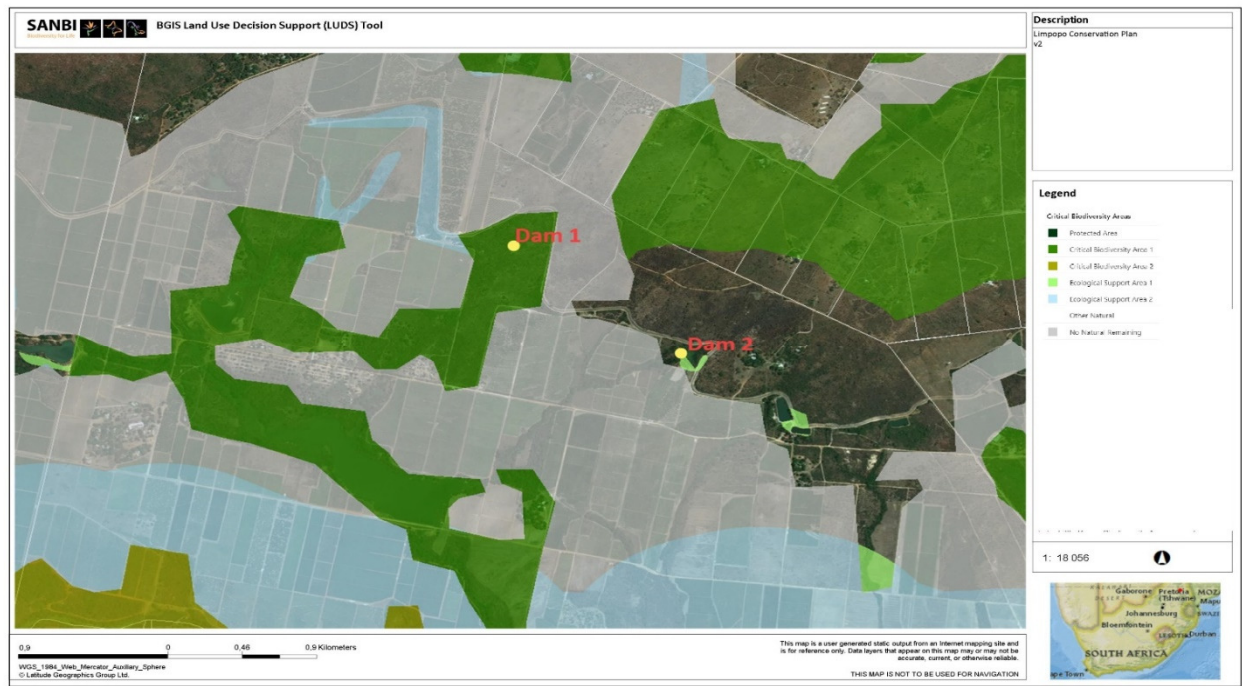
Agriculture forms a significant part of the municipal economy. The GTM Integrated Development Plan (IDP, 2017/2018) indicates that the GTM is the main contributor to the Mopani District's agricultural GDP (Gross Domestic Product), supplying 43% of the district's agricultural GDP.

#### 6.4.2 Limpopo Conservation Plan version 2 (2013)

According to the Limpopo Conservation Plan version 2 (2013), Dam 1 is situated in a Critical Biodiversity Area 1 (CBA 1) and Dam 2 is in "Other Natural Vegetation". The property also has areas within an Ecological Support Area 1 (ESA 1), but this will not be affected by the proposed dams.



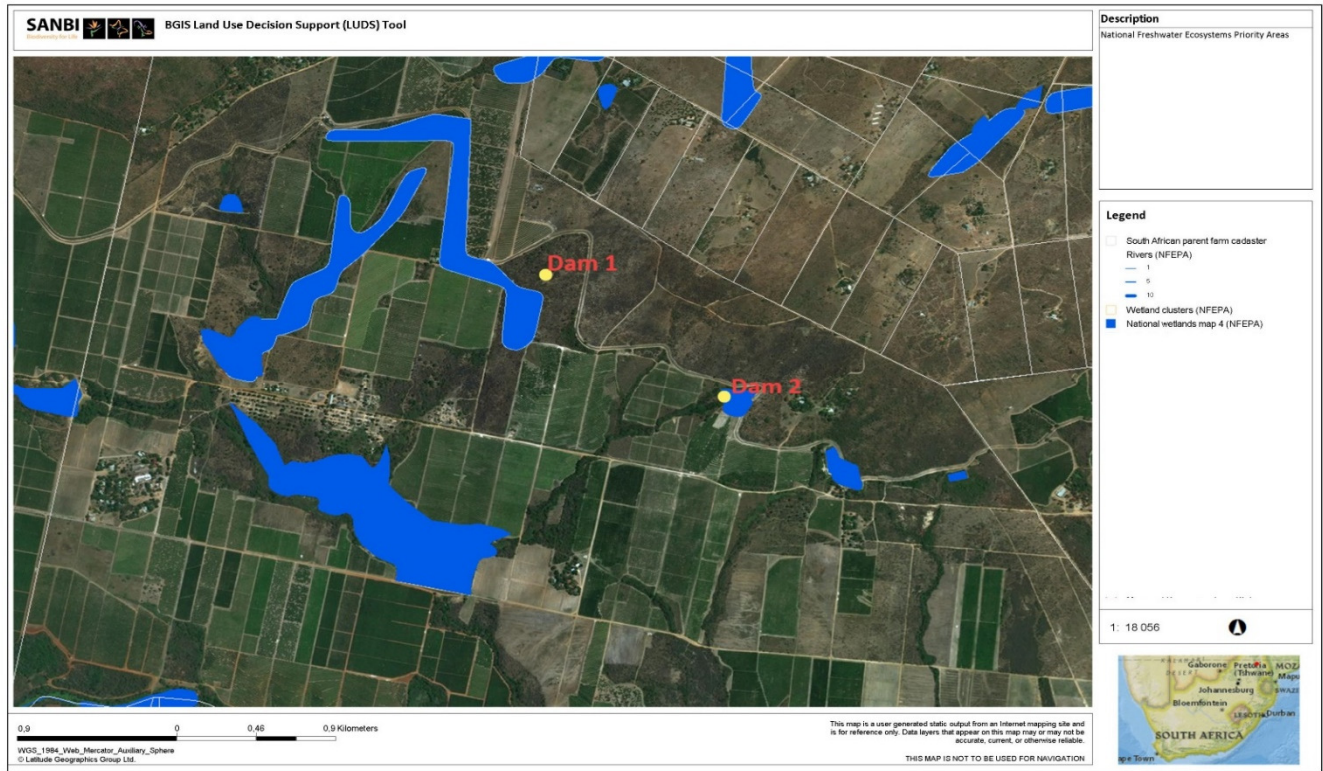
**Figure 6.3:** Extract from Limpopo Conservation Plan (image: SANBI BGIS, 2017)



**6.4.3 National Freshwater Ecosystems Priority Areas**

The National Freshwater Ecosystem Priority Area (NFEPA) Map indicates that there is a wetland near Dam 1 and an artificial wetland, an existing damaged dam, at the proposed site of Dam 2.

**Figure 6.4:** Location of the site in the context of FEPAs



## 7 IMPACT ASSESSMENT METHODOLOGY

Potential impacts were scored on the following basis:

- **Status:**

- *Positive* – the proposed project is to have a positive impact in terms of the particular parameter;
- *Negative* – the proposed project is to have a negative impact in terms of the particular parameter;
- *Neutral* – the proposed project is to have neither a positive nor a negative impact in terms of the particular parameter.

- **Extent:**

- *Local* – the impact is to be felt on the site and in its immediate surroundings, up to a radius of 50km from the site;
- *Sub-regional* – the impact is to be felt at a distance of up to 100km from the site;
- *Regional* – the impact is to be felt in the Limpopo Province;
- *National* – the impact is to be felt across provincial boundaries.

- **Duration:**

Refers to the period of time over which impacts can be expected to be experienced.

- *Short term* – 0 to 5 years;
- *Medium term* – more than 5 years, up to 15 years;
- *Long term* – more than 15 years;
- *Permanent* – the impact is irreversible.

- **Magnitude:**

Refers to the intensity of the potential impact, if it is experienced.

- *Negligible* – the impact will barely be felt, if at all. No mitigation required;
- *Low* – the parameter will only be affected to a small extent by the proposed project. No mitigation required, but monitoring is recommended;
- *Medium* – the parameter will be affected by the proposed project, but functions in terms of the parameter can still continue. Mitigation and monitoring required;
- *High* – functioning in terms of the parameter will be significantly affected by the impact. Extensive mitigation and long-term monitoring required.

- **Likelihood:**

- *Improbable* – it is unlikely that the impact will be experienced;
- *Possible* – the impact may be experienced. Monitoring required; mitigation may also be required based on the type of impact and its significance;
- *Highly probable* – the impact will most likely be experienced. Monitoring and mitigation required based on the type of impact and its significance in order to reduce the probability of the impact occurring and/or to reduce the magnitude of the impact;
- *Definite* – the impact will be experienced. Monitoring and mitigation required based on the type of impact and its significance in order to reduce the probability of the impact occurring and/or to reduce the magnitude of the impact.

- **Significance:**

Significance is based on a consolidation of the anticipated extent, duration, magnitude and likelihood of the potential impact.



- *Negligible* – The impact will barely be felt, if at all. No mitigation required;
- *Low* – The parameter will only be affected to a small extent by the proposed project. No mitigation required, but monitoring is recommended;
- *Medium* – The parameter will be affected by the proposed project, but functions in terms of the parameter can still continue. Mitigation and monitoring required;
- *High* – Functioning in terms of the parameter will be significantly affected by the impact. Extensive mitigation and long-term monitoring required.

## 8 BIO-PHYSICAL INVESTIGATIONS

### 8.1 Climate

#### 8.1.1 Status quo

The site is situated in a sub-tropical summer rainfall area with dry winters. Summers are hot and humid, with an average summer midday temperature of 29.1 °C in Tzaneen in January; winters are mild with very rare frost, and the average winter midday temperature is 21.9 °C in July. The region experiences its coldest temperatures during July when average evening temperature is 6.3 °C.

The mean annual rainfall of the catchment, based on the nearest rainfall station (Leeufontein 0679592W), is given as 760mm (Element, 2017).

The average potential mean annual gross evaporation, as measured by A-pan, is about 1 800mm in the mountainous western section of the WMA, where this site is located. The highest A-pan evaporation occurs between October and January, and the lowest in June (Luvuvhu/Letaba ISP, 2004).

January is the month in which the highest rainfall is received, whilst on average in July the lowest rainfall is received. Frost is infrequent but may occur at higher altitudes (Mucina & Rutherford 2006, SA Explorer 2012). The area is not particularly windy.

#### 8.1.2 Potential impacts

The proposed project is not anticipated to have any impact on the local climate, aside from micro-climatic impacts of negligible significance.

The climate may impact on the project in that rain during the construction phase can cause soil erosion, particularly on exposed slopes which have not been stabilised. Rainfall during the operation phase will also determine how quickly the dam will fill.

**Table 8.1:** Potential impacts in terms of climate

CONSTRUCTION PHASE							
Potential impact	Status	Extent	Duration	Magnitude	Likelihood	Significance without mitigation	Significance with mitigation
Rain during the construction phase can cause soil erosion, particularly on exposed, unstable slopes, which in	Negative	Local	Short term	Medium	Highly probable	Medium	Low

turn may lead to siltation of the stream							
<b>OPERATIONAL PHASE</b>							
Not anticipated	-	-	-	-	-		-

## 8.2 Topography, Soils, Agriculture and Geology

### 8.2.1 Status quo

#### Topography

The dam sites are located at 577m and 588m above mean sea level (mamsl) respectively, and both the dams are situated in non-perennial tributaries of the Letaba River. The dam sites are both located in valleys, on non-perennial drainage streams which drains into the Cramer dam south which drains into the Great-Letaba River. The proposed dam sites are all located downstream from an existing irrigation canal with Dam 2 located in the place of an existing dam

#### Soils

The area has Red, yellow and /or greyish soils with high base status.

#### Agriculture

The Letaba River Catchment – and in particular the Groot-Letaba sub-area within which this site is located – is a highly productive agricultural area, and agriculture is the base of the regional economy. Permanent fruit crops (such as are planned for this site and is also prevalent in the surrounding area) constitute approximately 47% of cultivation (Luvuvhu/Letaba ISP, 2004).

The dam sites are surrounded by cultivation (citrus orchards) and the surrounding larger areas is widely used for commercial agriculture. The dams would contribute to agricultural production as they will play a crucial role in the irrigation of the orchards.

#### Geology

The geology in the specific area consists of biotite granites. At some places, the granite bedrock daylights above ground level. Due to the location of the dams, near to rocky outcrops (“koppies”), it is expected that the granite bedrock, at some places on the proposed center lines, may be shallow (Element,2017).

The area is generally underlain by the potassium-poor gneisses of the Goudplaats gneiss (Swazian Erathem) and an Archaean granite dyke underlies most of the area. Shales and quartzite of the Wolkberg Group are present but not common (Mucina & Rutherford, 2006).

The Olifants-Letaba EMF indicates the general area as being underlain by Archaean granite and Gneiss basalt complex, which are the oldest exposed rock formations in the area. It forms the basement rock complex for other rock systems, and consists mainly of old Granite and Gneis formations and primitive groups of schistose rocks including metamorphosed sediments such as phyllites, banded ironstone, quartzite, conglomerate and limestone, together with rocks of igneous origin such as amphibolites, greenstone lavas, and chlorite-schists (Olifants-Letaba EMF, 2010).

### 8.2.2 Potential impacts

#### Topography

The topography will be slightly altered through the excavation of soil from within the dam basins for construction of the dam walls. This is anticipated to be of low significance, as the excavated area will in any case be inundated after completion of construction.

#### Soils

Potential acceleration of soil erosion is likely to occur on a short-term basis that is expected to be limited largely to the construction phase, when earthworks and clearing of vegetation takes place.

#### Agriculture

The establishment of the proposed dams is anticipated to improve agricultural production on the rest of the property by ensuring greater security of irrigation water.

#### Geology

Geology is not anticipated to be impacted.

Potential impacts that may be associated with topography, soils, agriculture and geology are summarised in the following table:

**Table 8.3:** Potential impacts in terms of topography, soils, agriculture and geology

<b>CONSTRUCTION PHASE</b>							
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance without mitigation</b>	<b>Significance with mitigation</b>
Soil erosion and associated siltation downstream	Negative	Local	Short term	Medium	Highly probable	Medium	Low
Alteration of topography within dam basins	Negative	Local	Long term	Low-Medium	Highly probable	Very low	Very low
<b>OPERATIONAL PHASE</b>							
Contribution to unlocking the agricultural potential of the property by providing irrigation security	Positive	Local	Long term	Medium	Highly probable	Medium	Medium

### 8.3 Surface hydrology and wetlands

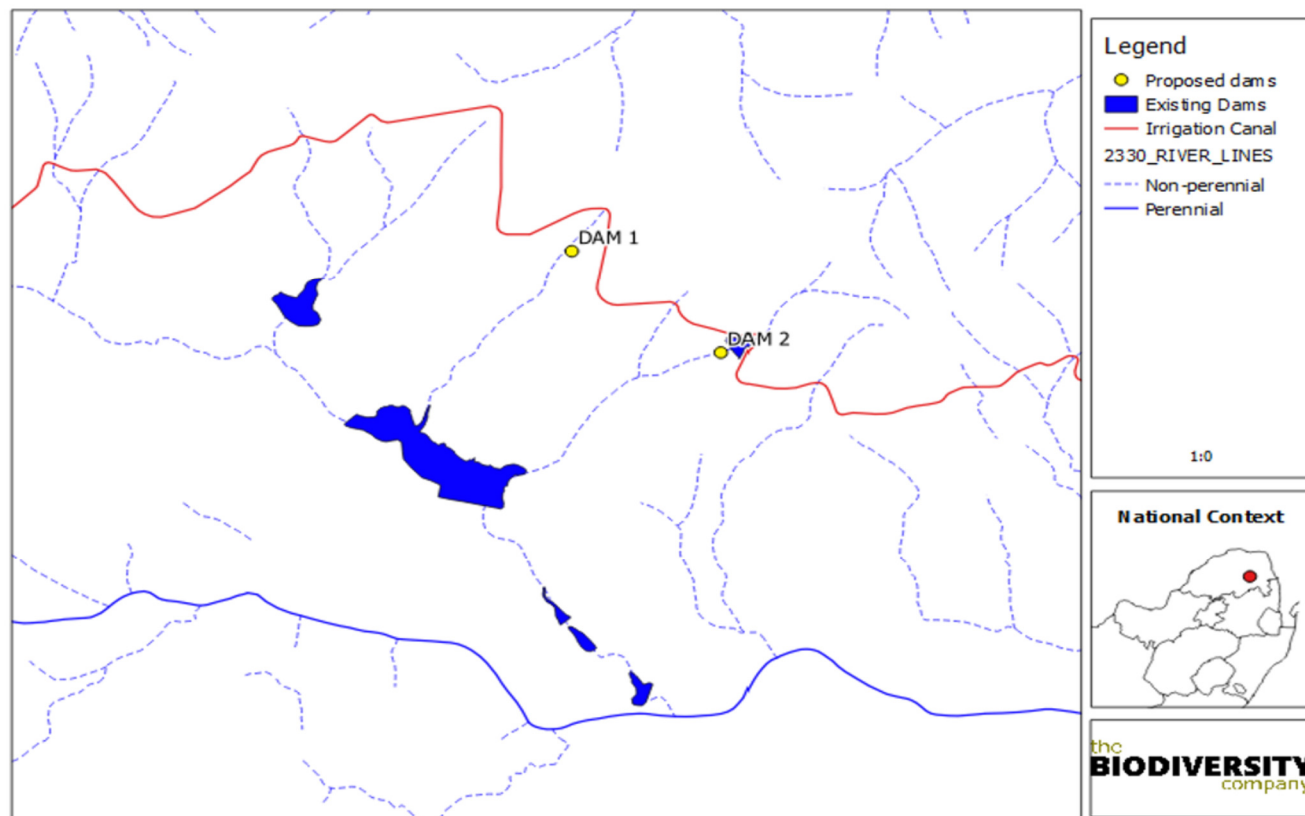
#### 8.3.1 *Status quo*

##### Surface hydrology

The proposed project site is located in the upper reaches of non-perennial tributaries of the Great Letaba River, within the B81D Quaternary Catchment, which forms part of the Groot Letaba Sub-Area of the Olifants Water Management Area (WMA). Dam 1 is situated on a 1<sup>st</sup> order tributary and Dam 2 on a 2<sup>nd</sup> order tributary, based on the Strahler stream order classification (The Biodiversity Company, 2017).

A canal that is fed by the Great Letaba River traverses the property, adjacent (directly upstream of) the proposed dam sites and will be the source of water for the dams. The water discharged from the small existing dam at the Dam 2 site, feeds into the Cramer dam which is located on the property. A non-perennial watercourse traverses the Dam 1 proposed site and the Great Letaba River forms the southern boundary of the property.

**Figure 8.1:** Map of the project area, indicating the location of the proposed dams in relation to the Letaba River, irrigation canal, non-perennial tributaries and existing dams (The Biodiversity Company, 2017).



##### Aquatic ecology

A desktop aquatic ecological assessment has been done by The Biodiversity Company (2017).

Based on the topographical map data (10m contours) and the stream orders, it is very unlikely that fish communities would naturally occur in these tributaries. Any flow present in these tributaries can be concluded to originate from releases from the irrigation canal; under natural conditions these tributaries would only have exhibited surface flows for brief periods following rains. Colonisation of the existing dams and proposed dams by fish species most likely occurs in a top-down direction, as the canal is open to the Letaba River. It should

also be noted that the four existing dams situated downstream of the proposed dam sites already present migration barriers to fish wanting to migrate into the remaining stream reaches.

The fish communities present in the project area are unusual in that originated from a top-down migration scenario as escapees from the irrigation canal, instead of the usual upstream migration scenario expected under natural conditions. Fish communities would not have been expected in these tributaries under natural conditions or in the absence of the canal. Construction of fishways or any other engineering designs designed to facilitate upstream migration of fish into the proposed dams is therefore considered to be unnecessary.

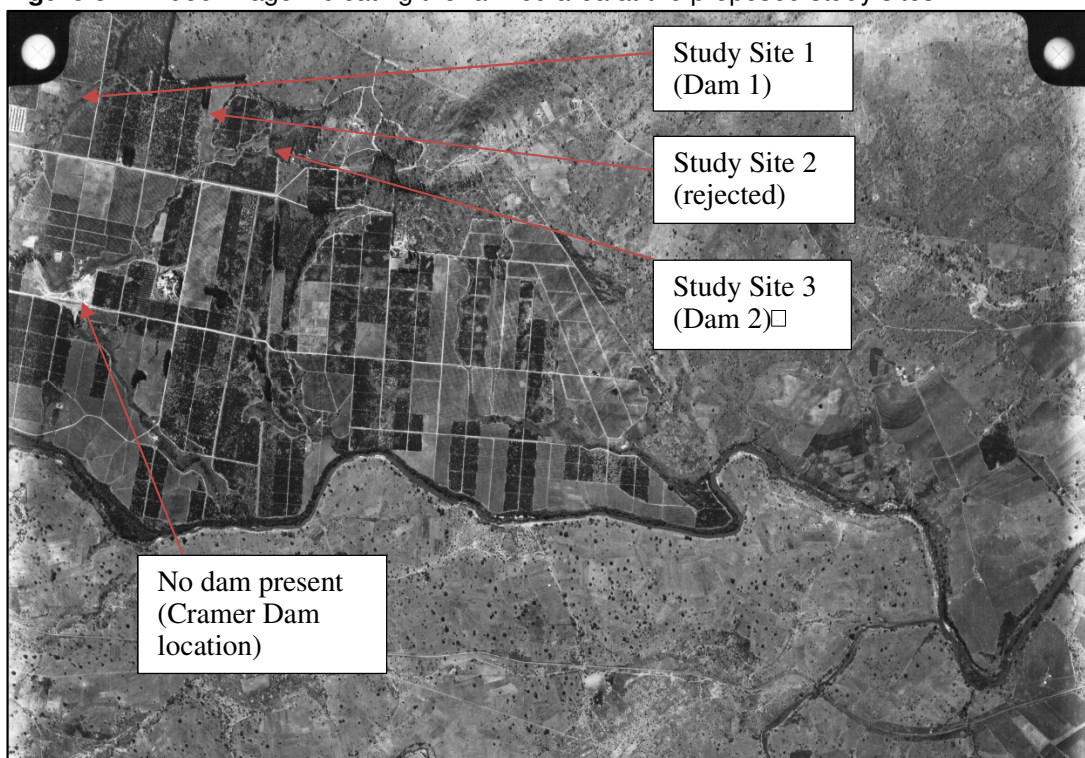
### Wetlands

The information in this section was gleaned from Limosella Consulting's report (2017). Note that the study included all three site alternatives: Study Site 1 equals Dam 1 in this application, Study Site 2 is the rejected site, and Study Site 3 equals Dam 2 in this application.

The study site entails three proposed alternative sites for a dam, each located within a small stream. Surrounding the streams are fruit orchards. The area has been cultivated from as early as 1956 and possibly earlier (Figure below). All three streams drain into the Cramer Dam located south of the study sites. The dam which currently houses a pod of hippo had not yet been constructed in 1956, at the time the historic aerial photograph below was taken. Roads service the orchards. Several existing earthen and cement farm dams are dotted throughout the region.

The three alternative areas are all located downstream from an existing irrigation canal. Study Site 1 is located in a relatively natural area at approximately 23°51'2.45"S and 30°19'6.33"E. Study Site 2 (rejected) lies adjacent to orchards at approximately 23°51'16.36"S and 30°19'25.81"E. Study Site 3 (for Dam 2 in this application) is located in the place of an existing dam with the new dam wall slightly downstream of the existing one.

**Figure 8.2:** 1956 image indicating the farmed area at the proposed study sites.





Soil: All three streams had a relatively small width and were characterised by sandy shallow active channels. The soil was characterised by brown sandy soil. Some boulders and cobbles were recorded in the streams.

**Figure 8.3:** Sandy active stream channel.



**Figure 8.4:** Relatively small channel width associated with the streams on site as well as boulders present in the streams.



Vegetation: The study sites are located on fruit orchards and thus the majority of indigenous vegetation has been replaced by fruit trees. The streams remained somewhat natural although a large number of exotic species has colonised these corridors, especially with regard to some climbers that are abundant. A large number of the woody species associated with the streams were also exotic species. The three stream areas generally had similar vegetation growth. The exotic species includes: *Melia azedarach*, *Eucalyptus sp*, *Pinus*



sp, *Tagetes minuta*, *Passiflora edulis*, *Solanum mauritianum*, *Ricinus communis* var. *communis*, *Rubus fruticosus*, *Lantana camara*, *Ageratina adenophora*, *Ageratum conyzoides*, *Arundo donax*, *Ipomoea purpurea*, *Argemone ochroleuca*.

The indigenous species recorded include: *Celtis africana*, *Terminalia sericea*, *Acacia nigrescens*, *Albizia harveyi*, *Ficus sycomorus*, *Eragrostis gummiflua*, *Melinis repens*, *Digitaria eriantha*, *Setaria megaphylla*, *Typha capensis* and *Phragmites australis*.

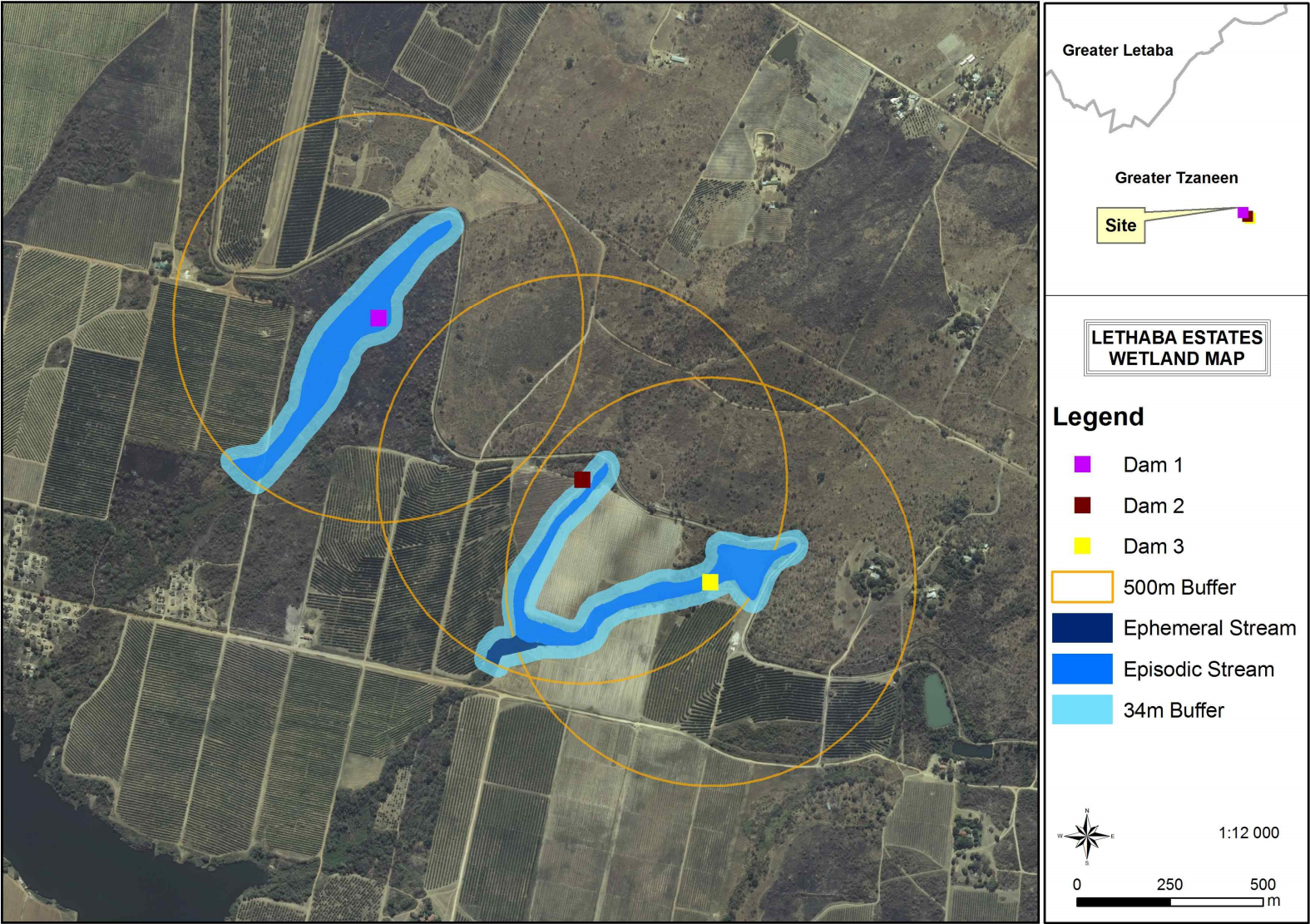
**Figure 8.5:** Vegetation characteristics at the three sites.



Wetland/Riparian Classification and Delineation: Three proposed site alternatives were identified and studied. All three study areas are located within streams classified as episodic streams, which are streams that generally flow for less than 3 months of the year and are often associated with the headwaters of a river. The episodic stream associated with Study Site 1 (Dam 1) drains directly into the Cramer Dam. The episodic streams associated with Study Site 2 (rejected) and Study Site 3 (Dam 2) flow south and then confluence to form an ephemeral river which drains into the Cramer Dam. The Cramer Dam flows directly into the Great-Letaba River.



**Figure 8.6:** Wetland sensitivity areas delineated together with associated buffer zones.



Functional and Integrity Assessment: All three proposed study areas have been impacted by farming over many years and as a result the vegetation composition and natural hydrology have greatly changed from their original state. The removal of indigenous vegetation has exposed the fringe stream habitat which is susceptible to exotic invasion. The episodic stream associated with Study Site 3 (Dam 2) has also been impacted by a dam immediately upstream of the site, constructed within the channel, thereby affecting the hydrology of the stream. However, these episodic streams remain vitally important in areas with such



fragmented habitat as they provide refuges and safe movement corridors for numerous animal and bird species including hippopotamus living in the downstream Cramer Dam.

**Figure 8.7:** The existing dam near the proposed site of Study Site 3 (Dam 2).



**Figure 8.8:** Downstream hippopotamus pod in the Cramer Dam.



The Riparian Vegetation Response Assessment Index (VEGRAI) and the Quick Habitat Integrity (QHI) assessment was done to determine the Ecological Category (EC) for the three streams. An EC score of **C – Moderately modified** was obtained. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged for both streams 1 and 2 (Dam 1 & Dam 2) and the

stream associated with Dam 3 scored a **C/D - Moderately to Largely modified**. A large loss of natural habitat, biota and basic ecosystem functions has occurred.

The QHI score was calculated as **D/E**. The Recommended Ecological Category (REC) was elevated following Rountree *et al* (2013) to a class **C**.

**Table 8.4:** Results and brief discussion of the VEGRAI assessment for the episodic stream associated with Dam 1 (Kleynhans *et al*, 2008).

LEVEL 3 ASSESSMENT					
METRIC GROUP	CALCULATED RATING	WEIGHTED RATING	CONFIDENCE	RANK	% WEIGHT
MARGINAL	70,0	26,3	2,5	2,0	60,0
NON MARGINAL	60,0	37,5	2,5	1,0	100,0
2,0					160,0
LEVEL 3 VEGRAI (%)				63,8	
VEGRAI EC				<b>C</b>	
AVERAGE CONFIDENCE				2,5	

**Table 8.5:** Results and brief discussion of the VEGRAI assessment for the episodic stream associated with Dam 2 (rejected site) (Kleynhans *et al*, 2008).

LEVEL 3 ASSESSMENT					
METRIC GROUP	CALCULATED RATING	WEIGHTED RATING	CONFIDENCE	RANK	% WEIGHT
MARGINAL	70,0	26,3	2,5	2,0	60,0
NON MARGINAL	66,7	41,7	2,5	1,0	100,0
2,0					160,0
LEVEL 3 VEGRAI (%)				67,9	
VEGRAI EC				<b>C</b>	
AVERAGE CONFIDENCE				2,5	

**Table 8.6:** Results and brief discussion of the VEGRAI assessment for the episodic stream associated with Dam 3 (Kleynhans *et al*, 2008).

LEVEL 3 ASSESSMENT					
METRIC GROUP	CALCULATED RATING	WEIGHTED RATING	CONFIDENCE	RANK	% WEIGHT
MARGINAL	70,0	26,3	2,5	2,0	60,0
NON MARGINAL	50,0	31,3	2,5	1,0	100,0
2,0					160,0
LEVEL 3 VEGRAI (%)				57,5	
VEGRAI EC				<b>C/D</b>	
AVERAGE CONFIDENCE				2,5	

**Table 8.7:** QHI for the Perennial river and the Episodic stream 1, 2 and 3 (Seaman *et al*, 2010).

QUATERNARY CATCHMENT	RIVER	Bed modification (0-5)	Flow modification (0-5)	Inundation (0-5)	Riparian/Bank condition (0-5)	Water quality modification	DESKTOP HABITAT	INSTREAM EC%	INSTREAM EC	Vegetation Rating (0-5)	ECOSTATUS %	ECOSTATUS EC	CONFIDENCE (1-5)
<b>B81D</b>	<b>Episodic Stream (Dam 1)</b>	2	2	1	2	3	69,0	69,0	C	3	62,7	C	3:MODERATE
	<b>Episodic Stream (Dam 2)</b>	2	2	1	2	2	73,0	73,0	C	3	65,3	C	3:MODERATE
	<b>Episodic Stream (Dam 3)</b>	3	3	3	2	2	58,0	58,0	C/D	2	62,0	C/D	3:MODERATE

The table below provides a summary of the results recorded for each wetland unit potentially affected by the proposed development.

**Table 8.8:** Summary of results for each wetland unit discussed.

Classification (SANBI, 2013)	EC (Kleynhans <i>et al</i> , 2008).	QHI (Seaman <i>et al</i> , 2010).	Scientific Buffer (Macfarlane <i>et al</i> 2015)	REC (Rountree <i>et al</i> , 2013)	Order of Preference
Non-Perennial Episodic Stream (Dam 1)	63,8 C	62,7 C	34 m	B	3
Non-Perennial Episodic Stream (Dam 2)	67,9 C	65,3 C		B	2
Non-Perennial Episodic Stream (Dam 3)	57,5 C/D	62,0 C/D		C	1

### 8.3.2 Potential impacts

The construction of dams has numerous environmental impacts. According to Tahmiscioğlu *et al*, (2011) and Manatunge *et al*, (2010) (both quoted in Limosella 2017) the following positive and negative effects are associated with the construction of dams:

- Decreased sediment transfer within the hydrological system, which in turn restricts the egg laying zone of fish
- Disruption of species migration within the stream (this point is addressed in the separate aquatic specialist opinion report).
- The areas that will be under water from the dam are lost (habitat destruction).
- Deterioration of water quality due to the decomposition of fauna and flora in the water.
- Decreased water quantity downstream leading to biodiversity changes.
- Negative effects associated with the construction process.
- Narrowing of channel may lead to vegetation overgrowth.
- A rise in evaporation may be expected as a result of the increase in the water surface area.

Certain impacts can be seen as either positive or negative, depending on the perspective. Alteration of the hydrological regime from non-perennial to a more constant flow due to the dams may pose negative environmental impacts to a system adjusted to a non-perennial stream, but downstream water users may see it as a positive impact due to more reliable water availability throughout the year.

Similarly, inundation of areas of free-flowing streams may be negative to the local ecology which is adjusted to non-perennial water availability but could pose positive impacts in terms of habitat creation for water-loving species such as birds.

On condition that mitigation measures are adhered to, no impact to downstream water resources are expected to result from the proposed development. Recommended mitigation measures will also be incorporated into the detailed EMPR in the impact assessment phase.

**Table 8.4:** Potential impacts in terms of surface hydrology

<b>CONSTRUCTION PHASE</b>							
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance without mitigation</b>	<b>Significance with mitigation</b>
Intercepting sediment load and preventing its transport downstream	Negative	Local	Medium term	Low	Possible	Medium	Low
Change in quantity and fluctuation properties of watercourse	Negative	Local	Medium term	Low	Highly probable	High	Low
Loss and disturbance of watercourse habitat and fringe vegetation	Negative	Local	Short term	Low	Highly probable	Low	Low
Changes in water quality due to pollution	Negative	Local	Short term	Unknown	Possible	Medium	Low
<b>OPERATIONAL PHASE</b>							
Increased water abstraction, though	Negative	Local	Long term	Low	Highly probable	Low-medium	Low

still within existing allocation							
Loss and disturbance of watercourse habitat and fringe vegetation	Negative	Local	Long term	Low	Highly probable	Low	Low
Intercepting sediment load and preventing its transport downstream	Negative	Local	Long term	Low	Highly probable	Medium	Low
Creation of habitat for water-loving birds and other fauna.	Positive	Local	Long term	Low-medium	Highly probable	Low	Medium
Changes in water quality due to pollution	Negative	Local	Short term	Unknown	Possible	Medium	Low
Change in quantity and fluctuation properties of watercourse	Negative	Local	Long term	Low	Highly probable	Medium	Low

## 8.4 Ecology

An ecological assessment was undertaken by Bateleur Ecological Services in 2017, consisting of fieldwork complemented by a desktop review of available information.

### 8.4.1 Status quo

#### Vegetation type

The site is located within the SVI 3 Granite Lowveld veld type, which has a conservation status of Vulnerable (Mucina & Rutherford 2006). Important taxonomy within this vegetation type includes (Mucina & Rutherford, 2006):

**Tall Trees** - *Acacia nigrescens*, *Sclerocarya birrea* subsp. *caffra*. Small Trees: *Acacia nilotica*, *Albizia harveyi*, *Combretum apiculatum*, *C. imberbe*, *C. zeyheri*, *Ficus stuhlmannii*, *Peltophorum africanum*, *Pterocarpus rotundifolius*, *Terminalia sericea*, *Acacia exuvialis*, *A. gerrardii*, *Bolusanthus speciosus*, *Cassia abbreviata* subsp. *beareana*, *Combretum collinum* subsp. *suluense*, *Dalbergia melanoxylon*, *Gymnosporia glaucophylla*, *Lannea schweinfurthii* var. *stuhlmannii*, *Pavetta schumanniana*, *Plectroniella armata*, *Terminalia prunioides*.

**Tall Shrubs** - *Combretum hereroense*, *Dichrostachys cinerea*, *Euclea divinorum*, *Strychnos madagascariensis*, *Gardenia volkensii*, *Hibiscus micranthus*, *Tephrosia polystachya*.

**Low Shrubs** - *Abutilon austro-africanum*, *Agathisanthemum bojeri*, *Aptosimum lineare*, *Barleria elegans*, *Clerodendrum ternatum*, *Commiphora africana*, *Gossypium herbaceum* subsp. *africanum*, *Pavonia burchellii*.

**Woody Climber** - *Sphedamnocarpus pruriens* subsp. *pruriens*.

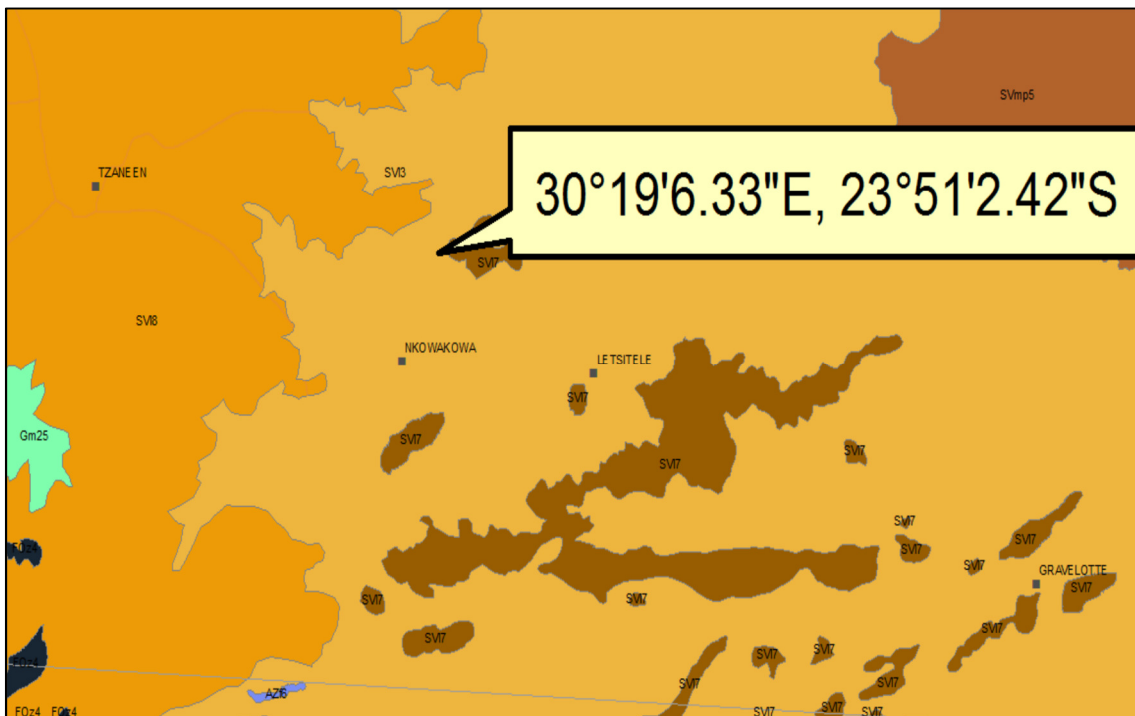
**Herbaceous Climber** - *Rhynchosia totta*.



**Graminoids** - *Brachiaria nigropedata*, *Digitaria eriantha* subsp. *eriantha*, *Eragrostis rigidior*, *Melinis repens*, *Panicum maximum*, *Pogonarthria squarrosa*, *Aristida congesta*, *Bulbostylis hispidula*, *Chloris mossambicensis*, *Enneapogon cenchroides*, *Heteropogon contortus*, *Leptochloa eleusine*, *Perotis patens*, *Schmidtia pappophoroides*, *Sehima galpinii*, *Tricholaena monachne*, *Urochloa mosambicensis*.

**Herbs** - *Achyranthes aspera*, *Aspilia mossambicensis*, *Becium filamentosum*, *Chamaecrista absus*, *Commelina benghalensis*, *C. erecta*, *Cucumis africanus*, *Evolvulus alsinoides*, *Heliotropium strigosum*, *Hermestaedia odorata*, *Hibiscus praeteritus*, *Indigofera filipes*, *I. sanguinea*, *Kohautia virgata*, *Kyphocarpa angustifolia*, *Leucas glabrata*, *Ocimum gratissimum*, *Phyllanthus maderaspatensis*, *Pupalia lappacea*, *Vahlia capensis* subsp. *vulgaris*, *Waltheria indica*. Succulent Herbs: *Orbea rogersii*, *Stapelia leendertziae*.

**Figure 8.2:** Reference map of site location within the Tzaneen Sour Bushveld (SVI 8) Vegetation Type (Mucina & Rutherford, 2006)



#### Vegetation units on site

**Dam 1:** *Melia azedarach*, *Eucalyptus grandis*, severely degraded and transformed open woodland. Encroachment by *Arundo donax* reeds. Indigenous vegetation in drainage lines and in open veld in the form of young plants. Showing signs of high fire frequency. Located in a Critical Biodiversity Area 1, but is degraded.

**Dam 2:** Artificial dam located on the stream. Riverine forest (supported by constant discharge from the dam to other dams and abstraction points downstream) comprising of *Adina microcephala* and *Ficus sycomorus* at the river's edge, surrounded by *Lantana camara* and *Phyllanthus reticulatus* encroached thicket. Area surrounding the dam comprising an array of indigenous and exotic species in a pioneer stage due to slashing and other ongoing disturbances. *Eichhorcia crassipes* (water hyacinth) was recorded as a dominant water plant.

### Protected plant species

Specimens of protected trees were identified in the proposed dam basins. These will be lost when the proposed dams are filled, and permits will therefore need to be applied for from the Department of Agriculture, Forestry and Fisheries (DAFF). Trees of the following protected species were identified within the area which will be inundated:

- Matumi (*Breonadia salicina*)
- Marula (*Sclerocarya birrea*)
- Apple Leaf (*Philenoptera violacea*)
- Leadwood (*Combretum imberbe*)

### Fauna

Due to the sites being somewhat degraded ecologically, presence or activity of larger mammal species is expected to be limited, but various species of smaller animals are likely to be present, such as porcupine, bush-pig, civet, genet, cane rat, vlei rat, various mice (e.g. Grey Climbing Mouse, Thomas's Pygmy Mouse, Multimammate Mouse, etc) and mongoose species (e.g. Banded Mongoose, Water Mongoose, Dwarf Mongoose, White-tailed Mongoose, etc). Duiker and Bushbuck also have a medium likelihood of occurrence onsite. Bush-pig and hippopotamus were confirmed present onsite.

Threatened or protected faunal species that may occur onsite include the following:

- **Invertebrates:** 3 protected species (1 spider and 2 scorpions) may occur; low probability of occurrence
- **Amphibians:** 3 protected frog species may occur; low probability of occurrence
- **Mammals:** 6 protected species may occur; low probability of occurrence for 5 of these, and low-medium probability for the sixth species (Samango monkey)
- **Reptiles:** 8 protected species (2 snakes, 2 geckos, 2 lizards, a skink and Nile Crocodile); low probability of occurrence for 7 of these, and low-medium probability for the eighth (African Rock Python)
- **Birds:** 2 endangered bird species, 1 protected and 1 vulnerable species; low probability of occurrence

For comprehensive species lists, please refer to the attached specialist ecological report.

### Ecological sensitivity

Both sites are sensitive due to their location on watercourses, but the Dam 1 site is considered the most sensitive of the two sites, due to its location within a CBA, even though it is ecologically degraded. The Dam 1 site is regarded as having medium sensitivity, while Dam 2 site is regarded as having low-medium sensitivity.

The current state of the vegetation for the sites scored in at semi-natural to degraded. Both proposed areas have been impacted by farming over many years and as a result the vegetation composition as well as the natural hydrology has greatly changed from their theoretical reference condition. Three protected tree species were found on the Dam 1 site, namely Marula, Leadwood and Apple-leaf, with four protected tree species found on the Dam 2 site, namely Marula, Leadwood, Apple-leaf and Matumi. No protected forb or grass species were present. Although some endangered faunal species may occur on the sites, the size and location of the sites do not lend themselves to the inhabitation by these particular species. The likelihood of endangered species occurring on the sites is therefore low.



**Figure 8.3:** Sensitivity map of Dam 1 site. Sensitivity: Medium (Bateleur, 2017).



**Figure 8.4:** Sensitivity map of Dam 2 site. Sensitivity: Low-Medium (Bateleur, 2017).



#### 8.4.2 Potential impacts

The potential impacts of the proposed dams on the vegetation are anticipated to be medium due to the location of Dam 1 within a CBA, even though the proposed dam sites consist of mostly degraded natural vegetation with significant infestation of alien vegetation.

The construction phase will allow for the removal of a large amount of alien vegetation, however, it will also cause destruction of whatever natural vegetation remains in the dam basins.

Fauna are likely to be disturbed by construction-related activities, particularly noise, vibrations, human presence and of course the removal of sections of habitat. However, no negative long-term impacts on terrestrial fauna and birds are expected.

The presence of a year-round supply of surface water at the site (in the form of the dams) is likely to draw water-dependent fauna such as birds and provide foraging habitat for them, and in this way the dams may serve as a refuge for water-loving species, especially if fringes of indigenous habitat are left intact around the dams (or re-established) and managed properly to remove alien invasive species, etc.

The impacts associated with the construction and operation of the two proposed dams were found by the ecological specialist investigation to be acceptable in terms of the risk assessment conducted and it was concluded that, providing the recommended mitigation measures set out in this document are followed carefully and executed to the very end, the proposed development could be supported from an ecological perspective.

**Table 8.5:** Potential impacts in terms of **vegetation**

<b>CONSTRUCTION PHASE</b>							
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance without mitigation</b>	<b>Significance with mitigation</b>
Veld fire risk associated with "hot" construction activities and workers smoking etc	Negative	Local	Short term	Very low	Possible	Low	Very low
Possible further spreading of alien plant species due to disturbance of natural vegetation	Negative	Local	Long term	Low	Highly probable	Medium	Low
<b>OPERATIONAL PHASE</b>							
Habitat destruction in the areas to be inundated by dams or cleared for embankments	Negative	Local	Long term	Medium	Definite	Medium	Medium
Possible further spreading of alien plant species due to disturbance of natural vegetation	Negative	Local	Long term	Low	Possible	Medium	Medium



Possible reduction in infestation by alien invasive plants due to improved management thereof	Positive	Local	Long term	Low	Highly probable	Very low	Low
Changing the in-stream flow regime downstream of the dam, creating a steadier, more predictable flow, with concomitant impacts on ecology which may be positive, negative or neutral	Negative / Positive	Local	Long term	Low	Highly probable	Low-Medium	Low-Medium

**Table 8.6:** Potential impacts in terms of fauna

<b>CONSTRUCTION PHASE</b>							
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance without mitigation</b>	<b>Significance with mitigation</b>
Disruption of the activities of fauna on and around the site due to construction activities, and possible trapping / hunting / killing fauna by labourers	Negative	Local	Short term	Very low	Highly probable	Low	Very low
<b>OPERATIONAL PHASE</b>							
Creation of habitat for water-dependent fauna, e.g. certain fish, amphibians and bird species	Positive	Local	Long term	Low	Highly probable	Low-Medium	Low-Medium
Change in faunal species composition onsite through change in habitat types	Neutral	Local	Long term	Low	Possible	Low	Low
Changing the in-stream flow regime downstream of the dam, with concomitant impacts on ecology which may be positive, negative or neutral	Negative	Local	Long term	Medium	Highly probable	Low-Medium	Low-Medium

## 9 SOCIO-ECONOMIC INVESTIGATIONS

The only specialist investigation conducted in terms of socio-economic aspects, consisted of a specialist heritage investigation conducted by Shasa Heritage Consultants. Other socio-economic parameters were investigated at a desktop level.

### 9.1 Heritage Assessment

A Phase 1 Heritage Impact Assessment (HIA) was undertaken by Shasa Heritage Consultants in August 2017 to determine the presence or absence of heritage resources and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features. Such resources include archaeological and historical sites and features, graves and places of religious and cultural significance.

The source of information was primarily the field reconnaissance and referenced literary sources. A pedestrian survey was undertaken, during which standard methods of observation were applied.

#### 9.1.1 Status quo

No areas designated for socio-religious activities were recorded onsite, and no remains from the historical period, Iron Age or Stone Age were recorded. There are no buildings older than 60 years in the area to be affected. No formal or informal graves were identified. In terms of palaeontological sensitivity, the area lies within the grey zone on the SAHRIS map, meaning that no further investigation is needed.

According to the most recent archaeological cultural distribution sequences by Huffman (2007), this area falls within the distribution area of various cultural groupings originating out of both the Urewe Tradition (eastern stream of migration) and the Kalundu Tradition (western stream of migration). The facies that may be present (but were not recorded onsite) are:

Urewe Tradition:	Kwale branch	– Silver Leaves facies	AD 280-450 (Early Iron Age)
		– Mzonjani facies	AD 450-750 (Early Iron Age)
	Moloko branch	– Icon facies	AD 1300-1500 (Late Iron Age)
Kalundu Tradition:	Happy Rest sub-branch	– Doornkop facies	AD 750-1000 (Early Iron Age)
		– Letaba facies	AD 1600-1840 (Late Iron Age)

None of the above Iron Age materials were recorded onsite.

Stone Age artifacts and materials dating to the Early, Middle and Late Stone Age are often recorded during survey near rivers and drainage lines in the Limpopo Province. However, no remains were recorded in the survey.

#### 9.1.2 Potential impacts

As no sites or objects of heritage-related significance were found onsite, no heritage-related impacts are anticipated to be associated with the project.

Should any previously undetected subterranean heritage remains however be found on site during the remainder of the construction phase, this must be reported to the Limpopo Heritage Resources Agency (LIHRA) or South African Heritage Resources Agency (SAHRA) and work onsite halted until given the go-ahead by LIHRA and/or SAHRA.

**Table 9.1:** Potential heritage impacts

<b>CONSTRUCTION PHASE</b>						
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance</b>
None expected	-	-	-	-	-	-
<b>OPERATIONAL PHASE</b>						
None expected	-	-	-	-	-	-

## 9.2. Social Aspects

### 9.2.1. *Status quo: Greater Tzaneen Local Municipality* (Information adapted from GTM IDP 2017/2018)

#### Location

The GTM forms part of the Mopani District in the Limpopo Province. The municipal area, which covers roughly 3 240 km<sup>2</sup>, extends from Haenertsburg in the west to Rubbervale in the east (a distance of 85 km), and from just south of Modjadjiskloof in the north to Trichardtsdal in the south (47 km).

The GTM comprises the proclaimed towns of Tzaneen, Nkowankowa, Lenyenye, Letsitele and Haenertsburg, together with 125 rural villages. The municipal area is divided into 34 wards; this site is located within Ward 21.

#### Population

According to the South African Statistics Census 2011, the GTM has increased its population from 375 588 to 390 092 (an increase of 14 504) with females outnumbering males as they comprise 53% of the population. Young people between the ages of 14 –35 constitute 40% (156 900) of the total population of the municipality.

#### Income, employment and education

The latest labour force survey by Statistics South Africa (first quarter 2012) indicates that unemployment in Limpopo has deteriorated from 19.3% in March 2011 to 21.9% in March 2012. During this period the number of discouraged work seekers increased from 415,000 (March 2011) to 424,000 in March 2012. This is the strict definition of unemployment, which excludes discouraged work seekers. The unemployment rate will be worse if discouraged work seekers are included.

Unfortunately, these official statistics are not available at the district or the municipal level. The only estimates at the municipal level that are available until the 2011 census results are published, are from commercial statistical service providers, such as Quantec and Global Insight. Quantec estimated the unemployment rate in GTM at 37.1% for 2010. They have not yet made an estimate for 2011.

#### Economic activities and opportunities

The finance, insurance, real estate & business services is the main employer within the GTM, providing 27% of the available jobs within the GTM's area of jurisdiction. General governmental services supply 19% of jobs, followed by trade, catering and accommodation (15%), and transport, storage and communication (12%). Other economic sectors provide a minority of job opportunities.

The sector supplying the greatest proportion of the GTM's Gross Domestic Product (GDP) is Community Services (37%), followed by Finance (24%) and Trade (10%).

The GTM is the main contributor to the Mopani District's agricultural GDP (Gross Domestic Product), supplying 43% of the district's agricultural GDP.

#### Infrastructure and services

**Water:** The GTM has applied to the Department of Water and Sanitation (DWS) for an increased allocation to abstract raw water for purification and supply to residents. However, due to the pressure on the Ebenezer and Tzaneen Dams, DWS has not yet been able to grant such an increase, and hence water supply is a concern over the long term. Water supply challenges are being experienced in the entire municipality especially where boreholes are dysfunctional due to lack of regular maintenance, theft of electrical cables while others being that they never operated from the time of construction. Some water schemes initially designed to cater certain number of households are unable to supply due to increase in demand while those schemes were not upgraded. Certain infrastructural projects are in the pipeline, such as raising the Tzaneen Dam wall (currently underway) and establishing a new dam near Nwamitwa (currently unknown when construction will start).

The GTM's drinking water quality is very good, and the GTM was awarded Blue Drop status by DWS in 2009 for the high quality of drinking water. Many of the rural areas are supplied by boreholes that are managed by the Mopani District Municipality (MDM).

**Sanitation:** Much of the municipal area, specifically in the extensive rural areas, relies on Ventilated Improved Pit (VIP) toilets. It is the MDM's responsibility to install these. Haenertsburg relies on individual septic tanks and French drains, whilst Tzaneen, Nkowankowa and Lenyenye have waterborne sewerage. Farms generally make use of septic tanks and French drains. Several villages have been, or are in the process of being, reticulated with waterborne sewerage.

**Electricity:** Electricity over most of the municipal area is provided by the GTM, but Nkowankowa, Lenyenye and the southernmost areas of the municipal area are supplied directly by Eskom. The GTM also supplies electricity to certain areas which do not fall within its area of jurisdiction, including Eiland and Gravelotte. Major investments have been made into electricity supply infrastructure in Tzaneen over the past approximately 2 years, which has improved the reliability and future capacity of electricity supply. The electrification backlog is estimated at 17.8%. A total number of 4,775 out of 108,926 households in the municipality receive Free Basic Electricity.

**Housing:** There is a backlog of more than 12 590 RDP houses and 1 563 middle income beneficiaries, but challenges are experienced in terms of the availability of land for the provision of these houses.

**Health care:** There are 29 clinics, 4 health centres and 165 visiting points within the municipal area, but only 16 of the visiting points have functioning structures, with the rest of the visiting points being community centres, day-care centres, farms or even just designated trees.

**Waste management:** Kerbside refuse removal is provided in Tzaneen, Lenyenye, Nkowankowa, Haenertsburg and Letsitele and disposal is done at the landfill site at Tzaneen; however, this constitutes only 11% of the households within the municipal area. Very little at-source recycling is done, but basic composting of garden waste is done adjacent to the landfill site.



### 9.2.2. Potential impacts

Construction is anticipated to extend over a period of a couple of months, and work will be done almost entirely by machinery. A contractor will be brought in to construct the dam using his/her machinery and staff, and no casual labourers are anticipated to be hired.

The following **short-term** socio-economic impacts may be expected during the construction phase of the proposed project:

- Support of local job opportunities through support of local businesses in the procurement of materials, equipment and services to be used in the construction phase;
- The possibility exists that the presence of construction activities may lead to an increase in criminal activity, trespassing and/or rowdiness;
- Construction-related noise resulting mostly from construction machinery (particularly during earthworks), offloading of materials, and the rumble of heavy construction vehicles / plant on the road.

**Long-term** socio-economic impacts during the operational phase may relate to the following:

- Greater job security at the farm, as the dam will lead to reduced vulnerability of agricultural production to drought conditions, and therefore less risk of retrenchments during times of below-average rainfall.
- Contribution to local economic development – the dams will give greater security for commercial agriculture on the property, which in turn is anticipated to contribute more to the secondary agriculture-based industries in the area, such as transport and packaging firms. Staff employed at the farm are also anticipated to spend most of their disposable income locally, which in turn will also stimulate the local economy.

**Table 9.2:** Potential social impacts

<b>CONSTRUCTION PHASE</b>							
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance without mitigation</b>	<b>Significance with mitigation</b>
Supporting local businesses through local procurement of materials, equipment & services	Positive	Local	Short term	Low	Highly probable	Very low	Low
Direct and indirect job creation	Positive	Local	Short term	Low	Highly probable	Very low	Low
<b>OPERATIONAL PHASE</b>							
Contribution to job creation and job security by buffering the farm against drought	Positive	Local	Long term	Low	Highly probable	Very low	Low
Contribution to local economy	Positive	Local	Long term	Low	Highly probable	Very low	Low

### 9.3. Visual Aspects

#### 9.3.1. Status quo

Dam 1: The site consists of degraded natural vegetation surrounded by citrus orchards and bordered by an irrigation canal. The site has a very low public visibility, being located in a private farm and being approximately 470m away from the boundary of the neighbouring farm.

Dam 2: The site consists of an existing small dam and degraded natural vegetation, surrounded by citrus orchards and bordered by an irrigation canal. The site has a very low public visibility, being located in a private farm and being approximately 605m away from the boundary of the neighbouring farm.

#### 9.3.2. Potential impacts

Construction-phase visual impacts can be expected in the form of site clearing, earthworks and construction activities themselves. In light of the short duration of the construction period and the limited visibility of the dam sites to the public or neighbours, construction activities are expected to have very low significance in terms of visual impacts.

Operational-phase impacts are anticipated to be **positive** – dams are usually regarded as aesthetically pleasing. The impacts are anticipated to have very low significance, though, as the sites are largely hidden from the public's or neighbours' view.

**Table 9.3:** Potential visual impacts

<b>CONSTRUCTION PHASE</b>							
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance without mitigation</b>	<b>Significance with mitigation</b>
Construction activities and site clearing	Negative	Local	Short term	Medium	Definite	Low	Very low
<b>OPERATIONAL PHASE</b>							
Visual impact of the new dams	Positive	Local	Long term	Medium	Definite	Very low	Very low

### 9.4. Noise

#### 9.4.1. Status quo

The site is situated in an area where ambient noise levels are low, with sounds mostly associated with the voices of workers on surrounding farms. There are no sensitive noise receptors (e.g. schools or dwellings) in close proximity to the proposed dam sites; the dam sites are surrounded by agricultural areas.

#### 9.4.2. Potential impacts

Construction-phase impacts are anticipated to be mainly associated with construction activities themselves, including earthworks, off-loading of material from trucks, etc., as well as with construction vehicles moving to

and from the site, and vehicles transporting construction workers. These impacts will be short-term in duration, occurring only whilst construction is underway, and will be very low in magnitude. The significance of the impacts will be further reduced by the absence of sensitive local noise receptors.

Given the short-term nature of construction phase noise impacts and the distance of the site from dwellings or other noise-sensitive receptors, noise impacts potentially associated with construction of the dam are anticipated to be of very low significance.

By its very nature, the dam will not generate any noise once completed. No operational-phase noise impacts are expected.

**Table 9.4:** Potential impacts in terms of noise

<b>CONSTRUCTION PHASE</b>							
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance without mitigation</b>	<b>Significance with mitigation</b>
Noise associated with construction activities and heavy vehicles during construction	Negative	Local	Short term	Very low	Highly probable	Low	Very low
<b>OPERATIONAL PHASE</b>							
No operational-phase noise impacts are expected.							

## 9.5. Indirect and cumulative impacts

The nature of the project is such that it is anticipated to result in various indirect impacts associated with the agriculture which it is proposed to support. The dams will contribute to facilitating large-scale commercial agriculture on the site, hence the impacts associated with such agriculture can be indirectly linked to the proposed dams.

Furthermore, as is the case for any activity, impacts are not limited to those directly or even indirectly associated with the proposed activity – potential cumulative impacts need to be considered as well, so that activities can be seen not as stand-alone entities but as part of the larger picture.

The following tables highlight potential indirect and cumulative impacts of the proposed dams:

**Table 9.5:** Potential indirect and cumulative impacts – BIOPHYSICAL ASPECTS

<b>CONSTRUCTION PHASE</b>						
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance</b>
Habitat loss and fragmentation	Negative	Local	Long term	Medium	Definite	Medium
<b>OPERATIONAL PHASE</b>						
Disruption of the stream's free flow, including disruption of movement of aquatic fauna	Negative	Local	Long term	Medium	Definite	Low
Increased water abstraction, with reduced water availability down-canal	Negative	Local	Long term	Low	Highly probable	Low-medium

Risk of contamination of water resources by agricultural chemicals in the associated farming operation	Negative	Local	Long term	Unknown	Possible	Medium
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**Table 9.6:** Potential indirect and cumulative impacts – SOCIO-ECONOMIC ASPECTS

<b>CONSTRUCTION PHASE</b>						
<b>Potential impact</b>	<b>Status</b>	<b>Extent</b>	<b>Duration</b>	<b>Magnitude</b>	<b>Likelihood</b>	<b>Significance</b>
Job creation	Positive	Local	Short term	Low	Definite	Very low
Visual impacts	Negative	Local	Long term	Low	Definite	Low
Noise	Negative	Local	Short term	Very low	Highly probable	Very low
<b>OPERATIONAL PHASE</b>						
Job creation and supporting of associated agricultural jobs	Positive	Local- sub regional	Long term	Low-medium	Definite	Low-medium
Contribution to local economy	Positive	Local	Long term	Low-medium	Definite	Low-medium

## 10. PUBLIC PARTICIPATION PROCESS

### 10.1. Advertisement of initial public comment period

The initial public comment period / I&AP registration period was advertised for a period of 30 days (18 August to 18 September 2017)) in the following ways (please refer to Appendix E for copies of newspaper advertisements, photographs of site notices and the list of stakeholders who were directly notified):

- Publication of a notice (English and SePedi) in the local newspaper, the Letaba Herald, on 18 August 2017;
- Display of site notices (each containing both the English and the SePedi adverts) at and near the site;
- Direct notification of identified Interested and/or Affected Parties (I&APs) via fax, e-mail and/or post.

### 10.2. Public Meetings

A public meeting was held on 21 November 2017, where information about the proposed project was to be presented and I&APs were to have the opportunity to discuss queries or concerns with members of the project team. However, there were no attendees aside from the project team representatives.

A second public meeting has been arranged for 12 March 2018, to be held onsite, to provide another opportunity for I&APs to be briefed on the proposed project and to discuss any queries with members of the project team.

### 10.3. Availability of consultative ESR for public review and comment

The consultative ESR was available for public review and comment for a period of 30 days, from 13 November to 13 December 2017. Copies of the report were available onsite and at Polygon's offices at 21C Peace Street, Tzaneen, during this period. Electronic copies on CD were also available from Polygon upon request and



copies (whether in hard copy or on CD) were submitted directly to certain stakeholders for their comment (notably DWS, SAHRA and Greater Tzaneen Municipality).

#### **10.4. Issues raised**

Some neighbours raised concerns that the volume of water reaching their properties may be affected by the proposed dams. However, the applicant will still only abstract their allocated volume, and do not intend increasing abstraction. Following this explanation to the relevant neighbours, there were no further concerns raised.

#### **10.5. Availability of consultative EIAR for public review and comment**

This consultative EIAR is currently available for public review and comment, from 2 March to 1 April 2018. Copies of the report are available at the site (security office at main entrance gate) and at Polygon's offices at 21C Peace Street, Tzaneen, during this period. Electronic copies on CD are also available from Polygon upon request and copies have been submitted directly to DWS, SAHRA and GTM for their comment.

The availability of the consultative EIAR for public comment was advertised as follows:

- Publication of a notice (English and SePedi) in the local newspaper, the Letaba Herald, on 2 March 2018;
- Display of site notices (each containing both the English and the SePedi adverts) at and near the site;
- Direct notification of identified Interested and/or Affected Parties (I&APs) via fax, e-mail and/or post.

### **10. ENVIRONMENTAL IMPACT STATEMENT**

The following table summarises the impacts anticipated to be associated with the proposed project. Please refer to the attached EMPR, which contains recommended measures for the prevention, mitigation or management of these potential impacts.

**Table 10.1:** Summary of potential impacts

POTENTIAL IMPACT	STATUS	EXTENT	DURATION	MAGNITUDE	LIKELIHOOD	SIGNIFICANCE WITHOUT MITIGATION	SIGNIFICANCE WITH MITIGATION	MITIGATION OF RESIDUAL IMPACTS
<b>Bio-physical aspects</b>								
Rain during the construction phase can cause soil erosion, particularly on exposed, unstable slopes, which in turn may lead to siltation of the stream	Negative	Local	Short term	Medium	Highly probable	Medium	Low	<ul style="list-style-type: none"> <li>- Mitigation and monitoring required</li> <li>- No further studies required</li> </ul>
Alteration of topography within dam basins	Negative	Local	Long term	Low-Medium	Highly probable	Very low	Very low	<ul style="list-style-type: none"> <li>- No mitigation or monitoring required</li> <li>- No further studies required</li> </ul>
Contribution to unlocking the agricultural potential of the property by providing irrigation security	Positive	Local	Long term	Medium	Highly probable	Medium	Medium	<ul style="list-style-type: none"> <li>- No mitigation or monitoring required</li> <li>- No further studies required</li> </ul>
Increased water abstraction, though still within existing allocation	Negative	Local	Long term	Low	Highly probable	Low-medium	Low	<ul style="list-style-type: none"> <li>- Monitoring required</li> <li>- No further studies required</li> </ul>
Loss and disturbance of watercourse habitat and fringe vegetation	Negative	Local	Long term	Low	Highly probable	Low	Low	<ul style="list-style-type: none"> <li>- Mitigation and monitoring required</li> <li>- No further studies required</li> </ul>
Intercepting sediment load and preventing its transport downstream	Negative	Local	Long term	Low	Highly probable	Medium	Low	<ul style="list-style-type: none"> <li>- Mitigation and monitoring required</li> <li>- No further studies required</li> </ul>
Creation of habitat for water-loving birds and other fauna.	Positive	Local	Long term	Low-medium	Highly probable	Low	Medium	<ul style="list-style-type: none"> <li>- Mitigation and monitoring required</li> <li>- No further studies required</li> </ul>
Changes in water quality due to pollution	Negative	Local	Short term	Unknown	Possible	Medium	Low	<ul style="list-style-type: none"> <li>- Monitoring required</li> </ul>

								- No further studies required
Change in quantity and fluctuation properties of watercourse	Negative	Local	Long term	Low	Highly probable	Medium	Low	- Mitigation and monitoring required - No further studies required
Veld fire risk associated with "hot" construction activities and workers smoking etc	Negative	Local	Short term	Very low	Possible	Low	Very low	- Management and monitoring required during construction - No further studies required
Habitat destruction in the areas to be inundated by dams or cleared for embankments	Negative	Local	Long term	Medium	Definite	Medium	Medium	- Mitigation required - No further studies required
Possible further spreading of alien plant species or bush encroachment by indigenous trees due to disturbance of natural vegetation	Negative	Local	Long term	Low	Possible	Low	Very low	- Mitigation and monitoring required - No further studies required
Possible reduction in infestation by alien invasive plants due to improved management thereof	Positive	Local	Long term	Low	Highly probable	Very low	Low	- No mitigation or monitoring required - No further studies required
Disruption of the activities of fauna on and around the site due to construction activities, and possible trapping / hunting / killing fauna by labourers	Negative	Local	Short term	Very low	Highly probable	Low	Very low	- Mitigation and monitoring required - No further studies required
Creation of habitat for water-dependent fauna, e.g. certain fish, amphibians and bird species	Positive	Local	Long term	Low	Highly probable	Low-Medium	Low-Medium	- Mitigation and monitoring required - No further studies required
Change in faunal species composition onsite through change in habitat types	Neutral	Local	Long term	Low	Possible	Low	Low	- Mitigation and monitoring required - No further studies required
<b>Socio-economic aspects</b>								

Supporting local businesses through local procurement of materials, equipment & services	Positive	Local	Short term	Low	Highly probable	Very low	Low	- No mitigation or monitoring required - No further studies required
Direct and indirect job creation	Positive	Local	Short term	Low	Highly probable	Very low	Low	- No mitigation or monitoring required - No further studies required
Contribution to job creation and job security by buffering the farm against drought	Positive	Local	Long term	Low	Highly probable	Very low	Low	- No mitigation or monitoring required - No further studies required
Contribution to local economy	Positive	Local	Long term	Low	Highly probable	Very low	Low	- No mitigation or monitoring required - No further studies required
Construction activities and site clearing	Negative	Local	Short term	Medium	Definite	Low	Very low	- Monitoring required - No further studies required
Visual impact of the new dams	Positive	Local	Long term	Medium	Definite	Very low	Very low	- No mitigation or monitoring required - No further studies required
Noise associated with construction activities and heavy vehicles during construction	Negative	Local	Short term	Very low	Highly probable	Low	Very low	- Monitoring required - No further studies required
Possible heritage impacts if sites or objects of heritage-related significance are found	Negative	Local	Long term to permanent	Unknown	Unlikely	Very low	Very low	- Monitoring required - No further studies required



## 11. CONCLUDING STATEMENT

### 11.1. Concluding statement

The environmental investigations undertaken as part of the EIA have identified no fatal flaw issues associated with the proposed project. The proposed development can potentially be supported on the proposed development site, on condition that the relevant authorisations are obtained and the necessary impact mitigation and management measures are implemented and monitored. Section 11.2 below also recommends certain conditions which we feel should be incorporated into the EA, if approved.

**Figure 11.1:** Preferred dam locations on the property



From an environmental perspective, it is felt that the preferred positions do not pose significantly greater impacts than alternative positions on the property would, and that the proposed positions, as indicated on the aerial photo, can therefore be supported, on condition that impact prevention and mitigation measures as stipulated in the EMPR are implemented.

Earthfill dams are the only feasible technological option, due to the lack of suitable founding conditions for other types of dams, but this type of dam can be supported from an environmental perspective.

Concerns raised by Interested and/or Affected Parties during the public participation process thus far have been addressed and no further concerns have been received.

**It is therefore felt that Environmental Authorisation may be issued** to the applicant, African Reality (Pty) Ltd, for the proposed project. The following section indicates **conditions** which are recommended for inclusion in such an authorisation, if issued.

## 11.2. Proposed conditions of authorisation

It is recommended that the following be included in any authorisation that may be granted by LDEDET in respect of the application:

- a) Appointment of an independent Environmental Control Officer (ECO) to monitor implementation of the EMPR during the construction phase;
- b) Submittal of an environmental compliance monitoring report to LDEDET by the ECO every six months;
- c) When employing workers during the construction phase, local labourers (within GTM's boundaries or within 50km of the site) must be given preference as far as availability of appropriate skills permit;
- d) Local suppliers (within GTM's boundaries or within 50km of the site) must be given preference in the sourcing of services and materials as far as availability and quality permits;
- e) A Water Use Licence (WUL) must be obtained from the Department of Water and Sanitation (DWS) for water uses to be triggered by the proposed dams;
- f) The existing water abstraction allocation may not be exceeded. If more water is required than the allocation permits, additional allocation must be applied for from the irrigation board, or a WUL obtained from DWS;
- g) Should protected plants need to be removed, de-limbed or relocated, the required permits must first be obtained from the relevant authorities prior to such disturbance;
- h) The impact mitigation measures in the EMPR as well as the conditions of the EA and WUL must be adhered to;
- i) Should any changes to the project as described in this report be envisaged, these must be communicated to LDEDET, and if necessary an application must be lodged for amendment of the EA.

## 12. REFERENCES

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