# PROPOSED CONSTRUCTION OF 13 DAMS AND ASSOCIATED ORCHARDS TO ACCOMMODATE THE DEVELOPMENT OF DECIDUOUS FRUIT PRODUCTION ON SEVERAL FARMS PART OF THE GUBENXA VALLEY TRUST IN THE GUBENXA VALLEY AREA OF SAKHISIZWE LOCAL MUNICIPALITY IN THE CHRIS HANI DISTRICT OF EASTERN CAPE.

## DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

**DEDEAT REF: EC/138/CH/LN2/M/2117;18;19;20;21;22;23;24;25;26;27;28&29**

**February 2022**

**Prepared For:** **THE EASTERN CAPE DEPARTMENT OF RURAL DEVELOPMENT AND AGRARIAN REFORM**

**On Behalf of: P. MACINGWANE; N. TASANA; QWATHI-TOLO FARM PROP HOLDINGS PTY LTD (L. DELANO); L. KETWA; M. MGEDEZI; BLUE WAVES PROP TRUST (M PAYI); GUBENXA COMMUNITY TRUST (M. MBANGA); WADELANDS FARMING CC (M NDZENDE); BLUEWHISPER 11 CC (NTSEKE); M. MAGODA; V. QANGULE**

***Prepared in support of an application for Environmental Authorisation in terms of Section 24(5) of the National Environmental Management Act 107 of 1998, as amended***

**Report No: J2020-03-DEIR**

Indwe Environmental Consulting

Indwe Environmental Consulting CC • 2 Ayr Place • Bonnie Doon • East London • 5241
Tel: 043 555 0656 • Fax: 086 513 9734 • Email: info@indwecon.co.za
Company Registration No.: 2006/074394/23

# PROPOSED CONSTRUCTION OF 13 DAMS AND ASSOCIATED ORCHARDS TO ACCOMMODATE THE DEVELOPMENT OF DECIDUOUS FRUIT PRODUCTION ON SEVERAL FARMS PART OF THE GUBENXA VALLEY TRUST IN THE GUBENXA VALLEY AREA OF SAKHISIZWE LOCAL MUNICIPALITY IN THE CHRIS HANI DISTRICT OF EASTERN CAPE.

## DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

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| | |
|---|---|
| **BLMC** | Biodiversity Land Management Class |
| **CBA** | Critical Biodiversity Area |
| **DAFF** | Department of Agriculture, Forestry and Fisheries |
| **EAP** | Environmental Assessment Practitioner |
| **ECBCP** | Eastern Cape Biodiversity Conservation Plan |
| **EIA** | Environmental Impact Assessment |
| **EIAR** | Environmental Impact Assessment Report |
| **EMP** | Environmental Management Programme |
| **DEDEAT** | Department of Economic Development, Environmental Affairs and Tourism |
| **IDP** | Integrated Development Plan |
| **NEMA** | National Environmental Management Act |
| **NHA** | National Heritage Resources Act |
| **NWA** | National Water Act |
| **SAHRA** | South African Heritage Resources Agency |
| **SDF** | Spatial Development Framework |
| **SED** | Safety Evaulation Discharge |
| **SEF** | Safety Evaluation Flood |
| **SIP** | Strategic Infrastructure Plan |
| **RDF** | Recommended Design Flood |
| **RDD** | Recommended Design Discharge |
| **PF** | Probable Flood |
| **RF** | Regional Flood |
| **MAR** | Mean Annual Rainfall |
| **FSL** | Full Supply Level |

# 1 INTRODUCTION

## 1.1 Project Background

The Department of Rural Development and Agrarian Reform are in the process of assisting the beneficiaries which currently consists of thirteen (13) individual owners to develop and irrigate a deciduous fruit operation within the Gubenxa Valley which is part of the Sakhisizwe Local Municipality within the Chris Hani District Municipality. These properties need to be completely developed individually in order to successfully obtain an operating deciduous set-up. Such development will include the following:

- Building of thirteen (13) water storage dams for irrigation which will be situated on thirteen (13) different farms
    - These dams are of different sizes and capacities
    - Pumps and piping of the water occur to localised balancing/ lei dams. These dams will function as holding dams for the irrigation of orchards.
- In field irrigation development on both existing and new plantation lands.
- Development of approximately 20 orchards across different farms within the area.

The Applicants are as follows: P. Macingwane; N. Tasana; Qwathi-Tolo Farm Prop Holdings Pty Ltd (L. Delano); L. Ketwa; M. Mgedezi; Blue Waves Prop Trust (M Payi); Gubenxa Community Trust (M. Mbanga); Wadelands Farming CC (M Ndzende); Bluewhisper 11 CC (Ntseke); M. Magoda; V. Qangule

Climate conditions within the area reveal that the area is suited to apple production of which South Africa experiences a shortfall. To test the viability of the project, trial plots investigating the level of potential for apple production in the area were developed of which have proven successful.

To date, a preliminary soil survey has been conducted which found sufficient high potential soils available on the farms for apple production, from this survey, 20 plantations were identified for apple production of which all differ in extent in hectarage.

In the preliminary engineering report undertaken by the ECDRDAR, Engineering Services was tasked to conduct a hydrological study to determine the availability of Irrigation water for apple production. A mass balance calculation was developed to determine the potential orchard size which could be irrigated for each dam.

The calculation estimated the naturalised run-off from each site by scaling the site catchment area to overall quaternary catchment and accounting for losses due to evaporation and gross irrigation demand over a typical dry year.

The initial storage capacity of each dam was selected as a percentage of the Mean Annual Runoff (MAR), the irrigation area was selected and a mass balance (aggregated low inflows minus evaporation and irrigation demand) was repeated on a monthly time step over 3 hydrological years.

The dam storage capacity was increased until it was adequate to balance the inflow with the outflow.

Based on this approach, the report recommended the following preliminary sizes:

**Table 1: Original dam and orchard details obtained from DRDAR at the beginning of the project**

| Farm name | Dam no. | Dam capacity ($m^3$) | Dam wall volume ($m^3$) | Dam wall height (m) | Orchard Area |
|---|---|---|---|---|---|
| Macingwane | 1 | 79 039 | 12 264 | 12.4 | **20.1 Ha** |
| Tasana | 2 | 28 825 | 6 161 | 8.89 | **14.7 Ha** |
| Hope | 3 | 148 294 | 40 422 | 12 | - |
| Berg | 4 | 173 816 | 57 399 | 15.16 | **28.9 Ha** |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 420 163 | 22 760 | 11.97 | 14.6 Ha<br>47.1 Ha<br>22.9 Ha<br>**84.6 Ha** |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 447 539 | 65 226 | 13.68 | 20.1 Ha<br>38.8 Ha<br>**58.9 Ha** |
| Mgedezi | 7 | 58 159 | 21 167 | 5.69 | **38.6 Ha** |
| Paardekraal | 8 | 134 796 | 25 808 | 7.81 | **25.4 Ha** |
| Gubenxa Trust | 9 | 253 919 | 32 515 | 11.84 | 46.3 Ha<br>28.6 Ha<br>**74.9 Ha** |
| Wadelands | 10 | 114 437 | 18 397 | 10.18 | 25.9 Ha<br>45.6 Ha<br>**71.5 Ha** |
| Greenfields | 11 | 75 816 | 30 062 | 12.5 | 30.2 Ha<br>38.9 Ha<br>**69.1 Ha** |
| Magoda | 13 | 51 500 | 21 308 | 12 | **13.7 Ha** |
| Qangule | 14 | 631 124 | 88 348 | 17.08 | 13.5 Ha<br>54.6 Ha<br>60.3 Ha<br>**128.4 Ha** |

** ***Dam number 12 was removed from the list.***

The hydrological study and mass balance calculation did not account for environmental water releases (EWR's) and loss of storage due to sedimentation, nor did the sizing specifically target a level of assurance of supply. It should be noted that dams with a storage of less than 25% of MAR, are generally at high risk of losing significant storage to sedimentation.

In order to validate and update the preliminary hydrological work, an independent hydrological study was completed for the dams using the storage/draft/frequency relationship provided in WR90 to calculate storage requirement as a function of assurance of supply.

Following on from the initial Hydrological Report it became clear the confirmation of design criteria had to be attained from the ECDRDAR in order for the design to continue. The following was confirmed:

- Assurance level – 90% of supply
- Minimum of 25% MAR storage required

Following this the dam sizes and irrigation was slightly amended

**Table 2: Amended dam sizes and orchard details following the preliminary design report stage**

| Farm name | Dam no. | Dam capacity ($m^3$) | Dam wall height (m) | Surface coverage (ha) | Irrigation/ Orchard area |
|---|---|---|---|---|---|
| Macingwane | 1 | 100 000 | 12.75 | 2.10 | 14 |
| Tasana | 2 | 50 000 | 12.40 | 1.38 | 10 |
| Hope | 3 | 80 000 | 14.7 | 2 | 20 |
| Berg | 4 | 130 000 | 9 | 2.8 | 23 |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 196 000 | 13.9 | 5.35 | TBC |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 83 400 | 8.2 | 3.7 | TBC |
| Mgedezi | 7 | 175 000 | 19 | 4.14 | TBC |
| Paardekraal | 8 | 52 000 | 5.6 | 3.38 | TBC |
| Gubenxa Trust | 9 | 64 720 | 10.2 | 2.72 | TBC |
| Wadelands | 10 | 364 000 | 12.5 | 1.6 | 75 |
| Greenfields | 11 | 343 000 | 17.5 | 1.75 | 63 |
| Magoda | 13 | 46 000 | 11 | 0.3 | 13 |
| Qangule | 14 | 654 000 | 18.5 | 1.4 | 95 |

The general project area is located around 31°21'31.719"S 28°9'19.92"E within the Gubenxa Valley. The project area is about 37 kilometers from the town of Elliot and can be accessed via the R56. The farms on which the dams are proposed to occur are those of RE/149, 7/149, 152, 161, 322, 304, 200 (De Wets), 287, 270 (Benmore), 234, 1032 (Greenfields), 1092, 216. **See Figures 1-3 for the general locality of the dams within the Gubenxa Valley Area.**

Indwe Environmental Consulting have been appointed by The Eastern Cape Department of Rural Development and Agrarian Report as an independent Environmental Assessment Practitioner to undertake a Full Scoping and Environmental Impact Assessment (EIA) process in terms of the National Environmental Management Act (Act 107 of 1998), for the proposed project.

The activities, in terms of the EIA Regulations, 2014 as amended, to be undertaken include:

- G.N.R. 327 Activity 9 – The development infrastructure exceeding 1000 meters in length for the bulk transportation of water or storm water.

- G.N.R. 327 Activity 12 – The development of dams or weirs, where the dam or weir including infrastructure and water surface area, exceeds 100 square meters or infrastructure or structure with a physical footprint of 100 square meters or more where such development occurs within a watercourse.

- G.N.R. 327 Activity 13 – The development of facilities of or infrastructure for the off stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.

- G.N.R. 327 Activity 27 – The clearance of an area of 1 hectare or more, but less than 20 hectares 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.

- G.N.R. 325 Activity 15 – The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for the undertaking of a linear activity, or maintenance purposes.

- G.N.R. 325 Activity 16 – 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 5 meters or higher or where the high-water mark of the dam covers an area of 10 hectares or more.

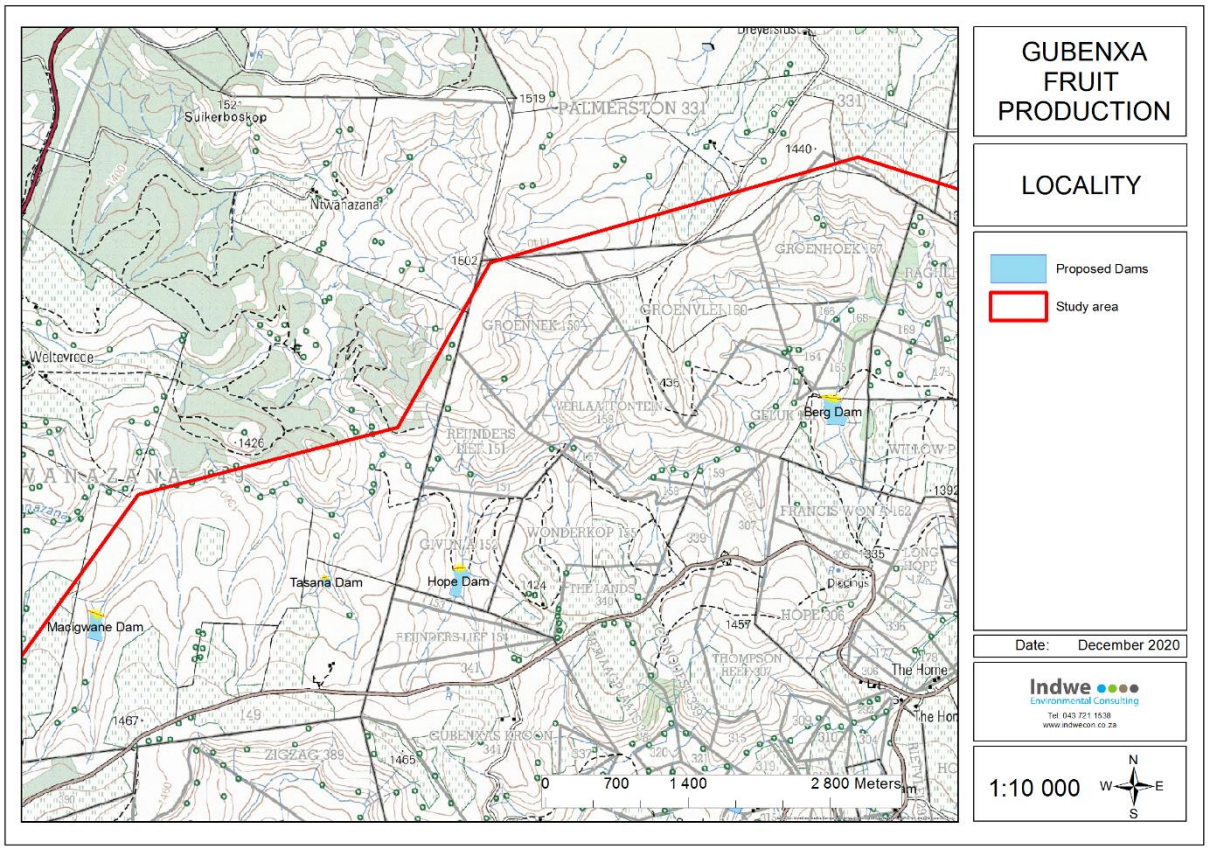



**Figure 1: Broad topographical locality plan illustrating the location of the proposed dam sites for dams 1-4.**

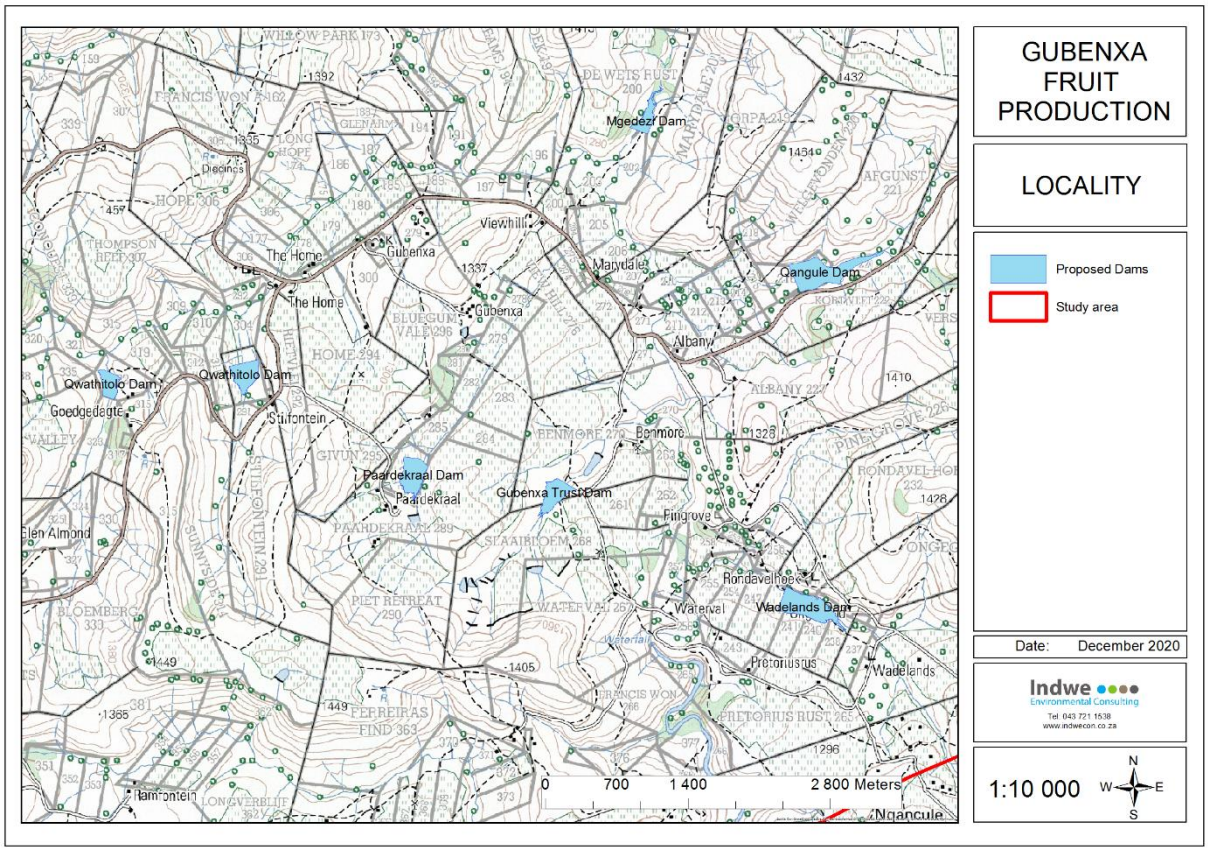



**Figure 2: Broad topographical locality plan illustrating the location of the proposed dam sites for dams 5-10 and 13.**

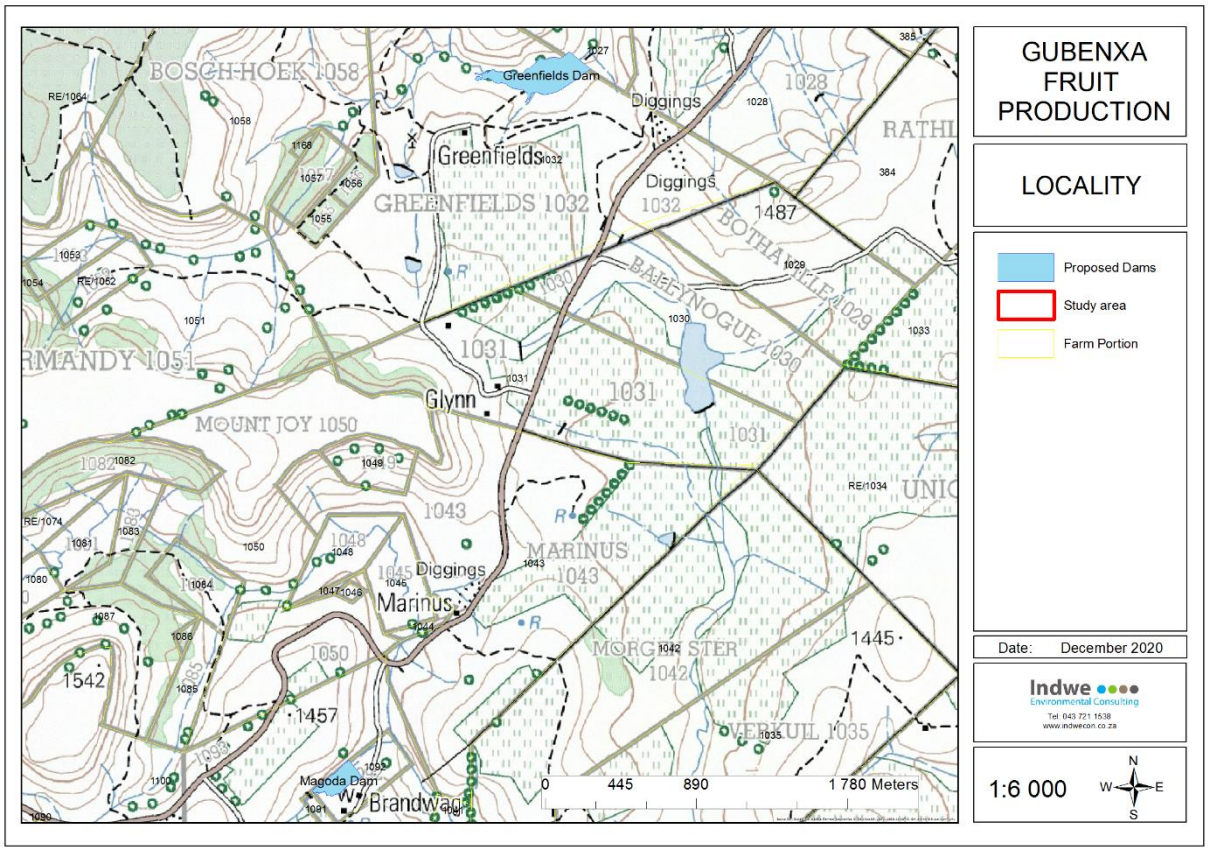



**Figure 3: Broad topographical locality plan illustrating the location of the proposed dam sites for dams 11 & 14 (dam 12 has been excluded)**

## 1.2 **Purpose of Report**

This report represents the draft EIA Report and is a component report as part of the submission requirements of the Environmental Impact Assessment (EIA) process as is detailed in Section 1.3 below.

## 1.3 **Environmental Impact Assessment (EIA) Process**

Two different processes for conducting environmental impact assessments are identified in the 2014 EIA Regulations (as amended) published under Government Notice No. R. 326, R.327, R. 325 and R. 324 promulgated in terms of Chapter 5 of the National Environmental Management Act (Act 107 of 1998) as amended.

1. **Basic Assessment** – This process is usually followed for all activities which are triggered in Government Notice (G.N.) No. R327 or R324. This process is shorter, generally requires less vigorous investigation and is for those project related activities which have been identified as having a potentially detrimental effect on the environment.

2. **Full Scoping and EIA Process –** This process is a more detailed investigative process and is typically followed for those listed activities in (G.N.) R325 which are recognised as having a more detrimental effect on the environment.

## 1.4 **Listed Activities**

NEMA Section 24(5) stipulates that "listed activities" require environmental authorisation. The following listed activities as contained in the 2014 EIA Regulations (as amended) are triggered:

**Table 3: Listed activities triggered by the project.**

| **Listing Notice No. and Activity No.** | Listed Activity | **Development Activity** |
|---|---|---|
| Listing Notice 1 – GN 327: Activity 9 | The development of infrastructure exceeding 1000 meters in length for the bulk transportation of water or storm water. | Pipelines are needed to pipe water from the main storage dam to the balancing/ lei dams and then from the balancing dam to the orchards in order to irrigate. The pipelines from the balancing dams to the orchards will all cover a distance greater than 1000 meters long. *****Details surrounding placement of pipelines still to be determined.*** |
| Listing Notice 1 – GN 327: Activity 12 | The development of dams or weirs, where the dam or weir including infrastructure and water surface area, exceeds 100 square meters or infrastructure or structure with a physical footprint of 100 square meters or more where such development occurs within a watercourse. | The 13 dams are to cover more than 100 square meters in water surface area. |
| Listing Notice 1 – GN 327: Activity 13 | The development of facilities of or infrastructure for the off stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014. | Off stream dams will have a capacity of more than 50 000 cubic meters. *****Details surrounding placement and sizes of lei dams still to be determined.*** |
| Listing Notice 1 – GN 327: Activity 27 | The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is | The establishment of orchards which some exceed the 20 hectare threshold will require |

| | | |
|---|---|---|
| | required for the undertaking of a linear activity, or maintenance purposes undertaken in accordance with a maintenance management plan. | clearing of current vegetation. Many previously cultivated lands will be used however some have not been utilised within the last 10 years. |
| Listing Notice 2 – GN 325: Activity 15 | The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for the undertaking of a linear activity, or maintenance purposes. | The establishment of orchards which some exceed the 20 hectare threshold will require clearing of current vegetation. Many previously cultivated lands will be used however some have not been utilised within the last 10 years. |
| Listing Notice 2 – GN 325: Activity 16 | 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 5 meters or higher or where the high-water mark of the dam covers an area of 10 hectares or more. | The dam walls of the dams exceed that of 5 meters. |

Given that the proposed project triggers GN R.325 Activity No 15 and 16, a **Full Scoping and EIA process** is to be followed.
Three phases in the full Scoping and EIA process are typically recognized:

- Application Phase
- Scoping Phase
- EIA Phase

### 1.4.1 Application Phase

The official Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) application forms was completed and signed by the applicants, the EAP and submitted to the Department on **20 August 2021.**

The Application Forms were accepted on 26 August 2021 with the following reference numbers:

| Farm | Dam No. | **DEDEAT Ref. No** |
|---|---|---|
| Macingwane | 1 | **EC138/CH/LN2/M/21-28** |
| Tasana | 2 | **EC138/CH/LN2/M/21-29** |
| Hope | 3 | **EC/138/CH/LN2/M/21-18** |
| Berg | 4 | **EC/138/CH/LN2/M/21-27** |

| | | |
|---|---|---|
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | **EC/138/CH/LN2/M/21-20** |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | **EC/138/CH/LN2/M/21-26** |
| Mgedezi | 7 | **EC/138/CH/LN2/M/21-24** |
| Paardekraal | 8 | **EC/138/CH/LN2/M/21-19** |
| Gubenxa Trust | 9 | **EC/138/CH/LN2/M/21-22** |
| Wadelands | 10 | **EC/138/CH/LN2/M/21-21** |
| Greenfields | 11 | **EC/138/CH/LN2/M/21-17** |
| Magoda | 13 | **EC/138/CH/LN2/M/21-23** |
| Qangule | 14 | **EC/138/CH/LN2/M/21-25** |

### 1.4.2 Scoping Phase

The Scoping Phase identified the key environmental issues associated with the project, in part through public consultation; the consideration of project alternatives; and provided the focus of assessment for the EIA Phase.

**(a) Draft Scoping Report**

On receipt of the application acceptance, the project entered the Scoping Phase which culminated in the submission of a Draft Scoping Report, which was subject to a 30 day Public Participation Process.

Prior to this, the following had already been undertaken:

- Preparation of a Background Information Document
- Notification to all organs of state, stakeholders and potential interested and affected parties
- Notification to all adjacent landowners
- Placing a newspaper advertisement in the **Barkly East Reporter** in both English and isiXhosa in **December 2020**
- Erection of a signboards in both English and isiXhosa on site in December 2020

The aim of the Scoping Report was to document the outcome of the Scoping Phase. This draft Scoping Report was subject to a 30-day comment period by Interested and Affected Parties (I&APs) and Organs of State. The public review period ran between 20 August 2021 and 20 September 2021. The draft Scoping Report was available at the **Elliot DRDAR offices in Elliot (opposite to the Police Station)** and was further made available to I&APs electronically through the Indwe Environmental Consulting website under the "public documents" tab (www.indwecon.co.za). Interested and Affected Parties were notified of the availability of the draft Scoping Report for review.

**(b) Final Scoping Report**

Once the draft Scoping Report had been reviewed by I&APs and organs of state, comments were collated, the report amended as appropriate and finalised. The final Scoping Report was submitted together with the Plan of Study for EIA to DEDEAT for their acceptance. The table below represents a breakdown of the application references, applicable case officer and date of acceptance letter relating to the Final Scoping Report.

**Table 4: Application reference numbers and dates of acceptance**

| Farm | Dam No. | DEDEAT Ref. No | Case Officer | Acceptance of FSR Letter date |
|---|---|---|---|---|
| Macingwane | 1 | **EC138/CH/LN2/M/21-28** | **Zikhona Mzalisi** | 4 November 2021 |
| Tasana | 2 | **EC138/CH/LN2/M/21-29** | **Zikhona Mzalisi** | 4 November 2021 |
| Hope | 3 | **EC/138/CH/LN2/M/21-18** | **Bhelinda Mtamo** | 2 November 2021 |
| Berg | 4 | **EC/138/CH/LN2/M/21-27** | **Sinetemba Mduzana** | 4 November 2021 |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | **EC/138/CH/LN2/M/21-20** | **Bhelinda Mtamo** | 2 November 2021 |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | **EC/138/CH/LN2/M/21-26** | **Zikhona Mzalisi** | 4 November 2021 |
| Mgedezi | 7 | **EC/138/CH/LN2/M/21-24** | **Zikhona Mzalisi** | 4 November 2021 |
| Paardekraal | 8 | **EC/138/CH/LN2/M/21-19** | **Bhelinda Mtamo** | 2 November 2021 |
| Gubenxa Trust | 9 | **EC/138/CH/LN2/M/21-22** | **Zikhona Mzalisi** | 4 November 2021 |
| Wadelands | 10 | **EC/138/CH/LN2/M/21-21** | **Bhelinda Mtamo** | 2 November 2021 |
| Greenfields | 11 | **EC/138/CH/LN2/M/21-17** | **Bhelinda Mtamo** | 2 November 2021 |
| Magoda | 13 | **EC/138/CH/LN2/M/21-23** | **Zikhona Mzalisi** | 4 November 2021 |
| Qangule | 14 | **EC/138/CH/LN2/M/21-25** | **Zikhona Mzalisi** | 4 November 2021 |

The DEDEAT formally accepted the Scoping Report with the following conditions:

- The specialist reports outlined in the plan of study must form part of the Environmental Impact Assessment Report
- The EAP/ Application must comply with the statement made in response to DEDEAT comments on DWS requirements and proof of consultation with the said department, which reads "The applications are anticipated to be made in due course once the scoping has been accepted the specialist studies completed in full.". This information must form part of the EIR and before the finalisation of the EIA process and issuing of the final decision.

The letter of acceptance was dated and received on 2 and 4 November 2021 respectively (see **Appendix A**).

### 1.4.3 EIA Phase

After acceptance of the Scoping Report, the project has proceeded into its detailed EIA Phase. This includes the undertaking of specialist studies, continued public participation and the compilation of an Environmental Impact Assessment Report.

During the EIA phase, an Environmental Impact Assessment Report (EIAR) is prepared by Indwe Environmental Consulting and submitted to DEDEAT. The EIAR provides an assessment of all the key issues and impacts identified in the Scoping Phase, as well as a description of appropriate mitigation measures. The EIAR also contains a draft Environmental Management Plan which will contain various specifications which contractors are to follow during the construction phase of the project, should the project be approved.

**(a) Draft EIA Report**

A draft EIA Report (*this report*) will be submitted to DEDEAT and placed for a 30-day comment period by Interest and Affected Parties (I&APs) and Organs of State. A copy of the draft EIA Report will be left at the **Elliot DRDAR offices in Elliot (opposite to the Police Station)** and will also made available to I&APs electronically through the Indwe Environmental Consulting website www.indwecon.co.za. Furthermore, all I&AP's will be notified of the availability of the draft EIA Report for review.

**(b) Final EIA Report**

Following the review of the draft EIA Report by I&AP's and Organs of State, all comments will be collated and responded to in the Comments and Response Section. The final EIA Report will be submitted to DEDEAT for their acceptance and authorisation.

### 1.4.4 Environmental Authorisation

Following submission of the final EIA report, DEDEAT will review and issue an Environmental Authorisation in favour or refusal of the development application. All registered Interested and Affected Parties will be notified with regards to the issue of the Environmental Authorisation and given the opportunity to lodge an appeal should they so wish.

## 2 STRUCTURE OF EIA REPORT

The content of this EIA Report has been structured in accordance with the requirements contained in Appendix 2 of the 2014 EIA Regulations Government Notice No. R. 326.

| Requirement | Section of EIA Report |
|---|---|
| (a) details of –<br>(i) the EAP who prepared the report; and<br>(ii) the expertise of the EAP to carry out scoping procedures; | Section 3.6 |
| (b) a description of the proposed activity; | Section 1.1 and 4 |
| (c) a description of the property on which the activity is to be undertaken and the location of the activity on the property; | Section 7.2 |
| (d) a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity; | Section 7.3 to 7.14 |
| (e) details of the public participation process conducted including –<br>(i) the steps undertaken in accordance with the plan of study;<br>(ii) a list of persons, organisations and organs of state that were registered as interested and affected parties;<br>(iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and<br>(iv) copies of any representations, objections and comments received from registered interested and affected parties; | Section 8 and Appendix E; F and G |
| (f) a description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity; | Section 13.1 and Section 5 & 6 |
| (g) a description of identified potential alternatives to the proposed activity | Section 5 |
| (h) an indication of the methodology used in determining the significance of potential environmental impacts; | Section 9 |
| (i) a description and comparative assessment of all alternatives identified during the environmental impact assessment process; | Section 6 |
| (j) a summary of the findings and recommendations of any specialist report or report on a specialised process; | Section 7 and Section 10 |
| (k) a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures; | Section 11 |
| (l) an assessment of each identified potentially significant impact, including – | Section 11 |

| Requirement | Section of EIA Report |
|---|---|
| (i) cumulative impacts;<br>(ii) the nature of the impact;<br>(iii) the extent and duration of the impact;<br>(iv) the probability of the impact occurring;<br>(v) the degree to which the impact can be reversed;<br>(vi) the degree to which the impact may cause irreplaceable loss of resources; and<br>(vii) the degree to which the impact can be mitigated; | |
| (m) a description of any assumptions, uncertainties and gaps in knowledge; | Section 12 |
| (n) an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of the authorisation; | Section 13 |
| (o) an environmental impact statement which contains –<br>(i) a summary of the key findings of the environmental impact assessment; and<br>(ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives; | Section 13 |
| (p) a draft environmental management programme; | Appendix B |
| (q) copies of any specialist reports and reports on specialised processes complying with Regulation 32; | Appendix D |
| (r) any specific information that may be required by the competent authority; | None requested |
| (s) any other matters required in terms of sections 24(4)(a) and (b) of the Act. | None required |

## 3 GENERAL APPLICATION DETAILS

This chapter is intended to provide details of the applicant and the competent authority as well as the Environmental Assessment Practitioner (EAP) who prepared the report and the expertise of the EAP to carry out the Scoping and EIA procedures.

### 3.1 **Project Applicant**

**Table 5: Project Applicant details for the 13 farmers involved in the project commissioned and managed by the ECDRDAR**

| Farm name | Dam no. | No. of Plantations | Applicant | E-mail |
|---|---|---|---|---|
| Macingwane | 1 | 1 | Patuxolo clearance Macingwane | pmcmacingwane@gmail.com |
| Tasana | 2 | 1 | Ncendile Tasana | ncediletasana@yahoo.com |
| Hope | 3 | 1 | Lundi Kama Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | qwathi.tolo@gmail.com |
| Berg | 4 | 0 | Loyiso Ketwa | lloidketwa@gmail.com |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 3 | Lundi Kamma Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | qwathi.tolo@gmail.com |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 2 | Lundi Kamma Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | qwathi.tolo@gmail.com |
| Mgedezi | 7 | 1 | Mbongeni Mgedezi | ayandamgedezi@gmail.com |
| Paardekraal | 8 | 1 | Makathini Payi Blue Waves Prop Trust | bongumusapayi@outlook.com |
| Gubenxa Trust | 9 | 2 | Mzonzima Wilson Mbanga Gubenxa Community Trust | ncediletasana@yahoo.com |
| Wadelands | 10 | 2 | Mantombazana Ndzende Wadelands Farming CC | mantombazana.ndzende@gmail.com |
| Greenfields | 11 | 2 | Mlindelwa Tobias Ntseke Bluewhisper 11 CC | kingzondifunerals@gmail.com |
| Magoda | 13 | 1 | Mkhuseli Magoda | mongamelicolelo@yahoo.com |
| Qangule | 14 | 3 | Victor Sabelo Qangule | qangules@gmail.com |

## 3.2 **Competent Authority**

The Competent Authority responsible for processing and making a decision on this application is the Department of Economic Development, Environmental Affairs and Tourism (Chris Hani Region).

The various applications were submitted to the DEDEAT and the below provides an overview of the reference number for each farm as well as the case officer from the Environmental Quality Management division of DEDEAT responsible.

| Farm | Dam No. | **DEDEAT Ref. No** | **Case Officer** |
|---|---|---|---|
| Macingwane | 1 | **EC138/CH/LN2/M/21-28** | **Zikhona Mzalisi** |
| Tasana | 2 | **EC138/CH/LN2/M/21-29** | **Zikhona Mzalisi** |
| Hope | 3 | **EC/138/CH/LN2/M/21-18** | **Bhelinda Mtamo** |
| Berg | 4 | **EC/138/CH/LN2/M/21-27** | **Sinetemba Mduzana** |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | **EC/138/CH/LN2/M/21-20** | **Bhelinda Mtamo** |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | **EC/138/CH/LN2/M/21-26** | **Zikhona Mzalisi** |
| Mgedezi | 7 | **EC/138/CH/LN2/M/21-24** | **Zikhona Mzalisi** |
| Paardekraal | 8 | **EC/138/CH/LN2/M/21-19** | **Bhelinda Mtamo** |
| Gubenxa Trust | 9 | **EC/138/CH/LN2/M/21-22** | **Zikhona Mzalisi** |
| Wadelands | 10 | **EC/138/CH/LN2/M/21-21** | **Bhelinda Mtamo** |
| Greenfields | 11 | **EC/138/CH/LN2/M/21-17** | **Bhelinda Mtamo** |
| Magoda | 13 | **EC/138/CH/LN2/M/21-23** | **Zikhona Mzalisi** |
| Qangule | 14 | **EC/138/CH/LN2/M/21-25** | **Zikhona Mzalisi** |

Case Officer: Zikhona Mzalisi
Telephone: 045 808 4000
E-mail: Zikhona.Mzalisi@dedea.gov.za

Case Officer: Bhelinda Mtamo
Telephone: 045 808 4000
E-mail: Bhelinda.mtamo@dedea.gov.za

Case Officer: Sinetemba Mduzana
Telephone: 045 808 4000
E-mail: Sinetemba.mduzana@dedea.gov.za

Manager: Nondwe Mdekazi-Nkqubezelo
Telephone: 045 808 4000
E-mail: Nondwe.Mdekazi@dedea.gov.za

## 3.3 **Local Municipality**

| | |
|---|---|
| Municipality: | Sakhisizwe local Municipality |
| Contact Person: | Tembeni Samual |
| Postal Address: | P.O Box 26, Cala |
| Telephone: | 0478770160 |
| Fax: | N/A |
| Email: | tsamual@sakhisizwe.gov.za |

## 3.4 **Landowner**

**Table 6: Landowner details of the DAM SITES ONLY**

| Farm name | Dam no. | Applicant | Landowner |
|---|---|---|---|
| Macingwane | 1 | Patuxolo clearance Macingwane | MACINGWANE, PETUXOLO MOYISI CLERANCE AND MACINGWANE MIRRIAM NOMINI |
| Tasana | 2 | Ncendile Tasana | TASANA, NCEDILE EDWARD AND TASANA, NOSIZWE ALICE |
| Hope | 3 | Lundi Kama Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | QWATHI-TOLO FARM PROP HOLDINGS PTY LTD |
| Berg | 4 | Loyiso Ketwa | BERG TRUST (Farrington) |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | Lundi Kamma Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | QWATHI-TOLO FARM PROP HOLDINGS PTY LTD |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | Lundi Kamma Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | QWATHI-TOLO FARM PROP HOLDINGS PTY LTD |
| Mgedezi | 7 | Mbongeni Mgedezi | MGEDEZI MBONGENI AND MGEDEZI NELISWA DOREEN |
| Paardekraal | 8 | Makathini Payi Blue Waves Prop Trust | BLUE WAVES PROP TRUST |
| Gubenxa Trust | 9 | Mzonzima Wilson Mbanga Gubenxa Community Trust | GUBENXA COMMUNITY TRUST |
| Wadelands | 10 | Mantombazana Ndzende Wadelands Farming CC | Wadelands Farming CC |
| Greenfields | 11 | Mlindelwa Tobias Ntseke | Bluewhisper 11 CC |

| | | | |
|---|---|---|---|
| | | Bluewhisper 11 CC | |
| Magoda | 13 | Mkhuseli Magoda | MAGODA MKHUSELI |
| Qangule | 14 | Victor Sabelo Qangule | TITI, CAMERON MALIHLAMBE AND TITI, NOTEMBA ROSE |

**Table 7: Landowner details of the ORCHARD/ PLANTATION SITES ONLY**

| Farm name | Dam no. | **No. of Plantations** | Applicant | Landowner |
|---|---|---|---|---|
| Macingwane | 1 | 1 | Patuxolo clearance Macingwane | MACINGWANE, PETUXOLO MOYISI CLERANCE AND MACINGWANE MIRRIAM NOMINI |
| Tasana | 2 | 1 | Ncendile Tasana | TASANA, NCEDILE EDWARD AND TASANA, NOSIZWE ALICE |
| Hope | 3 | 1 | Lundi Kama Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | QWATHI-TOLO FARM PROP HOLDINGS PTY LTD |
| Berg | 4 | 0 | Loyiso Ketwa | N/A |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 3 | Lundi Kamma Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | QWATHI-TOLO FARM PROP HOLDINGS PTY LTD |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 2 | Lundi Kamma Delano Qwathi-Tolo Farm Prop Holdings Pty Ltd | QWATHI-TOLO FARM PROP HOLDINGS PTY LTD |
| Mgedezi | 7 | 1 | Mbongeni Mgedezi | MGEDEZI MBONGENI AND MGEDEZI NELISWA DOREEN |
| Paardekraal | 8 | 1 | Makathini Payi Blue Waves Prop Trust | BLUE WAVES PROP TRUST |
| Gubenxa Trust | 9 | 2 | Mzonzima Wilson Mbanga Gubenxa Community Trust | GUBENXA COMMUNITY TRUST MBANGATA, ZOLILE MEASUREMENT ZWELINZIMA |
| Wadelands | 10 | 2 | Mantombazana Ndzende Wadelands Farming CC | Wadelands Farming CC |
| Greenfields | 11 | 2 | Mlindelwa Tobias Ntseke Bluewhisper 11 CC | BLUEWHISPER 11 CC |
| Magoda | 13 | 1 | Mkhuseli Magoda | Mkhuseli Magoda |
| Qangule | 14 | 3 | Victor Sabelo Qangule | Qangule, Victor Wallet Sabelo AN & AT POTELWA FAMILY TRUST |

## 3.5 **Indwe Environmental Consulting**

Indwe Environmental Consulting CC is a registered environmental consultancy that specialises in all facets of environmental management. Our focus is on project based environmental studies. Broadly, the services offered are Basic Assessments, full Scoping and Environmental Impact Assessments; Strategic Environmental studies (State of the Environment Reporting, Strategic Environmental Assessments, Environmental Management Frameworks) and integrated waste management planning.

The Indwe Environmental Consulting team is headed up and overseen by Brendon Steytler and Megan Hugo. Together they have a vast amount of experience in the environmental consulting industry of South Africa. Brendon Steytler was the founding member of Indwe Environmental Consulting in 2010 and has been instrumental in growing the company into the trusted and quality driven organisation that it is today.

Through strategic partnerships with other emerging consultancies we offer specialist environmental services throughout the Eastern Cape and abroad.

Further information is available on the website www.indwecon.co.za.

## 3.6 **Expertise of the EAP to carry out Environmental Evaluations**

**Megan Hugo** - Megan joined Indwe Environmental Consulting in September 2017 and was made a main member of the company in April 2018. **Megan is a Registered Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (Reg. No 2019/1530).** EAPASA is the single Registration Authority for EAPs in South Africa. Megan is also registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (Cand. Sci. Nat 118810) and an active paid up member of the International Association of Impact Assessment (IAIA) South Africa. Megan has been working as an Environmental Consultant since February 2015 and is responsible for all company related operations and financial management as well as acquiring new projects at Indwe Environmental Consulting and serving as the senior EAP for the organisation. Megan has experience in all aspects of Integrated Environmental Management (Environmental Impact Assessments, Basic Assessments, Mining Permitting, Auditing, Strategic Environmental Planning), Ecological Reporting and General Project Management. She has undertaken a range Environmental Impact Assessments for projects in both the private and public sectors as well as various non-compliance applications for commercial, agricultural, and residential projects. **Megan held the position of EAP and author of this document.**

A copy of the EAP's Curriculum Vitae, declaration (in the DEDEAT format) and professional registration is included in **Appendix H.**

## 3.7 **EAP'S Declaration**

As the lead Environmental Assessment Practitioner on this project assessment, I **Megan Joanne Hugo** can confirm the following:

1) To the best of my knowledge, all information authored by Indwe Environmental Consulting presented in this report is factually correct. We have relied on reports and information sourced from external parties. In this regard we assume that all external information is a true reflection and is factually correct.

2) I can confirm that all information of relevance received in the form of comments and inputs from stakeholders and interested and affected parties has been included; and

3) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties of relevance has been included.

For Indwe Environmental Consulting:

**MEGAN HUGO**
**REGISTERED EAP (EAPASA)- Reg. No 2019/1530**

# 4 DESCRIPTION OF PROPOSED ACTIVITY

The Department of Rural Development and Agrarian Reform are in the process of assisting the beneficiaries which currently consists of thirteen (13) individual owners to develop and irrigate a deciduous fruit operation within the Gubenxa Valley which is part of the Sakhisizwe Local Municipality within the Chris Hani District Municipality. These properties need to be completely developed individually in order to successfully obtain an operating deciduous set-up. Such development will include the following:

- Building of thirteen (13) water storage dams for irrigation which will be situated on thirteen (13) different farms
    - These dams are of different sizes and capacities
    - Pumps and piping of the water occur to localised balancing/ lei dams. These dams will function as holding dams for the irrigation of orchards.
- In field irrigation development on both existing and new plantation lands.
- Development of approximately 20 orchards across different farms within the area.

The Applicants are as follows: P. Macingwane; N. Tasana; Qwathi-Tolo Farm Prop Holdings Pty Ltd (L. Delano); L. Ketwa; M. Mgedezi; Blue Waves Prop Trust (M Payi); Gubenxa Community Trust (M. Mbanga); Wadelands Farming CC (M Ndzende); Bluewhisper 11 CC (Ntseke); M. Magoda; V. Qangule

Climate conditions within the area reveal that the area is suited to apple production of which South Africa experiences a shortfall. To test the viability of the project, trial plots investigating the level of potential for apple production in the area were developed of which have proven successful.

To date, a preliminary soil survey has been conducted which found sufficient high potential soils available on the farms for apple production, from this survey, 20 plantations were identified for apple production of which all differ in extent in hectarage.

In the preliminary engineering report undertaken by the ECDRDAR, Engineering Services was tasked to conduct a hydrological study to determine the availability of Irrigation water for apple production. A mass balance calculation was developed to determine the potential orchard size which could be irrigated for each dam.

The calculation estimated the naturalised run-off from each site by scaling the site catchment area to overall quaternary catchment and accounting for losses due to evaporation and gross irrigation demand over a typical dry year.

The initial storage capacity of each dam was selected as a percentage of the Mean Annual Runoff (MAR), the irrigation area was selected and a mass balance (aggregated low inflows minus evaporation and irrigation demand) was repeated on a monthly time step over 3 hydrological years.

The dam storage capacity was increased until it was adequate to balance the inflow with the outflow. Based on this approach, the report recommended the following preliminary sizes:

**Table 8: Original dam and orchard details obtained from DRDAR at the beginning of the project**

| Farm name | Dam no. | Dam capacity ($m^3$) | Dam wall volume ($m^3$) | Dam wall height (m) | Orchard Area |
|---|---|---|---|---|---|
| Macingwane | 1 | 79 039 | 12 264 | 12.4 | **20.1 Ha** |
| Tasana | 2 | 28 825 | 6 161 | 8.89 | **14.7 Ha** |
| Hope | 3 | 148 294 | 40 422 | 12 | - |
| Berg | 4 | 173 816 | 57 399 | 15.16 | **28.9 Ha** |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 420 163 | 22 760 | 11.97 | 14.6 Ha<br>47.1 Ha<br>22.9 Ha<br>**84.6 Ha** |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 447 539 | 65 226 | 13.68 | 20.1 Ha<br>38.8 Ha<br>**58.9 Ha** |
| Mgedezi | 7 | 58 159 | 21 167 | 5.69 | **38.6 Ha** |
| Paardekraal | 8 | 134 796 | 25 808 | 7.81 | **25.4 Ha** |
| Gubenxa Trust | 9 | 253 919 | 32 515 | 11.84 | 46.3 Ha<br>28.6 Ha<br>**74.9 Ha** |
| Wadelands | 10 | 114 437 | 18 397 | 10.18 | 25.9 Ha<br>45.6 Ha<br>**71.5 Ha** |
| Greenfields | 11 | 75 816 | 30 062 | 12.5 | 30.2 Ha<br>38.9 Ha<br>**69.1 Ha** |
| Magoda | 13 | 51 500 | 21 308 | 12 | **13.7 Ha** |
| Qangule | 14 | 631 124 | 88 348 | 17.08 | 13.5 Ha<br>54.6 Ha<br>60.3 Ha<br>**128.4 Ha** |

** ***Dam number 12 was removed from the list.***

The hydrological study and mass balance calculation did not account for environmental water releases (EWR's) and loss of storage due to sedimentation, nor did the sizing specifically target a level of assurance of supply. It should be noted that dams with a storage of less than 25% of MAR, are generally at high risk of losing significant storage to sedimentation.

In order to validate and update the preliminary hydrological work, an independent hydrological study was completed for the dams using the storage/draft/frequency relationship provided in WR90 to calculate storage requirement as a function of assurance of supply.

Following on from the initial Hydrological Report it became clear the confirmation of design criteria had to be attained from the ECDRDAR in order for the design to continue. The following was confirmed:

- Assurance level – 90% of supply
- Minimum of 25% MAR storage required

Following this the dam sizes and irrigation was slightly amended.

**Table 9: Amended dam sizes and orchard details following the preliminary design report stage**

| Farm name | Dam no. | Dam capacity ($m^3$) | Dam wall height (m) | Surface coverage (ha) | Irrigation/ Orchard area |
|---|---|---|---|---|---|
| Macingwane | 1 | 100 000 | 12.75 | 2.10 | 14 |
| Tasana | 2 | 50 000 | 12.40 | 1.38 | 10 |
| Hope | 3 | 80 000 | 14.7 | 2 | 20 |
| Berg | 4 | 130 000 | 9 | 2.8 | 23 |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 196 000 | 13.9 | 5.35 | TBC |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 83 400 | 8.2 | 3.7 | TBC |
| Mgedezi | 7 | 175 000 | 19 | 4.14 | TBC |
| Paardekraal | 8 | 52 000 | 5.6 | 3.38 | TBC |
| Gubenxa Trust | 9 | 64 720 | 10.2 | 2.72 | TBC |
| Wadelands | 10 | 364 000 | 12.5 | 1.6 | 75 |
| Greenfields | 11 | 343 000 | 17.5 | 1.75 | 63 |
| Magoda | 13 | 46 000 | 11 | 0.3 | 13 |
| Qangule | 14 | 654 000 | 18.5 | 1.4 | 95 |

The below provides an overview of each dam and its specifications:

### 4.1 **Macingwane**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam. Approximate footprint area to be cleared equates to $3625m^2$.

The maximum wall height proposed is 12.77m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category II dam with a low hazard potential rating.

The flood spillway of the dam is proposed to consist of an open side, uncontrolled spillway channel. Erosion protection measures within the spillway return channel will consist of gabion and reno mattress applications.

The proposed dam will be equipped with at least 315mm diameter uPVC outlet pipe encased in reinforced concrete. The outlet pipe is to be equipped with similar sized downstream gate valve closing mechanism. This will enable the release of water for irrigation as well as natural in-stream flow that may be required by the Department of Water and Sanitation (DWS). The outlet pipe will have an approximate length of 68m.

## 4.2 **Tasana**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam. Approximate footprint area to be cleared equates to 4455m$^2$.

The maximum wall height proposed is 12.40m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category II dam with a low hazard potential rating.

The flood spillway of the dam is proposed to consist of an open side, uncontrolled spillway channel. Erosion protection measures within the spillway return channel will consist of gabion and reno mattress applications.

The proposed dam will be equipped with at least 315mm diameter uPVC outlet pipe encased in reinforced concrete. The outlet pipe is to be equipped with similar sized downstream gate valve closing mechanism. This will enable the release of water for irrigation as well as natural in-stream flow that may be required by the Department of Water and Sanitation (DWS). The outlet pipe will have an approximate length of 66m.

## 4.3 **Hope**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam. Approximate footprint area to be cleared equates to 4945m$^2$.

The maximum wall height proposed is 14.7m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category II dam with a low hazard potential rating.

The flood spillway of the dam is proposed to consist of an open side, uncontrolled spillway channel. Erosion protection measures within the spillway return channel will consist of gabion and reno mattress applications.

The proposed dam will be equipped with at least 315mm diameter uPVC outlet pipe encased in reinforced concrete. The outlet pipe is to be equipped with similar sized downstream gate valve closing mechanism. This will enable the release of water for irrigation as well as natural in-stream flow that may be required by the Department of Water and Sanitation (DWS). The outlet pipe will have an approximate length of 78m.

## 4.4 **Berg**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam. Approximate footprint area to be cleared equates to 4290m$^2$.

The maximum wall height proposed is 9m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category I dam with a low hazard potential rating.

The flood spillway of the dam is proposed to consist of an open side, uncontrolled spillway channel. Erosion protection measures within the spillway return channel will consist of gabion and reno mattress applications.

The proposed dam will be equipped with at least 315mm diameter uPVC outlet pipe encased in reinforced concrete. The outlet pipe is to be equipped with similar sized downstream gate valve closing mechanism. This will enable the release of water for irrigation as well as natural in-stream flow that may be required by the Department of Water and Sanitation (DWS). The outlet pipe will have an approximate length of 49m.

### 4.5 **Qwatsitolo/ Qwathi-Tolo 1**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam.

The maximum wall height proposed is 13.9m which in terms of the Dam Safety Regulations (2012), is classified as a Medium Size Dam. The hazard rating is considered to be Low and therefore the combination between the size and hazard rating results in the dam being classified as a Category II dam.

A bywash spillway has been considered with the proposed upgrading to a weir-type should this be required. Energy dissipation will need to be provided at the end of the discharge channel before the water is released back into the river channel. Rip rap has been considered.

In terms of outlet works, the preliminary outlet pipe sizing (for irrigation) is chosen at 250mm diameter pipe that should be encased in a reinforced concrete encasement through the dam wall. The intake will be provided with an inlet sieve and the outlet end a T-piece fitted with two valves will be provided. This should be sufficient for an estimated peak irrigation supply of approximately 82ℓ/s. **This outlet pipe also forms the function of draining the dam in case of an emergency as well as releasing water for ecological/ environmental reserve and functioning.**

### 4.6 **Qwatsitolo/ Qwathi-Tolo 2**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam.

The maximum wall height proposed is 8.20 m which in terms of the Dam Safety Regulations (2012), is classified as a Small Size Dam. The hazard rating is considered to be Low and therefore the combination between the size and hazard rating results in the dam being classified as a Category I dam.

A bywash spillway has been considered with the proposed upgrading to a weir-type should this be required. This is to aid for increased discharge efficiency. Energy dissipation will need to be provided at the end of the discharge channel before the water is released back into the river channel. Rip rap has been considered.

In terms of outlet works, the preliminary outlet pipe sizing (for irrigation) is chosen at 250mm HDPE diameter pipe that should be encased in a reinforced concrete encasement through the dam wall. The intake will be provided with an inlet sieve and the outlet end a T-piece fitted with two valves will be provided. This should be sufficient for an estimated peak irrigation supply of approximately 38ℓ/s. **This outlet pipe also forms the function of draining the dam in case of an emergency as well as releasing water for ecological/ environmental reserve and functioning.**

## 4.7 **Mgedezi**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam.

The maximum wall height proposed is 19 m which in terms of the Dam Safety Regulations (2012), is classified as a Medium Size Dam. The hazard rating is considered to be Low and therefore the combination between the size and hazard rating results in the dam being classified as a Category II dam.

A bywash spillway has been considered with the proposed upgrading to a weir-type should this be required. This is to aid for increased discharge efficiency. Energy dissipation will need to be provided at the end of the discharge channel before the water is released back into the river channel. Rip rap has been considered.

In terms of outlet works, the preliminary outlet pipe sizing (for irrigation) is chosen at 250mm HDPE diameter pipe that should be encased in a reinforced concrete encasement through the dam wall. The intake will be provided with an inlet sieve and the outlet end a T-piece fitted with two valves will be provided. This should be sufficient for an estimated peak irrigation supply of approximately 80ℓ/s. **This outlet pipe also forms the function of draining the dam in case of an emergency as well as releasing water for ecological/ environmental reserve and functioning.**

## 4.8 **Paardekraal**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam.

The maximum wall height proposed is 5.6 m which in terms of the Dam Safety Regulations (2012), is classified as a Small Size Dam. The hazard rating is considered to be Low and therefore the combination between the size and hazard rating results in the dam being classified as a Category I dam.

A bywash spillway has been considered with the proposed upgrading to a weir-type should this be required. This is to aid for increased discharge efficiency. Energy dissipation will need to be provided at the end of the discharge channel before the water is released back into the river channel. Rip rap has been considered.

In terms of outlet works, the preliminary outlet pipe sizing (for irrigation) is chosen at 250mm HDPE diameter pipe that should be encased in a reinforced concrete encasement through the dam wall. The intake will be provided with an inlet sieve and the outlet end a T-piece fitted with two valves will be provided. This should be sufficient for an estimated peak irrigation supply of approximately 21ℓ/s. **This outlet pipe also forms the function of draining the dam in case of an emergency as well as releasing water for ecological/ environmental reserve and functioning.**

## 4.9 **Gubenxa Trust**

Refer to Appendix C for the preliminary layout design drawing.

This area is more suited to an embankment type dam and the proposed wall type is thus a zoned earthfill embankment dam.

The maximum wall height proposed is 10.2 m which in terms of the Dam Safety Regulations (2012), is classified as a Small Size Dam. The hazard rating is considered to be Low and therefore the combination between the size and hazard rating results in the dam being classified as a Category I dam.

A bywash spillway has been considered with the proposed upgrading to a weir-type should this be required. This is to aid for increased discharge efficiency. Energy dissipation will need to be provided at the end of the discharge channel before the water is released back into the river channel. Rip rap has been considered.

In terms of outlet works, the preliminary outlet pipe sizing (for irrigation) is chosen at 250mm HDPE diameter pipe that should be encased in a reinforced concrete encasement through the dam wall. The intake will be provided with an inlet sieve and the outlet end a T-piece fitted with two valves will be provided. This should be sufficient for an estimated peak irrigation supply of approximately 32ℓ/s. **This**

**outlet pipe also forms the function of draining the dam in case of an emergency as well as releasing water for ecological/ environmental reserve and functioning.**

## 4.10 **Wadelands**

Refer to Appendix C for the preliminary layout design drawing.

The dam type proposed is a homogeneous earth embankment provided that further geological investigations provide favourable results and suitable materials are sourced and used. Provision for a clay core embankment has been made as an alternative, if required. The embankment volume is proposed to be approximately 110 600$m^3$.

The availability of suitable soil material from the basin and dam wall sites will affect the final design of the dam cross sectional design, taking into account the use of impervious material and cut off trenches.

The maximum wall height proposed is 12.50m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category II dam with a low hazard potential rating.

A bywash spillway has been considered. Scour protection measures will be implemented in the form of cut off drains and gabions. Reno mattress protection to areas that will be susceptible to scouring.

In terms of inlet works, two options were considered for the dam inlet walls.

Option 1:

The inlet structure will consist of a RC concrete structure that will extend to the full height of the respective dam walls. The structure will be fitted with two inlet sluices positioned outside directional flow at levels that would allow draw down of top water and water above silt level. The chamber will also be fitted with a scour valve outlet coupled to the single outlet pipe.

It is intended for the water entering the inlet chamber to flow via the outlet pipe through a large sized strainer as to prevent any debris from entering the pump station. The draining of the inlet chamber will also be accomplished by installing a strained inlet into the outlet pipework.

Option 2:

This option will consist of a 300mm diameter steel coated pipeline encased in concrete to be installed below the footprint of the dam. The inlet end will consist of a strained inlet with a vortex breaker plate. No valves will be installed at the inlet and the inlet level will be set above the anticipated siltation level of the dam.

In both option 1 and 2 will it be essential that the environmental release be allowed to discharge via the outlet pipe. Control of the environmental flow will be via a 100mm diameter valve installed along the outlet of the pipe arrangement to discharge to the pumpstation.

In terms of outlet works allowance was made in the 300mm diameter outlet pipe to branch off to the future pump station. A scour chamber was constructed to house one of the scour valves and isolation valve to the proposed pump station. The chamber will be constructed from reinforced concrete and will be made secure with lock devices, etc.

### 4.11 **Greenfields**

Refer to Appendix C for the preliminary layout design drawing.

The dam type proposed is a homogeneous earth embankment provided that further geological investigations provide favourable results and suitable materials are sourced and used. Provision for a clay core embankment has been made as an alternative, if required. The embankment volume is proposed to be approximately 92 000$m^3$.

The availability of suitable soil material from the basin and dam wall sites will affect the final design of the dam cross sectional design, taking into account the use of impervious material and cut off trenches.

The maximum wall height proposed is 17.50m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category II dam with a low hazard potential rating.

A bywash spillway has been considered. Scour protection measures will be implemented in the form of cut off drains and gabions. Reno mattress protection to areas that will be susceptible to scouring.

In terms of inlet works, two options were considered for the dam inlet walls.

Option 1:

The inlet structure will consist of a RC concrete structure that will extend to the full height of the respective dam walls. The structure will be fitted with two inlet sluices positioned outside directional flow at levels that would allow draw down of top water and water above silt level. The chamber will also be fitted with a scour valve outlet coupled to the single outlet pipe.

It is intended for the water entering the inlet chamber to flow via the outlet pipe through a large sized strainer as to prevent any debris from entering the pump station. The draining of the inlet chamber will also be accomplished by installing a strained inlet into the outlet pipework.

Option 2:

This option will consist of a 300mm diameter steel coated pipeline encased in concrete to be installed below the footprint of the dam. The inlet end will consist of a strained inlet with a vortex breaker plate. No valves will be installed at the inlet and the inlet level will be set above the anticipated siltation level of the dam.

In both option 1 and 2 will it be essential that the environmental release be allowed to discharge via the outlet pipe. Control of the environmental flow will be via a 100mm diameter valve installed along the outlet of the pipe arrangement to discharge to the pumpstation.

In terms of outlet works allowance was made in the 300mm diameter outlet pipe to branch off to the future pump station. A scour chamber was constructed to house one of the scour valves and isolation valve to the proposed pump station. The chamber will be constructed from reinforced concrete and will be made secure with lock devices, etc.

### 4.12 **Magoda**

Refer to Appendix C for the preliminary layout design drawing.

The dam type proposed is a homogeneous earth embankment provided that further geological investigations provide favourable results and suitable materials are sourced and used. Provision for a clay core embankment has been made as an alternative, if required. The embankment volume is proposed to be approximately 44 200$m^3$.

The availability of suitable soil material from the basin and dam wall sites will affect the final design of the dam cross sectional design, taking into account the use of impervious material and cut off trenches.

The maximum wall height proposed is 11m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category II dam with a low hazard potential rating.

A bywash spillway has been considered. Scour protection measures will be implemented in the form of cut off drains and gabions. Reno mattress protection to areas that will be susceptible to scouring.

In terms of inlet works, two options were considered for the dam inlet walls.

Option 1:

The inlet structure will consist of a RC concrete structure that will extend to the full height of the respective dam walls. The structure will be fitted with two inlet sluices positioned outside directional flow at levels that would allow draw down of top water and water above silt level. The chamber will also be fitted with a scour valve outlet coupled to the single outlet pipe.

It is intended for the water entering the inlet chamber to flow via the outlet pipe through a large sized strainer as to prevent any debris from entering the pump station. The draining of the inlet chamber will also be accomplished by installing a strained inlet into the outlet pipework.

Option 2:

This option will consist of a 300mm diameter steel coated pipeline encased in concrete to be installed below the footprint of the dam. The inlet end will consist of a strained inlet with a vortex breaker plate. No valves will be installed at the inlet and the inlet level will be set above the anticipated siltation level of the dam.

In both option 1 and 2 will it be essential that the environmental release be allowed to discharge via the outlet pipe. Control of the environmental flow will be via a 100mm diameter valve installed along the outlet of the pipe arrangement to discharge to the pumpstation.

In terms of outlet works allowance was made in the 300mm diameter outlet pipe to branch off to the future pump station. A scour chamber was constructed to house one of the scour valves and isolation valve to the proposed pump station. The chamber will be constructed from reinforced concrete and will be made secure with lock devices, etc.

### 4.13 **Qangule**

Refer to Appendix C for the preliminary layout design drawing.

The dam type proposed is a homogeneous earth embankment provided that further geological investigations provide favourable results and suitable materials are sourced and used. Provision for a clay core embankment has been made as an alternative, if required. The embankment volume is proposed to be approximately 654 000$m^3$.

The availability of suitable soil material from the basin and dam wall sites will affect the final design of the dam cross sectional design, taking into account the use of impervious material and cut off trenches.

The maximum wall height proposed is 18.5m which in terms of the Dam Safety Regulations (2012), can be regarded as a medium sized Category II dam with a low hazard potential rating.

Owing to the steepness and close-proximity to the roadway at Qangule Dam, a side channel spillway was configured to suit the topography.

Scour protection measures will be implemented in the form of cut off drains and gabions. Reno mattress protection to areas that will be susceptible to scouring.

In terms of inlet works, two options were considered for the dam inlet walls.

Option 1:

The inlet structure will consist of a RC concrete structure that will extend to the full height of the respective dam walls. The structure will be fitted with two inlet sluices positioned outside directional flow at levels that would allow draw down of top water and water above silt level. The chamber will also be fitted with a scour valve outlet coupled to the single outlet pipe.

It is intended for the water entering the inlet chamber to flow via the outlet pipe through a large sized strainer as to prevent any debris from entering the pump station. The draining of the inlet chamber will also be accomplished by installing a strained inlet into the outlet pipework.

Option 2:

This option will consist of a 300mm diameter steel coated pipeline encased in concrete to be installed below the footprint of the dam. The inlet end will consist of a strained inlet with a vortex breaker plate. No valves will be installed at the inlet and the inlet level will be set above the anticipated siltation level of the dam.

In both option 1 and 2 will it be essential that the environmental release be allowed to discharge via the outlet pipe. Control of the environmental flow will be via a 100mm diameter valve installed along the outlet of the pipe arrangement to discharge to the pumpstation.

In terms of outlet works allowance was made in the 300mm diameter outlet pipe to branch off to the future pump station. A scour chamber was constructed to house one of the scour valves and isolation valve to the proposed pump station. The chamber will be constructed from reinforced concrete and will be made secure with lock devices, etc.

**See Figures 1-3 in section 1.1 for the general locality of the dams within the Gubenxa Valley Area.**

# 5 CONSIDERATION OF PROJECT ALTERNATIVES

The EIA Regulations stipulate that a requirement of the Scoping Process is to investigate alternatives to the project proposal. The EIA Regulations define "Alternatives", in relation to a proposed activity, as "different means of meeting the general purpose and requirements of the activity, which may include alternatives to –

(a) The property on which or location where it is proposed to undertake the activity;
(b) The type of activity to be undertaken;
(c) The design or layout of the activity;
(d) The technology to be used in the activity; and
(e) The operational aspects of the activity."

For the purposes of this EIA, the following alternatives were investigated:

- No-go alternative

## 5.1 **No-Go Alternative**

The No-Go alternative is simply that alternative if the project is not developed or built.

If the proposed project is not developed as is proposed, the following will occur:

- The likelihood of periods where there will be no irrigation due to the non-supply of water is high.
- The possible loss of the most significant deciduous fruit producer in the Eastern Cape
- Decrease the safety net of the Gubenxa farmers
- Decrease landowners agricultural productivity
- Increase in high yield agricultural lands to be left unmaintained and overtaken by weeds and invasive alien plants.
- Increase the likelihood of job losses and decrease in supply to the market.

# 6 MOTIVATION FOR THE PROPOSED ACTIVITY

## 6.1 Basics of Deciduous Fruit and the South African Context

The first deciduous fruit trees were planted in South Africa when Jan van Riebeeck established a garden in 1652, soon after his arrival in Table Bay (Theron, 2013). However, the deciduous fruit industry only really started towards the end of the 19th century, when markets for fresh fruit expanded and the industry was no longer limited to supplying passing ships and local consumers (Theron, 2013). From those humble beginnings the industry has grown to the extent that South Africa now produces deciduous fruit on approximately 75,000 ha. This is made up of approximately 31% dry and table grapes, 28% apples, 15% pears, 11% peaches, 6% Japanese plums, 5% apricots, 3% nectarines and 1% European plums.

Rieger (2006) defines a fruit as "a perennial, edible crop where the economic product is the true botanical fruit or is derived there from". The word perennial eliminates crops grown as annuals, e.g. tomatoes, peppers, melons, even though the harvested part is a botanical fruit. The management practices for perennial and annual crops differ markedly, with management decisions in one year having an effect on growth in the following year for perennial crops.

Taylor and Gush (2014) describe Deciduous plants as those plants that shed their leaves at the end of each growing season. Deciduous also applies to plant parts that fall off the plant. In trees this is not an indicator of taxonomic status. Deciduous fruit are also referred to as temperate fruit, referring to their area of origin in the temperate zones of the world. As a result of originating in temperate climates, with a distinct seasonal rhythm, deciduous fruit trees have good cold hardiness and require chilling for uniform bud-break and good cropping. In general, 500 to 1500 chill hours (defined as number of hours of exposure to about 7°C) are required during winter (from leaf drop in autumn until August or September (Southern Hemisphere)) when the trees are dormant. Deciduous fruit trees have reduced tree size and complexity and favour the development of growth models as they display strongly synchronised phenological events due to strong environmental signals. (WRC Report No. 1770/2/14)

Deciduous fruit can be split into a number of subgroups depending on the fruit type (Taylor and Gush, 2014). These sub-groupings include pome fruit, stone fruit, berries, vines (including grapes), and nuts (Taylor and Gush, 2014). A pome is a fruit with two or more seeds surrounded by a papery or cartilaginous structure, the carpel wall (Taylor and Gush, 2014). This grouping includes two of the most widely produced deciduous fruits in the world, viz. apples and pears (Taylor and Gush, 2014).

One of the chief factors influencing the distribution of fruit tree/orchard species is temperature. The temperature at which optimum plant growth occurs varies with the plant and the stage of development of the plant (Janick 1986). Each species also has a maximum and minimum growth temperature, above and below which injury occurs. In this regard the mean daily minimum of the coldest month is a good indication of the suitability of a fruit tree/orchard species for a specific location (Watson and Moncur 1985). This will give an indication if temperatures will be too low so as to cause injury to the plant or will be insufficient to satisfy the chilling requirements of the crop. However, all plants will suffer chilling injury if the temperature drops too low. The temperature at which chilling injury occurs depends on the species and the stage of development. Dormant apple trees can survive temperatures far below freezing when dormant, but will be damaged by light frosts during the flowering stage.

Other climatic factors also play a crucial role in determining the distribution of fruit tree/orchard crops (Taylor and Gush, 2014). Humidity and rainfall distribution play an important role in disease and pest incidence and can limit the areas in which certain crops can be grown successfully (Taylor and Gush, 2014). The occurrence of wind and the incidence of solar radiation also impact upon fruit tree cultivation (Taylor and Gush, 2014). In terms of rainfall, South Africa can be split into three broad regions, viz., 1) winter rainfall region, 2) summer rainfall region and 3) year-round rainfall region. **Elliot falls within mid to late summer rainfall within a summer rainfall region. Deciduous fruit is produced in the dry, late summer rainfall areas, where summer humidity will not be restrictive to fruit production (Taylor and Gush, 2014).**

Most deciduous trees are trained to maintain tree shape and height and allow better radiation penetration into the canopy (Taylor and Gush, 2014). This implies that deciduous fruit trees are generally smaller than subtropical fruit and can thus be planted at higher densities. Typically deciduous trees receive a heavy winter pruning and a lighter summer pruning to encourage the proliferation or dominance of the type of wood that bears fruit. The amount of pruning depends on the vigour of the tree and the type of wood on which the fruit are borne (Taylor and Gush, 2014).

A wide range of orchard designs and training systems are permissible for apple trees due to the availability of a wide range of rootstocks (Taylor and Gush, 2014). In most cases, however, trees are grown in rectangular blocks or hedgerows (Taylor and Gush, 2014). In South Africa apple and pear trees are generally planted in hedgerows at 1.5 m x 4 m. Pears and apples require cross-pollinators, which are included in alternate rows or every 10th or 15th tree within hedgerows (Rieger 2006).

Apples require a deep, well-drained, loamy soil with a pH (water) of 6-7, but can be grown on a wide variety of soils world-wide due to the incredible number of rootstocks available (Taylor and Gush, 2014).

The aim of irrigation should be to obtain the maximum possible yield of marketable produce from a given amount of water supplied to the crop (Taylor and Gush, 2014). In order to achieve this, a thorough understanding of the soil in the orchard and the various growth stages and water requirements of the crop are required (Orloff 2006). The three main driving variables on which irrigation decisions are based are: 1) how much water the root zone of the crop can hold, 2) how much water infiltrates into the soil and 3) how much water is the crop using? (Orloff 2006). A grower must plan irrigation according to soil water holding capacity, plant water use, prevailing weather conditions and quantified management decisions. The level of irrigation in an orchard will depend on environmental factors which drive evaporative demand and transpiration, salinity, and electrolyte composition in the soil solution, the resistance of the soil to root penetration and water transport, soil aeration, tree hydraulic architecture (including the rootstock), and crop load (Naor 2006). Losses due to percolation, where applied water is lost below the root zone, and runoff from the soil surface must be avoided.

For long-term sustainability of perennial fruit trees it is important to safeguard against drought at all stages, but during certain stages of development each season, water may have to be managed more carefully than at other stages of growth e.g. flowering or early fruit growth. Maintaining adequate soil water conditions during water-sensitive stages of growth will have a beneficial effect on plant growth (Orloff 2006). Restricted water supply during these critical periods will negatively impact upon yield as the provision of adequate water at other stages will not compensate for the harm sustained. As soil water status and nutrition are interrelated, the provision of adequate water to plants is also required for adequate nutrient uptake (Orloff 2006). However, excessive water will leach nutrients below the active root zone, and increase the risk of root rot.

**Based on the above, the availability of water for irrigation and correct method of irrigation is profoundly important to the success of deciduous fruit production. As such, the proposal to construct dams to act as storage dams for periods of irrigation is key to the development of deciduous fruit production within the Gubenxa Valley of Elliot.**

## 6.2 **Deciduous Fruit Industry of South Africa**

The Eastern Cape agricultural sector has identified an area in the cold northern part of the province where deciduous fruit is grown, with the hope of employing thousands of workers in the next few years. The area, Gubenxa Valley, is 1419m above sea level – which is ideal for fruit farming – and is situated between Elliot and Ugie.

Sikuka (2017) mentions that the Western Cape is the largest and traditional producer of deciduous fruits in South Africa. However, in the past two decades, the Northern and Eastern Cape, and Limpopo provinces have become increasingly large producers of deciduous fruit. South Africa is ranked the fourth largest apple producer and second largest pear producer in the Southern Hemisphere.

According to a Sub-Sector Study by the National Agricultural Marketing Council on Deciduous Fruit released in 2007, the report notes that "the deciduous fruit industry consists mainly of pome fruit (apples and pears), stone fruit (apricots, peaches & nectarines and plums) as well as table grapes. The total area planted to deciduous fruit in South Africa amounts to 74 246 hectares. The total number of deciduous fruit producers is 2 225. The Western Cape has the largest concentration growers which represent 74% of the total area planted to deciduous fruit. The Northern Cape is the second largest area representing 15% of the total area followed by the Eastern Cape (8%)."

Comparatively, Hortgro released its 2020 "Key Deciduous Fruit Statistics" whereby it notes that there are 1 140 pome and stone fruit producers in South Africa. The total pome and stone fruit turnover is valued at R 14.06 Billion and the industry accounts for 1.25 permanent jobs per hectare. Almost half of the produce is exported.

Hortgro (2020) adds that in terms of pome fruit there are 663 producers accounted for of which apple production areas are mostly located in Ceres with a total of 7 714 ha planted and the smallest production area is the Eastern Cape of which only 15 ha has been planted which amounts to 3 739 trees. Furthermore, Mr Lundi Kama of Gubenxa Valley in Elliot notes that 1 700 apple trees were planted in 2017. This is almost half of the total trees planted in the Eastern Cape.

## 6.3 **Previously Disadvantaged Individual's within the Deciduous Fruit Industry: Case Study**

Troskie (2014) compiled an article in the Elsenburg Journal titled "The value of working together: A case study of the Deciduous Fruit Industry". The article summarised the process and results of the "Boompie Project".

The "Boompie Project" is a partnership between the Western Cape Department of Agriculture (WCDoA) and the Deciduous Fruit Industry. The purpose of the project was to enhance the livelihoods of previously disadvantaged fruit farmers (both new and established) by expanding
their area under production and linking them to markets (Troskie, 2014). This is much like what ECDRDAR is doing for the farmers of the Gubenxa Valley.

The Industry took the responsibility to provide the plant material (boompies) and technical advice whilst the Department carried the cost associated with land preparation, irrigation as well as drainage and trellising (where appropriate) (Troskie, 2014). In this way an equal funding partnership was created. Furthermore, the viability of all projects was evaluated by a Commodity Project Evaluation Committee (CPAC) in which Industry and Government have equal representation (Troskie, 2014).

In this manner almost 313 hectares of fruit trees were established on the land of previously disadvantaged fruit farmers in the Western Cape over the period 2009 to 2012 Troskie (2014). In the outer years approximately 50 hectares were established while in the middle close to 100 hectares were planted per year Troskie (2014).

According to the Labour Model of the Bureau for Food and Agricultural Policy, the labour multiplier for deciduous fruit ranges (depending on the fruit type) between 1,4 to 1,6 jobs being created for every hectare under fruit production. In this multiplier both permanent jobs as well as the permanent equivalent of seasonal jobs are included. If the hectares planted are weighted according
to the fruit type established, it is calculated that a total of 469 long-term and sustainable jobs were created over the four years this initiative was active. It is important to make one comment on the sustainability of these jobs Troskie (2014). Whereas the often-used term "employment opportuni- ties" usually refers to a job which ceases to exist the moment government support is withdrawn, the jobs created through the Boompie Project will continue to exist long after the project has ceased to function Troskie (2014).

It was subsequently calculated that the total value of investment over the four years was R55,84 million. Of this amount the WCDoA invested R10,66 million from its Comprehensive Agricultural Support Programme (CASP)1 facility and Hortgro (the industry representative body) contributed R13,14 million with the result that the total value of support amounted to roughly half of the total
investment (R23,80 million). The balance of the investment came from own sources and constituted inter alia "sweat capital" and investment by equity partners Troskie (2014). It follows that government investment in each hectare of fruit trees was, on average, R34 104 and the cost of creating one job amounted to R22 736. The result is that the once-off CASP investment of R34 104 per hectare generated an annual recurring income stream of R83 135 per hectare for the beneficiaries participating in the Boompie Project Troskie (2014).

Through this partnership government invested R10,66 million and the Industry contributed R13,14 million to establish 313 ha of fruit trees. Whereas it would have cost government R178 622 to establish each hectare of trees, the partnership resulted in a CASP investment of just R34 104 per hectare. In the process

469 long-term sustainable jobs were created at the once-off cost to government of R22 736 per job Troskie (2014). At the same time the participating farmers can depend on an annual income stream of R83 135 per hectare in perpetuity. It is important to note that, if government did not enter into this partnership, it would have been able to establish only 59,7 hectares and created just 89,5 jobs. It follows that the partnership extended government funds by a factor of 5,24 times Troskie (2014).

Troskie (2014) concludes that Based on the information discussed in the case it can be concluded that the government money invested in the Boompie Project was well spent towards the achievement of policy outcomes Troskie (2014). Furthermore, these results would not have been possible if the partnership between the Department and the Industry was not established.

***It is important to note the similarities between the Boompie Project and the Gubenxa Valley project. The assistance by DRDAR with the Gubenxa Valley farmers to equip and establish the farmers as a unit (within their own individual land ownership) within the current deciduous fruit industry so that they can share skills, support and knowledge to efficiently compete within the sector and ensure sustainable jobs occur within the rural area of the Gubenxa Valley.***

## 6.4 **Municipal Planning Policy**

### 6.4.1 Sakhisizwe Local Municipality Draft Integrated Development Plan 2021-2022

The Integrated Development Plan (2021-2022) for the LM notes that *"there is a need for the development of a new LED strategy. Sakhisizwe's competitive advantage is on tourism and agriculture, these sectors contribute in the LED strategy and economic growth of the area…The municipalities' comparative advantage is in agriculture, forestry and tourism, though the major economic contributors include community services and trade sectors."*

Furthermore, according to the IDP (2021-2022), Sakhisizwe has high potential for agricultural produce but this potential is not yet fully explored. The municipality is also endowed with high fertility lands for crop growing. However, this potential remains unutilised in most parts of the municipality. Approximately 40% of land in the Sakhisizwe municipality is arable lands. This land is currently occupied by a range of land uses including:

- Communal grazing
- Communal subsistence agricultural production which is largely led by individualised small pockets of gardens and ploughing fields. This is more prevalent in the former Transkei areas which remain largely rural and underdeveloped
- Commercial farming in especially the northern parts of Khowa
- Dispersed forestry activities with minimal commercialization (of largely blue wattle, pine and gum tree species).

Notably, the IDP states that there is a "need to lobby the departments of Agriculture as we well as Rural Development and Land reform to prioritise funding of catalyst infrastructure projects to revitalize agricultural production in Sakhisizwe. The priority support and infrastructure necessary should include but not limited to:

- Training and capacitation of farmers (skills to operate agricultural enterprises and linkages to market)
- Provision of functional mechanical implements and machinery for production (irrigation equipment, tractors, ploughing tools, workshops for repair of machinery, stock dams, sales pans, feeding lots, stock medicines and other)
- Fencing of lands to mitigate damages caused by stray animals
- Security of assets
- Land purchases to promote and empower previously disadvantages to become fully fledged commercial farmers
- Breeding stock (bulls, rams and other)

**The Sakhisizwe LM estimates that if agricultural sector can be fully supported and capacitated, it can easily contribute over 30% of jobs in the local economy and would significantly improve its contribution to gross domestic product (GDP).**

### 6.4.2 Chris Hani District Spatial Development Framework 2018

According to the SDF for the Chris Hani District Municipality, the proposed development site falls within an area noted as "Agricultural- Crops, Livestock, Fruit Production" in terms of their Economic Opportunity- Agriculture and Forestry plan. See below extract.

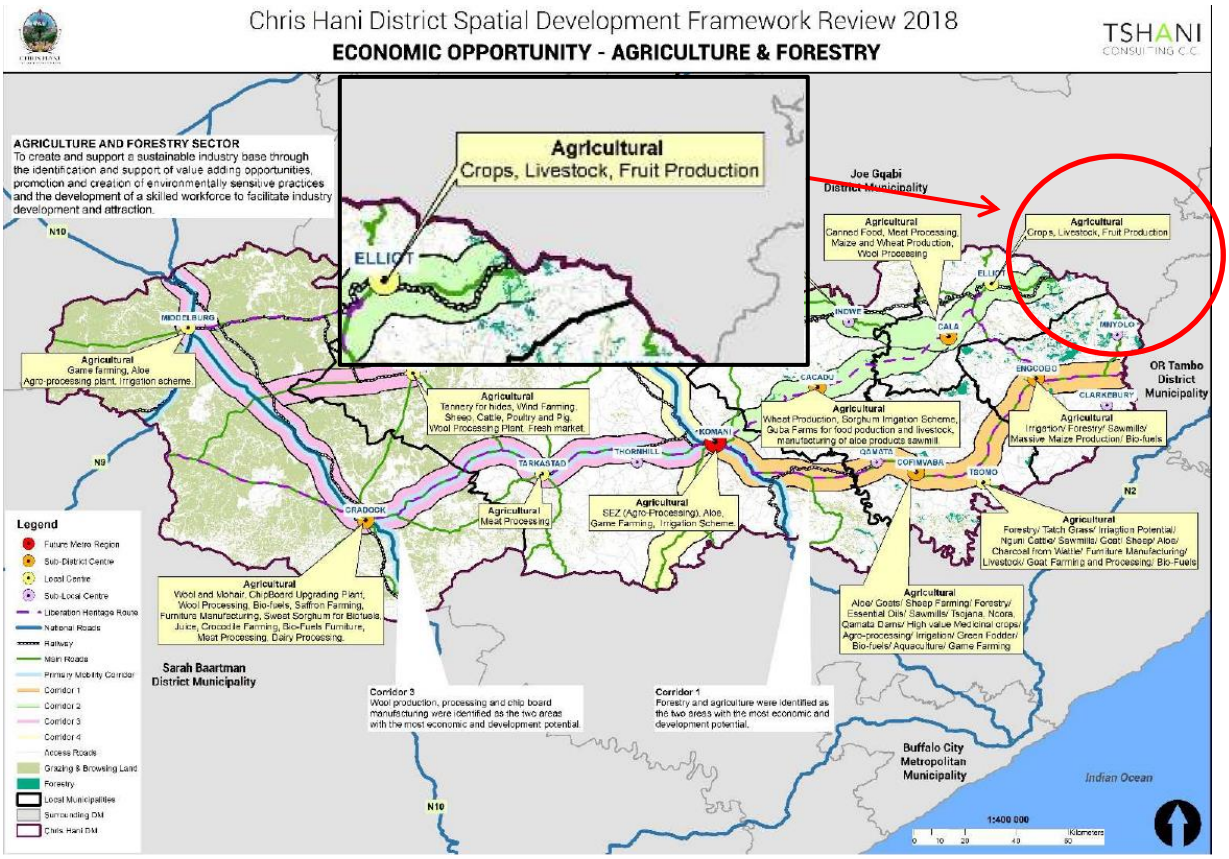



**Figure 4: Chris Hani District SDF with economic opportunities noted within the agricultural sector**

The SDF also notes the importance of an "Agri-Park Establishment" for the CHDM whereby the "Agri-Park" must be farmer controlled, be supported by government to ensure sustainability, maximise access to markets to all farmers, particularly emerging farmers and rural communities maximise use of high value agricultural land and strengthen partnerships between government and private sector to increase access to services (roads etc.). Elliot is noted as being a Famer Production Support Unit (FSPU) as a component of a proposed "Agri-Park Establishment".

The proposed agricultural development will relate to the objectives of a "Agri-Park Establishment" and certainly be beneficial to the emerging farmers and rural communities involved in the Gubenxa Valley area.

## 6.5 **Proven Success of Eastern Cape Department of Rural Development and Agrarian Reform and Support to Eastern Cape Agricultural Sector**

This section comprises a summary of the Eastern Cape DRDAR Policy Speech for 2021/22.

According to Census of Commercial Agriculture 2020, "the total income for commercial agriculture industry in 2017 was R27.0 billion, which was 380% higher than R5.6 billion recorded for 2007. In 2017,

the major contributor to total income was farming of animals (R15.0 billion or 55.6%), followed by **horticulture** (R6,1 billion or 22.7%)". The StatsSA 2020 Report on Commercial Agriculture depicts a sad reality that 65% smallholder producers contribute about 7% into provincial GDP and only about 12% of jobs, while 5.7% large commercial farmers contributes 62 % in GDP and 50% of jobs. Sarah Baartman has the largest provincial share in terms of number of commercial farms at 38.8%, generating 47.5% income and 55.5% employment. **This is followed by Chris Hani with 21.4% farms, generating 12.6% income and 14.4% employment.** In third position is Nelson Mandela Bay with 14.1% farms, generating 14.1% income and 3.2 % employment; Amathole with 10.7% farms, generating 8.8% income and 14.4% employment; and Alfred with 1,4% farms, generating 1.0% income and 1.1 % employment.

ECDRDAR has identified the need for "District Mechanisation Centres". The limited access to affordable mechanization services is a major constraint to smallholder and communal producers to commercially produce for markets. With the support of provincial economic stimulus fund, DRDAR have been able to establish the Joe Gqabi mechanization Centre at a value of R13 million. The Joe Gqabi Mechanization Centre has been operationalized and supported 1 000 communal and smallholder producers. **Furthermore, the Department continued its partnership with Chris Hani District Municipality to support producers with affordable mechanization services through the Chris Hani District Mechanization Centre.**

In 2021/22 the Department will extend the establishment of mechanisation services in Amathole, Sarah Baartman and Alfred Nzo with a budget of **R7.9 million set aside to support these Centres.**

ECDRAR identified the importance of irrigation schemes to supporting emerging and smallholder farming activities as well as increasing production capabilities and job creation.

The Department has facilitated the revitalization of irrigation schemes by supporting producers to increase production of grain in Qamata (185 ha), Ncora (439 ha) and Bilatye (201 ha). Furthermore, the Department supported vegetable producers in Qamata (150 ha), Bilatye (30 ha), Ncora (150 ha), Zanyokhwe (100 ha) and Upper Gxulu (7 ha). Also, the Department supported dairy production in Ncora (1000 dairy cows), Shilo (500 dairy cows), Keiskammahoek (950 dairy cows). In 2021/ 22, the Department is investing R2.6 million to install irrigation system in Shilo Irrigation Scheme to ensure sustainable dairy production.Further to the CHDM SDF discussed in the previous section and the concept of "Agri-Park Establishments" and the need for government support to implement such establishments, ECDRDAR has taken a decision to transform the Rural Economic Development (RED) Hubs to be **agro-processing aggregation centres** in order to exploit the government food nutrition programs. The ECDRDAR is directed to engage producers with a view to aggregate their produce in order to **package and process for the markets**. It must be noted that due to COVID 19 restrictions the ECDRDAR was unable to repurpose the RED Hub infrastructure for aggregation. The infrastructure upgrades for the RED Hubs will be done in 2021/ 22 financial year. ECDRDAR reported that in the last financial year, Mqanduli and Mbizana RED Hubs processed 332 tonnes and 325 tonnes respectively.

In 2021/22 financial year, the Department has allocated **R11.2 million** to transform the RED Hubs into agro-processing aggregation centres by aggregating primary produce in order to package and process for both public and private markets. This will incentivise farmers to produce high quantity products for the RED Hub agro-processing centres. Each RED Hub will be required to aggregate the agricultural

commodity/products produced by the surrounding farmers within 100 km radius. The ECDRDAR will have to deploy people with business expertise to drive the aggregation business model for RED Hubs.

The ECDRDAR identifies the challenge and affects of Climate Change on our environment and the agricultural sector and the people and communities that depend on it. ECDRDAR has prompted the implementation of ten projects that seek to promote climate smart and conservation agricultural to address these challenges. Through their analytical services farmer support was provided with the analysis of 2100 soils, water and plant/feed samples to improve farmer production across the province. In 2021/22, the Department has set aside a budget of R13 million to continue their research activities in order to promote climate smart agricultural practices and address agriculture production challenges. The Department will continue to strive for the development of technologies that will scale up food production to increase the yield and collaborate with local and international research partners for the development of drought, pest and disease resistant crops and animals.

ECDRDAR notes the importance of land care in ensuring sustainable agriculture such that in the 2020/21 financial year, a total of **3 651 ha of land has been rehabilitated** through clearing of invasive plants and 243 ha under conservation agriculture practices, creating 359 jobs.

ECDRDAR intends to rehabilitate 5 964 ha of alien invaded lands and put 294 ha under conservation agriculture in the next financial year, creating 500 green jobs through the EPWP programme. This will be done through community land rehabilitation programs, implementation of conservation measures and improved veld, soil and water management in partnership with land users. A total budget of R20.9 million is set aside for this purpose.

ECDRDAR's response to low levels of commercial agriculture, especially in the former homeland areas, is to transform black producers to be "agroentrepreneurs" that participate throughout the agriculture value chains to increase growth and employment. ECDRDAR are cognisant of the low or absence of investment and huge infrastructure backlog which increases cost of doing business (production and limit access to markets) which inhibits black producer's participation in the commercial value chains. Furthermore, the strategy will promote commercially viable partnerships between smallholder / communal and commercial / commodities to leverage investment, business skills, technology and access to markets.

ECDRDAR acknowledges that the Eastern Cape is the second largest producer of citrus in the country accounting for 26% of the produce. However, the citrus commodity in the province is not transformed. **This necessitates the Department to continue to support black citrus producers to increase their participation in the value chain. To improve transformation in the citrus commodity, the Department has over the years supported 34 black citrus producers and that resulted in 1.7 million cartons exported during the 2020 production season.** This represents 25% growth in their production from 2019 to 2020 season and improved their contribution to provincial exports from 2% to 5%.

In 2020/21, the ECDRDAR commenced with the revitalisation of Citrus Orchards in Amathole, as a result debushing of 45ha and fencing has been completed. Irrigation equipment has been supplied and will be installed in 2021/22 Financial Year and these farms will be ready for production. Despite the challenges of the COVID-19 pandemic, this initiative has created 25 temporary jobs for the local communities.

In Sarah Baartman, the ECDRDAR partnered with black citrus producers to expand citrus orchards from 117 to 400 ha. These producers have been awarded water rights in the Sundays River Water System. The

Department has delivered R4 million worth of irrigation equipment which is currently being installed by the farmers and 10 jobs have been created during this phase.

***It is clear that the support from ECDRDAR on Eastern Cape farming initiatives and rural communities is based on a history of positive results and significant financial backing. This provides additional backing as to the anticipated potential success these farmers will benefit from with the support from ECDRDAR.***

# 7 DESCRIPTION OF SURROUNDING ENVIRONMENT

## 7.1 **Project Locality**

The proposed development of the Decidous fruit production occurs in the broad locality of Gubenxa Valley situated within the Sakhisizwe Local Municipality where the nearest town is Elliot. The project involves assisting beneficiaries who currently consist of thirteen individual's within who own separate farms across the Gubenxa Valley area. These properties need to be completely developed individually in order to successfully obtain an operating deciduous setup.

The centre of the proposed overall project area can be said to be located at geographic coordinates 31°22'27.16"S; 28° 8'33.76"E. See Figure 5 and 6 for the general locality of the project area where the dam localities in relation to proposed plantations are indicated.

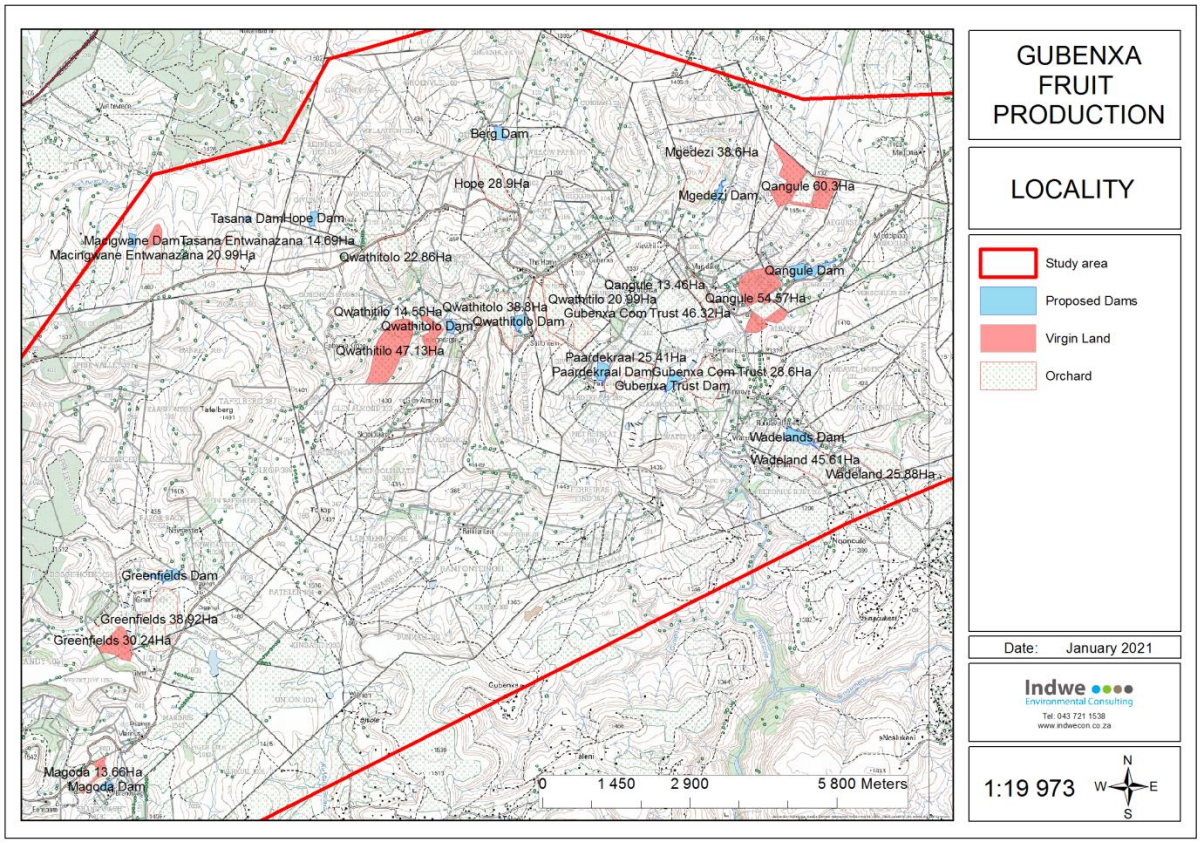



**Figure 5: Topographical locality of the proposed Gubenxa Deciduous fruit production dams and plantations**

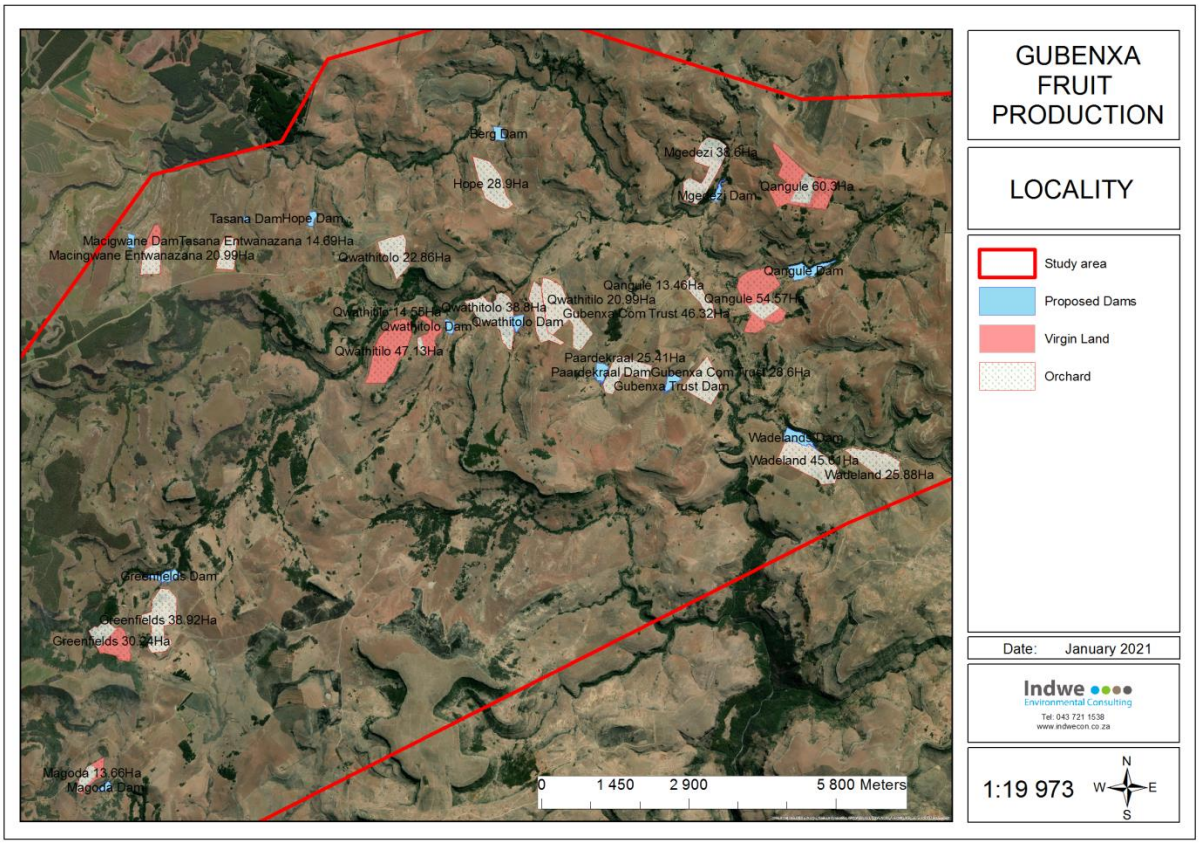



**Figure 6: Aerial locality of the proposed Gubenxa Decidious fruit production dams and plantations.**

## 7.2 **Property Details**

### 7.2.1 Property Details for Macingwane Dam 1

| **Item** | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | RE/ 149 |
| Development footprint size(s) in $m^2$: | 209 900 $m^2$ Plantation<br>21 000 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000014900000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD LATITUDE (S) | ORCHARD LONGITUDE (E) |
|---|---|---|---|---|
| 1 | 31°20'20.53"S | 28° 6'34.81"E | 31°20'14.17"S | 28° 6'49.18"E |
| 2 | 31°20'23.69"S | 28° 6'33.71"E | 31°20'17.35"S | 28° 6'50.95"E |
| 3 | 31°20'27.24"S | 28° 6'33.98"E | 31°20'41.12"S | 28° 6'50.67"E |
| 4 | 31°20'26.44"S | 28° 6'29.17"E | 31°20'41.57"S | 28° 6'37.83"E |
| 5 | 31°20'23.18"S | 28° 6'30.08"E | 31°20'22.63"S | 28° 6'42.36"E |
| 6 | 31°20'19.02"S | 28° 6'30.00"E | 31°20'14.59"S | 28° 6'46.60"E |

### 7.2.2 Property Details for Tasana Dam 2

| **Item** | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | Farm 7/149 |
| Development footprint size(s) in $m^2$: | 146 900 $m^2$ Plantation<br>13 800 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000016100007 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD LATITUDE (S) | ORCHARD LONGITUDE (E) |
|---|---|---|---|---|
| 1 | 31°20'11.69"S | 28° 7'42.81"E | 31°20'21.82"S | 28° 7'39.31"E |
| 2 | 31°20'10.94"S | 28° 7'43.84"E | 31°20'39.21"S | 28° 7'37.70"E |
| 3 | 31°20'10.11"S | 28° 7'43.55"E | 31°20'38.58"S | 28° 7'25.95"E |
| 4 | 28° 7'45.19"E | 28° 7'45.19"E | 31°20'27.70"S | 28° 7'28.32"E |
| 5 | 31°20'11.07"S | 28° 7'46.72"E | 31°20'21.54"S | 28° 7'31.54"E |
| 6 | 28° 7'46.52"E | 28° 7'46.52"E | | |
| 7 | 31°20'12.90"S | 28° 7'46.55"E | | |
| 8 | 31°20'13.28"S | 28° 7'45.77"E | | |
| 9 | 31°20'11.96"S | 28° 7'44.41"E | | |

### 7.2.3 Property Details for Hope Dam 3

| **Item** | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 152, 306, 162 |

| | |
|---|---|
| Development footprint size(s) in $m^2$: | 289 000 $m^2$ Plantations<br>20 000 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C0240000000015200000;C0240000000016200000;<br>C0240000000030600000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD LATITUDE (S) | ORCHARD LONGITUDE (E) |
|---|---|---|---|---|
| 1 | 31°20'9.90"S | 28° 8'31.19"E | 31°19'36.82"S | 28°10'9.49"E |
| 2 | 31°20'11.61"S | 28° 8'28.63"E | 31°19'39.98"S | 28°10'20.58"E |
| 3 | 31°20'15.02"S | 28° 8'27.97"E | 31°19'47.79"S | 28°10'27.91"E |
| 4 | 28° 8'24.54"E | 28° 8'24.54"E | 31°19'58.69"S | 28°10'31.24"E |
| 5 | 31°20'9.78"S | 28° 8'25.94"E | 28°10'35.74"E | 28°10'35.74"E |
| 6 | 31°20'7.53"S | 28° 8'25.83"E | 31°20'6.20"S | 28°10'31.41"E |
| 7 | 31°20'7.24"S | 28° 8'29.50"E | 31°20'0.23"S | 28°10'17.85"E |

### 7.2.4 Property Details for Berg farm Dam 4

| **Item** | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 161 |
| Development footprint size(s) in $m^2$: | 28 000$m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C0240000000016100000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) |
|---|---|---|
| 1 | 31°19' 21.04"S | 28° 10'22.84"E |
| 2 | 31°19' 21.74"S | 28° 10'29.03" |
| 3 | 31°19' 24.45"S | 28° 10'28.79"E |
| 4 | 31°19' 27.02"S | 28° 10'30.89"E |
| 5 | 31°19' 28.65"S | 28° 10'30.10"E |
| 6 | 31°19' 28.31"S | 28° 10'24.13"E |
| 7 | 31°19' 24.79"S | 28° 10'23.32"E |

### 7.2.5 Property Details Qwatsitolo/ Qwathi-Tolo Dam 5

| Item | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 322, 338, RE/339, 334, 335 |
| Development footprint size(s) in $m^2$: | 874 600 $m^2$ Plantation<br>53 500 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000032200000; C02400000000033800000; C02400000000033900000; C02400000000033400000; C02400000000033500000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD 1 LATITUDE (S) | ORCHARD 1 LONGITUDE (E) | ORCHARD 2 LATITUDE (S) | ORCHARD 2 LONGITUDE (E) | ORCHARD 3 LATITUDE (S) | ORCHARD 3 LONGITUDE (E) |
|---|---|---|---|---|---|---|---|---|
| 1 | 31°21'6.26"S | 28° 9'51.26"E | 31°21'3.54"S | 28° 9'36.95"E | 31°21'6.34"S | 28° 9'28.37"E | 31°20'44.83"S | 28° 9'20.80"E |
| 2 | 31°21'5.87"S | 28° 9'53.21"E | 31°21'4.17"S | 28° 9'39.86"E | 31°21'13.96"S | 28° 9'30.78"E | 31°20'30.85"S | 28° 9'13.53"E |
| 3 | 31°21'7.63"S | 28° 9'58.07"E | 31°21'11.37"S | 28° 9'50.39"E | 31°21'25.95"S | 28° 9'25.75"E | 31°20'30.57"S | 28° 9'11.13"E |
| 4 | 31°21'8.64"S | 28° 9'58.84"E | 31°21'14.43"S | 28° 9'47.45"E | 31°21'26.65"S | 28° 9'22.77"E | 31°20'24.18"S | 28° 9'8.72"E |
| 5 | 31°21'10.26"S | 28° 9'57.79"E | 31 °21'17.72"S | 28° 9'45.17"E | 31°21'40.05"S | 28° 9'13.92"E | 31°20'19.76"S | 28° 9'25.27"E |
| 6 | 31°21'11.90"S | 28° 9'57.57"E | 31°21'22.50"S | 28° 9'46.07"E | 31°21'40.41"S | 28° 9'0.62"E | 31°20'22.61"S | 28° 9'27.25"E |
| 7 | 31°21'14.11"S | 28° 9'56.43"E | 31°21'26.43"S | 28° 9'42.09"E | 31°21'16.51"S | 28° 9'9.57"E | 31°20'30.44"S | 28° 9'26.83"E |
| 8 | 31°21'12.91"S | 28° 9'52.99"E | 31°21'22.24"S | 28° 9'34.97"E | 31°21'6.55"S | 28° 9'20.88"E | 31°20'36.47"S | 28° 9'29.67"E |
| 9 | 31°21'10.54"S | 28° 9'53.19"E | 31°21'15.79"S | 28° 9'34.29"E | 31°21'5.66"S | 28° 9'25.04"E | | |
| 10 | 31°21'6.91"S | 28° 9'51.98"E | 31°21'13.38"S | 28° 9'41.47"E | | | | |
| 11 | | | 31°21'8.46"S | 28° 9'41.37"E | | | | |
| 12 | | | 31°21'5.48"S | 28° 9'35.87"E | | | | |

### 7.2.6 Property Details for Qwatsitolo/ Qwathi-Tolo Dam 6

| Item | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 309, 310, RE/307, 315, 319, 312, RE/314, 311, 303, 304, 292, 295 |
| Development footprint size(s) in $m^2$: | 566 000 $m^2$ Plantations<br>37 000 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000030900000; C02400000000031000000;<br>C02400000000030700000; C02400000000031500000;<br>C02400000000031900000; C02400000000031200000;<br>C02400000000031400000; C02400000000031100000;<br>C02400000000030300000; C02400000000030400000;<br>C02400000000029200000; C02400000000029500000 |
| | |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD 1 LATITUDE (S) | ORCHARD 1 LONGITUDE (E) | ORCHARD 2 LATITUDE (S) | ORCHARD 2 LONGITUDE (E) |
|---|---|---|---|---|---|---|
| 1 | 31°21'3.20"S | 28°10'42.36"E | 31°20'45.10"S | 28°10'48.97"E | 31°21'22.55"S | 28°10'34.46"E |
| 2 | 31°21'7.67"S | 28°10'42.19"E | 31°20'48.75"S | 28°10'53.54"E | 31°21'17.34"S | 28°10'28.28"E |
| 3 | 31°21'11.44"S | 28°10'38.87"E | 31°21'12.79"S | 28°10'57.38"E | 31°21'8.91"S | 28°10'24.35"E |
| 4 | 31°21'12.92"S | 28°10'37.98"E | 31°21'18.85"S | 28°11'8.93"E | 31°21'7.26"S | 28°10'18.64"E |
| 5 | 31°21'12.56"S | 28°10'36.89"E | 31°21'19.94"S | 28°11'5.65"E | 31°21'11.09"S | 28°10'12.94"E |
| 6 | 31°21'10.56"S | 28°10'36.37"E | 31°21'17.54"S | 28°10'58.37"E | 31°21'4.34"S | 28°10'11.91"E |
| 7 | 31°21'8.91"S | 28°10'34.58"E | 31°21'18.75"S | 28°10'53.42"E | 31°20'56.10"S | 28°10'4.05"E |
| 8 | 31°21'5.14"S | 28°10'33.39"E | 31°21'11.64"S | 28°10'49.96"E | 31°20'53.13"S | 28°10'16.32"E |
| 9 | 31°21'8.95"S | 28°10'34.70"E | 31°21'0.11"S | 28°10'48.60"E | 31°20'56.80"S | 28°10'22.34"E |
| 10 | 31°21'5.10"S | 28°10'33.05"E | 31°20'54.55"S | 28°10'45.41"E | 31°20'52.48"S | 28°10'25.16"E |
| 11 | | | | | 31°20'52.02"S | 28°10'30.71"E |
| 12 | | | | | 31°20'56.48"S | 28°10'34.36"E |
| 13 | | | | | 31°21'5.87"S | 28°10'36.24"E |

### 7.2.7 Property Details for Mgedezi Dam 7

| Item | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including | 200, 202, 199 |

| | |
|---|---|
| portion) of all proposed sites: | |
| Development footprint size(s) in $m^2$: | 388 600 $m^2$ Plantation<br>41 400 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000019900000; C02400000000020000000; C02400000000020200000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD LATITUDE (S) | ORCHARD LONGITUDE (E) |
|---|---|---|---|---|
| 1 | 31°19'49.19"S | 28°12'50.14"E | 31°20'3.57"S | 28°12'32.67"E |
| 2 | 31°19'50.65"S | 28°12'48.63"E | 31°20'0.42"S | 28°12'24.19"E |
| 3 | 31°19'52.08"S | 28°12'47.42"E | 31°19'49.05"S | 28°12'27.82"E |
| 4 | 31°19'53.98"S | 28°12'48.13"E | 31°19'51.85"S | 28°12'35.53"E |
| 5 | 31°19'56.70"S | 28°12'48.17"E | 31°19'43.00"S | 28°12'40.29"E |
| 6 | 31°20'2.02"S | 28°12'46.08"E | 31°19'39.89"S | 28°12'31.00"E |
| 7 | 31°20'0.21"S | 28°12'40.80"E | 31°19'32.31"S | 28°12'34.07"E |
| 8 | 31°19'58.41"S | 28°12'43.33"E | 31°19'27.10"S | 28°12'39.19"E |
| 9 | 31°19'55.29"S | 28°12'45.42"E | 31°19'31.66"S | 28°12'51.69"E |
| 10 | 31°19'52.98"S | 28°12'46.28"E | 31°19'49.20"S | 28°12'43.83"E |

### 7.2.8 Property Details of Paardekraal Dam 8

| **Item** | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 287, 289 |
| Development footprint size(s) in $m^2$: | 254 000 $m^2$ Plantation<br>33 800 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000028700000; C02400000000028900000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD LATITUDE (S) | ORCHARD LONGITUDE (E) |
|---|---|---|---|---|
| 1 | 31°21'29.56"S | 28°11'28.77"E | 31°21'41.43"S | 28°11'33.12"E |
| 2 | 31°21'30.05"S | 28°11'33.72"E | 31°21'25.41"S | 28°11'42.87"E |
| 3 | 31°21'32.22"S | 28°11'36.21"E | 31°21'30.97"S | 28°12'4.10"E |
| 4 | 31°21'41.15"S | 28°11'31.85"E | 31°21'38.71"S | 28°12'2.00"E |
| 5 | 31°21'39.22"S | 28°11'31.83"E | 31°21'35.54"S | 28°11'45.29"E |
| 6 | 31°21'39.23"S | 28°11'29.10"E | 31°21'46.59"S | 28°11'39.15"E |
| 7 | 31°21'36.27"S | 28°11'27.41"E | 31°21'45.96"S | 28°11'34.00"E |

### 7.2.9 Property Details for Gubexna Trust Dam 9

| Item | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | RE/294, 270, 268, RE/ 261, 262, 260 |
| Development footprint size(s) in $m^2$: | 749 200 $m^2$ Plantation<br>27 200 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000029400000; C02400000000027000000;<br>C02400000000026800000; C02400000000026100000;<br>C02400000000026200000; C02400000000026000000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD 1 LATITUDE (S) | ORCHARD 1 LONGITUDE (E) | ORCHARD 2 LATITUDE (S) | ORCHARD 2 LONGITUDE (E) |
|---|---|---|---|---|---|---|
| 1 | 31°21'38.66"S | 28°12'23.68"E | 31°21'25.88"S | 28°12'39.41"E | 31°20'42.91"S | 28°10'54.48"E |
| 2 | 31°21'41.45"S | 28°12'18.66"E | 31°21'42.43"S | 28°12'48.90"E | 31°20'47.69"S | 28°11'6.52"E |
| 3 | 31°21'45.80"S | 28°12'12.46"E | 31°21'52.50"S | 28°12'41.75"E | 31°20'58.75"S | 28°11'11.80"E |
| 4 | 31°21'45.55"S | 28°12'11.65"E | 31°21'43.39"S | 28°12'22.73"E | 31°21'13.58"S | 28°11'26.78"E |
| 5 | 31°21'39.23"S | 28°12'13.56"E | | | 31°21'23.14"S | 28°11'17.46"E |
| 6 | 31°21'36.45"S | 28°12'14.06"E | | | 31°21'21.23"S | 28°11'13.55"E |
| 7 | 31°21'35.49"S | 28°12'17.50"E | | | 31°21'8.82"S | 28°11'13.70"E |
| 8 | | | | | 31°21'6.20"S | 28°11'11.34"E |
| 9 | | | | | 31°21'14.33"S | 28°11'0.91"E |
| 10 | | | | | 31°21'12.36"S | 28°10'57.75"E |
| 11 | | | | | 31°20'48.82"S | 28°10'53.96"E |

### 7.2.10 Property Details for Wadelands Dam 10

| Item | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 241, 240, 238, 237, 235, 234 |
| Development footprint size(s) in $m^2$: | 714 900 $m^2$ Plantation<br>16 000 $m^2$ Dam |

| | |
|---|---|
| SG Digit code(s) of all proposed sites: | C02400000000024100000; C02400000000024000000; C02400000000023800000; C02400000000023700000; C02400000000023500000; C02400000000023400000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD 1 LATITUDE (S) | ORCHARD 1 LONGITUDE (E) | ORCHARD 2 LATITUDE (S) | ORCHARD 2 LONGITUDE (E) |
|---|---|---|---|---|---|---|
| 1 | 31°22'4.85"S | 28°13'30.38"E | 31°22'7.20"S | 28°13'31.53"E | 31°22'16.76"S | 28°14'6.75"E |
| 2 | 31°22'7.57"S | 28°13'39.24"E | 31°22'27.59"S | 28°14'3.43"E | 31°22'15.42"S | 28°14'11.85"E |
| 3 | 31°22'8.38"S | 28°13'40.01"E | 31°22'35.27"S | 28°14'0.79"E | 31°22'16.77"S | 28°14'18.13"E |
| 4 | 31°22'7.72"S | 28°13'40.75"E | 31°22'35.68"S | 28°13'51.84"E | 31°22'16.23"S | 28°14'21.20"E |
| 5 | 31°22'10.91"S | 28°13'43.68"E | 31°22'33.49"S | 28°13'50.17"E | 31°22'17.26"S | 28°14'23.07"E |
| 6 | 31°22'13.10"S | 28°13'46.70"E | 31°22'21.90"S | 28°13'24.12"E | 31°22'18.65"S | 28°14'30.88"E |
| 7 | 31°22'16.66"S | 28°13'49.27"E | | | 31°22'18.48"S | 28°14'33.09"E |
| 8 | 31°22'13.82"S | 28°13'44.73"E | | | 31°22'23.23"S | 28°14'42.07"E |
| 9 | 31°22'13.93"S | 28°13'42.92"E | | | 31°22'29.13"S | 31°22'29.13"S |
| 10 | 31°22'14.76"S | 28°13'42.71"E | | | 31°22'32.73"S | 28°14'30.08"E |
| 11 | 31°22'11.85"S | 28°13'32.37"E | | | | |
| 12 | 31°22'11.14"S | 28°13'27.70"E | | | | |

### 7.2.11 Property Details for Greenfields Dam 11

| **Item** | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 1030, 1031, 1032 |
| Development footprint size(s) in $m^2$: | 691 600 $m^2$ Plantation<br>17 500 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000103000000; C02400000000103100000; C02400000000103200000; |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD 1 LATITUDE (S) | ORCHARD 1 LONGITUDE (E) | ORCHARD 2 LATITUDE (S) | ORCHARD 2 LONGITUDE (E) |
|---|---|---|---|---|---|---|
| 1 | 31°23'21.95"S | 28°6'59.47"E | 31°23'32.51"S | 28° 6'55.53"E | 31°23'49.12"S | 28°6'15.60"E |
| 2 | 31°23'24.55"S | 28° 7'3.53"E | 31°23'37.34"S | 28° 7'0.97"E | 31°23'53.41"S | 28°6'21.11"E |
| 3 | 31°23'28.70"S | 28°6'54.98"E | 31°23'51.97"S | 28° 7'0.55"E | 31°23'54.44"S | 28°6'26.85"E |
| 4 | 31°23'28.43"S | 28°6'52.66"E | 31°23'58.93"S | 28° 6'53.54"E | 31°24'1.63"S | 28°6'33.20"E |

| | | | | | | |
|---|---|---|---|---|---|---|
| 5 | 31°23'29.94"S | 28°6'51.06"E | 31°24'1.88"S | 28° 6'57.70"E | 31°24'6.31"S | 28°6'30.61"E |
| 6 | 31°23'28.61"S | 28°6'51.58"E | 31°24'6.51"S | 28° 6'53.74"E | 31°24'12.27"S | 28°6'30.95"E |
| 7 | 31°23'26.09"S | 28°6'44.12"E | 31°24'4.50"S | 28° 6'42.77"E | 31°24'8.59"S | 28°6'21.63"E |
| 8 | 31°23'25.90"S | 28°6'42.02"E | 31°23'52.46"S | 28° 6'44.47"E | 31°24'7.81"S | 28°6'11.97"E |
| 9 | 31°23'25.61"S | 28°6'50.71"E | 31°23'48.17"S | 28° 6'38.41"E | 31°23'54.78"S | 28° 6'4.66"E |
| 10 | 31°23'22.78"S | 28°6'54.02"E | 31°23'44.55"S | 28° 6'44.96"E | 31°23'49.03"S | 28°6'15.70"E |
| 11 | | | 31°23'38.83"S | 28° 6'44.75"E | 31°23'53.32"S | 28°6'21.51"E |
| 12 | | | 31°23'32.08"S | 28° 6'50.44"E | 31°23'53.32"S | 28°6'25.74"E |

### 7.2.12 Property Details for Magoda Dam 12

| **Item** | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | 1092, 1091 |
| Development footprint size(s) in $m^2$: | 136 600 $m^2$ Plantation<br>3 000 $m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000109200000; C02400000000109100000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD 1 LATITUDE (S) | ORCHARD 1 LONGITUDE (E) |
|---|---|---|---|---|
| 1 | 31°25'19.81"S | 28° '19.97"E | 31°25'3.77"S | 28° 6'14.93"E |
| 2 | 31°25'22.18"S | 28° '15.67"E | 31°25'14.68"S | 28° 6'13.78"E |
| 3 | 31°25'22.83"S | 28° 6'14.11"E | 31°25'16.39"S | 28° 6'9.03"E |
| 4 | 31°25'22.77"S | 28° 6'13.35"E | 31°25'20.88"S | 28° 6'3.28"E |
| 5 | 31°25'22.18"S | 28° 6'12.71"E | 31°25'24.32"S | 28° 6'0.84"E |
| 6 | 31°25'22.30"S | 28° 6'11.58"E | 31°25'22.93"S | 28° 5'56.63"E |
| 7 | 31°25'22.01"S | 28° 6'10.73"E | 31°25'15.18"S | 28° 5'58.92"E |
| 8 | 31°25'17.05"S | 28° 6'17.49"E | 31°25'9.03"S | 28° 6'3.70"E |

### 7.2.13 Property Details for Qangule Dam 13

| Item | Description |
|---|---|
| Property location of all proposed sites: | Eastern Cape Province, Chris Hani DM, Sakhisizwe LM, Ward 0 |
| Farm/Erf name(s) & number(s) (including portion) of all proposed sites: | RE/ 219, 220, 221, 217, 216, 215, 214, 213, 212, 229, 227, 230, 272, 271 |
| Development footprint size(s) in $m^2$: | 1 283 300 $m^2$ Plantation<br>13 000$m^2$ Dam |
| SG Digit code(s) of all proposed sites: | C02400000000021900000; C02400000000022000000;<br>C02400000000022100000; C02400000000021700000;<br>C02400000000021600000; C02400000000021500000;<br>C02400000000021400000; C02400000000021300000;<br>C02400000000021200000; C02400000000022900000;<br>C02400000000022700000; C02400000000023000000;<br>C02400000000027200000; C02400000000027100000 |

Coordinates of corner points of study area:

| | DAM LATITUDE (S) | DAM LONGITUDE (E) | ORCHARD 1 LATITUDE (S) | ORCHARD 1 LONGITUDE (E) | ORCHARD 2 LATITUDE (S) | ORCHARD 2 LONGITUDE (E) | ORCHARD 3 LATITUDE (S) | ORCHARD 3 LONGITUDE (E) |
|---|---|---|---|---|---|---|---|---|
| 1 | 31°20'34.03"S | 28°14'1.10"E | 31°19'30.16"S | 28°13'22.67"E | 31°20'38.40"S | 28°13'20.20"E | 31°21'5.37"S | 28°12'43.64"E |
| 2 | 31°20'38.39"S | 28°13'51.57"E | 31°19'48.11"S | 28°13'45.55"E | 31°20'47.33"S | 28°13'25.97"E | 31°21'6.37"S | 28°12'39.36"E |
| 3 | 31°20'40.93"S | 28°13'48.60"E | 31°19'50.81"S | 28°14'2.18"E | 31°20'53.96" | 28°13'16.08"E | 31°20'56.83"S | 28°12'34.98"E |
| 4 | 31°20'42.71"S | 28°13'47.21"E | 31°20'6.56"S | 28°13'55.21"E | 31°21'2.74"S | 28°13'29.78"E | 31°20'46.95"S | 28°12'23.60"E |
| 5 | 31°20'42.35"S | 28°13'42.91"E | 31°20'4.03"S | 28°13'31.28"E | 31°21'6.91"S | 28°13'26.84"E | 31°20'42.40"S | 28°12'28.91"E |
| 6 | 31°20'44.90"S | 28°13'35.01"E | 31°20'5.27"S | 28°13'24.68"E | 31°21'8.28"S | 28°13'22.94"E | 31°20'48.51"S | 28°12'35.98"E |
| 7 | 31°20'37.46"S | 28°13'31.05"E | 31°19'56.85"S | 28°13'18.74"E | 31°21'7.17"S | 28°13'15.72"E | 31°20'57.53"S | 28°12'43.13"E |
| 8 | 31°20'35.54"S | 28°13'39.92"E | 31°19'51.98"S | 28°13'30.12"E | 31°21'10.58"S | 28°13'17.23"E | | |
| 9 | 31°20'38.24"S | 28°13'44.19"E | 31°19'48.01"S | 28°13'25.10"E | 31°21'14.15"S | 28°13'10.65"E | | |
| 10 | 31°20'36.83"S | 28°13'48.46"E | 31°19'41.58"S | 28°13'27.91"E | 31°21'13.15"S | 28°13'2.27"E | | |
| 11 | | | | | 31°21'3.32"S | 28°13'7.49"E | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 12 | | | | | 31°20'56.90"S | 28°13'2.25"E | | |
| 13 | | | | | 31°20'48.37"S | 28°12'58.53"E | | |
| 14 | | | | | 31°20'44.10"S | 28°13'0.24"E | | |

## 7.3 **Current Land Use**

All the properties involved in the project are agricultural properties. Large areas of cultivated lands are present, the most common crop being maize. **The areas allocated for the orchards are predominantly comprised of 417.3 Ha cultivated lands (66.34%).** The balance of the area in terms of land use comprises gravel roads and dwellings.

## 7.4 **Infrastructure**

Infrastructure is generally of a rural standard with regards to the properties. Gravel roads are the only roads present, Eskom is present in some areas, and some farms do have smaller stock dams.

## 7.5 **Climate**

Average monthly rainfall site-specific data was sourced from Pegram (2016). Extract 1 presents the summary of the site-specific average monthly rainfall distribution.

| Month | Rainfall (mm) |
|---|---|
| Jan | 117 |
| Feb | 111 |
| Mar | 100 |
| Apr | 46 |
| May | 25 |
| Jun | 16 |
| Jul | 17 |
| Aug | 22 |
| Sep | 43 |
| Oct | 63 |
| Nov | 87 |
| Dec | 106 |
| **Total** | **753** |

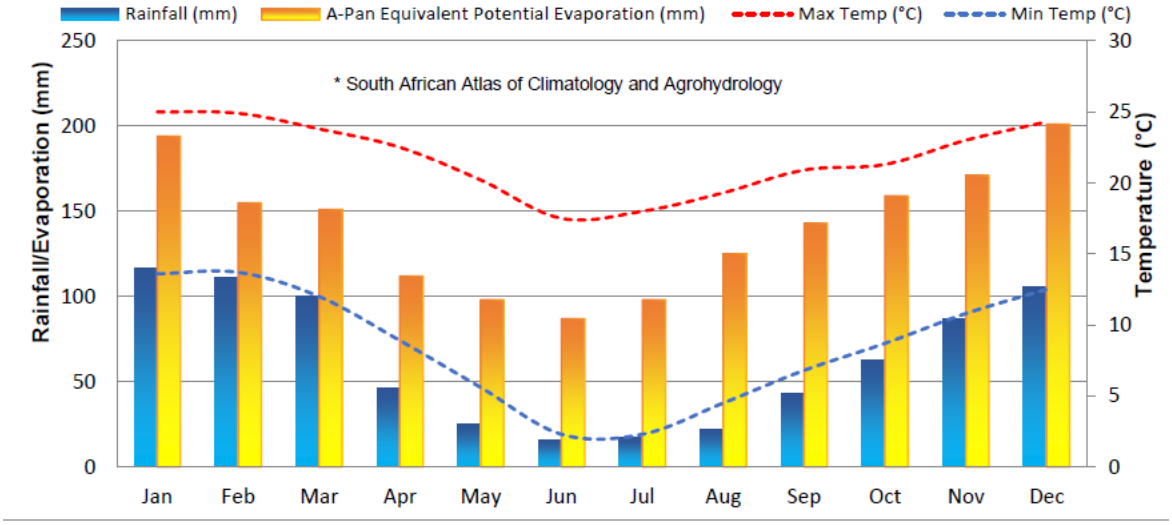
**Extract 1: Average Monthly Rainfall Distribution (Pegram, 2016)**

The average monthly evaporation distribution is presented in Extract 2 and shows the site has an annual potential evaporation of 1694mm.

| Month | Evaporation(mm) |
|---|---|
| Jan | 194 |
| Feb | 155 |
| Mar | 151 |
| Apr | 112 |
| May | 98 |
| Jun | 87 |
| Jul | 98 |
| Aug | 125 |
| Sep | 143 |
| Oct | 159 |
| Nov | 171 |
| Dec | 201 |
| **Total** | **1694** |

**Extract 2: Average Monthly A-PAN Equivalent Evaporation (Pegram, 2016)**

The average climate for the site is presented in Extract 3 using the outcome of the investigation into rainfall and evaporation for the site. The combination of rainfall (Pegram, 2016) and evaporation and temperature (Schulze and Lynch, 2006) result in a warm temperate climate (fully humid with warm summers) according to the Köppen-Geiger climate classification.




**Extract 3: Average Monthly Climate For The Site**

## 7.6 **Topography**

The site falls within a hilly to mountainous area incised by numerous perennial and non-perennial drainage lines.

Refer to **Figure 7** for the map showing the terrain and elevation. Noticeable features are the amount of drainage features and elevation above sea level being medium to high values.

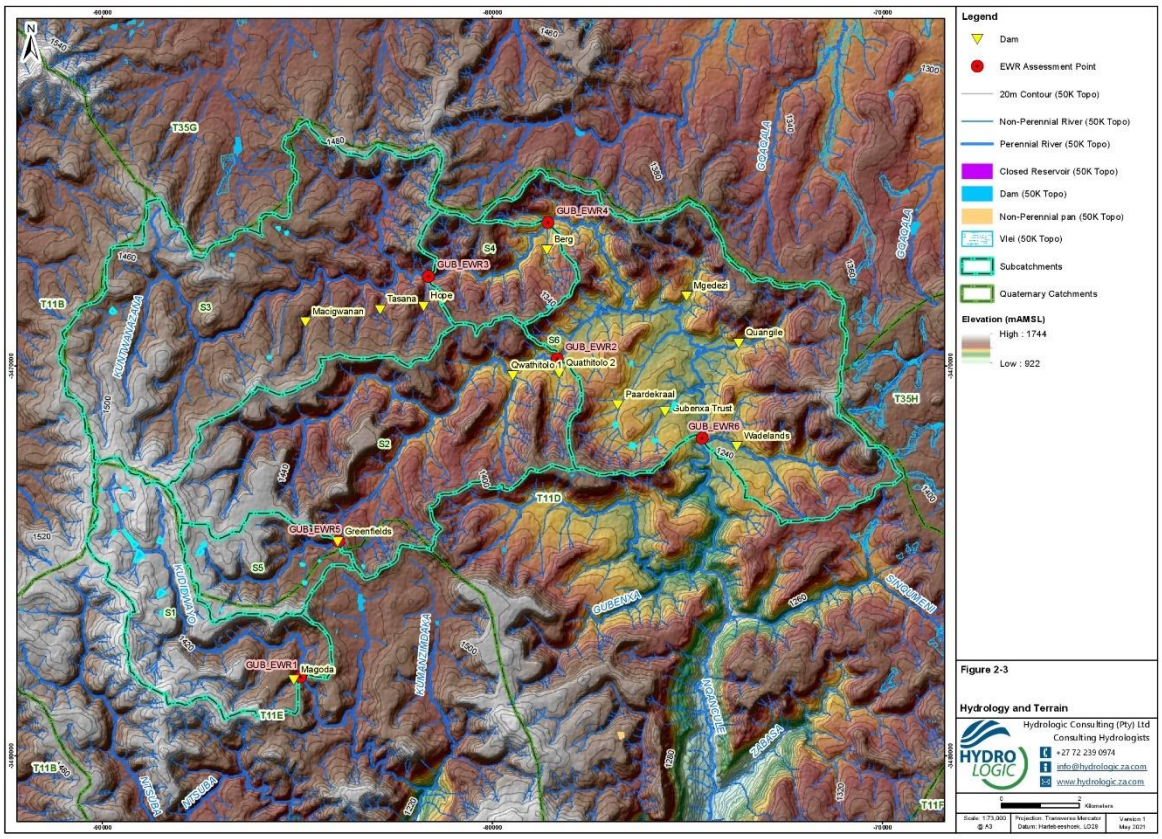



**Figure 7: Hydrology and Terrain Map**

## 7.7 **Hydrology**

Figure 8 provides a visual representation of the drainage features associated with the site.

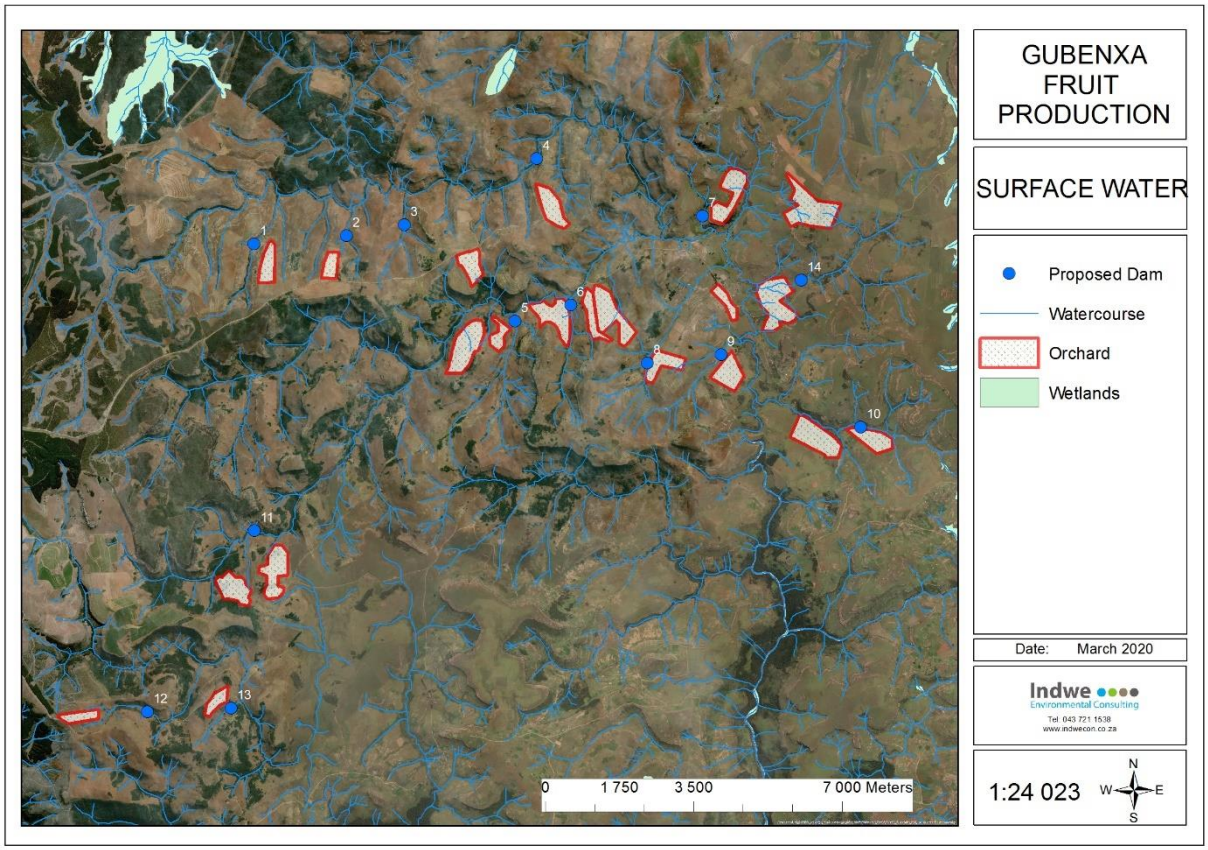



**Figure 8: Drainage features within the development area**

Of the 13 dams of interest, 12 are within quaternary catchment T11D, while one is within quaternary catchment T11E. The quaternary catchment is of particular relevance as it is the scale of assessment used to define the naturalised runoff (streamflow). Of the 13 dams, all but four are associated with non-perennial rivers (as defined by the NGI's 1:50,000 topographical map data). The remaining dams are associated with perennial rivers. This classification is not definitive, and it is possible that a river which is classified as non-perennial may in fact be perennial in nature (and visa versa). The NGI data indicates 29 small dams within the subcatchments of interest.

Most of the affected streams are tributaries of the Nqancule River, Kuntwanazana River and the Kudidwayo River except the Greenfields dam which is proposed to be built in the Nqancule River.

The below tables provides an overview of the "river of influence" applicable to each dam.

**Table 10: Table noting the "river of influence" applicable to each dam associated with the project**

| Farm name | Dam no. | River of influence |
|---|---|---|
| Macingwane | 1 | Kuntwanazana River |
| Tasana | 2 | Kuntwanazana River |

| | | |
|---|---|---|
| Hope | 3 | Kuntwanazana River |
| Berg | 4 | Kuntwanazana River |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | Nqancule River |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | Nqancule River |
| Mgedezi | 7 | Nqancule River |
| Paardekraal | 8 | Nqancule River |
| Gubenxa Trust | 9 | Tributary of the Nqancule River |
| Wadelands | 10 | Nqancule River |
| Greenfields | 11 | Nqancule River |
| Magoda | 13 | Kudidwayo River |
| Qangule | 14 | Nqancule River |

For the Ecological Reserve Determination assessment six EWR assessment points were defined with one point within quaternary T11E and five points within quaternary T11D. These six points of assessment were utilised in preference to an assessment point at each of the 13 dams due to the following:

- Once an EWR is defined, the subsequent requirement is that streamflow be monitored at or close to the EWR point (for management purposes). Having many EWR points (one for each dam) would consequently increase monitoring and management requirements.
- EWRs become difficult to define for small river catchments (where streamflow is not well established), with a review of dam catchments suggesting that a few may fall into the aforementioned.
- The method by which EWRs are calculated, requires naturalised 'pre-development' streamflow. This streamflow data was sourced at from a dataset established from quaternary level data. Smaller catchments are consequently less likely to reflect the rainfall-runoff response of the quaternary catchment thereby increasing the potential for error within the EWR estimation.

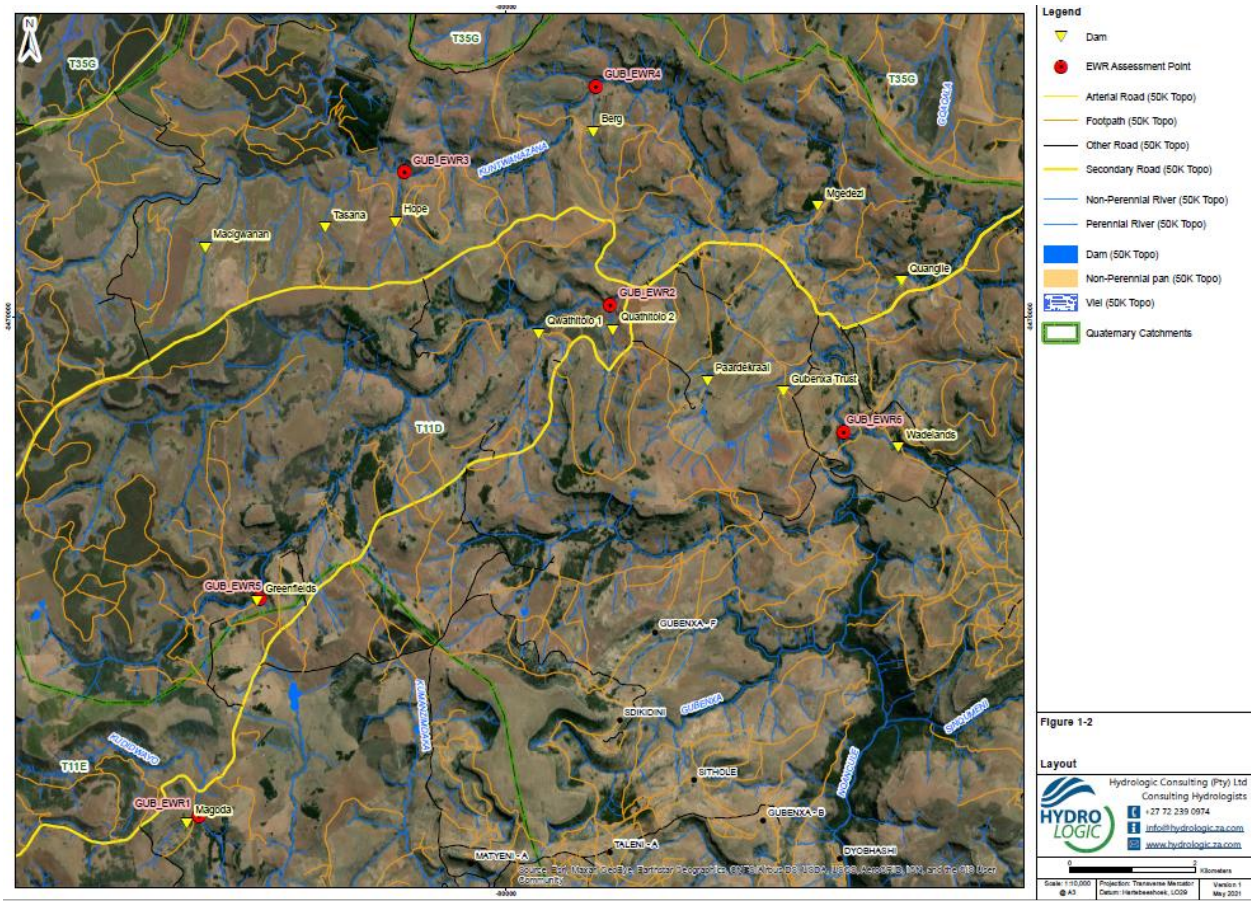



**Figure 9: EWR Sites in relation to the proposed dam sites**

The six EWR assessment identified, enable the assessment of the EWR for multiple dams (based upon the accumulation of streamflow), while also adding up to encompass a higher number of dams as is illustrated by accumulation of dams of relevance when assessment points GUB_EWR3 (3 dams), GUB_EWR4 (4 dams) and GUB_EWR6 (12 dams) are considered. This approach of limiting EWR assessment points to key locations should enable more practical management with regards to the maintenance of streamflows associated with the construction and operation of the 13 dams.

All six EWR assessment points were positioned on defined perennial rivers, and by association, on rivers with larger upstream subcatchment areas (compared to some of the dams). For example, GUB_EWR1 has a subcatchment area of 18.8km$^2$, compared to the contributing area of the associated dam (Magoda) which is estimated as less than 1km$^2$. The occurrence of small subcatchments (when considering dam locations), motivated the positioning of the EWR assessment points within the larger perennial rivers.

When considering the quaternary catchments of relevance (T11D and T11E), the estimation of their effective catchment area is possible by one of two approaches. Either the quaternary catchment boundaries as defined can be used or the quaternary catchment boundaries can be 'recalculated' using the same 25m NGI DEM as used for the subcatchment area calculation. The second approach was adopted for the study in order to maintain consistency in the calculation of sub/catchment areas as well as to overcome the high-level delineation of quaternary catchment boundaries.

The WR2012 report (Bailey and Pitman, 2015) and associated datasets includes a simulation of water resources for each of the country's quaternary catchments. This includes quaternary catchment T11D and T11E within which the site falls. WR2012 includes an assessment of both present-day streamflow (including the influence of irrigation, afforestation, mining, alien vegetation, paved areas, abstractions, dams and transfers) and naturalised streamflow (in which the man-made features are removed). Naturalised streamflow was consequently extracted for use in the EWR assessment.

The full period of modelled streamflow (which runs from 1920 to 2009) was extracted from the WR2012 dataset for the relevant quaternary catchments and downscaled to the EWR assessment points.

The Revised Desktop Reserve Model (RDRM) provides an efficient approach which enables quick estimates of the ecological reserve for rivers within South Africa. Unlike the previous desktop reserve model (DRM), the RDRM includes explicit links between hydrology, hydraulics, ecology and flooding (each of which are implemented as submodels in the software). The RDRM is consequently rooted in the Buildings Blocks Methodology (BBM) by King and Louw (1998), which considers the complex process of interaction between ecological, geomorphological, hydraulic and hydrological processes and the resulting ecological water requirement (EWR) necessary to keep a river in a predetermined sustainable condition (referred to as the recommended ecological category or REC). Estimation of the EWR is achieved through the use of naturalised streamflow to enable an assessment of a rivers flow conditions 'predevelopment' (Hughes et al., 2012).

The recommended ecological category (REC) for a river is a continuation of the present ecological state (PES) for a river, with both using the same classification, from category A to F as per the following:

- Class A: close to natural condition;
- Class B: largely natural with few modifications;
- Class C: moderately modified;
- Class D: largely modified;
- Class E: seriously modified; no longer providing sustainable services; and
- Class F: critically modified; no longer providing sustainable services.

The REC classification for each of the EWR assessment points were classified according to the following:

- GUB_EWR1 – REC = 'C' (moderately modified)
- GUB_EWR2 – REC = 'B' (largely natural with few modifications)
- GUB_EWR3 – REC = 'C' (moderately modified)
- GUB_EWR4 – REC = 'C' (moderately modified)
- GUB_EWR5 – REC = 'B' (largely natural with few modifications)
- GUB_EWR6 – REC = 'B' (largely natural with few modifications)

The selected level of assessment for this study was set to that of 'Rapid 2'. This was due to the input from an aquatic ecologist (Amanda Austin), while no channel survey of the EWR assessment points was available which meant that a Rapid 3 level of assessment could not be undertaken. The use of a 'Rapid' approach to the estimation of the EWRs is also in-line with the terms of reference for this study2 which requested a 'rapid ecological reserve determination'.

The RDRM has been integrated into the Spatial and Time Series Information Modelling (SPATSIM) system, with SPATSIM version 3 being used to run the model. Supplementary datasets required for

running the RDRM included hydrologic parameters (e.g baseflow separation values), hydraulic model parameters (e.g. river longitudinal slope) and ecological parameters (e.g. stress weights emphasising important streamflow regimes for sensitive species). The naturalised streamflow for each of the EWR assessment points (as derived from the WR2012 dataset) were also used.

The results of the RDRM are presented in the extract below, which indicates the annual low flow and total flow requirements for each REC (reported as EWR's in million m3/annum). Low flows are associated with maintenance and drought requirements while total flows (the combination of low and high flows) are associated with the overall EWR in any one month (which will usually include periods of high flows). Relevant RECs are highlighted as per the classifications described above.

| REC | Low Flows | | Total Flows | |
|---|---|---|---|---|
| | $Mm^3$/annum | %MAR | $Mm^3$/annum | %MAR |
| GUB_EWR1 | | | | |
| A | 0.852 | 20.7 | 1.362 | 33.1 |
| A/B | 0.76 | 18.4 | 1.256 | 30.5 |
| B | 0.69 | 16.7 | 1.173 | 28.5 |
| B/C | 0.603 | 14.6 | 1.07 | 26 |
| C | 0.53 | 12.9 | 0.971 | 23.6 |
| C/D | 0.447 | 10.9 | 0.864 | 21 |
| D | 0.38 | 9.2 | 0.768 | 18.7 |
| GUB_EWR2 | | | | |
| A | 1.988 | 24.7 | 3.159 | 39.3 |
| A/B | 1.829 | 22.8 | 2.964 | 36.9 |
| B | 1.686 | 21 | 2.77 | 34.5 |
| B/C | 1.483 | 18.5 | 2.516 | 31.3 |
| C | 1.296 | 16.1 | 2.293 | 28.5 |
| C/D | 1.062 | 13.2 | 1.996 | 24.8 |
| D | 0.842 | 10.5 | 1.726 | 21.5 |
| GUB_EWR3 | | | | |
| A | 2.038 | 24.5 | 3.235 | 38.9 |
| A/B | 1.849 | 22.2 | 3.009 | 36.2 |
| B | 1.698 | 20.4 | 2.808 | 33.8 |
| B/C | 1.495 | 18 | 2.556 | 30.8 |
| C | 1.316 | 15.8 | 2.33 | 28 |
| C/D | 1.101 | 13.3 | 2.063 | 24.8 |
| D | 0.906 | 10.9 | 1.808 | 21.8 |
| GUB_EWR4 | | | | |
| A | 2.326 | 23.8 | 3.679 | 37.6 |
| A/B | 2.095 | 21.4 | 3.412 | 34.8 |
| B | 1.948 | 19.9 | 3.231 | 33 |
| B/C | 1.742 | 17.8 | 2.954 | 30.2 |
| C | 1.542 | 15.7 | 2.7 | 27.6 |
| C/D | 1.286 | 13.1 | 2.379 | 24.3 |
| D | 1.031 | 10.5 | 2.057 | 21 |
| GUB_EWR5 | | | | |
| A | 0.314 | 22.8 | 0.522 | 37.9 |
| A/B | 0.281 | 20.4 | 0.482 | 35 |
| B | 0.255 | 18.5 | 0.445 | 32.3 |
| B/C | 0.221 | 16.1 | 0.404 | 29.4 |
| C | 0.193 | 14 | 0.368 | 26.7 |
| C/D | 0.161 | 11.7 | 0.326 | 23.7 |
| D | 0.135 | 9.8 | 0.291 | 21.1 |
| GUB_EWR5 | | | | |
| A | 6.536 | 25.2 | 10.214 | 39.4 |
| A/B | 5.975 | 23 | 9.56 | 36.8 |
| B | 5.538 | 21.3 | 8.994 | 34.7 |
| B/C | 4.942 | 19 | 8.233 | 31.7 |
| C | 4.394 | 16.9 | 7.537 | 29 |
| C/D | 3.696 | 14.2 | 6.665 | 25.7 |
| D | 3.028 | 11.7 | 5.814 | 22.4 |

In considering the results of the EWR analysis, March and July were identified by the RDRM as the critical wettest and driest months respectively for all EWR assessment points.

**Appendix B to Appendix G of the Rapid Ecological Reserve Determination for 13 Dams in the EC Report** in Appendix D of this Draft EIR presents the flow duration curves for all months of the year (including the

critical months) and illustrate the percentage of time that streamflow is required to equalled or exceeded to satisfy the ecological reserve. The flow duration (or assurance) curves illustrate the range of naturalised streamflow conditions and associated EWR's that may be experienced at the EWR assessment point during any particular month (since some years' experience more streamflow than others). The low and total flow assurance curves for the EWR are illustrated according to their relevant REC.

In the wetter months baseflow is supplemented by a large volume of runoff produced by rainfall events (amounting to the natural total illustrated in the Figures). In the drier months (where runoff is limited) the surplus of streamflow from rainfall events is diminished significantly, with the EWR low flow assurance nearly overlapping the natural baseflow curve. The implication from the aforementioned is that there is proportion of water available (above the EWR) for the wetter months where rainfall supplements streamflow.

A baseline assessment, including the sourcing and processing of appropriate data pertaining to rainfall, evaporation, topography, land-cover, soils as well as regional and local hydrology, has been undertaken to determine the ecological water requirements (or ecological reserve determination) for 13 dams in the Gubenxa Valley. The need for EWRs is due to the requirements of the National Water Act of 1998 (NWA, 1998) which establishes that all existing and future water users will require licencing which accounts for both basic human needs reserve and the ecological reserve (i.e. the water requirement before other users are permitted to abstract water). This specialist report and inclusion of this Draft EIR is consequently intended to inform the water use authorisation processes and specifically the quantification of the EWR.

According to the Hydrology and Yield Analysis Assessments done for the dams through the Engineers, the following was determined:

- For dams 10 (Wadelands), 11 (Greenfields), 13 (Magoda) and 14 (Qangule), Knight Piesold Consulting who were the organisation responsible for assessing the hydrology and yield of the said dam catchments noted that ***"it is apparent, the trend for the outflows remains similar and peak flows are only marginally reduced following construction of a dam at all sites. This suggests little attenuation and nominal impact on the natural flow regime. The overall impact on the catchment hydrology and runoff triggered by the construction of these dams is considered minor"***
- For dams 1 (Macingwane), 2 (Tasana), 3 (Hope) and 4 (Berg), SJL Mallory was responsible for assessing the hydrology and yield of the said dam catchments noted that "although the dams are small and located in small catchments, due to the substantial runoff in the mountainous area in which the dams will be located, the yield from the dams is significant, with a total estimated yield of 483 000 $m^3$/annum at 80% assurance and 400 000 $m^3$/annum at 90% assurance. This is after allowing for releases for the EWR and 20 years of sediment deposition."

## 7.8 **Aquatic Ecology**

BioBlue Environmental Sustainability conducted the Aquatic Ecological/ Biodiversity Assessment (Refer to Appendix D) in order to evaluate the impact of the proposed dams on the Nqancule, Kuntwanazana and Kudidwayo Rivers. This section includes the reporting of general habitat integrity, riparian vegetation integrity, habitat conditions and fish communities. The condition of upstream and downstream monitoring sites for each dam site is included.

Site visits were conducted on 3rd of March until the 14th of March 2021 and it was noted that the area had sufficient summer rain

The area is located within the South Eastern Uplands- Upper Eco Region. A complex range of terrain morphological classes occur in this region: plains with a moderate relief, lowlands with a low relief, lowlands with a high relief, open hills with low relief, open hills with high relief, closed hills with a moderate relief and low mountains with a high relief.

Vegetation types are equally diverse and include a variety of Grassland types, Bushveld types, Thicket types and Afromontane Forest. The most prominent amongst these are Moist Upland Grassland. A range of rivers such as, Mgeni, Mzimvubu, Mkomazi, Mzimkulu and Groot Kei traverses this region. Perennial tributaries of these rivers are also common. Characteristics are as follows:

- Mean annual precipitation: Generally high;
- Coefficient of variation of annual precipitation: Mostly moderate to low;
- Drainage density: Medium in the north, tending towards low in the south;
- Stream frequency: Low to medium in the south, tending towards medium high in the north;
- Slopes <5%: <20% (central areas), (20-50% (northern areas) and 50-80% (south areas);
- Median annual simulated runoff: Moderate to high; and
- Mean annual temperature: Moderate to moderately high.

The project for the National Freshwater Ecosystem Priority Areas (NFEPA) prioritised freshwater systems in the country with an aim to incorporate conservation into Catchment Management Strategies (Driver *et al.* 2011). The NFEPAs provides guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition. It supports the implementation of the National Water Act (NWA, Act 36 of 1998), National Environmental Management: Biodiversity Act (NEM:BA, Act 10 of 2004), and the National Environmental Management: Protected Areas Act (NEM:PAA, Act 57 of 2003).

The project outputs are in the form of numerous maps indicating various different categories that each has different management implications. These categories include river FEPA's and associated sub-quaternary catchments, wetland FEPA's, wetland clusters, Fish Support Areas and associated sub-quaternary catchments, fish sanctuaries, phase 2 FEPA's and associated sub-quaternary catchments and Upstream Management Areas (Driver *et al*. 2011).

Based on the NFEPA information (Driver et al. 2011), the sites selected on the Nqancule River, Kuntwanazana River and the Kudidwayo River, were identified as Fish Support Areas in the study area. Fish Support Areas are fish sanctuaries with a lower than an A or B ecological condition and also include sub-quaternary catchments that are important for migration of threatened or near-threatened fish species.

### 7.8.1 Monitoring Sites

All the downstream and some of the upstream had sufficient water available to conduct a SASS5 assessment. Invertebrate Habitat Assessment System (IHAS) evaluation was conducted to evaluate the habitats available. Vegetation was limited but was still available. The flow of water at all upstream points

were low. Some of the main Rivers are affected by erosion due to farming activities as well as alien invasive vegetation that have resulted in the riverbanks being destabilised.

Impacting activities taking place at the study area and stemming upstream of the project area include farming activities such as grazing cattle and irrigation of crops, erosion and disintegration of the river's banks, river crossings, alien invasive plants and rural/informal settlements. Alien vegetation, lack of endemic marginal vegetation, unstable riverbanks and erosion were evident at all the monitoring points in the main Rivers. Currently the impacts from the agricultural activities in the area is minimal. But the impacts of alien vegetation are evident. The area will greatly benefit from a riparian zone replant and alien vegetation removal program.

**Table 11: Table noting the locality and description of monitoring sites, as adapted by the Aquatic Ecological Assessment Report**

| Farm name | Dam no. | River of influence | Upstream (US) or Downstream (DS) of proposed dam | Habitat Conditions |
|---|---|---|---|---|
| Macingwane | 1 | Kuntwanazana River | DS | Limited vegetation habitat |
| Tasana | 2 | Kuntwanazana River | DS | Limited vegetation, Limited GSM |
| Hope | 3 | Kuntwanazana River | DS | Limited vegetation, Limited sand and mud |
| Berg | 4 | Kuntwanazana River | DS | Limited stones and vegetation |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | Nqancule River | US & DS | Limited stones (US) Limited vegetation (DS) |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | Nqancule River | US & DS | Limited stones (US) Limited vegetation (DS) |
| Mgedezi | 7 | Nqancule River | US & DS | Limited stones and vegetation (DS) Limited stones (US) |

| | | | | |
|---|---|---|---|---|
| Paardekraal | 8 | Nqancule River | US/DS | No water flow present |
| Gubenxa Trust | 9 | Tributary of the Nqancule River | US | Limited Stones |
| Wadelands | 10 | Nqancule River | DS | Limited Vegetation |
| Greenfields | 11 | Nqancule River | DS | Limited stones and vegetation |
| Magoda | 13 | Kudidwayo River | DS | Habitat seems to be in a good conditions |
| Qangule | 14 | Nqancule River | DS | Limited vegetation |

### 7.8.2 Present Ecological State (PES)

Most of the monitoring sites scored in a class D (Largely modified) or E/F (Seriously modified) except for the Hope Dam (Dam 3 DS) which scored an C (moderately modified), Berg Dam (Dam 4 DS) and Qwathitolo 2 Dam (Dam 10 DS) which scored an B (Largely Natural with a few modifications) and the Wadelands Dam downstream monitoring point which scored an A (Natural).

The Nqancule River and Kudidwayo River seems to be in an ecological poor state. The ecological state is classified as largely modified to seriously modified. The Rivers still housed an abundance of sensitive macro-invertebrate species. The lack of natural riparian vegetation and densely populated alien invasive trees in the riparian zone, could have caused the riverbanks to become unstable, decrease sunlight for vegetation growth and decrease habitat for macro-invertebrate. Thus, although the water quality in the region is good and the physical and chemical conditions of the rivers are in great condition the lack of vegetation is decreasing the present ecological status of the rivers.

The Kuntwanazana River seems to be in a moderate state with two of the monitoring sites within the River scoring as expected.

### 7.8.3 Upstream Monitoring Sites vs Downstream Monitoring Sites

The upstream monitoring points were usually lacking in available habitats to conduct a SASS5 evaluation. When a SASS5 evaluation could be conducted the SASS5, evaluation scored a E/F class (Seriously modified). The upstream monitoring sites housed sensitive taxas namely: Aeshnidae (Hawkers & Emperors) and Corduliidae (Cruisers)

The downstream monitoring points appeared to be in better condition and a SASS evaluation could be conducted at all the proposed dam sites except Dam 9 (Paardekraal) due to no water flow. The riparian zone was largely impacted by alien invasive trees; restricting sunlight, reducing scrubs and shoots on the riverbank and causing erosion and destabilised riverbanks.

The expected Present ecological state of the Kuntwanazana River is a B only one of the monitoring sites scored within the expected ecological state (Berg Rivier Dam downstream) (Dam 4 DS). The other three monitoring sites scored below the expected ecological state. The River still had an abundance of sensitive

macro-invertebrate taxas indicating that the physical and chemical composition of the river is still in a good condition. The one habitat the seems to be constantly at a low quantity within the river is vegetation. Alien invasive trees played a major role in the loss of vegetation restricting the available habitats for macro-invertebrates. The monitoring sites will greatly benefit from an alien invasive removal program tighter with a riverbank regrowth program.

The expected Present ecological state of the Nqaucule River is a B in the Northern part of the river and an C on the Southern part of the river. Only two of the monitoring sites scored within the expected ecological state (Wadelands Dam Downstream and Qwathitolo 2 Dam Downstream) (Dam 7 DS and Dam 10 DS). Most of the monitoring sites scored below the expected present ecological state. The River still had an abundance of sensitive macro-invertebrate taxas indicating that the physical and chemical composition of the river is still in a good condition. The one habitat the seems to be constantly at a low quantity within the river is vegetation. Alien invasive trees played a major role in the loss of vegetation restricting the available habitats for macro-invertebrates.

Only one site within the Kudidwayo River was monitored. The specific site scored a D present ecological status. The expected present ecological status of the river is unknown but given that it is in a small catchment area and the other rivers in the system have an expected PES of C/B it is assumed that one can expect the same for this river. The River system does house some sensitive macro-invertebrate taxa. Alien trees were also heavily present on the riverbank.

### 7.8.4 Fish Community Assessment

The reference fish community associated with the Gubenxa project is expected to contain 6 fish species in total, namely

- African longfin eel
- Amatola Barb
- Chubbyhead Barb
- Vaal-Orange smallmouth yellowfish
- Common carp
- Banded Tilapia

These fish species are noted has having a “Least Concern” conservation status with the Common carp being an “introduced/ alien” species.

Only three of the expected six fish species were sampled in the systems. The indigenous fish species include *Enteromius amatolicus* (Amatola barb) and *E. anoplus* (Chubbyhead barb). One alien fish species was also sampled Cyprinus carpio (Common carp) in a tributary of the Nqancule River (Gubenxa Trust Dam). Overall, the fish diversity and abundances are low in the Nqancule River, Kuntwanazana River and the Kudidwayo River.

Three of the sites on the Kuntwanazana River (Macingwane, Tsana & Hope Dams) were high up in the catchment and closer to the source of the Kuntwanaza River with a lack in habitat availability. No fish were sampled here during the current assessment and these sites were largely modified. However, it is anticipated that the *Enteromius* species should still be present here as they occur further downstream on this river. Unfortunately, no fish were sampled at one of the sites on the Nqancule River (Quangile Dam) and this might be due to migration of these species between the river reaches. Therefore, this site was

also classed as largely modified. The remaining sites on the Kuntwanazana, Nquancule and Kudidwayo River were moderately modified with one or both *Enteromius* species present.

The tributaries of the Kuntwanazana (Mgadezi) and Nquancule Rivers (Qwathitolo 2 & 1) are smaller watercourses and one or both *Enteromius* species were present. This indicated that these smaller watercourses are important systems for many of the smaller fish species found within these systems, as it provides refuge areas during high flow events in the rainy summer season.

Based on the current results, it is highly recommended that *E. amatolicus* should be used as an indicator species in future monitoring events because it occurred at most of the sampled sites.

### 7.8.5 Water Quality Analysis

At the time of the site inspection 13 (thirteen) monitoring sites were visited, water quality monitoring took place at all these sites. The monitoring point Paardekraal Dam had no flow of water from any direction and cattle were drinking out the wetland. SASS5 was performed at only four of these points. The reason for this is that the other sites did not have adequate habitats to conduct a SASS evaluation.

Turbidity, TDS, Faecal coliform Bacteria, and E Coli were higher that the target Quality objectives at some of the sites. Turbidity seems to be high at most of the sites except Dam 2, 5 and 11. Most of these locations are within agricultural land and turbid water is expected. The geomorphology of most of South Africa's rivers tend to have more turbid waters. The TDS of most of the Dams seems to be near TQO except for Dam 9-11. These dams are situated in close proximity to one another. The point source of the higher salt within the water are unknown but it seems that it is something in the area; agricultural runoff is a potential cause of the higher TDS within the water.

Both E Coli and Faecal coliform Bacteria are linked to excrement Dams 4, 10, 12 and 13 consideration than the TQO. **At all these sites livestock were observed within the area where the monitoring took place. The most likely cause of the higher concentration is the livestock within close proximity to the streams.**

## 7.9 Wetland Features

According to the National Water Act, 1998 (Act 36 of 1998) a wetland is defined as *"land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soil".*

Wetlands can be found in the landscape where water is slowed down because of the topography (i.e., very flat). Wetlands are also found where groundwater discharges or is very close to the surface. Generally, wetlands have permanent, seasonal, and temporary zones. Wetlands are habitats that act as a transition from the terrestrial to the aquatic. Plants that are specifically adapted to wetland soils can be found in wetlands. These plants are called hydrophytes and even further slows down the movement of water through the landscape (Collins, 2005).

Wetlands play an important role in water security through the recharge of groundwater, which in turn leads to the replenishment of aquifers, as well as by augmenting stream and river flow. This in many

instances has the effect of sustaining flow throughout the year. The soils together with the vegetation within a wetland acts as a sponge, which retains water long after precipitation events. The water within the wetland zones then slowly release water into rivers and streams during the dry periods, providing streamflow regulation throughout the year. Wetland vegetation prevents erosion by binding and stabilising the soil, dissipating energy from stream flow and storm events. Wetland vegetation possess the capacity to rapidly recover after storm events (Kotze et al., 1994).

Wetlands are essential for providing goods and services either directly and indirectly. For direct benefits, some wetlands serve as important breeding grounds for fish, and many wetlands, due to the prolonged presence of water, can be used as dry season grazing areas, if undertaken on a sustainable basis. Wetlands also contain a wide variety of species, some totally reliant on wetland habitats for their survival. Many of these species are used for food, craft manufacture, medicines, building material and fuel. There are also many indirect hydrological functional benefits which wetlands provide. For instance, some wetlands act like giant sponges, holding back water during floods and releasing it during low flow periods. In a dry country like South Africa, this is crucial. By regulating water flows during floods, wetlands reduce downstream erosion and flood damage. Some wetlands are also able to trap pollutants such as sediment, heavy metals, and disease-causing organisms, improving water quality.

A wetland assessment was undertaken by BioBlue Environmental Sustainability. The methodology consisted of a two-pronged approach. Firstly, a desktop study was undertaken for the study sites which was followed up by a field surveys to verify or "ground truth" the findings from the desktop study and to gain a deeper insight into the health, impacts and functioning of the wetland system to perform the wetland assessment. The field surveys were also necessary to delineate the boundaries of the wetland systems. The field surveys were conducted over a period of a week and half in March 2021. A full wetland assessment was undertaken for the wetlands within a 500m regulated area of the proposed dam walls on each of the proposed 13 dam sites. For the proposed 20 orchard sites only wetland screenings and delineations were carried out.

### 7.9.1 The National Freshwater Ecosystem Priority Areas (NFEPA)

The National Freshwater Ecosystem Priority Areas (NFEPA) project represents a multi-partner project between the Council for Scientific and Industrial Research (CSIR), South African National Biodiversity Institute (SANBI), Water Research Commission (WRC), Department of Water Affairs (DWA), Department of Environmental Affairs (DEA), Worldwide Fund for Nature (WWF), South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks). More specifically, the NFEPA project aims to:

- Identify Freshwater Ecosystem Priority Areas to meet national biodiversity goals for freshwater ecosystems; and
- Develop a basis for enabling effective implementation of measures to protect FEPA's, including free-flowing rivers.

The first aim uses systematic biodiversity planning to identify priorities for conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development. The second aim comprises a national and sub-national component: The national component aims to align DWA and DEA policy mechanisms and tools for managing and conserving freshwater ecosystems. The sub-national component aims to use three case study areas to demonstrate how NFEPA products should be implemented to influence land and water resource decision-making processes at a sub-national level. The

project further aims to maximise synergies and alignment with other national level initiatives such as the National Biodiversity Assessment (NBA) and the Cross-Sector Policy Objectives for Inland Water Conservation.

Based on current outputs of the NFEPA database, NFEPA wetlands were identified within the 500m regulated area from the proposed dam walls on four (4) of the study sites, with no NFEPA wetlands identified on the remaining nine (9) study sites (**Refer to Table 12**). The wetlands on the thirteen (13) study sites provide hydrological inputs to the Kuntwanazana, Nqancule, and Kudidwayo rivers. The wetland ecosystem type across the entire study area is the Sub-Escarpment Grassland Group 5 according to the NFEPA database. The wetlands on the study sites fall within Mzimvubu to Kieskamma Water Management Area (WMA).

**Table 12: The 13 proposed dam sites of the project along with their NFEPA status**

| Farm name | Dam no. | NFEPA Wetland presence |
|---|---|---|
| Macingwane | 1 | No |
| Tasana | 2 | No |
| Hope | 3 | No |
| Berg | 4 | No |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | No |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | No |
| Mgedezi | 7 | No |
| Paardekraal | 8 | Yes |
| Gubenxa Trust | 9 | Yes |
| Wadelands | 10 | No |
| Greenfields | 11 | No |
| Magoda | 13 | Yes |
| Qangule | 14 | Yes |

Within the 500m regulated area from the proposed Macingwane, Tasana, Hope, Berg, Mgedezi, Wadelands, Qwathitolo 1, Qwathitolo 2, and Greenfields dam wall there were no NFEPA wetlands present according to the BGIS database.

Within the 500m regulated area from the proposed Quangule dam wall a NFEPA wetland is present, it is classified as being natural and a channelled valley bottom wetland according to the BGIS database. During the field survey the wetland was confirmed to be a natural wetland belonging to the unchanneled valley bottom HGM type. **This NFEPA wetland will not be impacted upon.**

Within the 500m regulated area from the proposed Gubenxa trust dam wall three (3) NFEPA wetlands are present, two (2) are classified as artificial and one as a natural channelled valley bottom wetland according to the BGIS database. During the field survey it was found that the two (2) artificial wetlands referred to are actually one (1) and it is in the form of manmade soil dam. The other NFEPA wetland was confirmed to be a natural wetland belonging to the channelled valley bottom HGM type.

Within the 500m regulated area from the proposed Paardekraal dam wall two (2) NFEPA wetlands are present, and both are classified as channelled valley bottom wetlands according to the BGIS database. During the field survey it was confirmed that both wetlands belong to the channelled valley bottom HGM type.

Within the 500m regulated area from the proposed Magoda dam wall a NFEPA wetland is present and is classified as artificial according to the BGIS database. During the field survey it was confirmed to be a manmade soil dam within a channelled valley bottom.

### 7.9.2 Macingwane Dam Wetland Conditions and Delineations

There is one major wetland system on this site and falls within the channelled valley bottom HGM type. The channel is deeply incised and is totally infested with black wattle (*Acacia mearnsii*). The deeply incised channel confines the flow of water and stops it from spreading over the wetland, therefore the hydrological functioning of the wetland is also negatively impacted. Livestock, sedimentation and erosion has negatively impacted this wetland.

The wetland vegetation is present where the wetland soils are still intact and haven't been eroded as is the case in the channel. The wetland vegetation consists of a variety of small low growing *Cyperus* species with interspersed moist grassland species. The wetlands surface roughness has been compromised due to incision and erosion, presence of alien invasive vegetation, trampling and grazing pressure by livestock. These alien invasive species are also very water hungry and consume huge amounts of water which only increases as alien invasive's continue to spread. If not addressed, it will lead to further ecological degradation, loss of habitat and a decline in biodiversity.

Refer to **Figure 10** for the delineated wetland applicable to the dam

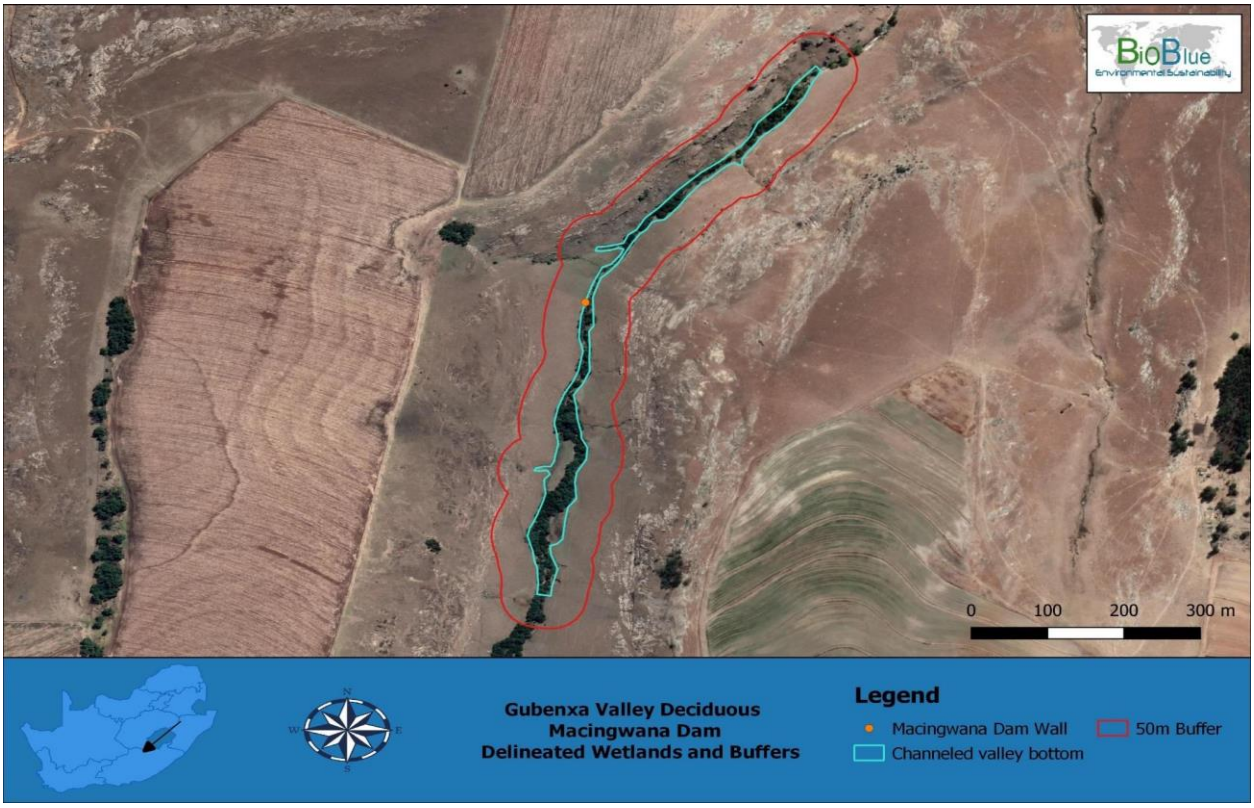



**Figure 10: Macingwane Dam: Delineated Wetlands and Buffers**

### 7.9.3 Tasana Dam Wetland Conditions and Delineations

There is one major wetland system on this site and falls within the unchanneled valley bottom HGM type. The wetland consist of two arms which come together and then downstream from there it gradually develops into a stream flowing over bedrock with riparian characteristics. Head cut erosion, and invasive alien vegetation is present however the ecological condition of the wetland is considered as being intact with a high level of integrity however if the erosion is not addressed this could lead to loss of valuable soil and decrease in water quality.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Dense stands of various *Cyperus* species are present in the permanent wet zones with *Phragmites* reeds also present but in very limited numbers. Red hot pokers or *Kniphofia spp.* were recorded at low densities. *Acacia mearnsii* do possess the ability to spread into the wetland systems and cause dense stands of infestation and this wetland would benefit from an invasive eradication plan.

Refer to **Figure 11** for the delineated wetland applicable to the dam

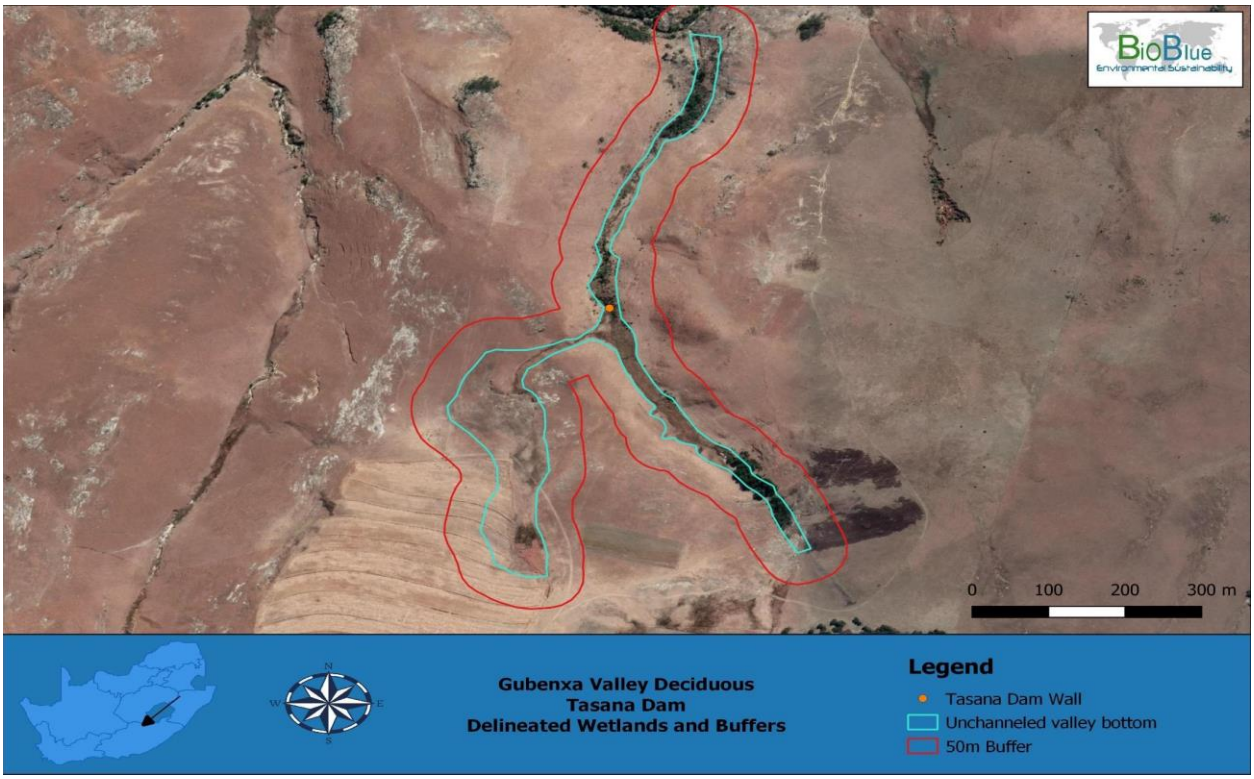



**Figure 11: Tasana Dam: Delineated Wetlands and Buffers**

### 7.9.4 Hope Dam Wetland Conditions and Delineations

There is one major wetland system on this site and falls within the channelled valley bottom HGM type. There is also a secondary wetland system which falls within the hillslope seepage HGM type which is connected to the channelled valley bottom wetland. The channelled valley bottom system which is the primary wetland system on the study site, is deeply incised with severe erosion and head-cuts present. Head cut erosion and invasive alien vegetation is present.

What is now a channelled valley bottom system was in all likelihood a unchanneled valley bottom and has trough years of a combination of degrading factors turned into a channelled valley bottom. Livestock tracks criss-crossing this wetland has led to erosion and preferential flow paths being established. The ecological condition of the wetland is poor due to the severe erosion and incision and presence of alien invasive vegetation.

A pair of Grey crowned cranes were observed foraging in the study site during the site inspection.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Various *Cyperus* species are present in the permanent wet zones. *Acacia mearnsii* do possess the ability to spread into the wetland systems and cause dense stands of infestation and therefore an alien invasive eradication plan would be most beneficial to this area.

Refer to **Figure 12** for the delineated wetland applicable to the dam

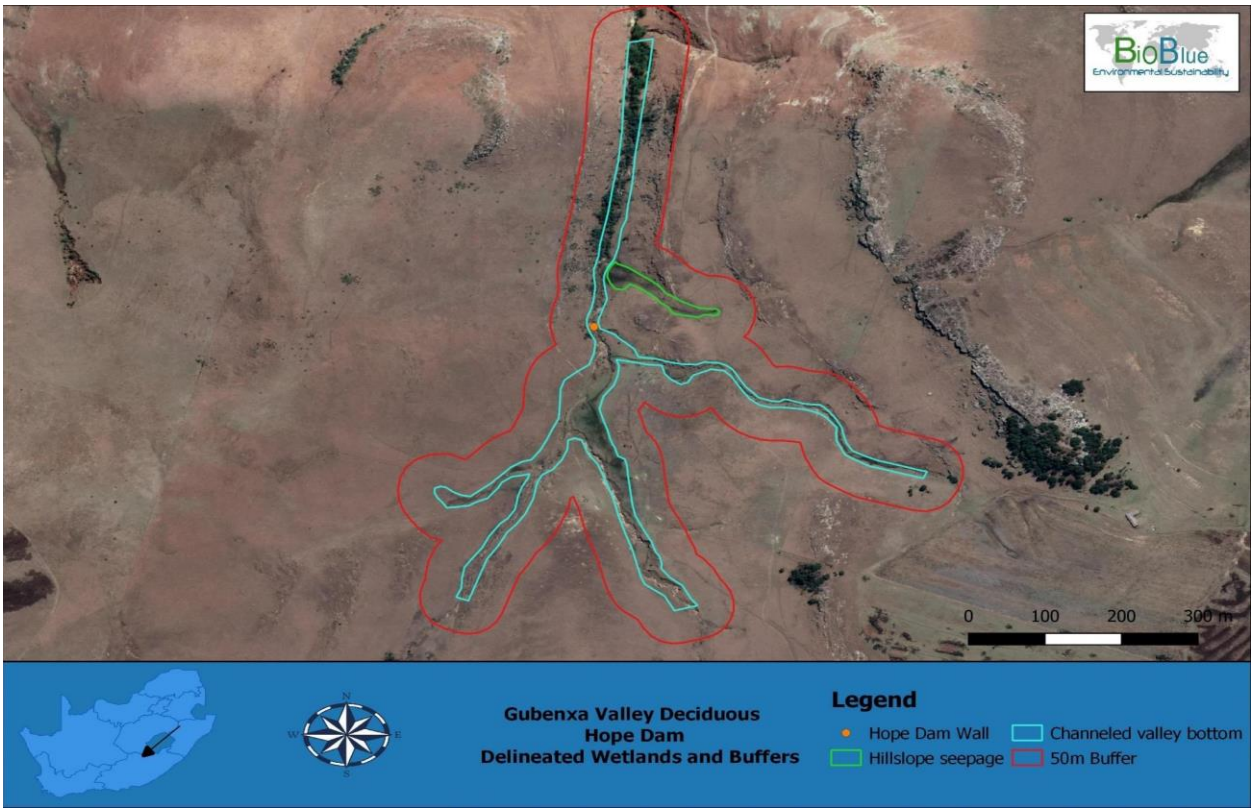



**Figure 12: Hope Dam: Delineated Wetlands and Buffers**

### 7.9.5 Berg Dam Wetland Conditions and Delineations

This study site is comprised of three wetland systems. There is a channelled valley bottom two large hillslope seepages on each side of it. The hillslope seepage wetlands are both hydrologically connected to the channelled valley bottom wetland. The channelled valley bottom system is incised along certain stretches of its course and a head-cut erosion is present.

No alien invasive vegetation is present within any of the wetland systems. The ecological integrity of the two hillslope seepage wetlands is higher than that of the channelled valley bottom, with virtually no degrading impacts being identified within the hillslope seeps except for light trampling and grazing by livestock. What is now a channelled valley bottom system was in all likelihood an unchanneled valley bottom and has through years of a combination of degrading factors turned into a channelled valley bottom.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Various *Cyperus* species are present in the permanent wet zones with moist grassland species present on the outer edges of the wetland.

Refer to **Figure 13** for the delineated wetland applicable to the dam

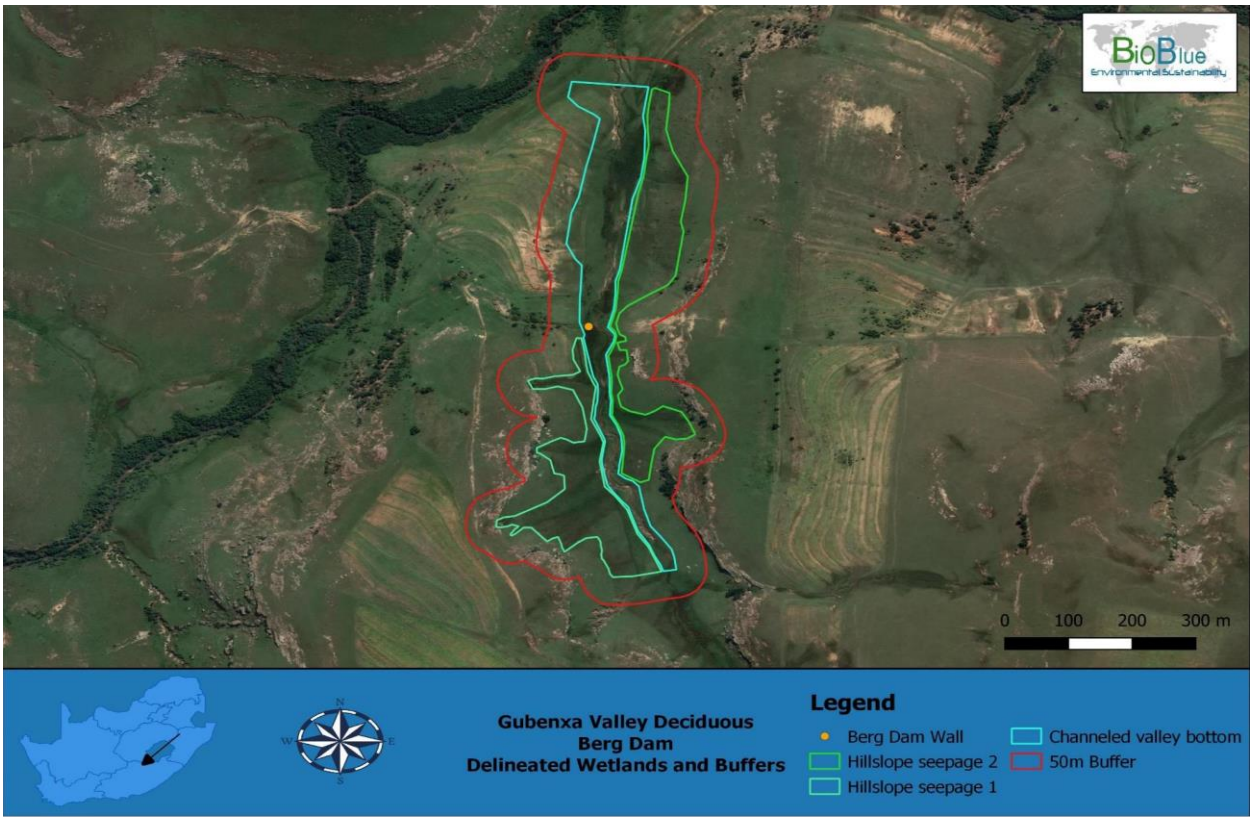



**Figure 13: Berg Dam: Delineated Wetlands and Buffers**

### 7.9.6 Mgedezi Dam Wetland Conditions and Delineations

There are two wetlands within a 500m regulated area from the proposed dam wall. Both wetlands belong to the hillslope seepage HGM type (Refer to Figure 21). Both the seeps are connected to a stream. The one wetland falls under the dam wall and will not be impacted by it. There is some erosion channels and alien invasive vegetation at the upper end of the seep and alien invasive vegetation in the form of black wattle (*Acacia mearnsii*). The ecological condition of the wetland can be described as being intact with a high level of integrity and health, although there are signs of limited degradation.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. *Cyperus* species are scattered throughout and interspersed with moist grassland species. *Acacia mearnsii* do possess the ability to spread into the wetland systems and cause dense stands of infestation. The stream is already heavily infested with alien invasive black wattle. If not addressed, it will lead to further ecological degradation, loss of habitat and a decline in biodiversity.

Refer to **Figure 14** for the delineated wetland applicable to the dam

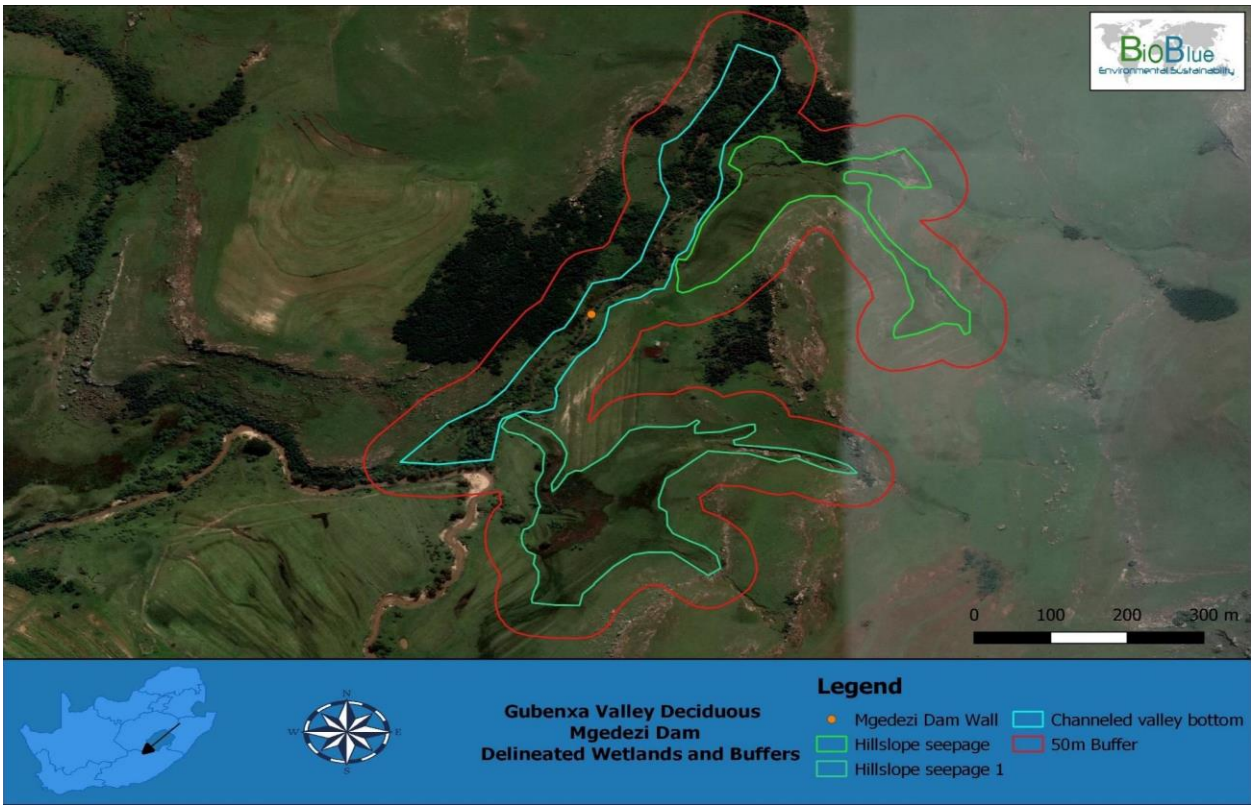



**Figure 14: Mgedezi Dam: Delineated Wetlands and Buffers**

### 7.9.7 Qangule Dam Wetland Conditions and Delineations

There are two wetlands within a 500m regulated area from the proposed dam wall. Both wetlands belong to the hillslope seepage HGM type. Both the seeps are connected to a stream. The stream is so deeply incised that in most places the incision reached bedrock. The stream has vertical walls of 8m and higher with the riparian zone infested with dense stands of black wattle (*Acacia mearnsii*). The one wetland falls under the dam wall and will not be impacted by it, therefore the focus is going to be on the hillslope seep above the dam wall. There is some erosion visible with alien invasive black wattle (*Acacia mearnsii*) also being scattered throughout.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. *Cyperus* species are scattered throughout and interspersed with moist grassland species. *Acacia mearnsii* do possess the ability to spread into the wetland systems and cause dense stands of infestation. The stream is already heavily infested with alien invasive black wattle. If not addressed, it will lead to further ecological degradation, loss of habitat and a decline in biodiversity.

Refer to **Figure 15** for the delineated wetland applicable to the dam

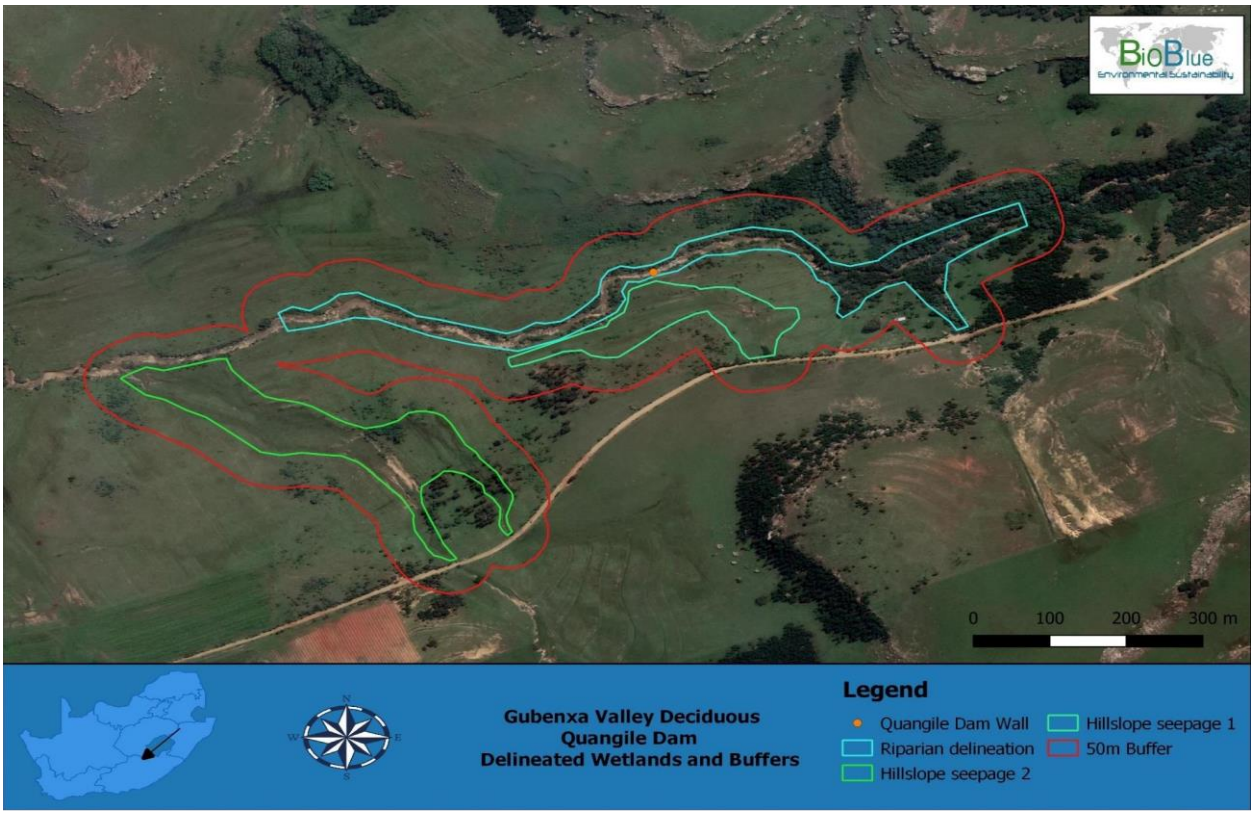



**Figure 15: Qangule Dam: Delineated Wetlands and Buffers**

### 7.9.8 Wadelands Dam Wetland Conditions and Delineations

There is only one wetland within a 500m regulated area from the proposed dam wall. The wetland belongs to the hillslope seepage HGM type. The seep is connected to a stream. The stream is deeply incised along certain stretches that it even reaches bedrock. The riparian zone is infested with dense stands of black wattle (*Acacia mearnsii),* although a few indigenous species remain at very low densities such as *Searsia pyriodes* and *Diospyros lyciodes.*

Livestock (sheep and cattle) were observed within the wetland and the stream as well as the effects of the trampling and grazing pressure which they exert upon these ecosystems

Within the catchment of the hillslope seepage there is cultivated fields. The hillslope seepage receives sediment inputs from these cultivated fields but acts as filter strip to keep the sediment out of the stream located downslope from the wetland. These degrading factors however has a limited extent. The ecological condition of the wetland can be described as being in a good and healthy state

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. *Cyperus* species are scattered throughout and interspersed with moist grassland species. *Acacia mearnsii* do possess the ability to spread into the wetland systems and cause dense stands of infestation. The stream is already heavily infested with alien invasive black wattle. If not addressed, it will lead to further ecological degradation, loss of habitat and a decline in biodiversity.

Refer to **Figure 16** for the delineated wetland applicable to the dam

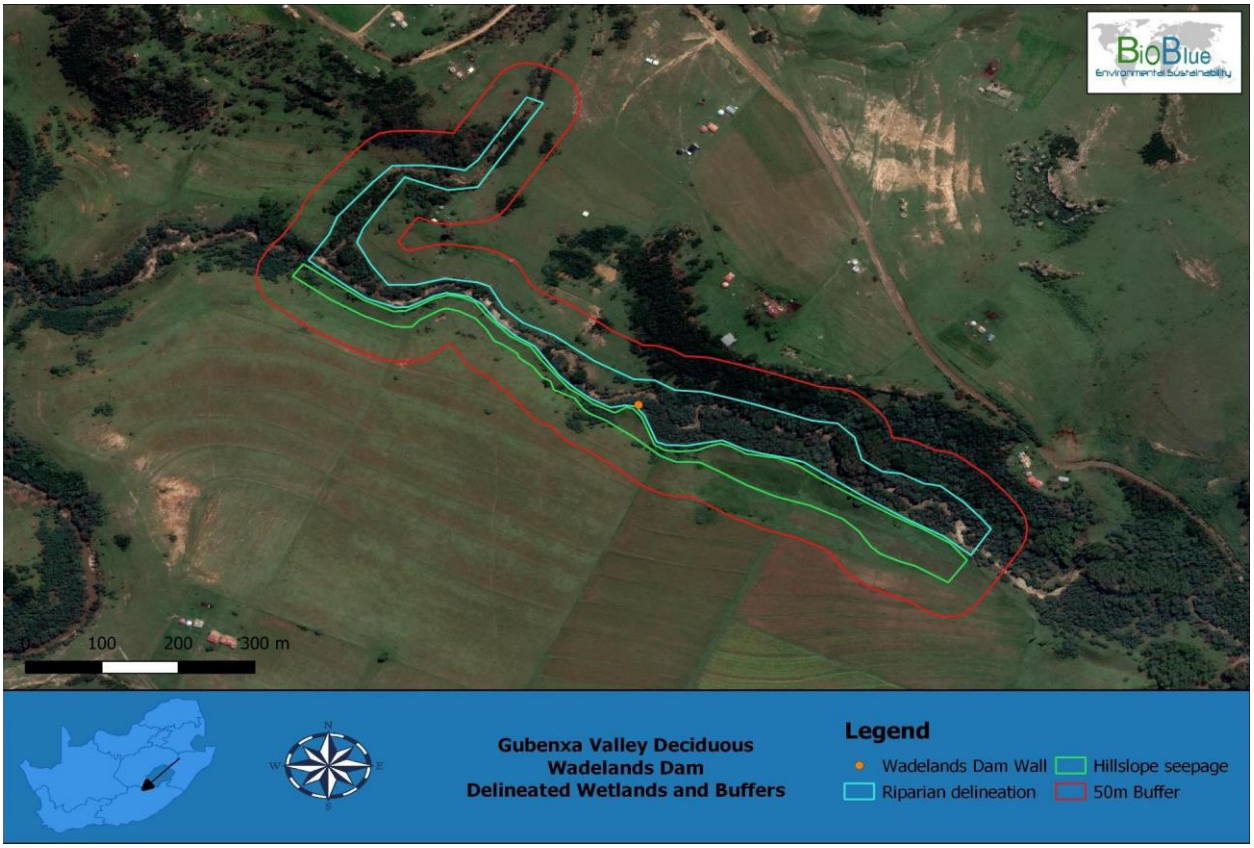



**Figure 16: Wadelands Dam: Delineated Wetlands and Buffers**

### 7.9.9 Gubenxa Trust Dam Wetland Conditions and Delineations

This study site is comprised of two wetland systems. There is a channelled valley bottom with a hillslope seepage which links up with it. The hillslope seepage wetland is hydrologically connected to the channelled valley bottom wetland. The channelled valley bottom system is incised along certain stretches of its course, there is evidence of trampling due to excessive livestock pressure and a few scattered Black wattle's. There is also an existing soil dam within the channelled valley bottom system. The Hillslope seepage also has livestock grazing pressure but not to the extent that erosion starts to occur, there are no dams or alien invasive vegetation present within this system. The wetlands on the study site delivers hydrological inputs to the river downstream.

The ecological integrity of the hillslope seepage wetland is higher than that of the channelled valley bottom, with virtually no degrading impacts being identified within the hillslope seeps except for light trampling and grazing by livestock. What is now a channelled valley bottom system was in all likelihood an unchanneled valley bottom and has through years of a combination of degrading factors turned into a channelled valley bottom. Livestock tracks criss-crossing this wetland has led to erosion and preferential flow paths being established. By far the biggest factor impacting on the health and ecological integrity of the channelled valley bottom wetland is the incision and livestock impacts. If the grazing pressure and associated trampling is not addressed it will lead to more serious erosion of the wetland, loss of valuable

soil and a decrease in the water quality as a result of higher turbidity levels which in turns negatively affects the health of the aquatic ecosystems including various aquatic organisms.

A pair of Blue cranes *(Grus paradisea)* where observed in the wetland busy foraging*.*

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Various *Cyperus* species are present in the permanent wet zones with moist grassland species present on the outer edges of the wetland.

Refer to **Figure 17** for the delineated wetland applicable to the dam

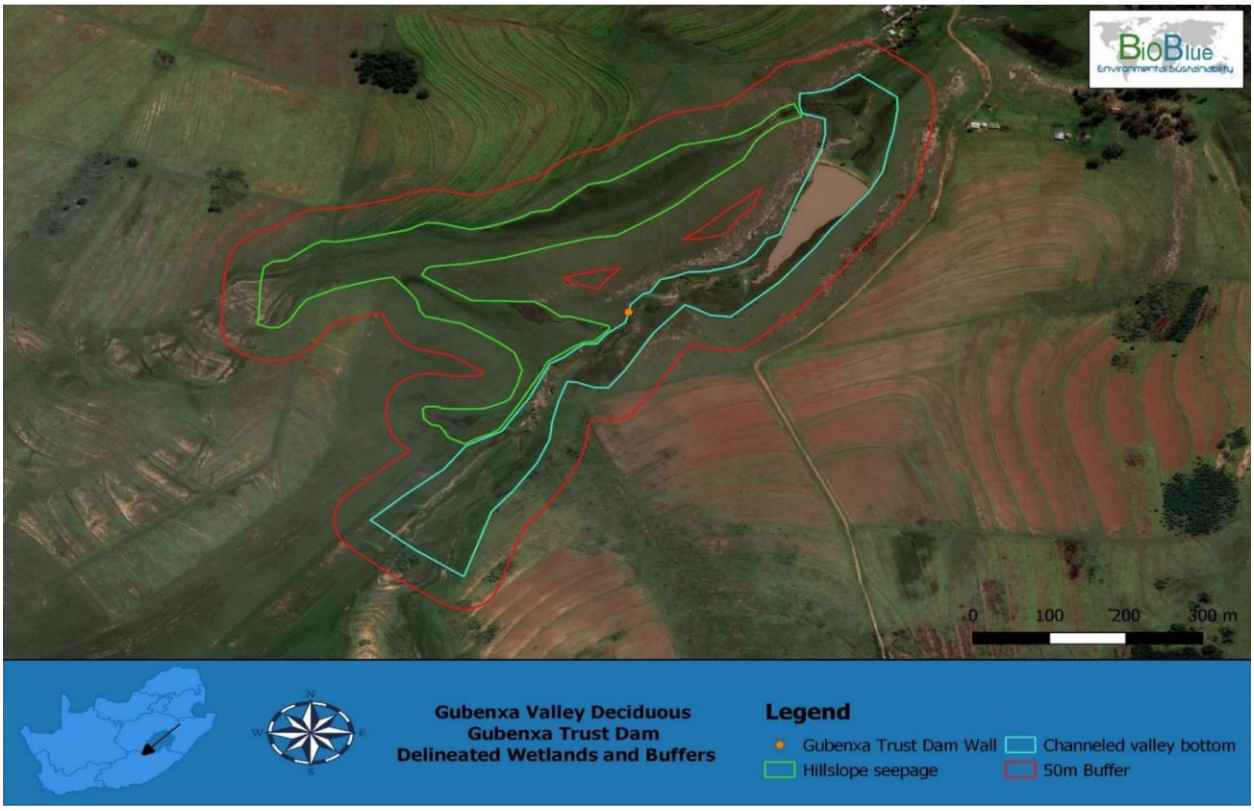



**Figure 17: Gubenxa Trust Dam: Delineated Wetlands and Buffers**

### 7.9.10 Paardekraal Dam Wetland Conditions and Delineations

This study site is comprised of two wetland systems. There is a unchanneled valley bottom and a hillslope seepage which links up with it. The hillslope seepage wetland is hydrologically connected to the unchanneled valley bottom wetland. The unchanneled valley bottom system becomes channelled further downstream. There almost no erosion and alien invasive species are limited to the edges of the wetland and not within the wetland itself. There is evidence of grazing and trampling but its effects are minimal. There is a soil dam within a section of the catchment, but the soil dam wall has been breached and thus water inputs continue to be delivered to the wetland.
The Hillslope seepage also has livestock grazing pressure and here the effects are more drastic in terms of erosion and trampling. No alien invasive vegetation is present within the hillslope seepage. The wetlands

on the study site delivers hydrological inputs to the river downstream. The ecological integrity of the hillslope seepage wetland is lower than that of the unchanneled valley bottom. Despite the wetlands on site not being in a pristine state they are still in a good ecological condition especially the unchanneled valley bottom.

A pair of Grey crowned cranes (*Balearica regulorum*) were observed foraging on the study site.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Various *Cyperus* species are present in the permanent wet zones with moist grassland species present on the outer edges of the wetland.

Refer to **Figure 18** for the delineated wetland applicable to the dam

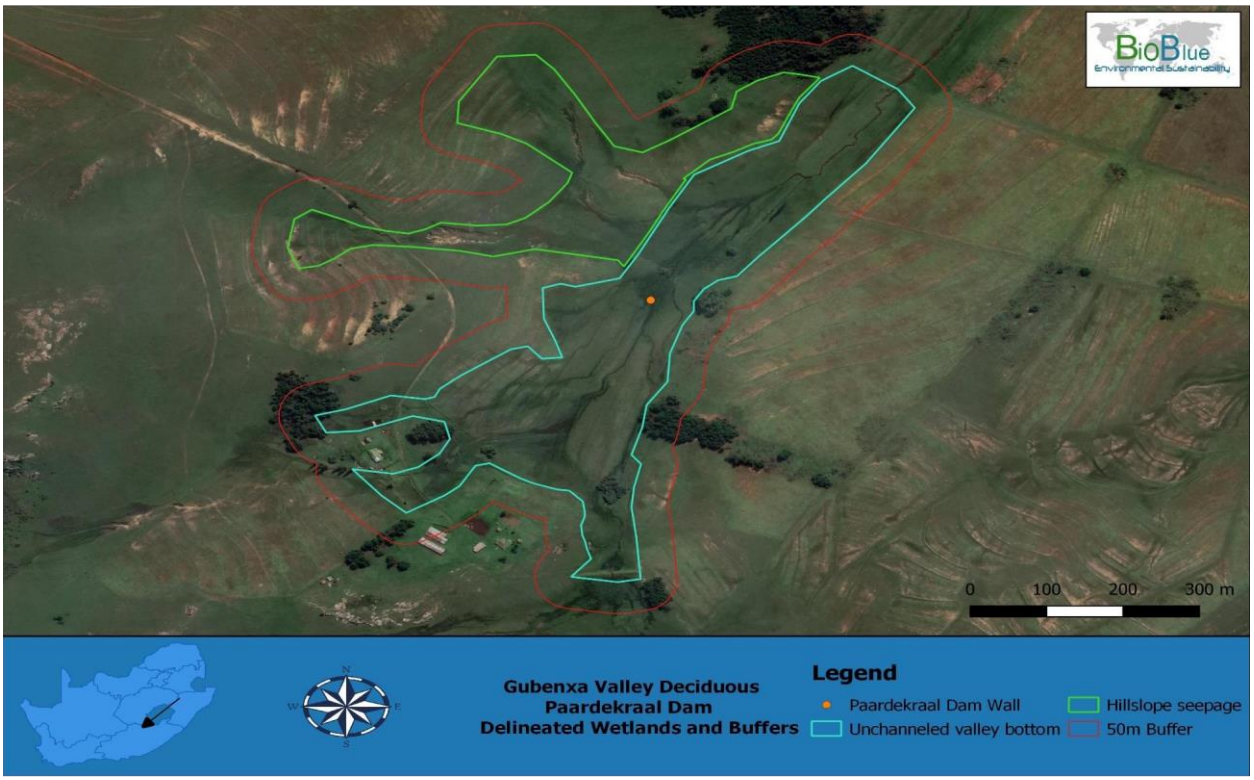



**Figure 18: Paardekraal Dam: Delineated Wetlands and Buffers**

### 7.9.11 Qwatsitolo/ Qwathi-Tolo 1 Dam Wetland Conditions and Delineations

There is one major wetland system on this site and falls within the channelled valley bottom HGM type. The channelled valley bottom system is deeply incised to a depth of 3-4m. Alien invasive vegetation namely black wattle (*Acacia mearnsii*) grows where the channelled valley bottom enters the riparian zone of the river and Weeping willow (*Salix babylonica)* is sparsely scattered throughout the rest of the wetland. The wetland is hydrologically connected to the river further downstream. Livestock tracks criss-crossing this wetland has led to erosion and preferential flow paths being established. The ecological condition of the wetland is compromised due to the quite severe incision and presence of alien invasive vegetation

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Various *Cyperus* species are present in the permanent wet zones. *Acacia mearnsii* do possess the ability to spread into the wetland systems and cause dense stands of infestation. It is advised that an alien invasive eradication plan is implemented to stop the spread. These alien invasive species are also very water hungry and consume huge amounts of water which only increases as alien invasive continue to spread. If not addressed, it will lead to further ecological degradation, loss of habitat and a decline in biodiversity.

Refer to **Figure 19** for the delineated wetland applicable to the dam

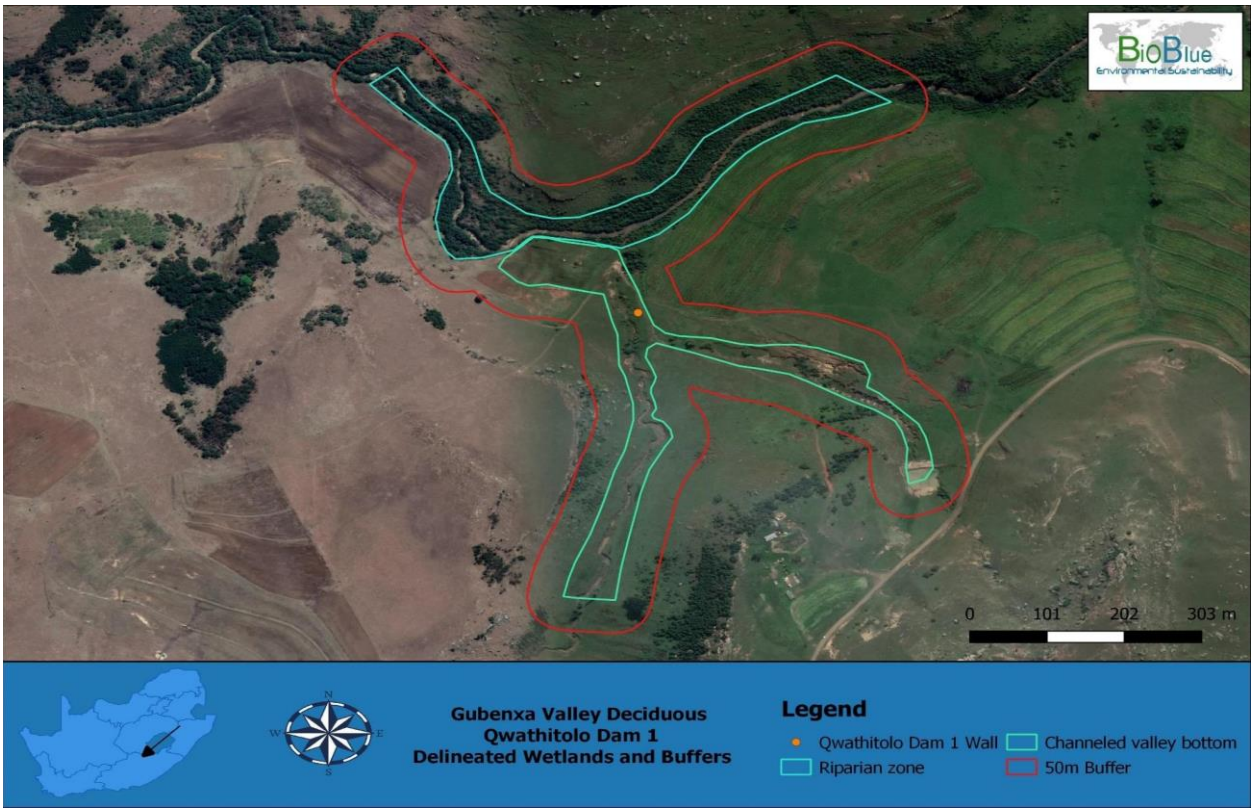



**Figure 19: Qwatsitolo/ Qwathi-Tolo 1 Dam: Delineated Wetlands and Buffers**

### 7.9.12 Qwatsitolo/ Qwathi-Tolo 2 Dam Wetland Conditions and Delineations

This study site is comprised of three wetland systems. There is a channelled valley bottom and two hillslope seepages which is hydrologically connected to the channelled valley bottom wetland. These three wetlands both deliver hydrological inputs to the river which lies downstream and at a lower elevation. The channelled valley bottom system is incised along certain stretches of its course to a depth ranging from 1-5m, there is evidence of trampling due to excessive livestock pressure and a few alien invasive vegetation species especially where the incision is at its worst. Head-cut erosion is also present within the system . The Hillslope seepage on the eastern side of the channelled valley bottom also has evidence of livestock grazing pressure and alien invasive vegetation is present within this system although no clear signs of erosion. The hillslope seepage on the western side of the channelled valley bottom is almost

totally converted into a maize field with different terraces. Wetland vegetation and soils are still present within the maize field.

By far the biggest factor impacting on the health and ecological integrity of the wetlands on the study site is the agricultural activities whether it is livestock pressure or cultivated fields. These activities has led to favourable circumstances for incision and establishment of alien invasive vegetation. If the grazing pressure and associated trampling is not addressed it will lead to more serious erosion of the wetland, loss of valuable soil and a decrease in the water quality as a result of higher turbidity levels which in turns negatively affects the health of the aquatic ecosystems including various aquatic organisms.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Various *Cyperus* species are present in the permanent wet zones with moist grassland species present on the outer edges of the wetland. Common reed (*Phragmites australis)*, Bulrush (*Typha capensis)* and River pumpkin (*Gunnera perpensa)* where present in the permanent zone of the channelled valley bottom.

Refer to **Figure 20** for the delineated wetland applicable to the dam

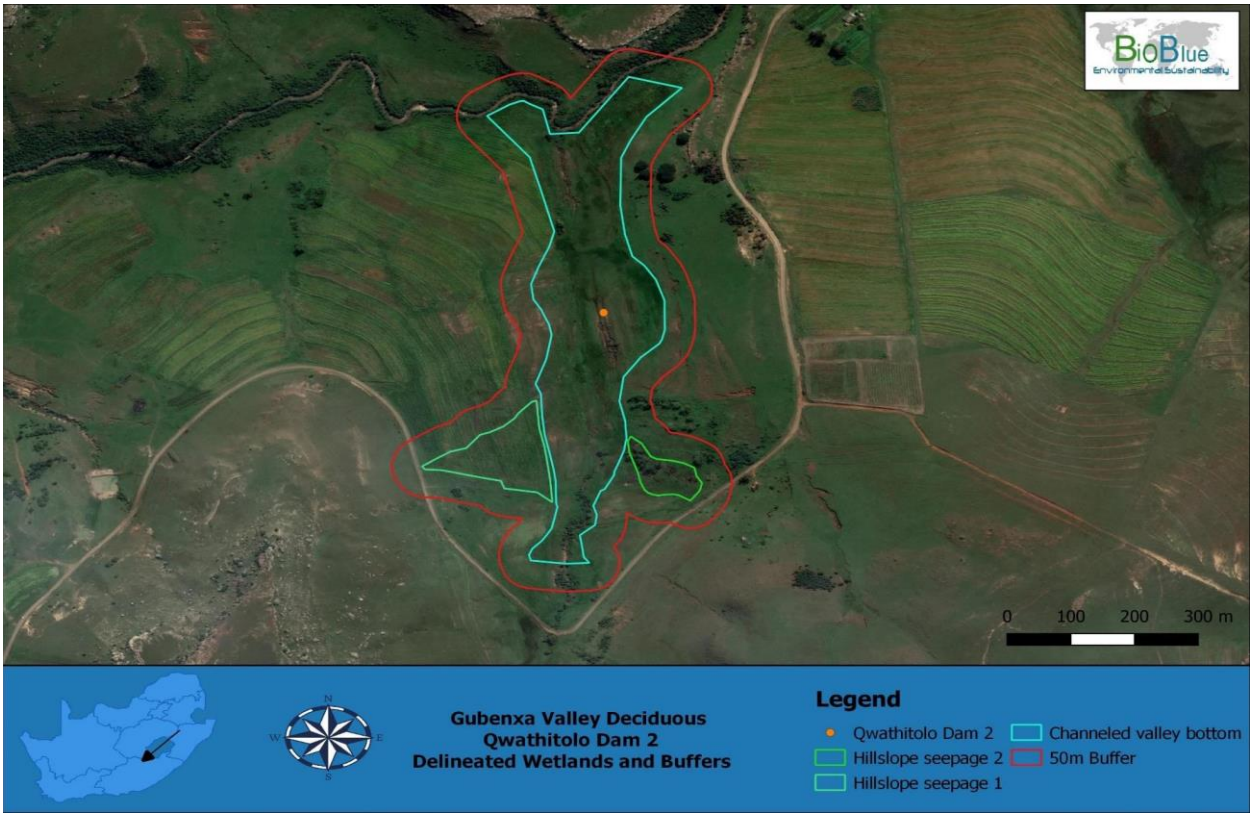



**Figure 20: Qwatsitolo/ Qwathi-Tolo 2 Dam: Delineated Wetlands and Buffers**

### 7.9.13 Greenfields Dam Wetland Conditions and Delineations

There are two wetland systems on this study site. These wetlands can be classified as a channelled valley bottom and a hillslope seepage HGM type. The channelled valley bottom is deeply incised and is totally

infested with black wattle (*Acacia mearnsii*). The deeply incised channel confines the flow of water and stop its from spreading over the wetland thus the hydrological functioning of the wetland is also negatively impacted. The erosion of the channel is likely due to cattle trampling and no grazing management being implemented. There is extraordinarily little wetland soil left in the channel and the wetland soils are confined to the margins of the channelled valley bottom.

The hillslope seepage is hydrologically connected to the channelled valley bottom. There are no alien invasive vegetation or erosion present within this system only a moderate degree of livestock grazing and trampling. The hillslope seepage has a higher ecological integrity compared to the channelled valley bottom.

The vegetation of the hillslope seepage wetland consists of a variety of small low growing *Cyperus* species with interspersed moist grassland species. The channelled valley bottom's vegetation has been totally transformed and virtually no indigenous species are left. The wetlands surface roughness has been compromised due to incision and erosion, presence of alien invasive vegetation and trampling and grazing pressure by livestock. Consequently, this leads to higher velocity of water flow through the channelled valley bottom wetland which in turn lead to loss of topsoil, erosion and sedimentation.

Obligate wetland species as well as facultative wetland species were recorded in the hillslope seepage wetland. It is advised that an alien invasive eradication plan is implemented to stop the spread and clear the banks of the wetland channel. These alien invasive species are also very water hungry and consume huge amounts of water which only increases as alien invasive vegetation continue to spread. If not addressed, it will lead to further ecological degradation, loss of habitat and a decline in biodiversity.

Refer to **Figure 21** for the delineated wetland applicable to the dam

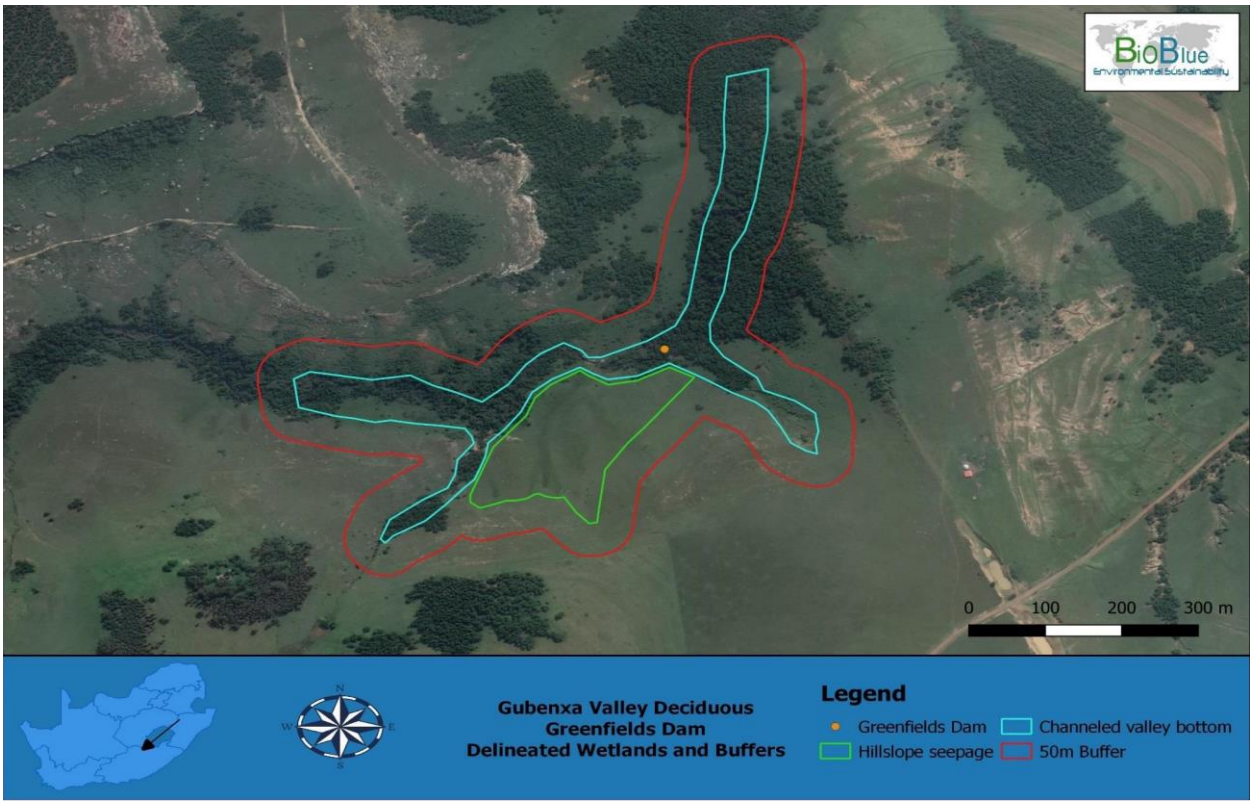



**Figure 21: Greenfields Dam: Delineated Wetlands and Buffers**

### 7.9.14 Magoda Dam Wetland Conditions and Delineations

This study site is comprised of three wetland systems. There is a channelled valley bottom and two hillslope seepages which is hydrologically connected to the channelled valley bottom wetland. The channelled valley bottom system is incised along certain stretches of its course to a depth ranging from 1-3m, there is evidence of trampling due to excessive livestock pressure and a few alien invasive vegetation species especially where the incision is at its worst. Head-cut erosion is also present within the system. There is also a soil dam within this system. The one hillslope seepage is located above the dam wall and will be impacted upon by the proposed dam wall and flooding footprint. The other hillslope seepage is located downstream of the proposed dam wall and will not be impacted by the proposed construction. Both the hillslope seepages are impacted by grazing pressure and trampling but no alien invasive vegetation or erosion.

By far the biggest factor impacting on the health and ecological integrity of the wetlands on the study site is the agricultural activities related to livestock rearing. These activities have led to favourable circumstances for incision and establishment of alien invasive vegetation.

There are a wide variety of obligate wetland species as well as facultative wetland species recorded on the study site. Various *Cyperus* species are present in the permanent wet zones with moist grassland species present on the outer edges of the wetland.

Refer to **Figure 22** for the delineated wetland applicable to the dam

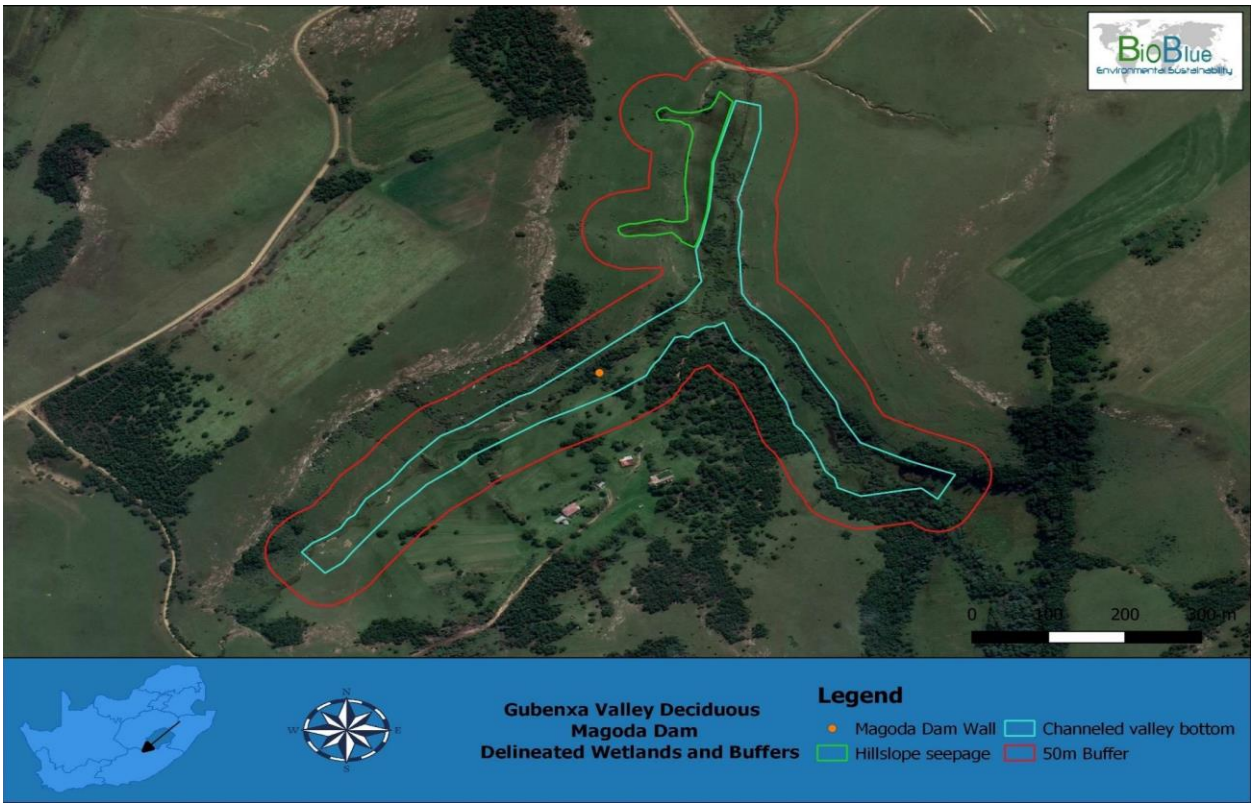



**Figure 22: Magoda Dam: Delineated Wetlands and Buffers**

### 7.9.15 Present Ecological State (PES)

This section provides an overview of the PES of the wetlands on each of the 13 sites where the dams are proposed. More specific information can be found in section 4.1.3 of the Wetland Assessment Report in Appendix D.

It must be noted that the following PES employed by Wet-Health to categorise the heath and integrity of wetlands is as follows:

- Class A: close to natural condition;
- Class B: largely natural with few modifications;
- Class C: moderately modified;
- Class D: largely modified;
- Class E: seriously modified; some remaining natural habitat features
- Class F: critically modified; ecosystem processes have been modified completely with an almost loss of natural habitat and biota

The table below provides a summary of each dams impact scores and PES rating for the wetland:

**Table 13: The 13 proposed dam sites and their associated impact scores and PES rating**

| Farm name | Dam no. | PES Health Score | Comment |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Macingwane | 1 | D | This is an indication that the channelled valley bottom wetland has largely been modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred. |
| Tasana | 2 | B | The impact upon the PES of the wetland is small. It is largely natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. |
| Hope | 3 | C | This is an indication that the wetlands are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. |
| Berg | 4 | B | This is an indication that the wetlands are in a largely natural state with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | C | This indicates that the wetlands are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | C | This indicates that the wetlands are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. |
| Mgedezi | 7 | B | This is an indication that the wetlands are in a largely natural state with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. |
| Paardekraal | 8 | B | This is an indication that the wetlands are in a largely natural state with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. |
| Gubenxa Trust | 9 | C | This indicates that the wetlands are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. |
| Wadelands | 10 | B | This is an indication that the wetlands are in a largely natural state with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. |
| Greenfields | 11 | C | This indicates that the wetlands are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. |
| Magoda | 13 | B | This is an indication that the wetlands are in a largely natural state with only a few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place. |
| Qangule | 14 | C | This indicates that the wetlands are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. |

### 7.9.16 Ecological Importance and Sensitivity (EIS)

This section provides an overview of the Ecological Importance and Sensitivity (EIS) scores of each of the wetlands on the thirteen (13) different study sites where the dams are proposed to be established. More specific information can be found in section 4.1.4 of the Wetland Assessment Report in Appendix D.

It must be noted that the following Ecological Importance and Sensitivity Categories are as follows:

- Low/ Marginal: Wetlands that are not unique and not sensitive at any scale, low biodiversity and contribution to water quality and quantity is almost nothing
- Moderate: Wetlands considered to be ecologically important and sensitive on a provincial and local scale. Biodiversity not sensitive to flow and habitat modifications. contribution to water quality and quantity is very small.
- High: Wetlands considered to be ecologically important and sensitive. Biodiversity sensitive to flow and habitat modifications. Value of contribution to water quality and quantity is significant.
- Very High: Wetlands considered ecologically important and sensitive on a national level. Biodiversity is usually sensitive to flow and habitat modifications. Value of contribution to water quality and quantity is very significant.

The table below provides a summary of each dams impact scores and EIS rating for the wetland:

**Table 14: The 13 proposed dam sites and their associated EIS rating**

| Farm name | Dam no. | EIS Score | EIS Rating Category |
|---|---|---|---|
| Macingwane | 1 | 1.4 | Moderate |
| Tasana | 2 | 2.7 | High |
| Hope | 3 | 1.4 (CVB)[1]<br>1.16 (HS)[2] | Moderate (CVB)<br>Moderate (HS) |
| Berg | 4 | 1.93 (CVB)<br>1.0 (HS Seep 1)<br>1.0 (HS Seep 2) | Moderate (CVB)<br>Low/ Marginal (HS Seep 1)<br>Low/ Marginal (HS Seep 2) |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 1.26 | Moderate |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 1.8 (CVB)<br>0.5 (HS Seep 1)<br>0.83 (HS Seep 2) | Moderate (CVB)<br>Low/ Marginal (HS Seep 1)<br>Low/ Marginal (HS Seep 2) |
| Mgedezi | 7 | 1.3 (CVB)<br>0.9 (HS Seep 1)<br>0.9(HS Seep 2) | Moderate (CVB)<br>Low/ Marginal (HS Seep 1)<br>Low/Marginal (HS Seep 2) |
| Paardekraal | 8 | 2.63 (UCVB)[3]<br>1.06 (HS) | High (UCVB)<br>Moderate (HS) |
| Gubenxa Trust | 9 | 1.7 (CVB) | Moderate (CVB) |

[1] Channelled Valley Bottom Wetland (CVB)

[2] Hillslope Wetland (HS)

[3] Unchannelled Valley Bottom Wetland (UCVB)

| | | | |
|---|---|---|---|
| | | 1.43 (HS) | Moderate (CVB) |
| Wadelands | 10 | 1.06 | Moderate |
| Greenfields | 11 | 1.5 (CVB)<br>1.76 (HS) | Moderate (CVB)<br>Moderate (HS) |
| Magoda | 13 | 1.9 (CVB)<br>1.03 (HS Seep 1)<br>1.06 (HS Seep 2) | Moderate (CVB)<br>Moderate (HS Seep 1)<br>Moderate (HS Seep 2) |
| Qangule | 14 | 0.96 (HS Seep 1)<br>0.93 (HS Seep 2) | Low/ Marginal (HS Seep 1)<br>Low/ Marginal (HS Seep 2) |

## 7.10 **Vegetation**

### 7.10.1 Vegetation of Southern Africa

A single vegetation unit Drakensberg Foothill Moist Grassland is primarily affected by the proposed project (Mucina & Rutherford, 2006) with a second unit (East Griqualand Grassland) being present on the north-eastern boundary of the study area **(Figure 23).** Both units have a Least Concern status (NBA, 2018). A general description of the vegetation unit is provided below (as per Mucina & Rutherford, 2006) as a reference point for the baseline vegetation composition.

The vegetation unit, Drakensberg Foothill Moist Grassland (Gs 10), has the following characteristics:

- **Distribution:** KwaZulu-Natal and Eastern Cape Provinces: Broad arc of Drakensberg piedmonts covering the surrounds of Bergville in the north, Nottingham Road, Impendle, Bulwer in the east, and Kokstad, Mount Currie, Underberg (KZN) and the surrounds of Mt Fletcher, Ugie, Maclear and Elliot (Eastern Cape) in the southwest. Altitude 880–1 860 m.
- **Vegetation & Landscape Features:** Moderately rolling and mountainous, much incised by river gorges of drier vegetation types and by forest, and covered in forb-rich grassland dominated by short bunch grasses including *Themeda triandra* and *Tristachya leucothrix*.
- **Geology & Soils:** Geology is dominated by mudstones and sandstones of the Tarkastad Subgroup and the Molteno Formation (Karoo Supergroup) as well as intrusive dolerites of Jurassic age. The dominant soils on the sedimentary parent material are well drained, with a depth of more than 800 mm and clay content from 15–55%, representing soil forms such as Hutton, Clovelly, Griffin and Oatsdale. On the volcanic parent material (dolerite) the soils are represented by forms such as Balmoral, Shortlands and Vimy. Most common land types Ac and Fa.
- **Climate:** Summer rainfall, with MAP almost 890 mm. MAT of 14.6°C and 26 frost days per year are indicative of a cooler, submontane form of warm-temperate climate.

- **Important Taxa:** Graminoids: *Diheteropogon filifolius* (d), *Elionurus muticus* (d), *Eragrostis capensis* (d), *E. chloromelas* (d), *E. curvula* (d), *E. plana* (d), *E. racemosa* (d), *Heteropogon contortus* (d), *Microchloa caffra* (d), *Monocymbium ceresiiforme* (d), *Panicum natalense* (d), *Rendlia altera* (d), *Sporobolus africanus* (d), *Themeda triandra* (d), *Trachypogon spicatus* (d), *Tristachya leucothrix* (d), *Agrostis lachnantha*, *Alloteropsis semialata* subsp. *eckloniana*, *Aristida junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Digitaria tricholaenoides*, *Harpochloa falx*, *Hyparrhenia hirta*, *Panicum ecklonii*, *Paspalum dilatatum*. Herbs: *Helichrysum simillimum* (d), *Senecio retrorsus* (d),

*Acalypha depressinerva*, *Ajuga ophrydis*, *Berkheya rhapontica* subsp. *aristosa*, *Conyza pinnata*, *Dicoma anomala*, *Euryops laxus, Haplocarpha scaposa*, *Helichrysum chionosphaerum*, *H. cooperi*, *H. herbaceum*, *H. nudifolium* var. *pilosellum*, *H. subglomeratum*, *H. umbraculigerum*, *Hesperantha ingeliensis*, *Kohautia amatymbica*, *Mohria caffrorum*, *Pentanisia prunelloides* subsp. *latifolia*, *Schistostephium crataegifolium*, *Sebaea sedoides* var. *schoenlandii*, *S. sedoides* var. *sedoides*, *Senecio asperulus*, *Vernonia natalensis*, *Wahlenbergia undulata*. Herbaceous Climber: *Rhynchosia totta*. Geophytic Herbs: *Oxalis depressa* (d), *Cheilanthes deltoidea*, *C. hirta*, *Chlorophytum acutum*, *Disperis renibractea*, *Habenaria dregeana*, *H. lithophila*, *Haemanthus humilis* subsp. *hirsutus*, *Hesperantha coccinea*, *Hypoxis rigidula* var. *pilosissima*, *Ledebouria sandersonii*, *Moraea modesta*, *Nerine bowdenii*, *Oxalis corniculata*, *Rhodohypoxis baurii* var. *platypetala*, *Watsonia pillansii*, *Xysmalobium tysonianum*, *Zantedeschia albomaculata* subsp. *albomaculata*. Small Trees: *Protea roupelliae* subsp. *roupelliae* (d), *Encephalartos ghellinckii*. Low Shrubs: *Anthospermum rigidum* subsp. *pumilum*, *Chrysocoma ciliata*, *Felicia filifolia* subsp. *filifolia*, *Gnidia kraussiana*, *Helichrysum odoratissimum*, *H. sutherlandii*, *Rhus discolor*, *Senecio burchellii*.

- **Conservation:** Least threatened. Target 23%. Only 2–3% statutorily conserved in the uKhahlamba Drakensberg Park, Ntsikeni Wildlife Reserve as well as in the Karkloof, Mount Currie, Coleford, Fort Nottingham, Impendle, Ngeli, and Umgeni Vlei Nature Reserves. Almost 20% already transformed for cultivation, plantations and by urban sprawl. Alien woody species of *Rubus* and *Acacia dealbata* and *Solanum mauritianum* may become invasive in places. Erosion is very low (49%), low (28%) and moderate (17%).

The vegetation unit, East Griqualand Grassland (Gs 12), which only "affects" the Qangule site, has the following characteristics:

- **Distribution:** KwaZulu-Natal and Eastern Cape Provinces: Major portion of this unit covers most of East Griqualand (with Kokstad and Matatiele as centres). Altitude 920–1 740 m.
- **Vegetation & Landscape Features:** Hilly country with slopes covered by grassland in places, with patches of bush clumps with *Leucosidea sericea* (only wet sites) or *Diospyros lycioides*, *Acacia karroo* and *Ziziphus mucronata* in low-lying and very dry sites.
- **Geology & Soils:** Mudstone and sandstone of the Beaufort Group of the Karoo Sequence predominate, but sedimentary rocks of the Molteno, Elliot and Clarens Formations are also present. The dominant soils on the sedimentary parent material are well drained, with a depth of 500–800 mm and clay content from 15–55%. The soils are of Hutton, Clovelly, Oatsdale forms on sediments and Shortlands on dolerite. Most common land types Fa and Ac.
- **Climate:** The region has mostly summer rainfall, with MAP of 780, mm ranging from 620–816 mm. Kokstad records 88 rain days in a year and three of those occur in the midwinter (June–July). Both mist and snow occur less frequently than in Gd 4 Southern Drakensberg Highland Grassland (Kokstad 26 misty days per year) and much of the rain comes in the form of thunderstorms (Kokstad 45 days). MAT 12.9–15.6°C (overall MAT 14.7°C). Moderately severe frosts occur 30 days in a year. Mean annual evaporation 1 457–1 723 mm (Camp 1999b). See also climate diagram for Gs 12 East Griqualand Grassland

- **Important Taxa:** Graminoids: *Alloteropsis semialata* subsp. *eckloniana* (d), *Aristida congesta* (d), *A. junciformis* subsp. *galpinii* (d), *Brachiaria serrata* (d), *Digitaria tricholaenoides* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. plana* (d), *E. racemosa* (d), *Harpochloa falx* (d), *Heteropogon contortus* (d), *Hyparrhenia hirta* (d), *Melinis nerviglumis* (d), *Microchloa caffra* (d), *Paspalum dilatatum* (d), *Sporobolus africanus* (d), *Themeda triandra* (d), *Tristachya leucothrix* (d),

*Abildgaardia ovata*, *Andropogon appendiculatus*, *Cynodon incompletus*, *Cyperus obtusiflorus* var. *obtusiflorus*, *Digitaria ternata*, *Eragrostis capensis*, *Eulalia villosa*, *Hemarthria altissima*, *Setaria nigrirostris*, *Trachypogon spicatus*, *Urochloa panicoides*. Herbs: *Acanthospermum australe*, *Centella asiatica*, *Conyza podocephala*, *Haplocarpha scaposa*, *Helichrysum herbaceum*, *H. nudifolium* var. *pilosellum*, *Hermannia depressa*, *Hibiscus aethiopicus* var. *ovatus*, *Ipomoea crassipes*, *Kohautia amatymbica*, *Lessertia harveyana*, *Pentanisia prunelloides* subsp. *latifolia*, *Rhynchosia effusa*, *Senecio retrorsus*, *Stachys aethiopica*, *Tolpis capensis*, *Vernonia natalensis*. Herbaceous Climber: *Rhynchosia totta*. Geophytic Herbs: *Cheilanthes deltoidea*, *C. hirta*, *Haemanthus humilis* subsp. *hirsutus*, *Ledebouria sandersonii*, *Rhodohypoxis baurii* var. *baurii*, *Watsonia pillansii*, *Zantedeschia albomaculata* subsp. *albomaculata*. Low Shrubs: *Anthospermum rigidum* subsp. *pumilum* (d), *Chaetacanthus setiger*, *Erica caffrorum* var. *caffrorum*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Helichrysum dregeanum*, *Rubus rigidus*. Succulent Shrub: *Euphorbia clavarioides* var. *clavarioides*.

- **Conservation:** Vulnerable. Target 23%. Only 0.2% is statutorily conserved in the Malekgonyane (Ongeluksnek) Wildlife Reserve and Mount Currie Nature Reserve. Over one quarter of the area has already been transformed for cultivation (maize), plantations and by urban sprawl. *Acacia dealbata* and *A. mearnsii* are invading these grasslands in some places. Erosion is low (31%), very low (30%) and moderate (30%).

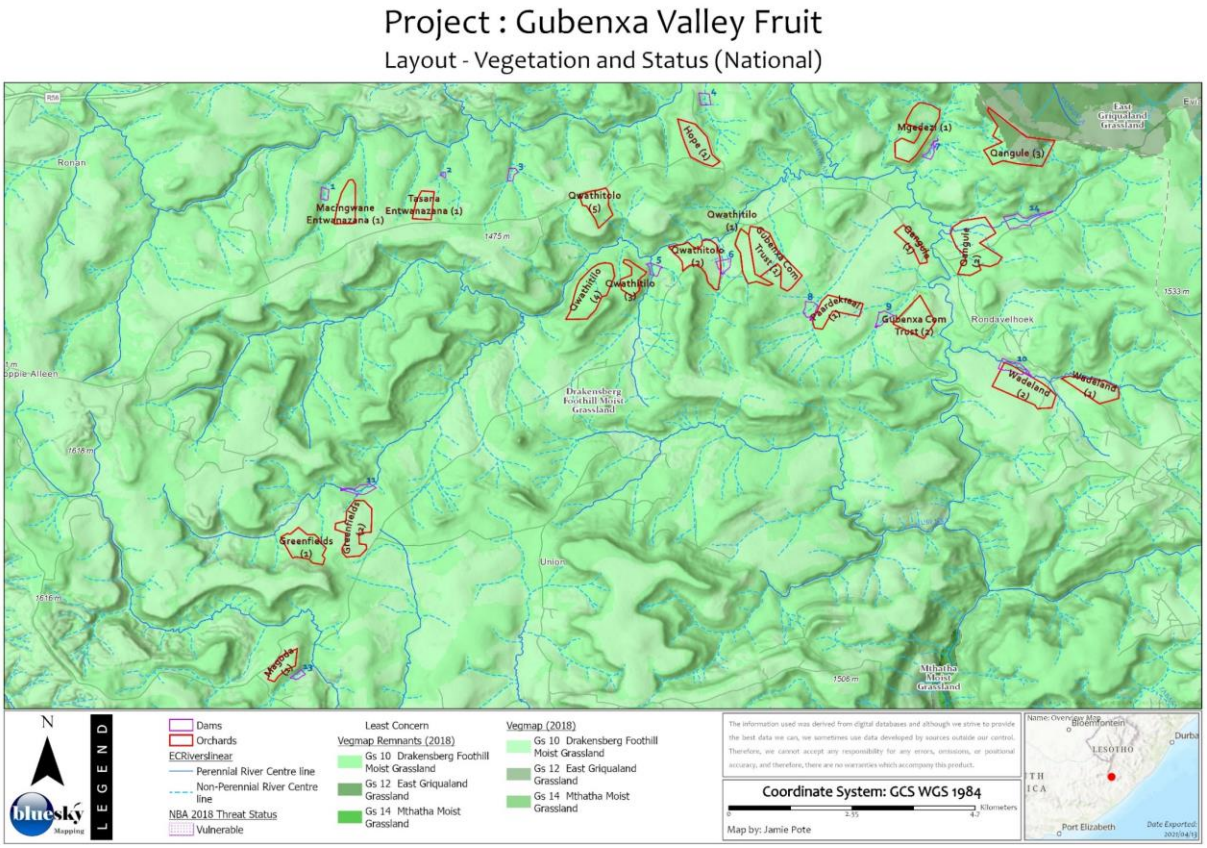



**Figure 23: Vegetation types found in the study area as mapped by VEGMAP (2018).**

In general, the project area is generally characterised by incised river valleys and watercourses within predominantly grassland vegetation. The vegetation is characterised as being typical of Drakensberg Foothill Moist Grassland, with East Griqualand Grassland in the north-east. The forb-rich grasslands are comprised of short bunch grasses including *Themeda triandra* and *Tristachya leucothrix, Diheteropogon filifolius*, *Elionurus muticus*, *Eragrostis capensis*, *Heteropogon contortus*, *Panicum natalense*, *Sporobolus africanus*, *Trachypogon spicatus* and *Tristachya leucothrix*. Shrub and herbaceous elements include the genera *Helichrysum, Senecio, Berkheya, Conyza, Chrysocoma, Felicia* and *Euryops* as well as a range of geophytic species belonging to the Iridaceae, Oxalidaceae and Orchidaceae. Indigenous trees are generally absent in the wider grasslands, other than occasional small trees, confined to fire refugia such as rocky outcrops and include *Searsia* (*Rhus*) and other species.

Alien invasive trees (primarily Black Wattle) occurs in dense patches, with many watercourses congested as well as surrounding areas. This offers habitat for a limited suite of animal species, while topological complexity, including slope and aspect, as well as rocky outcrops and aquatic habitat (riparian, wetlands and seeps) allow for a greater availability of microhabitats for a diverse range of flora and fauna different species.

The general area has overall moderate levels of utilization, primarily for crops, with maize and cattle currently being favoured as well as pine and eucalyptus tree plantations in the wider area, particularly to the west and north.

### 7.10.2 National Environmental Screening Tool

The DEA (now DFFE) screening tool identifies *High & Low* Plant Species Sensitivities in the proximity to the site. **Figure 24** below is extracted directly from the Screening Tool report.

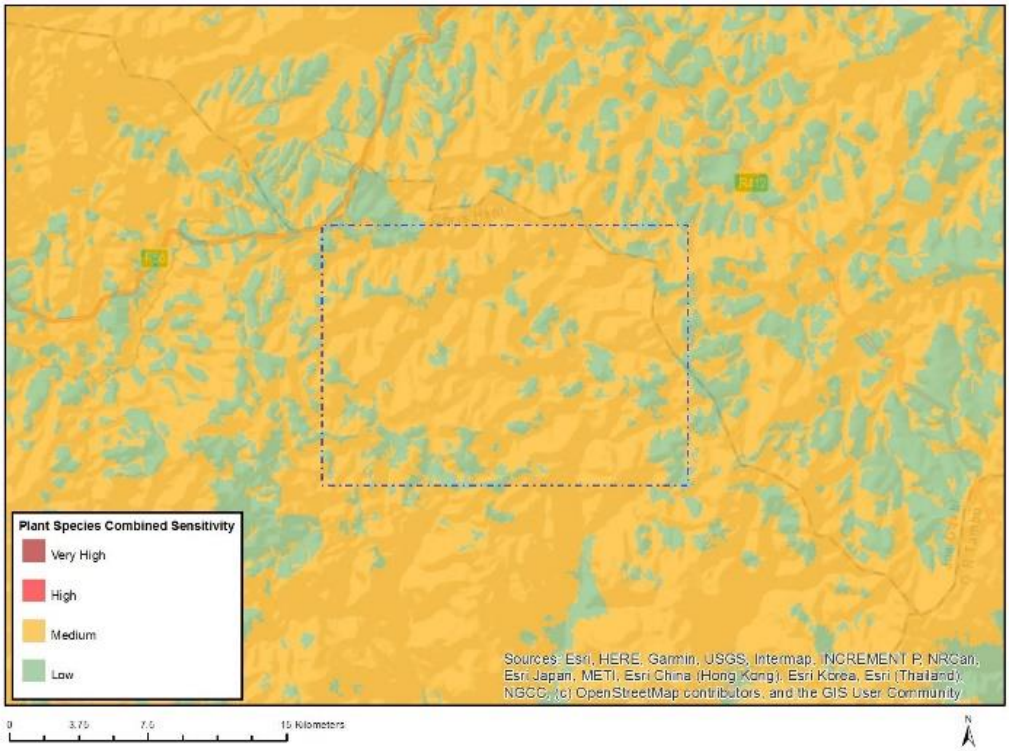



**Figure 24: National Screening Tool Plant Species Combined Sensitivity for the study area**

Jamie Pote, the terrestrial ecologist and botanical specialist undertook his specialist assessment in order to contribute to this EIA process. The site assessment has physically screened for the presence of these, and other possible species not identified in the screening tool.

Several flora species (*Ocotea bullata, Prunus africana, Erica cooperi var. cooperi, Sensitive species 1252, 735, 609, 535, 441, 451, 1248*) regarded as being of conservation concern are noted to occur in the wider area and presence were investigated.

Mr Pote noted in this specialist report that the site is located within a rural commercial and subsistence farming area. The vegetation is generally a mix of cultivated lands, secondary vegetation (old lands) and intact vegetation. The vegetation type has a widespread distribution and does not have an elevated conservation status. The proposed activity will occur in proximity to watercourses, rivers, and wetlands and possibly habitat for fauna and flora species of conservation concern. The site assessment would physically screen for the presence of these and other possible species not identified in the screening tool and will be supported by data available such as distribution records and other species-specific information, including habitat preferences, etc.

The following terrestrial habitats can be differentiated:

1. Primary Grassland (intact and semi-intact)
2. Old Lands - Secondary Grassland (previously cleared)
3. Lands - Transformed (currently or recently cultivated)

### 7.10.3 Terrestrial Vegetation

The project area is generally characterised by incised river valleys and watercourses within predominantly grassland vegetation. The vegetation is characterised as being typical of Drakensberg Foothill Moist Grassland, with East Griqualand Grassland in the north-east. The forb-rich grasslands are comprised of short bunch grasses including *Themeda triandra* and *Tristachya leucothrix, Diheteropogon filifolius*, *Elionurus muticus*, *Eragrostis capensis*, *Heteropogon contortus*, *Panicum natalense*, *Sporobolus africanus*, *Trachypogon spicatus* and *Tristachya leucothrix*. Shrub and herbaceous elements include the genera *Helichrysum, Senecio, Berkheya, Conyza, Chrysocoma, Felicia* and *Euryops* as well as a range of geophytic species belonging to the Iridaceae, Oxalidaceae and Orchidaceae. Indigenous trees are generally absent in the wider grasslands, other than occasional small trees, confined to fire refugia such as rocky outcrops and include *Searsia* (*Rhus*) and other species.

Alien invasive trees (primarily Black Wattle) occurs in dense patches, with many watercourses congested as well as surrounding areas.

This offers habitat for a limited suite of animal species, while topological complexity, including slope and aspect, as well as rocky outcrops and aquatic habitat (riparian, wetlands and seeps) allow for a greater availability of microhabitats for a diverse range of flora and fauna different species.

The general area has overall moderate levels of utilization, primarily for crops, with maize and cattle currently being favoured as well as pine and eucalyptus tree plantations in the wider area, particularly to the west and north.

The following terrestrial habitats can be differentiated:

1. Primary Grassland (intact and semi-intact)
2. Old Lands - Secondary Grassland (previously cleared)
3. Lands - Transformed (currently or recently cultivated)

The dominant vegetation in the area is grassland, comprised of graminoid dominated vegetation with a wide diversity of herbaceous and geophytic forbs **(Figure 25 and Figure 26).** Grazing is variable across the area. Dominant grasses include *Themeda triandra* and *Tristachya leucothrix, Diheteropogon filifolius*, *Elionurus muticus* and *Eragrostis capensis*. Shrub and herbaceous elements include the genera *Helichrysum, Senecio, Berkheya, Conyza, Chrysocoma, Felicia* and *Euryops* as well as a range of geophytic species belonging to the Iridaceae, Oxalidaceae and Orchidaceae.

**Figure 25: Overview of grassland vegetation (often well grazed)**

**Figure 26: Overview of grassland vegetation (with outcrop and watercourse)**

Rocky outcrops exist within some orchards and are deemed unsuitable for orchards and are not likely to be affected as they cannot be ploughed and are therefore likely to be left intact. Several succulent and geophytic species are common in rocky outcrops, as well as small trees and shrubs, being fire-protected refuges. Refer **Figure 27**

**Figure 27: Rocky outcrop ridge providing a fire refuge for succulent plant species and fauna (reptiles).**

Where areas have been historically disturbed but have been left for sufficient time, a secondary grassland regenerates **(Figure 28)**. This secondary grassland is generally significantly less diverse compared to intact grassland.

**Figure 28: Overview of secondary grassland habitat**

Large areas of cultivated lands are present, the most common crop being maize **(Figure 29).** Where left fallow for a short period of time, weed species tend to proliferate followed by a slow grassland succession process.

**Figure 29: Overview of typical cultivated areas**

Dense wattle infestations are common along watercourses, but generally localised to a few watercourse rather than all watercourses **(Figure 30)**

**Figure 30: Overview of typical watercourse with dense invasive alien infestation (Wattle)**

### 7.10.4 Riparian Vegetation

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are very closely linked to the terrestrial system. Perennial, nonperennial watercourses and wetlands are present in the wider area. Several minor non-perennial watercourses would require clearing for construction of dams. Refer to the "aquatic environment" section of this report for more information on the aquatic systems present in the area.

Wetlands are scattered throughout the area and are generally dominated by grass species **(Figure 31).**

**Figure 31: Overview of typical aquatic areas with watercourse and surrounding grassy seeps (non-invaded).**

18 orchards are characteristic of wetlands either on their boundary, in the defined 50m buffer that was prescribed by the aquatic specialist or some with Hillslope Seepage wetlands following drainage lines between two orchards. It is not anticipated that planting will not take place on the wetland areas due to the soil not being compatible for orchards and these areas will be excluded. Refer to **Figures 32 to 45** for the orchards that comprises wetland features or their associated buffers.

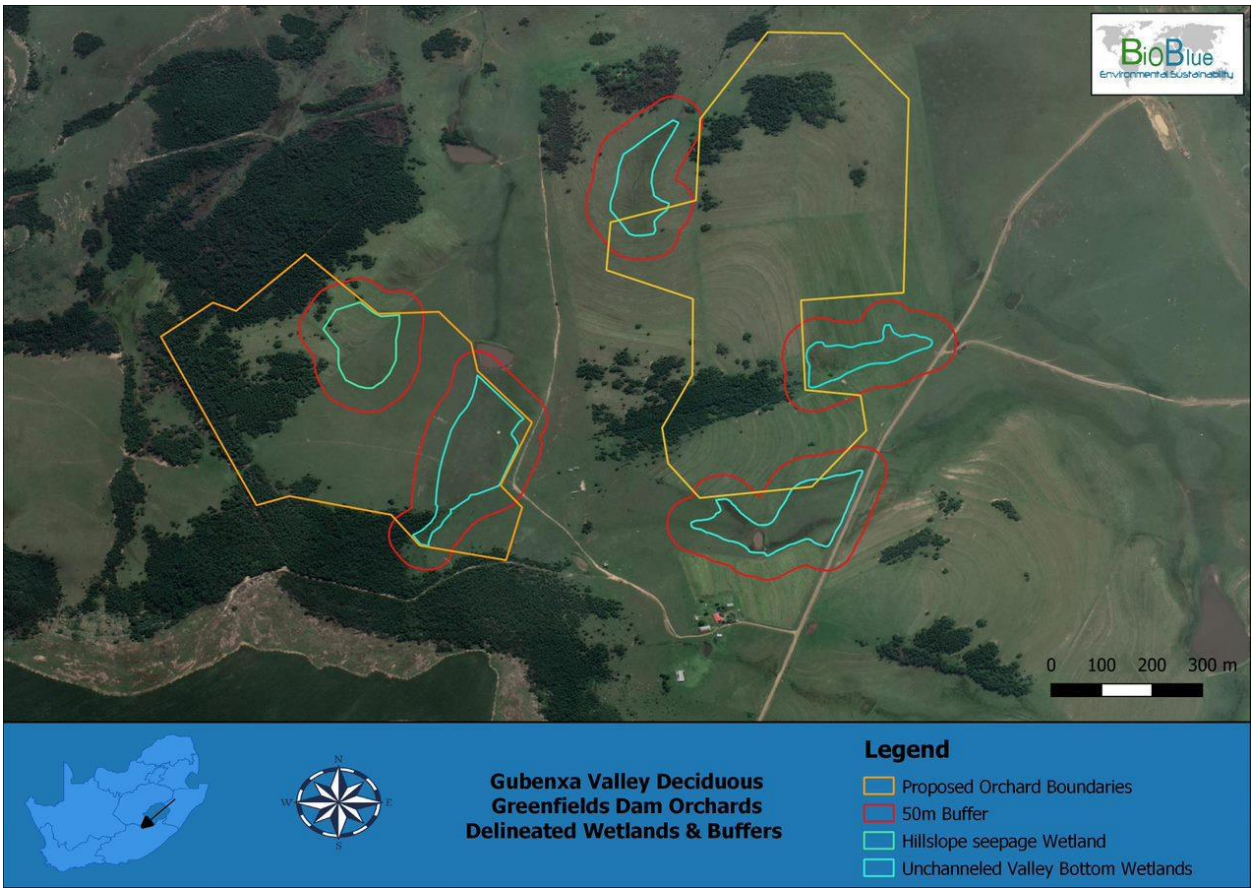



**Figure 32: Greenfields Dam Orchards**

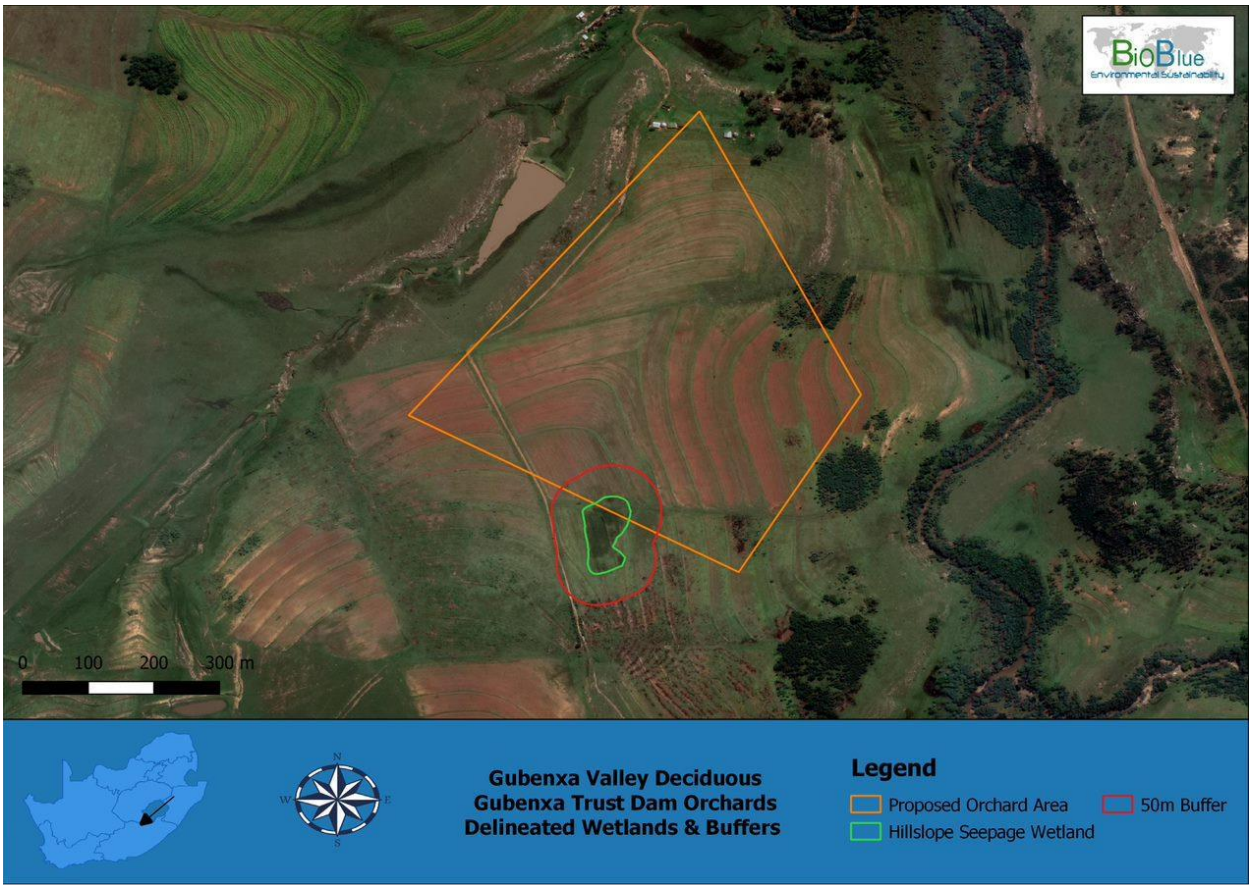



**Figure 33: Gubenxa Trust Dam Orchard**

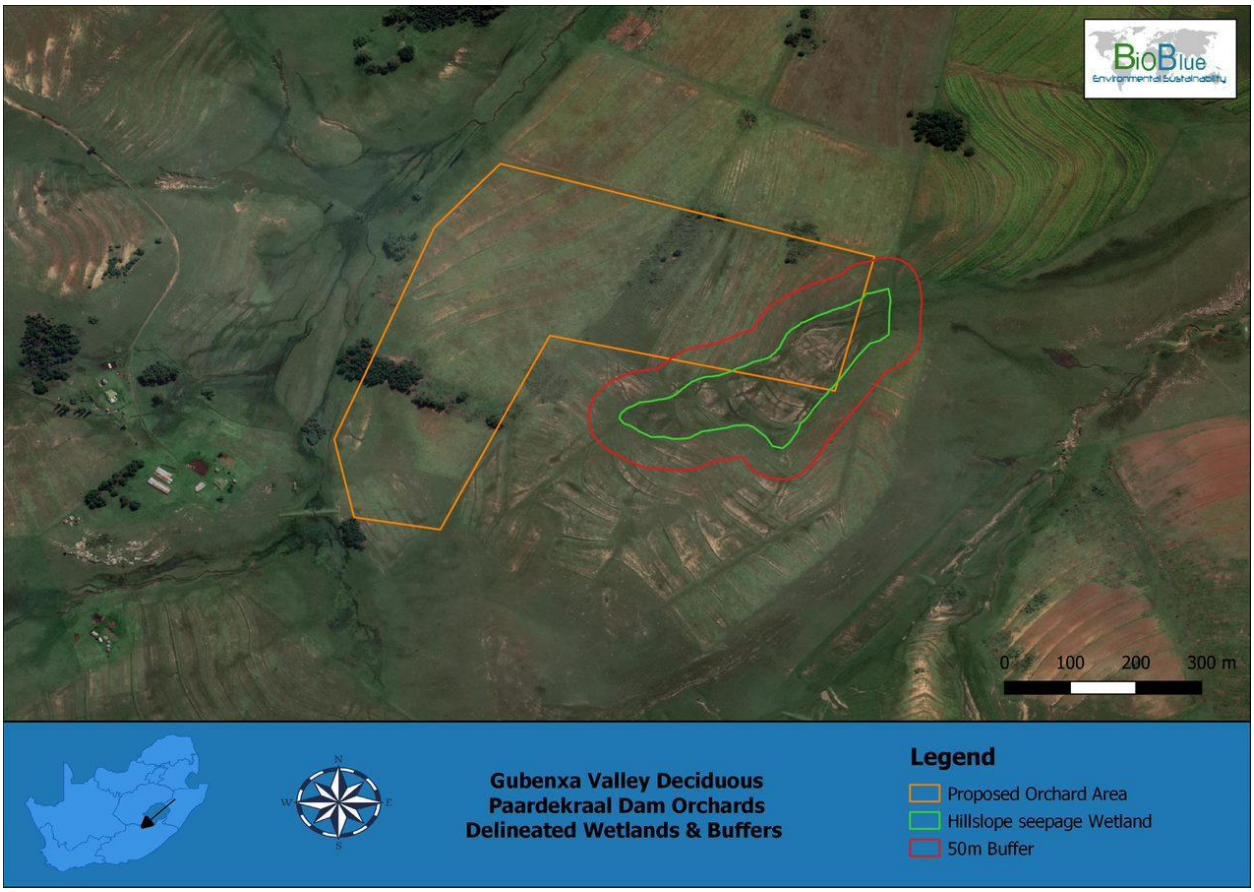



**Figure 34: Paardekraal Dam Orchard**

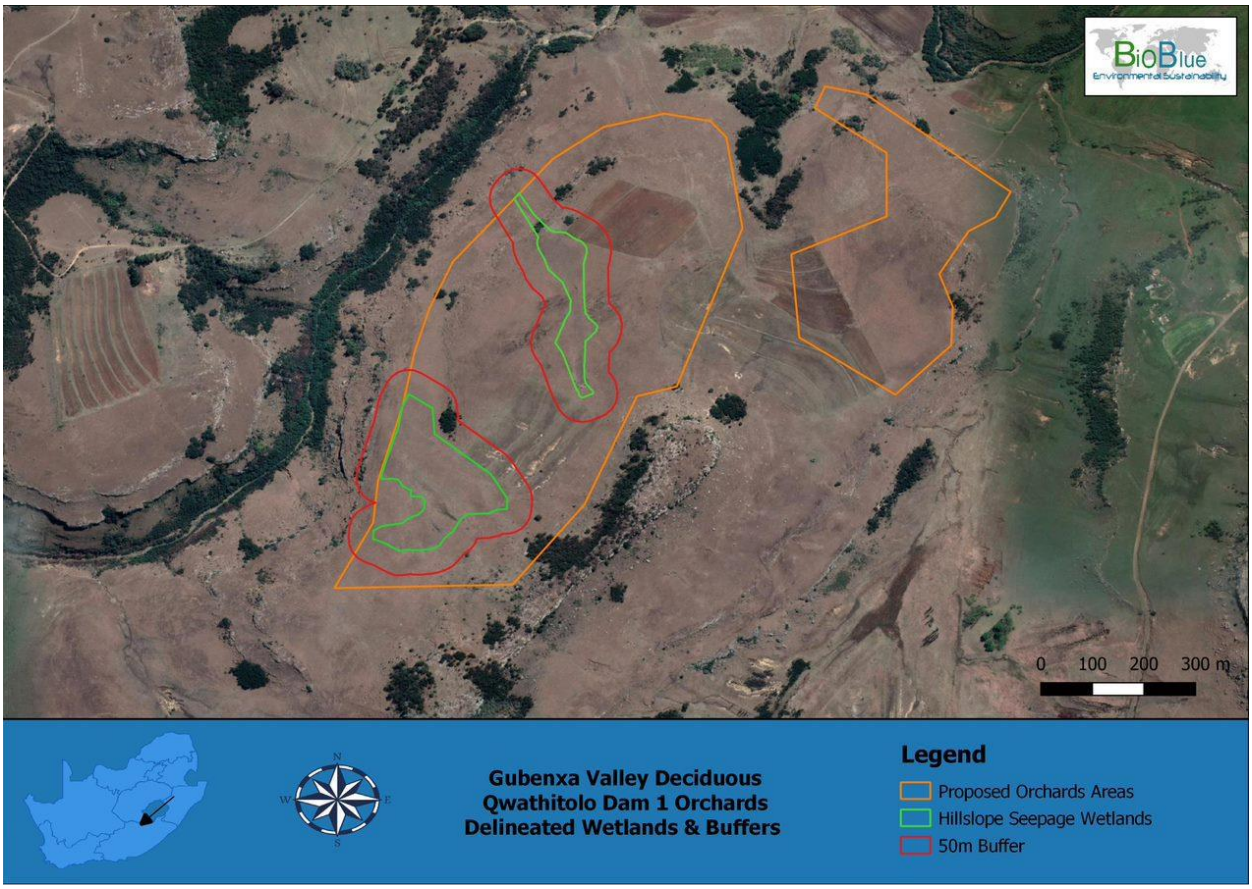



**Figure 35: Qwathitolo Dam Orchard**

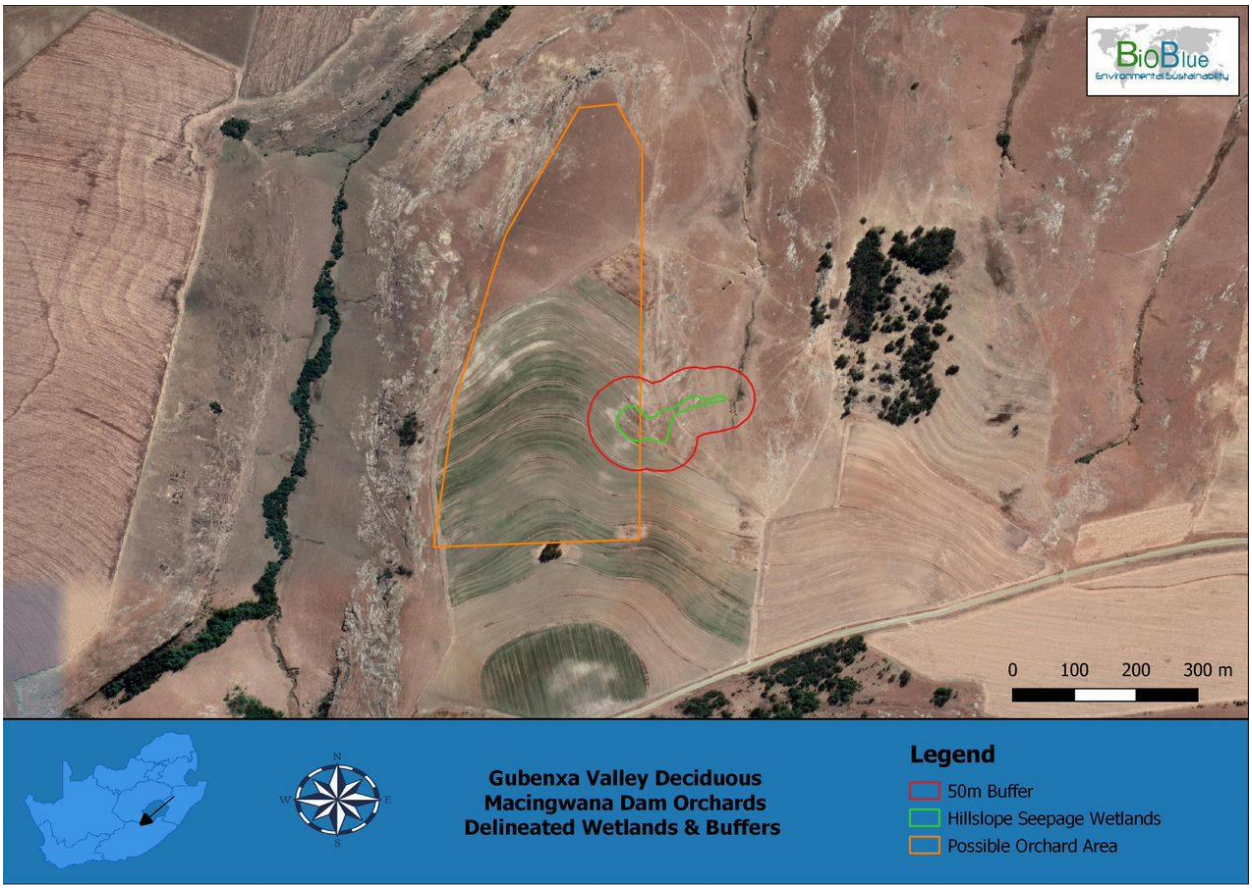



**Figure 36: Macingwane Dam Orchard**


**Figure 37: Tasana Dam Orchard**

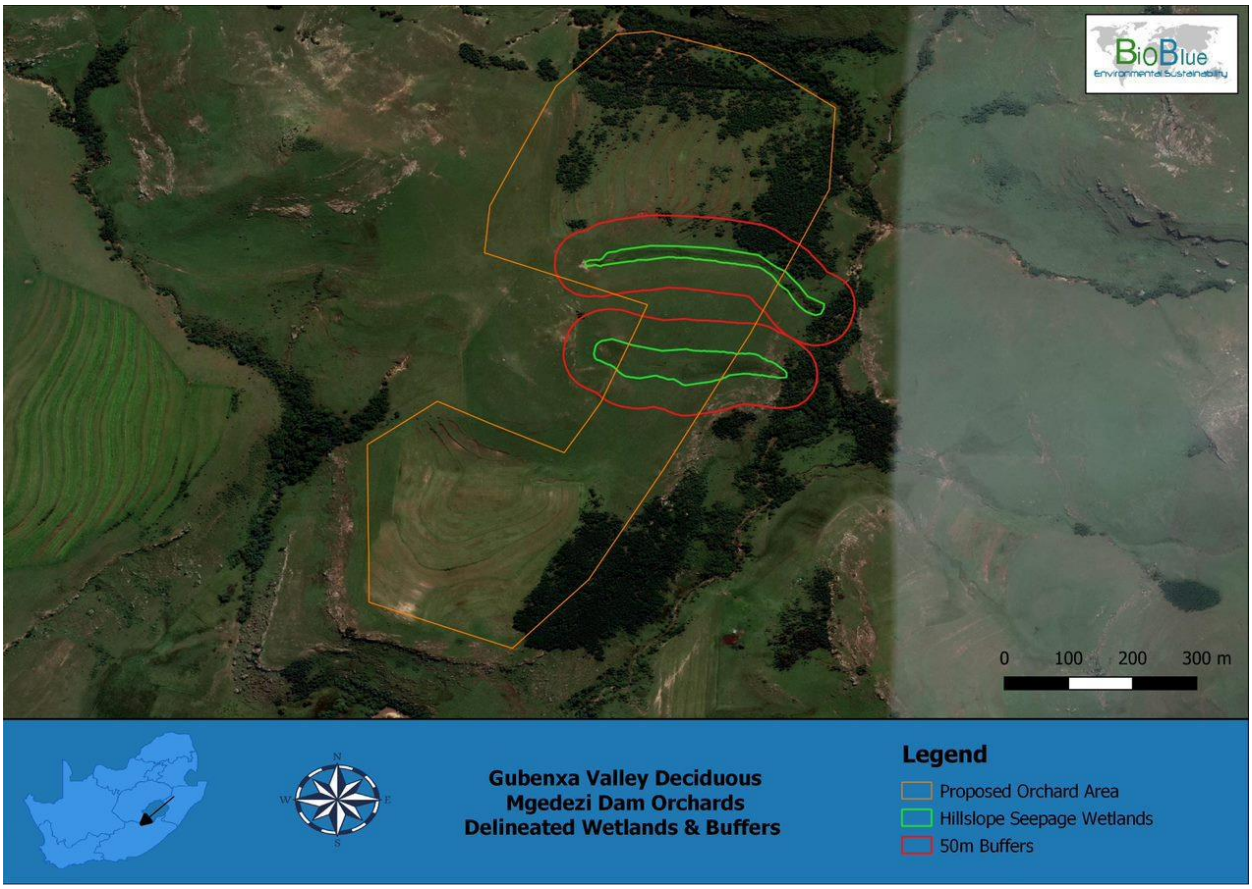



**Figure 38: Mgedezi Dam Orchard**

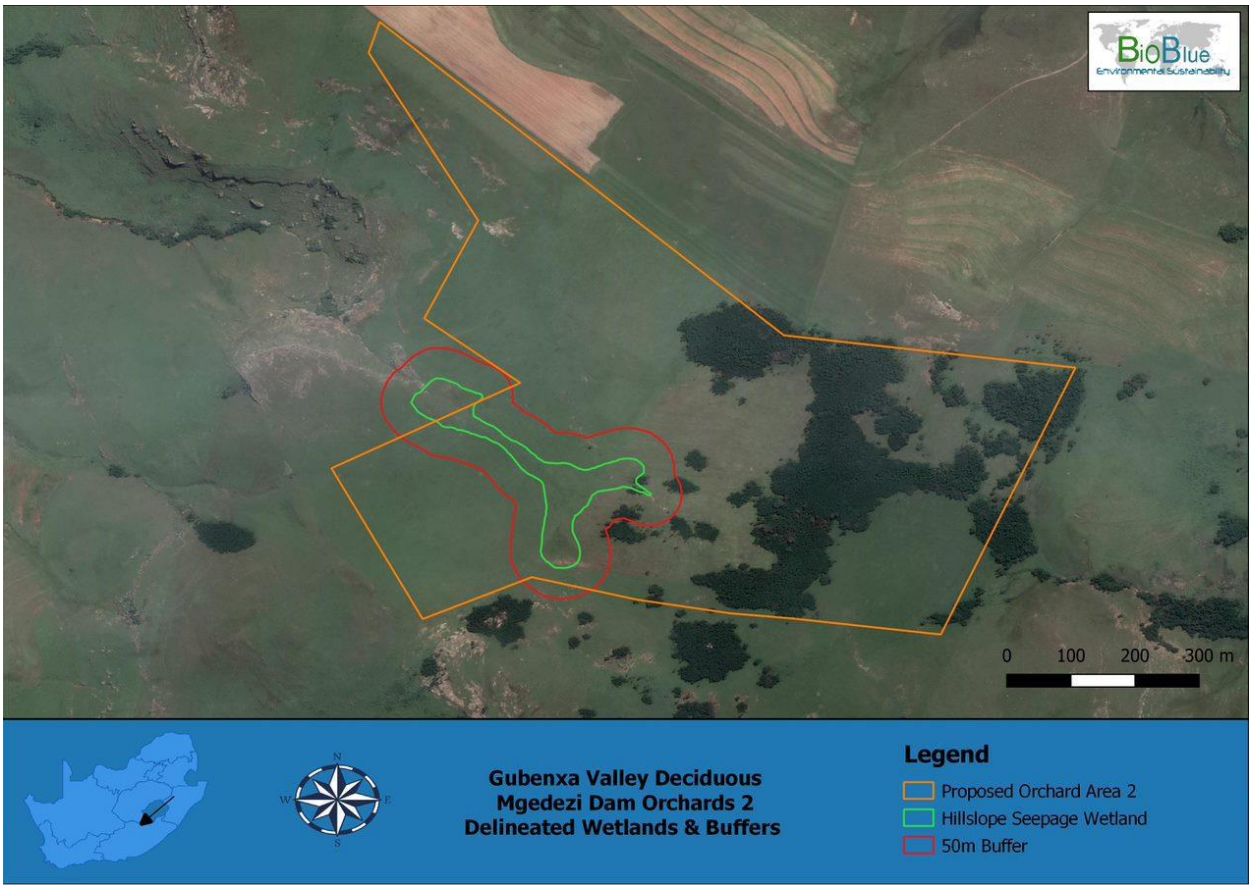



**Figure 39: Qangule Dam Orchard**

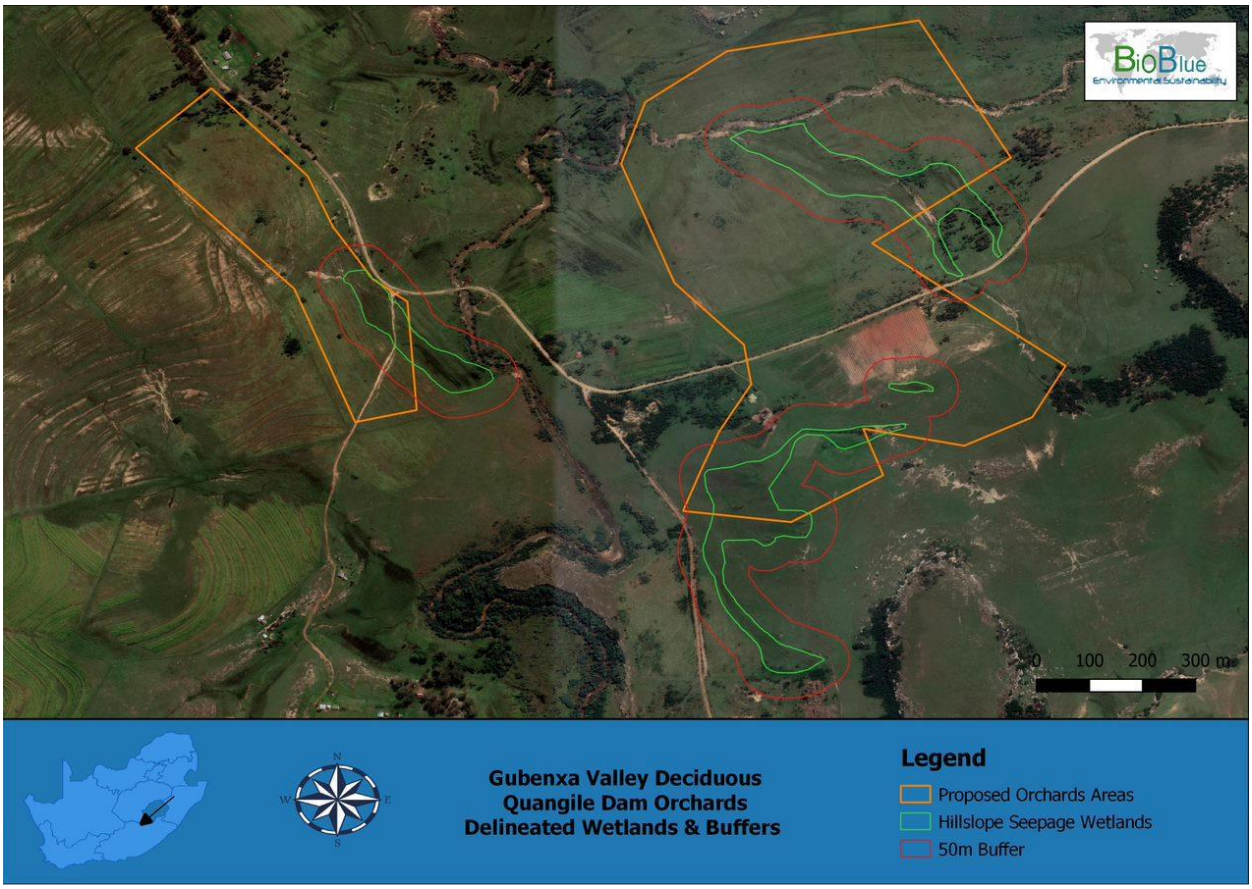



**Figure 40: Qangule Dam Orchard**

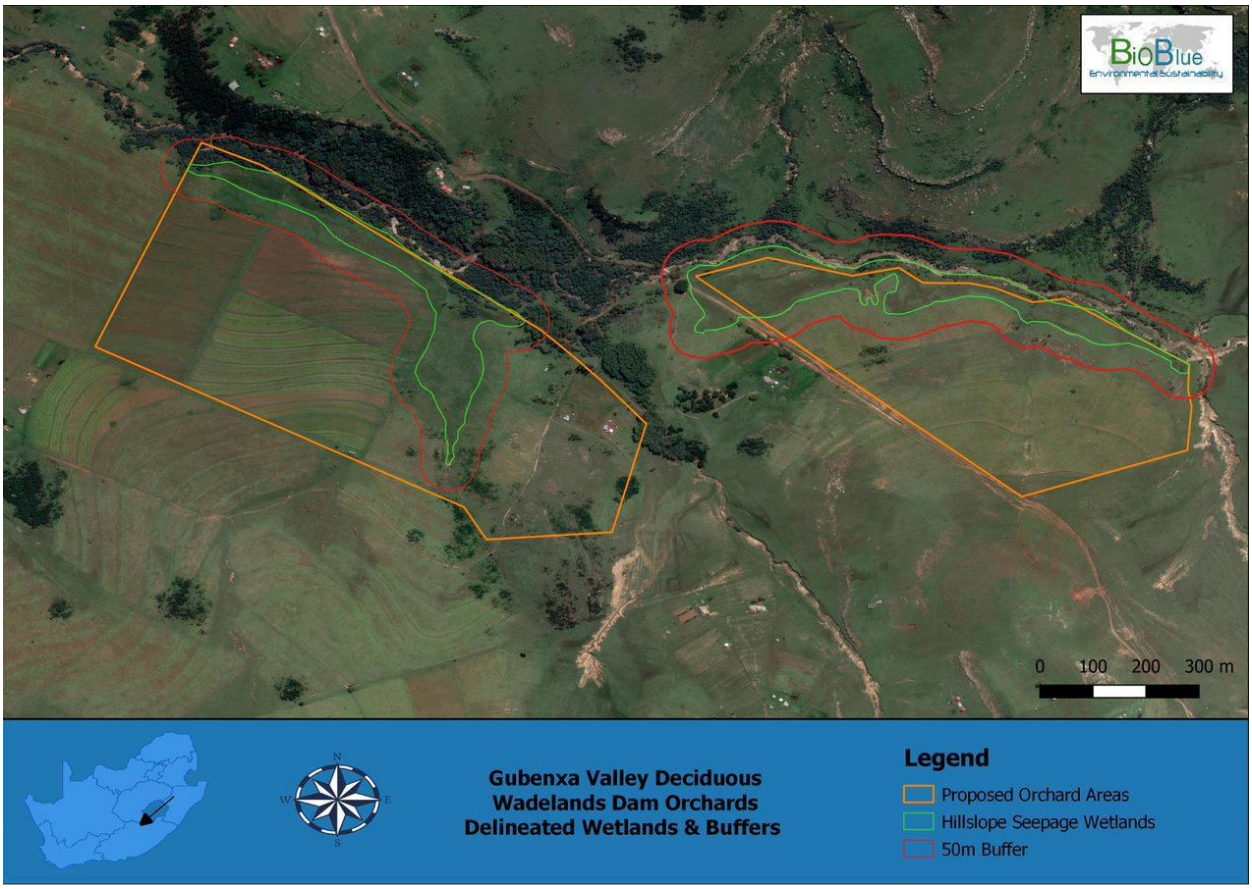



**Figure 41: Wadelands Dam Orchards**

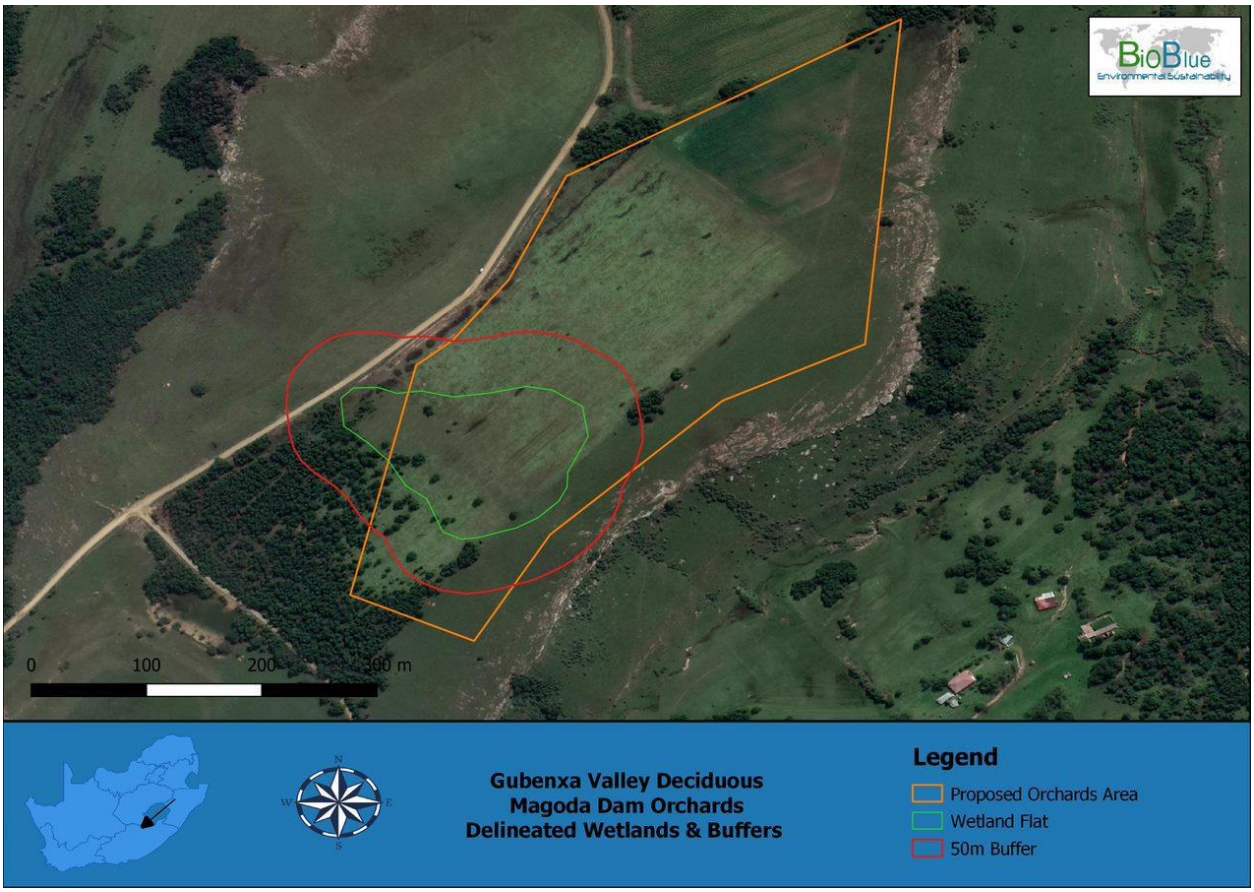



**Figure 42: Magoda Dam Orchard**

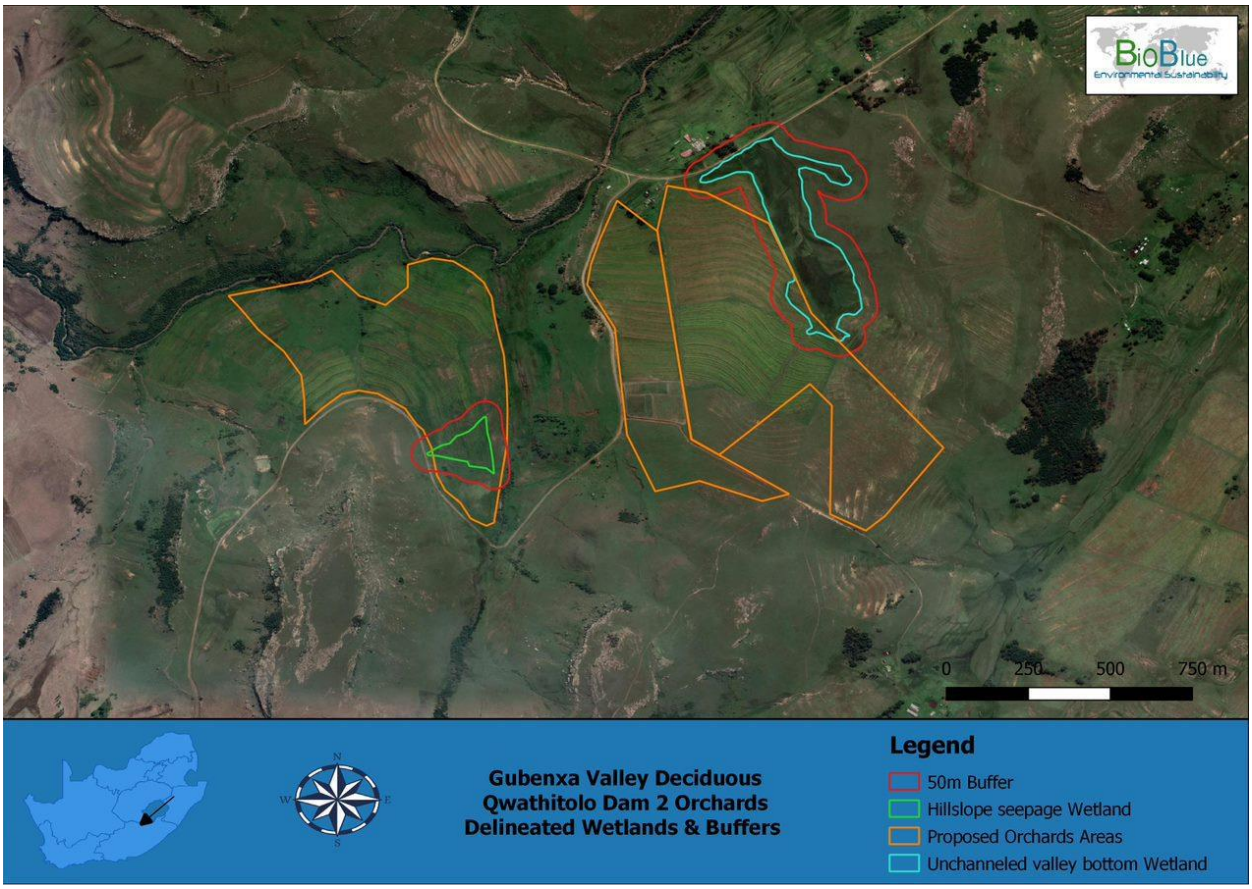



**Figure 43: Qwathitholo and Gubenxa Trust Dam Orchards**

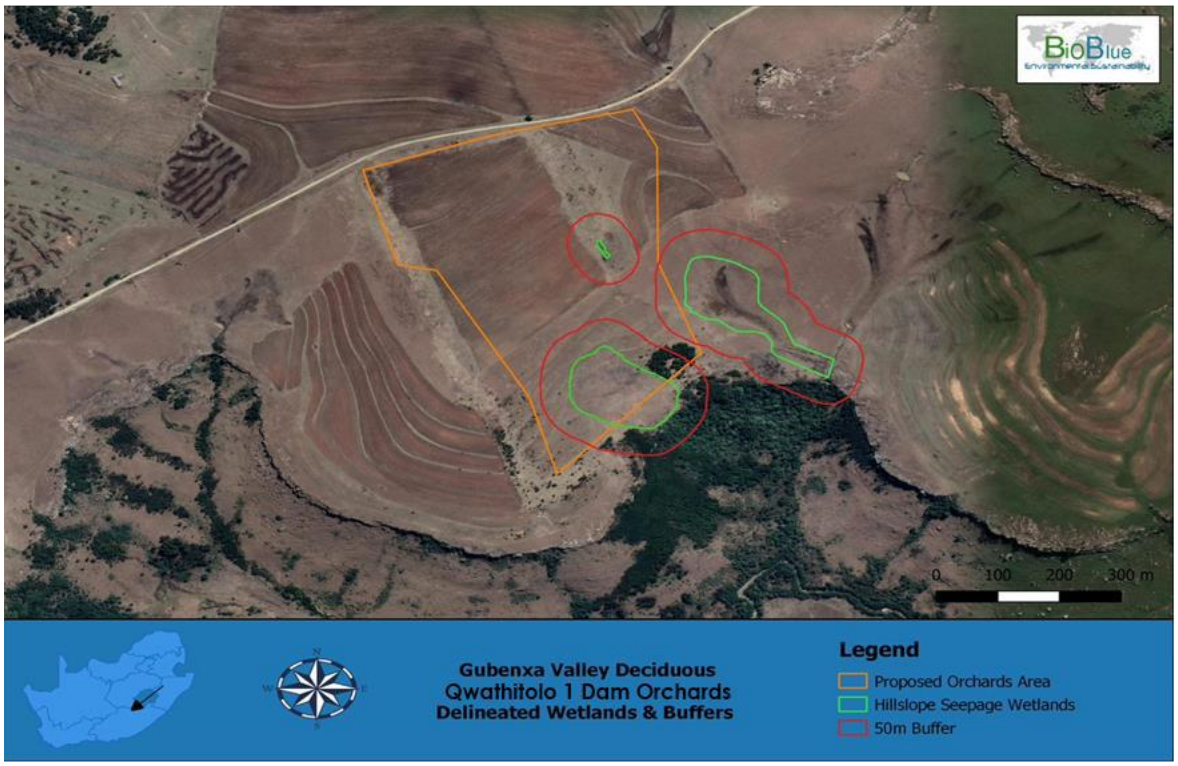


**Figure 44: Qwathitholo Dam Orchards**


**Figure 45: Hope Dam Orchard**

Riparian vegetation along watercourses is generally comprised of several sedge species and (**Figure 46)** are found along the banks of perennial and non-perennial watercourses.

**Figure 46: Overview of typical watercourse with riparian fringe consisting primarily of sedges**

Grassland seeps are prevalent in the area, similar in composition to wetlands but are free-draining into downstream watercourses **(Figure 47).**

**Figure 47: Typical seep area in proximity to watercourse with grasses and sedges and seasonal water.**

### 7.10.5 Vegetation Statistics/ Calculations

In overview, the orchards are predominantly comprised of 417.3 Ha cultivated lands (66.34 %), with intact grassland constituting 165.4 Ha intact grassland (26.3 %). Sensitive habitats include rocky outcrops, which constitute 8.5 Ha (1.4 %), and Riparian areas (including riparian vegetation along watercourses, wetlands and seeps) comprising approximately 12 Ha (1.9 %). It is unlikely that rocky outcrops will be suitable for ploughing and similarly wet areas associated with watercourse, wetlands and seeps, are unlikely to be suitable for deciduous fruit trees and hence will be excluded from the orchards. Other degraded and transformed areas include densely invaded stands of exotic trees, which comprise 26.3 % (165.4 Ha), where ecological functioning has likely been significantly compromised and species diversity (fauna and flora) will be low to very low. Dwellings and gravel roads, which are likely to be excluded from the orchards, comprise 0.4 % (2.4 Ha).

Vegetation within the proposed dams is largely a mix of Riparian vegetation along watercourses (15.42 Ha, 27.9 %), surrounding intact Grassland (20.9 Ha, 37.8 %) and cultivated lands (11.4 Ha, 20.7 %) with patches of densely invaded exotic species (6.9 Ha, 12.5 %) which often intrude into riparian vegetation. A small proportion of intact rocky outcrops, often occurring upslope from watercourses comprises approximately 0.6 Ha (1.1 %).

**Table 15: Vegetation Coverage of Orchards (Summary per project).**

| Feature | Transformed | Grassland | Invaded | Lands | Riparian | Rocky Outcrop | Total |
|---|---|---|---|---|---|---|---|
| Greenfields | | **20.09** | 10.04 | 38.98 | | **0.04** | 69.14 |
| Gubenxa Com Trust | 0.48 | 0.66 | | 73.28 | 0.50 | | 74.91 |
| Hope | | 0.72 | | 28.15 | | | 28.88 |
| Macingwane | | 5.97 | | 15.02 | | | 20.99 |
| Magoda | | 4.19 | | 9.47 | | | 13.66 |
| Mgedezi | | 13.06 | 2.87 | 22.19 | 0.51 | | 38.63 |
| Paardekraal | | 3.56 | 1.30 | 20.20 | 0.35 | | 25.41 |
| Qangule | 0.94 | **40.19** | 8.70 | 67.90 | **8.27** | **2.30** | 128.29 |
| Qwathitolo | 0.31 | **66.40** | 0.41 | 70.67 | **2.36** | **6.14** | 146.29 |
| Tasana | | 1.00 | | 13.68 | | | 14.68 |
| Wadeland | 0.67 | 9.56 | 0.15 | 57.78 | | | 68.16 |
| **TOTAL** | **2.40** | **165.40** | **23.46** | **417.32** | **11.99** | **8.47** | **629.04** |
| ***PERCENT*** | ***0.38*** | ***26.29*** | ***3.73*** | ***66.34*** | ***1.91*** | ***1.35*** | ***100.00*** |

The above figures are broken down into the separate planting blocks **(Table 16).**

**Table 16: Vegetation Coverage of Orchards (Summary per orchard block).**

| Feature | Transformed | Grassland | Invaded | Lands | Riparian | Rocky Outcrop | Total |
|---|---|---|---|---|---|---|---|
| Greenfields (1) | | **18.53** | 7.49 | 4.21 | | | 30.22 |
| Greenfields (2) | | 1.56 | 2.55 | 34.77 | | 0.04 | 38.92 |
| Gubenxa Com Trust (1) | | | | 45.82 | **0.50** | | 46.32 |
| Gubenxa Com Trust (2) | 0.48 | 0.66 | | 27.46 | | | 28.59 |
| Hope (1) | | 0.72 | | 28.15 | | | 28.88 |
| Macingwane (1) | | 5.97 | | 15.02 | | | 20.99 |
| Magoda (1) | | 4.19 | | 9.47 | | | 13.66 |
| Mgedezi (1) | | **13.06** | 2.87 | 22.19 | 0.51 | | 38.63 |
| Paardekraal (1) | | 3.56 | 1.30 | 20.20 | 0.35 | | 25.41 |
| Qangule (1) | 0.32 | 1.35 | | 11.77 | | | 13.45 |
| Qangule (2) | 0.61 | **18.62** | | 32.27 | **3.03** | | 54.54 |
| Qangule (3) | | **20.22** | 8.70 | 23.86 | **5.24** | 2.30 | 60.30 |
| Qwathitolo (1) | 0.31 | 6.22 | | 14.23 | | 0.21 | 20.97 |
| Qwathitolo (2) | | **11.03** | | 26.22 | 0.69 | | 37.94 |
| Qwathitolo (3) | | **13.16** | | 2.84 | | 1.39 | 17.39 |
| Qwathitolo (4) | | **32.43** | | 9.18 | 0.98 | 4.54 | 47.13 |
| Qwathitolo (5) | | 3.56 | 0.41 | 18.21 | 0.69 | | 22.87 |
| Tasana (1) | | 1.00 | | 13.68 | | | 14.68 |
| Wadeland (1) | | **9.56** | | 16.33 | | | 25.89 |
| Wadeland (2) | 0.67 | | 0.15 | 41.45 | | | 42.27 |
| **TOTAL** | **2.40** | **165.40** | **23.46** | **417.32** | **11.99** | **8.47** | **629.04** |

| Feature | Transformed | Grassland | Invaded | Lands | Riparian | Rocky Outcrop | Total |
|---|---|---|---|---|---|---|---|
| ***PERCENT*** | ***0.38*** | ***26.29*** | ***3.73*** | ***66.34*** | ***1.91*** | ***1.35*** | ***100.00*** |

As indicated in **Table 17** vegetation within the proposed dams is largely a mix of Riparian vegetation along watercourse (15.42 Ha, 27.9 %), surrounding intact Grassland (20.9 Ha, 37.8 %) and cultivated lands (11.4 Ha, 20.7 %) with patches of densely invaded exotic species (6.9 Ha, 12.5 %) which often intrude into riparian vegetation. A small proportion of intact rocky outcrops, often occurring upslope from watercourses comprises approximately 0.6 Ha (1.1 %).

**Table 17: Vegetation coverage of dams.**

| Site | Transformed | Grassland | Invaded | Lands | Riparian | Rocky Outcrop | Total |
|---|---|---|---|---|---|---|---|
| Dam 1 | | **2.14** | | | **0.26** | 0.22 | 2.62 |
| Dam 2 | | 0.25 | | | 0.37 | | 0.62 |
| Dam 3 | | 1.63 | | | 0.99 | 0.04 | 2.66 |
| Dam 4 | | 1.77 | | 0.70 | 0.98 | 0.16 | 3.61 |
| Dam 5 | | 2.77 | | | 0.74 | | 3.51 |
| Dam 6 | | 0.47 | | | **3.75** | | 4.22 |
| Dam 7 | | 1.13 | 0.40 | | 0.97 | 0.21 | 2.72 |
| Dam 8 | | **3.28** | | | **1.83** | | 5.11 |
| Dam 9 | | 2.93 | | | **1.33** | | 4.26 |
| Dam 10 | | | 2.96 | 3.94 | **1.09** | | 7.99 |
| Dam 11 | | 3.24 | 1.85 | | 0.80 | | 5.89 |
| Dam 13 | | 0.61 | 0.22 | 0.87 | 0.28 | | 1.97 |
| Dam 14 | | 0.63 | 1.43 | 5.90 | **2.04** | | 10.00 |
| **TOTAL** | **0.00** | **20.85** | **6.87** | **11.41** | **15.42** | 0.63 | **55.17** |
| ***PERCENT*** | ***0.00*** | ***37.79*** | ***12.45*** | ***20.68*** | ***27.94*** | ***1.14*** | ***100.00*** |

### 7.10.6 Species of Special Concern occurring in the region

A number of endemic and range restricted species are known from the general surrounding area and there is a residual likelihood that they could be present, but cannot be discounted without comprehensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, with vegetation clearing only required for site development, as well as the level of degradation, the risk of a species suffering any significant population loss is low. There is always a residual risk to species for any activity.

The site falls within the general distribution range of several endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are also only from a single or a few populations. As per **Table 18**, no Endangered or Critically Endangered flora species were confirmed to be present nor are known to be present in the affected area. Listed species were flagged from various database sources as occurring in the region and having an elevated status. All were cross-checked for distribution overlay and were actively screened for

presence/absence on site. Other species may be endemic, but distribution range has been checked and are generally widespread. Sensitive species names have not been included for protection reasons.

**Table 18: Species of Conservation Concern**

| SCIENTIFIC NAME | FAMILY | STATUS [4] | COMMENT/PRESENCE |
|---|---|---|---|
| *Alchemilla incurvata* | Rosaceae | End | |
| *Alepidea duplidens* | Apiaceae | End | Present |
| *Argyrolobium sericosemium* | Fabaceae | End | |
| *Berkheya griquana* | Asteraceae | End | Present |
| *Brachystelma molaventi* | Apocynaceae | End | |
| *Delosperma wiunii* | | End | |
| *Diascia esterhuyseniae* | Scrophulariaceae | End | |
| *Dioscorea brownii* | Dioscoreaceae | End, PNCO | |
| *Disperis renibractea* | Orchidaceae | PNCO | |
| *Encephalartos friderici-guilielmi* | Zamiaceae | BIT, PNCO, CITIES | Not recorded |
| *Encephalartos ghellinckii* | Zamiaceae | PNCO, CITIES | Not recorded |
| *Erica caffrorum var. caffrorum* | Ericaceae | PNCO | |
| *Erica cooperi var. cooperi* | Ericaceae | NEST (M), Rare | Habitat specialist, EOO 3 000 km². Not threatened. Widespread WC, EC, KZN to Limpopo, Swaziland & Mozambique. KwaZulu-Natal midlands, from Mvoti to Elliot in the Eastern Cape. Seepage areas on grassy mountain slopes. NOT RECORDED. |
| *Habenaria dregeana* | Orchidaceae | PNCO | |
| *Habenaria lithophila* | Orchidaceae | PNCO | |
| *Haemanthus humilis subsp. hirsutus* | Amaryllidaceae | PNCO | |
| *Hesperantha coccinea* | Iridaceae | PNCO | |
| *Hesperantha ingeliensis* | Iridaceae | PNCO | |
| *Hypoxis rigidula var. pilosissima* | Hypoxidaceae | PNCO | |
| *Ledebouria sandersonii* | Hyacinthaceae | PNCO | |
| *Moraea modesta* | Iridaceae | PNCO | |
| *Nerine bowdenii* | Amaryllidaceae | PNCO | |

4 **PNCO** - Provincial Nature Conservation Ordinance (Schedule 2) [1974]; **ToPS** – Threatened or Protected Species [NEMBA]; **IUCN**: Lease Concern, Not Threatened; **NEMBA**: Protected species; Threatened species; **CITIES** - Conservation for International trade in Endangered Species (Category II); **NEST** – National Environmental Screening Tool.; **BIT** – Biogeographic Important Taxa; **End** – Endemic.

| | | | |
|---|---|---|---|
| *Ocotea bullata* | Lauraceae | NEST (M), EN [A2bd] | The species was heavily exploited for the timber industry in the past, and more recently for bark for the traditional medicine trade. Despite its wide, but disjunct, distribution, subpopulations in at least 53% of its range have been heavily exploited, rendering them extinct, near-extinct, rare, scarce or fragmented. We estimate a minimum of 50% population reduction in the last 240 years (generation length 80 years). Widespread in South Africa from the Cape Peninsula to the Wolkberg Mountains in Limpopo. NOT RECORDED. |
| *Ornithogalum baurii* | Hyacinthaceae | End, PNCO | |
| *Prunus africana* | Rosaceae | NEST (M), VU [A4acd; C1+2a(i)] | Widespread in Africa from the southern Cape, through KwaZulu-Natal, Swaziland and northwards in to Zimbabwe and central Africa and the islands of Madagascar and Comoros. NOT RECORDED. |
| *Rhodohypoxis baurii var. baurii* | Hypoxidaceae | PNCO | |
| *Rhodohypoxis baurii var. platypetala* | Hypoxidaceae | PNCO | |
| *Schizochilus bulbinella* | Orchidaceae | BIT, PNCO | |
| *Schoenoxiphium burttii* | Cyperaceae | BIT | Present |
| *Sensitive species 1248* | | NEST (M), VU [A2ad] | Eastern Cape, Gauteng, KwaZulu-Natal, Limpopo, Mpumalanga, Eastern Cape to Limpopo Province. Widespread elsewhere in southern and eastern Africa. NOT RECORDED. |
| *Sensitive species 1252* | | NEST (M), VU [A2cd] | Widespread WC, EC, KZN to Limpopo, Swaziland & Mozambique. NOT RECORDED. |
| *Sensitive species 441* | | NEST (M), EN [A2c; C2a(i)] | KwaZulu-Natal Midlands around Estcourt southwards along the KwaZulu-Natal and Eastern Cape Drakensberg foothills to the Amathole Mountains near Hogsback. NOT RECORDED. |
| *Sensitive species 451* | | NEST (M), EN [A2d] | Amathole Mountains in the Eastern Cape, extending north-eastwards to southern KwaZulu-Natal and along the eastern border of Lesotho. NOT RECORDED. |
| *Sensitive species 535* | | NEST (M), EN [A2d] | Amathole Mountains in the Eastern Cape, extending north-eastwards to southern |

| | | | |
|---|---|---|---|
| | | | KwaZulu-Natal and along the eastern border of Lesotho. NOT RECORDED. |
| *Sensitive species 609* | | NEST (M), VU [A2d; B2ab(v)] | This species is common in traditional medicine markets and very rare in the wild. A decline of >30% over the past 15 years is estimated as a result of heavy trade pressure (generation length five years). AOO <2000 km², severely fragmented subpopulations occur in isolated sites and continue to decline. Eastern Cape to KwaZulu-Natal. NOT RECORDED. |
| *Sensitive species 735* | | NEST (M), VU [D2] | Four known locations are potentially threatened by livestock overgrazing. Cala and Engcobo. High altitude grasslands, wedged between rocks. NOT RECORDED. |
| *Stachys rivularis* | Lamiaceae | End | Present |
| *Wahlenbergia dentata* | Campanulaceae | End | |
| *Wahlenbergia ingrata* | Campanulaceae | End | Present |
| *Watsonia pillansii* | Iridaceae | PNCO | Present |

### 7.10.7 Alien Invasive Species

Several exotic invasive and other weed species were noted within the site, although they are present in low numbers. A few large *Acacia mearnsii* (Black Wattle) trees are present, as well as Lantana (*Lantana camara/rugosa*) and a few other ruderal weed species. A weed management programme, as part of the construction contract including an after-care period will be required. A list of species is included in **Table 19.** Some species listed are not within the site but may be introduced during construction from the adjacent area.

**Table 19: Alien (exotic) invasive and other weed species and status.**

| SCIENTIFIC NAME | COMMON NAME | FAMILY | STATUS[5] | **PRESENCE** |
|---|---|---|---|---|
| *Acacia mearnsii* | Black Wattle | Fabaceae | CARA 2 | Present |
| *Agave sisalana* | Sisal/Hemp | Asparagaceae | CARA 2 | Present |
| *Argemone mexicana* | *Mexican Poppy* | Asteraceae | CARA 1b | Present |
| *Cirsium vulgare* | Scotch Thistle | Asteraceae | CARA 1b | Present |
| *Datura spp.* | Thorn Apple | Solanaceae | CARA 1b | Present |
| *Lantana camara* | Lantana/ Tickberry | Verbenaceae | CARA 1b | Common |
| *Pennisetum clandestinum* | Kikuyu | Poaceae | CARA 1b | Common |
| *Pinus pinaster* | Pine | | CARA 1b | Present |
| *Psidium guajava* | Guava | Myrtaceae | CARA 3 | Present |
| *Senna didymobotrya* | Peanut butter cassia | Fabaceae | CARA 1b | Present |

[5] CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016). Refer to Section **Error! Reference source not found.** & **Error! Reference source not found.** for detailed procedures and requirements.

| SCIENTIFIC NAME | COMMON NAME | FAMILY | STATUS[5] | **PRESENCE** |
|---|---|---|---|---|
| *Solanum mauritianum* | Bugweed | Solanaceae | CARA 1b | Present |
| *Solanum sisymbriifolium* | Wild tomato | Solanaceae | CARA 1b | Present |
| *Verbena bonariensis* | Verbena | Verbenaceae | CARA 1b | Present |

### 7.10.8 Present Ecological State

Table **20** provides a comprehensive description and assessment of biodiversity and ecological indicators for the site. In summary, the following general observations can be noted regarding the site:

- The grassland vegetation on site is moderately degraded to completely transformed.
- Alien invasion is presently low with occasional trees including Black Wattle and Pine, as well as weeds such as Bugweed and Lantana.
- Dumping of various forms of historical and ongoing dumping of rubble is evident.

**Table 20: Summary of Key Biodiversity and Ecological Indicators**

| ASPECT | DESCRIPTION |
|---|---|
| **LANDSCAPE AND COMMUNITY DESCRIPTION** | |
| Aspect, Slope, Topography | Hilly to mountainous with incised watercourses and river valleys |
| Substrate | Moderate to shallow soils |
| Vegetation units | Grassland |
| Total Ground Cover (%) | > 90 % |
| Tree Height (m) – Median (alien species) | 5 - 10 m (Invasives)<br>< 2 m (indigenous) |
| Tree Cover (%) Aerial | < 20 % (invasives) |
| Shrub Cover (%) | < 20 % |
| Herbaceous Cover (%) | |
| Grass Cover (%) | > 90 % (estimated) |
| Bare soil/rock (%) and disturbed | < 10 % (excluding cultivated areas) |
| **TERRESTRIAL LANDSCAPE FEATURES** | |
| Forest | No Forest is present |
| Thicket | No thicket is present |
| Grassland | Grassland is the dominant vegetation unit. |
| Fynbos/Grassy Fynbos | No Fynbos elements are present |
| Riparian | Riparian vegetation is present along watercourses, drainage lines, seeps and wetlands. |
| Wetland | Wetlands are present on site |
| Estuaries | No estuaries are present |
| Dunes/Coastal | No coastal/dune habitat is present |
| Rocky Outcrop Habitat | Some exposed rocky areas are present in steeper less accessible areas and cliffs |
| Fauna Nesting Sites | Cliffs in surrounding hill may provide nesting habitat but will not be affected. |

| ASPECT | DESCRIPTION |
|---|---|
| Fauna Feeding Grounds | The grassland is likely to provide suitable habitat for a range of faunal species. |
| Ecotones | Ecotones are not present, as site is a single vegetation unit |
| Ecological Corridors | The grassland as a whole is likely to function as an ecological corridor, with watercourses for species that favour wetter conditions. |
| Evolutionary Processes | None of significance within terrestrial environment |
| Transformed (crops) | Large areas have been cultivated. Forestry plantations also prevalent in wider area. |
| Transformed (housing) | Minimal, occasional rural dwellings |
| Transformed (other) | Site is mix of intact vegetation as well as cultivated areas. |
| Degraded (modified) | Minimal, other than around human disturbances (settlements, roads, pathways). |
| Secondary vegetation | |
| **DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION** | |
| Human disturbances | Human disturbance due to rural development is moderate within and surrounding the site, with extensive cultivation and forestry but with extensive intact areas still present. |
| Habitat fragmentation | Fragmentation is low related to scattered agriculture, limited access roads and hilly and incised terrain. |
| Invasive Alien Plants | Present in disturbed areas, such as along roads, become dense along certain watercourses. |
| Other degradation | Rubble and other rubbish is present but not prevalent due to low population density. |
| Remaining intact habitat: | Intact habitat is extensive in the surrounding landscape. |
| Grazing (livestock) | Surrounding area is used extensively for seasonal grazing. |
| Hunting | Likely present in surrounding rural landscape |
| Conservation (passive) | General area does contribute significantly to passive conservation, having low population density and vegetation being mostly intact. |
| Recreational (sport) | None |
| Other | None |
| **PATTERNS OF BIODIVERSITY** | |
| Flora | Flora diversity is low to moderate due to the presence of a single vegetation type. |
| Fauna | Fauna diversity is low to moderate within the grasslands but moderate to high in wetlands/seeps/watercourse areas. |
| Species of Special Concern | A few species are potentially found in the region and vegetation units. |
| **ECOLOGICAL PROCESSES** | |
| Gene dispersal barriers | Roads, rural settlements, minimal fragmentation |
| Gene dispersal corridors | Extensive river valleys likely provide corridors for movement of a suite of fauna |
| Aeolian (dune) processes | None |
| Climatic gradients | Climatic gradients are present due to slopes and different aspects |
| Rivers and Drainage Lines (Riparian Vegetation) | Several watercourses and rivers in proximity to the site. |
| Refuges (outcrops/islands) | Rocky and other refuges are present within the site, generally confined to steep inaccessible areas and cliff faces. |

| ASPECT | DESCRIPTION |
|---|---|
| Fire | Fire is an important ecological process in grassland vegetation. |
| Ecotones/Tension zones | Ecotones are mostly absent because of the single vegetation unit |
| Erosion | Erosion is low within the site |
| **ECOLOGICAL SERVICES** | |
| Carbon storage | Grassland is considered a low carbon accumulator. |
| Provisioning Services | Livestock grazing: Informal grazing is prevalent in the rural area with moderate grazing capacity; however, the area is generally considered to be well- to over-grazed.<br>Timber (Building materials): Extensive woodlands likely used extensively.<br>Fuelwood: Extensive woodlands likely used extensively.<br>Food: None known<br>Fibre: None known<br>Medicinal plants: None were recorded within the site. Various species in the surrounding area have medicinal properties and are most likely harvested informally. |
| Other (ornamentals) | None known |
| **CONSERVATION IMPORTANCE** | |
| Current Distribution (extent) | Vegetation units have a widespread regional distribution covering an extensive area outside of the site footprint. More than 60 % is considered to be still intact. |
| Red Listed Species and other Species of Special Concern | A few species are potentially found in the region and vegetation units. |
| Habitat for SSC | Several species of special concern are known from the general area, as well as the vegetation unit that is present. The site is likely to provide habitat viable potential for any of the mostly mobile faunal species as well as several flora species. |
| Relative Conservation importance | Vegetation unit is regionally widespread. |
| **OTHER SENSITIVITIES** | |
| Conservation importance | A few species are potentially found in the region and vegetation units. |
| Topography | Hilly to Mountainous |
| Wetlands | None |
| Rehabilitation potential | Rehabilitation potential is moderate to high for grassland. |
| Community structure | Community structure is relatively simple with limited growth forms begin present. |

## 7.11 **Fauna**

The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to. Site is unlikely to provide significant faunal habitat.

### 7.11.1 National Environmental Screening Tool

The DEA (now DFFE) screening tool identifies *High & Medium* Animal Species Sensitivty in proximity to the site. **Figure 48** below is extracted directly from the Screening Tool report.

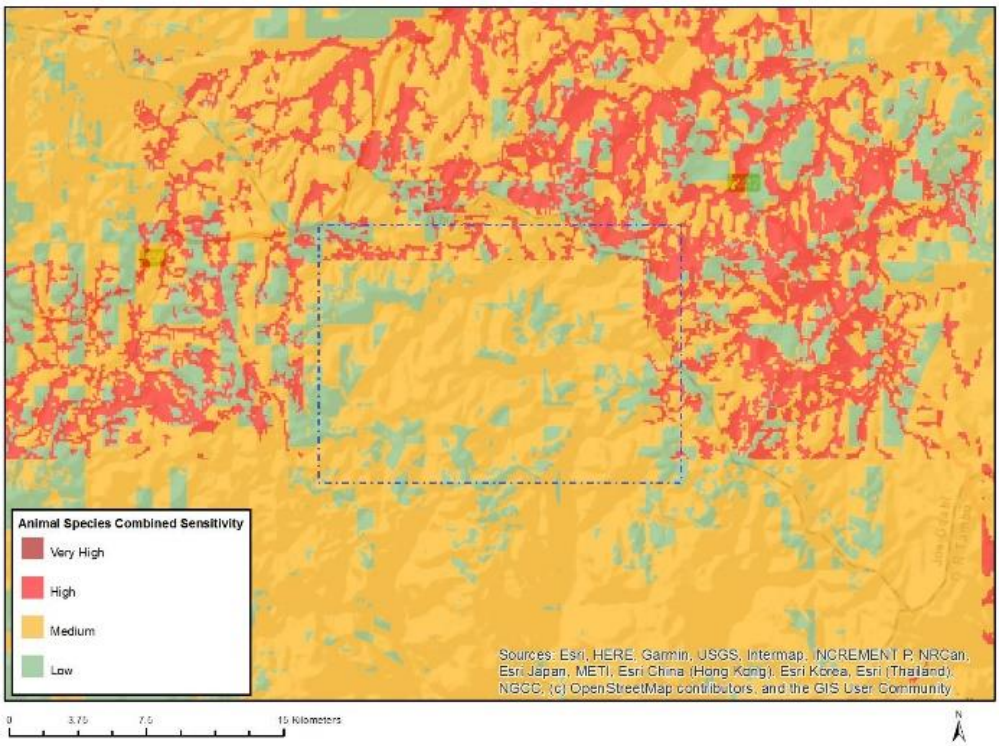



**Figure 48: National Screening Tool Animal Species Combined Sensitivity for the study area**

Several fauna species *Circus ranivorus* (African Marsh Harrier)*, Neotis denhami (Denham's Bustard)* and *Sensitive species 9* have been recorded in the area with *Chrysoritis lyncurium (Tsomo River Opal), Cercopithecus albogularis labiatus* (Samango monkeys)*, Hydrictis maculicollis* (Spotted-necked Otter)*, Dendrohyrax arboreus (Tree Hyrax), Sagittarius serpentarius (Secretarybird)* identified as potentially being present and were investigated further by Mr Jamie Pote the ecologist responsible for assessing the terrestrial biodiversity, flora and fauna in the area.

### 7.11.2 Mammals

No larger mammal species, other than cattle, sheep or goats, are likely to be found on the site. Should they be present, they are likely to be mobile species that would move away from disturbance and with intact habitat available in the immediate surrounds would unlikely be negatively affected by the development.

Small mammals within the habitat are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Generally, these small mammals are mobile and will

vacate the area once construction commences. A latent risk of mortality due to vehicular activity is possible. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity and a faunal search and rescue is not deemed to be required.

### 7.11.3 Avifauna and Bats

The affected area generally has a low human presence, so there has unlikely been significant displacement of birds, with extensive intact habitat in the wider area. Common bird sightings include:

- Grey Crowned Crane - *Balearica regulorum*
- Secretarybird- *Sagittarius serpentarius*
- Cape Rock- Thrush- *Monticola rupestris*
- Buff Streaked-Chat- *Campicoloides bifasciatus*
- Jackal Buzzard- *Buteo rufofuscus*
- African Marsh Harrier- *Circus ranivorus*

Interestingly, there have been sightings of Yellow-billed Oxpecker in the Elliot area and Wattled Cranes (more towards Ugie). Cape Vulture have also been sighted. According to Birdlife South Africa, the closest Important Bird Area (IBA) is the Collywobbles Vulture Colony which is located 70km to the south east of the site.

The Grey Crowned Crane is commonly present in the area can be seen in singles, pairs, and flocks. Naturally, they prefer wetlands, flooded grasslands, and man-made water bodies, but they can range widely through other open habitats when foraging. Resident but may be locally nomadic in response to rain. This bird species is considered as being “Endangered”.

The Grey crowned crane was observed to be foraging in old lands and new cultivated (operational) lands and it is likely that it will only suffer temporary displacement during construction.

The introduction of water bodies as a result of the project is likely to increase the presence and occurrence of bird species due to increased foraging grounds, nesting sites and the like.

The proposed activity is unlikely to pose any significant risk to bats. In addition the presence of dams may result in increase in seasonal bat presence (foraging).

### 7.11.4 Reptiles and Amphibians

In terms of reptiles, it is anticipated the following snakes are likely to occur in the area:

- Mole snake
- Rhinkals
- Western Natal Green Snake
- Dusky Bellied Water Snake

- Puff Adder

Lizards, skinks and agamas are also likely to occur, particularly on the rocky outcrops.

Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is unlikely that a faunal search and rescue would be required. Should any reptiles be found during constructions, a reptile handler should be on called.

No amphibians of conservation concern are likely to be present that will be significantly affected.

### 7.11.5 Red Listed and Protected Fauna

As per Table 21, *Gyps coprotheres* (Cape Vulture) is known to nest on the cliffs in vicinity to the site. No other Endangered or Critically fauna species were found to be present nor are known to be present in close proximity to the affected area, or are likely to be directly affected by the proposed activity. The site falls within the general distribution range of a few faunal species as indicated in Table 21 below. Since the project footprint is surrounded by extensive outlying areas of natural habitat, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact faunal species.

**Table 21: Fauna Species of Special Concern**

| SCIENTIFIC NAME | COMMON NAME | STATUS[6] | COMMENT/PRESENCE |
|---|---|---|---|
| **Mammals** | | | |
| *Cercopithecus albogularis labiatus (Cercopithecus mitis ssp. labiatus)* | Samango monkeys | NEST (M); VU [B2ab(ii,iii,v)] | Eastern Cape, Port Elizabeth and inland to Swaziland and Limpopo |
| *Dendrohyrax arboreus* | Tree Hyrax | NEST (M), EN [B2ab(ii,iii,iv,v); C2a(i)] | Angola; Burundi; Congo, The Democratic Republic of the; Kenya; Malawi; Mozambique; Rwanda; South Africa (KwaZulu-Natal, Eastern Cape Province); Tanzania, United Republic of; Uganda; Zambia. Forest, Savanna, Rocky areas (eg. inland cliffs, mountain peaks) |

6 **PNCO -** Provincial Nature Conservation Ordinance (Schedule 2) [1974]; ToPS – Threatened or Protected Species [NEMBA]; IUCN: Lease Concern, Not Threatened; NEMBA: Protected species; Threatened species; Conservation for International trade in Endangered Species (Category II)

| SCIENTIFIC NAME | COMMON NAME | STATUS[6] | COMMENT/PRESENCE |
|---|---|---|---|
| *Hydrictis maculicollis* | Spotted-necked Otter | NEST (M), VU [C2a(i)] | Widespread, west, central & southern Africa, Marine Intertidal, Coastal/Supratidal, Artificial/Aquatic & Marine |
| **Birds** | | | |
| *Actitis hypoleucos* | Common Sandpiper | | May be transient visitor |
| *Aquila pennatus* | Booted Eagle | | May be transient visitor |
| *Buteo buteo* | Steppe (Common) Buzzard | | May be transient visitor |
| *Bycanistes (Ceratogymna) bucinator* | Trumpeter Hornbill | | May be transient visitor |
| *Circaetus cinereus* | Brown Snake-Eagle | | May be transient visitor |
| *Gyps coprotheres* | Cape Vulture | Global: EN; BLSA: EN | Present, transient visitor for foraging |
| *Haliaeetus vocifer* | African Fish-Eagle | | May be transient visitor |
| *Milvus aegyptius* | Yellow-billed Kite | | May be transient visitor |
| *Phalacrocorax lucidus* | White-breasted (Great) Cormorant | | May be transient visitor |
| *Polyboroides typus* | African Harrier-Hawk (Gymnogene) | | May be transient visitor |
| *Vidua funerea* | Dusky Indigobird | | May be transient visitor |
| *Circus ranivorus* | African Marsh Harrier | NEST (H, M), BLSA: EN (SA), LC (Global) | May be transient visitor |
| *Neotis denhami* | Denham's Bustard | NEST (H, M), BLSA: VU (SA), NT (Global) | May be transient visitor |
| *Sagittarius serpentarius* | Secretarybird | NEST (M), BLSA: VU (SA), VU (Global) | May be transient visitor |
| Sensitive species 9 | | NEST (H, M), BLSA: EN (SA), EN (Global) | Present, common in natural areas, wetlands and cultivated areas. |
| **Reptiles** | | | |
| None | | | |

| SCIENTIFIC NAME | COMMON NAME | STATUS[6] | COMMENT/PRESENCE |
|---|---|---|---|
| **Amphibians** | | | |
| None | | | |
| **Invertebrates** | | | |
| **LEPIDOPTERA (BUTTERFLIES)** | | | |
| *Chrysoritis lyncurium* | Tsomo River Opal | NEST (M), VU [B2ab(iii,iv); D2] | Scattered populations in Western EC and southern KZN, Savanna, Grassland, Rocky areas (eg. inland cliffs, mountain peaks). NOT RECORDED. |
| ***INVERTEBRATES*** | | | |
| *None* | | | |
| **SCORPIONS AND SPIDERS** | | | |
| Baboon Spiders | Baboon Spiders | ToPS | Likely present, rocky areas and grassland |
| Scorpions | Scorpions | ToPS | Likely present, rocky areas and grassland |

## 7.12 **Biodiversity Conservation Status**

### 7.12.1 National Environmental Screening Tool

The DEA screening tool identifies *Very High & Low* Terrestrial Biodiversity (ESA 2, ESA 1, CBA 2, CBA 1, Forest, FEPA quinary catchments) Sensitivities in the proximity to the site.

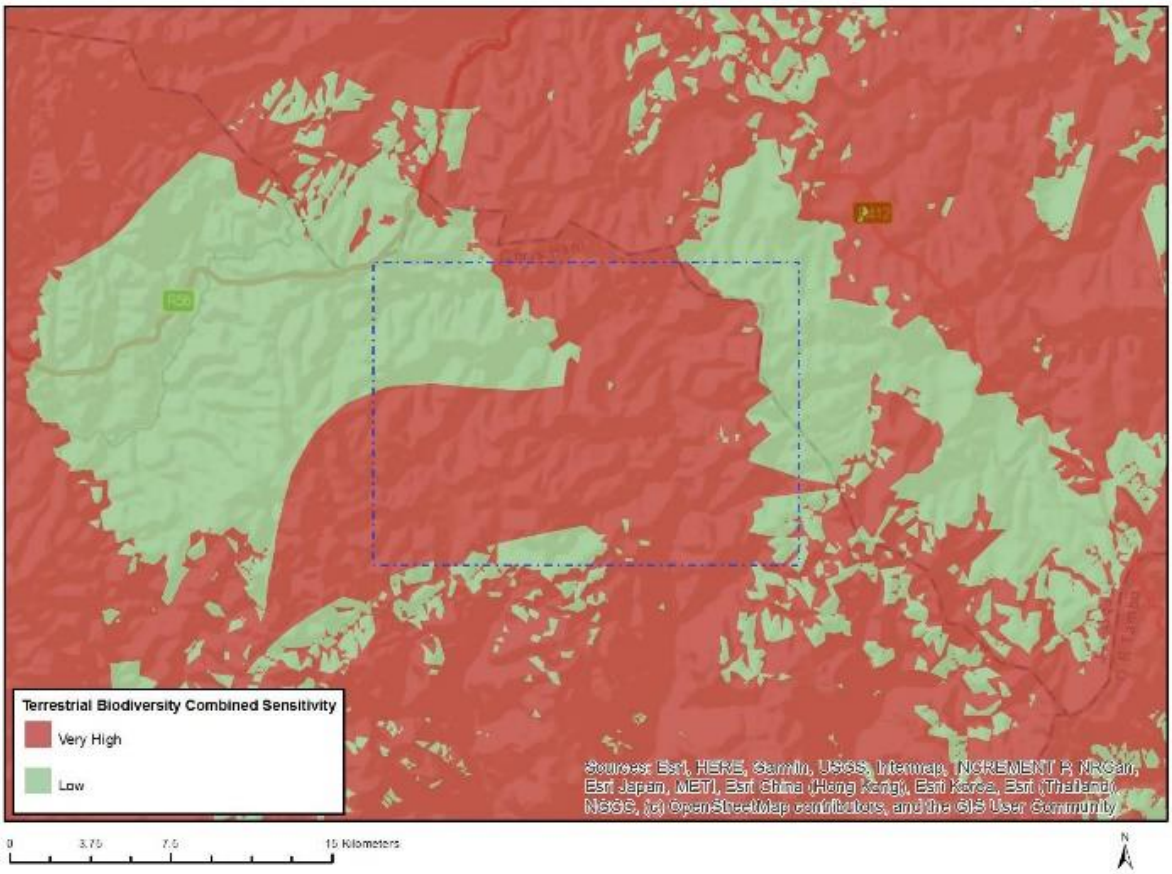



**Figure 49: National Screening Tool Terrestrial Biodiversity Combined Sensitivity for the study area**

### 7.12.2 The Eastern Cape Biodiversity Conservation Plan

The Eastern Cape Biodiversity Conservation Plan was originally implemented in 2007. The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007) identified Critical Biodiversity Areas (CBAs). Critical Biodiversity Areas are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning (Berliner & Desmet, 2007). The ECBCP analysis identified a number of CBA's in the province. CBA's are the fundamental components of Bioregional Plans.

A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007) was undertaken of which the Eastern Cape Biodiversity and Conservation Plan (2019) was derived.

The Eastern Cape Biodiversity Conservation Plan (ECBCP2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, "Guideline regarding the determination of Bioregions and the Preparation of and publication of Bioregional Plans".

The management objectives required to achieve the desired state, as described by the ECBCP (2019) are indicated in **Table 22.**

**Table 22: Land Management Objectives associated with the ECBCP (2019)**

| CBA Map Category | Desired State | Land management objective |
|---|---|---|
| Protected Areas | Natural | Protected Areas are managed through Protected Area Management Plans and are therefore not managed through the ECBCP2019. |
| Critical Biodiversity Area 1 | Natural | Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:<br>For areas classified as CBA1, the following objectives must apply:<br>• Ecosystem and species must remain intact and undisturbed;<br>• Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met;<br>• Important: these biodiversity features are at, or beyond, their limits of acceptable change.<br>If land use activities are unavoidable in these areas and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented. |
| Critical Biodiversity Area 2 | Natural | Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes:<br>For areas classified as CBA2, the following objectives must apply:<br>• Ecosystem and species must remain intact and undisturbed.<br>There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA2 area may elevate other CBA 2 areas to a CBA 1 category.<br>• These biodiversity features are at risk of reaching their limits of acceptable change.<br>If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented. |

| | | |
|---|---|---|
| Ecological Support Area 1 | Functional | Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.<br>For areas classified as ESA1, the following objectives apply:<br>• These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.<br>• These systems may vary in condition and maintaining function is the main objective, therefore:<br>o Ecosystems still in natural, near natural state should be maintained.<br>o Ecosystems that are moderately disturbed/degraded should be restored. |
| Ecological Support Area 2 | Functional | Maintain current land use with no intensification.<br>For areas classified as ESA2, the following objectives apply:<br>• These areas have already been subjected to severe and/or irreversible modification<br>• These areas are not required to meet biodiversity targets, but they may still perform *some* function with respect to connectivity, ecosystem service delivery and climate change resilience<br>• Objective is to maintain remaining function, therefore:<br>o Areas should not undergo any further deterioration in ecological function.<br>o Opportunities to change land use practices to improve ecological function (i.e. cultivation agriculture to livestock grazing agriculture) are desirable in ESA2 areas. |
| Other Natural Areas and No Natural Habitat Remaining | Production | No desired state or management objective is provided for ONA or NNR. |

A range of various land use types and activities associated with the Eastern Cape are described below. These have been derived from SPLUMA land use categories, municipal zoning scheme definitions and predominant land uses, and practices present in the Eastern Cape. Each category has been expressly linked to corresponding SPLUMA land use category for the purposes of facilitating the integration of the CBA map land use guidelines into other spatial planning products such as Spatial Development Frameworks. These land uses are described in more detail in **Table 23 below (See Agriculture, Cultivation),** which states that "Cultivation is not considered compatible with the land management objectives of CBAs and ESA1".

**Table 23: Land Use Guideline as per the ECBCP (2019)**

| **Environmental Conservation** |
|---|
| Environmental Conservation is where land uses are primarily involved with conservation activities. These include:<br>• Conservation management activities in formal protected areas and informal conservation areas managed for biodiversity (wildlife conservation and recreational/educational tourism);<br>• Low-intensity eco-tourism activities (such as hiking trails).<br>Subject to appropriate controls, planning and management, these land use activities can be accommodated in CBAs and ESAs. It is the preferred land use in CBAs and ESAs.<br>This land use zone corresponds to the SPLUMA scheduled land use purpose 'conservation'. This land use activity provides for the following:<br>• Protection of the natural environment and natural processes for their cultural, historic, scientific, scenic, biodiversity, habitat or economic.<br>Sustainable delivery of ecosystem services to the community. |
| **Tourism** |
| The Tourism and Accommodation land use covers broad range of tourist and recreational facility types, inclusive of tourism, recreation and accommodation facilities. Tourism and Accommodation is divided into two sub-categories depending on the level of intensity of development and types of activities involved:<br><br><u>Low impact tourism, recreation and accommodation</u><br>This includes low impact facilities that include camp sites and "rondavels" or traditional homestead structures, hiking trails, ablutions, gift/coffee shops, cultural centres. Sustainable rural tourism, rural businesses and communities that provide for the rural recreational and leisure needs of urban and rural dwellers, could be allowed in CBAs and ESAs provided that the development is in keeping with the management objective of the CBA or ESA and is subject to the appropriate biodiversity-related controls being in place.<br><br>The SPLUMA land use purpose for this activity would be 'Residential', but would have an equivalent classification in a municipal zoning scheme of 'Low density Special/Resort Zone'. |
| **High-impact tourism facilities** |
| This includes developments such as lodges, hotels, large resorts, golf courses and estates.<br>High-impact tourism and accommodation facilities should only be considered in ESA2 or ONA's. In all cases, the current state of ESA 2 areas must be maintained (e.g. pineapple field converted to golf-course would maintain connectivity in the landscape). The location of infrastructure must be placed outside of natural areas (CBAs and ESAs), must be clustered and be located adjacent to existing urban development.<br><br>The SPLUMA land use purpose for this activity would be 'Residential', but would have an equivalent classification in a municipal zoning scheme of 'Special/Resort Zone'. |
| **Municipal commonage** |
| The municipal commonage areas provide for the implementation of the Municipal Commonage Policy of<br>the National Government and the relevant municipality, and to promote and facilitate local agri-economic |

development. This land use corresponds to the SPLUMA scheduled land use purpose 'agriculture" and is often used for extensive unmanaged grazing, which is not compatible with land management objectives of CBAs, but may (under management) be permitted in ESAs.

Commonage is typically covered by natural vegetation. These areas therefore have the potential to contribute towards biodiversity conservation if managed appropriately and may be instrumental for retaining ecological connectivity across landscapes.

**Rural residential**

The rural residential land use type includes a range of residential and recreational activities. It is divided into two sub-types described below.
The SPLUMA land use purpose would be 'Residential', but may be associated with a municipal zoning scheme equivalent of 'low density/special/resort'.

Low density rural housing and eco-estates

This land use type is associated with low density residential and eco-estate development. Low density is defined here as covering 0.2% (please see text box below for clarification) or less of a property. It makes provision for rural housing development such as low-density, lifestyle estates, multi-ownership of reserves, eco-estates (but excluding golf estates). Land uses in this zone can be compatible in CBAs and ESAs, although impacts should be carefully assessed and managed.
NOTE: It is important to clarify how the 0.2% was derived. Several zoning schemes throughout South Africa enforce a land use policy on agricultural land which restricts the development of dwelling units on agricultural land. The number of units typically permitted is 1 per 10 ha. This has been used as the basis for what can be considered rural development.
For the purposes of the ECBCP2019 land use guidelines this policy (1 dwelling unit per 10 ha) was adapted and converted to an area-based unit. This was done by determining a reasonable area of influence of a single rural dwelling unit (200m2 including household gardens). This area was then multiplied by the number of units permitted in terms of the policy to be developed on 100ha in a rural area (e.g. 10 units in 100 ha) in order to determine the development footprint on 100ha. The ECBCP2019 therefore defines rural housing and eco-estates as development footprints that cover 200m2 per 10ha or 0.2ha per 100ha or 2ha per 1000ha, irrespective of the number of units.

Traditional/Communal and Low-medium density rural development

This land use type may range in density from low to medium density and describes rural housing development. Low-medium density is defined here as a development footprint (including gardens, agricultural fields and parking areas) covering between 0.2-10% of a designated area/property. It includes infrastructure associated with rural landscapes, including the villages, recreational and service facilities and agricultural fields/gardens. This land use type may result in impacts not in keeping with the land use management objectives of CBAs, but may be in keeping with ESAs on a case-by-case basis and under specific authorisation conditions.
The following conditions should be observed for all rural development applications:

- Intensive recreational developments (e.g. golf and polo estates) which result in significant habitat loss and which represent urban development outside the urban edge, are not compatible with CBA management objectives.
- Any infrastructural developments in CBAs should be avoided with respect to Traditional Communal Areas (Existing) and Rural Communal Settlements (New).
- Rural residential development (houses and infrastructure) within CBAs and ESAs MUST be clustered into distinct residential precincts.

Residential developments within ESAs must consider the functionality of the ESA, which may be related to connectivity and their role as biodiversity corridors. In these cases residential houses and infrastructure should not disrupt or fragment the corridor, or establish impermeable fences or boundaries to disrupt movement of fauna.

**High density urban residential development**

Urban residential development is described as the use of land primarily for human habitation, and comprises a dwelling house, group housing, hotels, hostels or flats, where more than 10% of the property area is developed. This land use zone corresponds to the SPLUMA scheduled land use purpose 'residential' associated with a municipal zoning scheme equivalent of medium to high density (such as Residential 1 or 2).

Urban residential land uses are generally not compatible with the land management objectives of CBAs or ESAs.

**Other urban influences**

*"Other Urban Influences" is a collective term for several urban related activities defined by SPLUMA including land use purposes for: commercial (light industrial), educational, institutional, business and recreation and mixed used developments. In all cases, the land uses permitted in these zones are not compatible with CBAs or ESAs.*

**Agriculture**

A range of agricultural activities have been considered in this land use type, including:

- Extensive game and livestock farming (where 'extensive' means: low stocking rates over large areas, with minimal additional food supplementation);
- Intensive livestock and game ranching;
- Agricultural infrastructure, including agri-industrial facilities, agri-villages, buildings, houses, sheds and intensive animal production facilities (e.g. feedlots); and
- Arable land, including cultivation of irrigated and dryland crops, woodlots, orchards and multi-cropping systems.

This land use zone corresponds to the SPLUMA scheduled 'agricultural' land use purpose.

Many agricultural activities may impact on, and are largely incompatible with, biodiversity conservation objectives. If poorly managed, they may accelerate degradation by causing habitat loss, soil erosion and hydrological changes. Associated impacts vary from moderate to severe depletion of natural biota and disturbance of ecosystem function. However, agriculture may also contribute to the overall functionality of a landscape by maintaining connectivity necessary for the movement and foraging of animals.

<u>Extensive Game and Livestock Farming</u>

Extensive Livestock and Game farming is the utilisation of large areas of natural (unimproved) rangelands with the commercial objective of producing livestock or game animals (excluding feedlots and game breeding farms). This land use is considered to be compatible with biodiversity objectives of some CBAs and ESAs, under certain conditions, including:

- A biodiversity and veld condition assessment should underpin the calculation of carrying capacity;
- Game and livestock stocking rates should not exceed the recommended carrying capacity. Overgrazing, which results in a loss or degradation of an ecosystem, is in conflict with NEMA principals and is governed by Section 28 of NEMA which regulates the 'Duty of care and remediation of environmental damage'.
- Give preference to stocking game species that fall within their natural distribution range in the province.

- Sensitive habitats and species-rich areas should be set-aside for the purposes of biodiversity conservation.
- Ecologically and economically sustainable management is applied.

Intensive Game Breeding

Game breeding involves the subdivision of grazing veld into small camps (less than 100 ha) using fencing that does not allow free movement of naturally occurring wildlife (e.g. small mammals, reptiles, etc.).
Game breeding involves supplemental feeding of animals allowing stocking rates in excess of recommended carrying capacities and is considered a form of feedlot production. The forms of fencing used create impenetrable barriers to wildlife movement in the landscape.
Game breeding should not be permitted in CBAs or ESAs as is not considered compatible with the land management objectives for these categories.

Feedlots and agri-processing

Feedlots and agri-processing facilities are intensive farming operations which involve high animal densities and almost exclusive supplemented feeding and include: piggeries, broiler houses, dairies, aquaculture and livestock feedlots. These facilities produce waste streams that require treatment and disposal and should be operated in line with authorisation conditions. Since pollution may be felt beyond the direct footprint of the land use activity itself, this land use activity may impact on ecosystem functionality.

Feedlots and agri-processing activities are not compatible with land management objectives for CBAs. They may be considered within Terrestrial ESAs (i.e. ESA 2 areas with imposed restrictions), but should not be considered in aquatic ESAs associated with CBA rivers.

Cultivation

A number of different types of cultivation have been aggregated into this land use type and is fundamentally used to describe any earth-turning activity or a replacement of natural vegetation, including:

- Irrigated crop cultivation
- Dryland crop cultivation (e.g. orchards, pastures, groves, plantation forestry)

Cultivation is not considered compatible with the land management objectives of CBAs and ESA1.

**Open Space**

Open space areas, either public or private, are sites easily accessible for recreational purposes and activities for local and designated communities. These include parks, botanical gardens and other open spaces as well as corridor linkages between open areas for passive recreational purposes.

This land use may correspond to either of SPLUMA's scheduled land use purposes under 'Public' or 'Community'.
The land use could potentially be compatible with the management objectives of CBAs and ESAs if it secures significant areas of natural habitat and manages human activities within them

**Low, high and general industry**

This land use encompasses industrial land use activities, such as low impact industry, general industry and high impact industry. This land use zone corresponds to the SPLUMA scheduled 'Industrial' land use purpose. These land uses are not compatible with biodiversity conservation and should not be located in CBAs or ESAs.

**Transport Services**

This land use accommodates transportation service functions and land uses such as airports, railway stations, petro-ports and truck stops, bus and taxi ranks and other transport depots. These activities correspond to the SPLUMA scheduled 'Transport' land use purpose.
The permitted land uses in this category are not compatible with CBAs and most ESAs.

***Roads and railways***

Roads and railways includes all existing and future planned linear infrastructure, such as hardened roads and railways. This land use zone corresponds to the SPLUMA scheduled 'Transport' land use purpose. These land uses are not consistent with the land management objectives of CBAs and ESAs. In cases where technical options are limited, these activities may only take place in CBAs and ESAs under specific conditions of authorisation and contingent on biodiversity offsets.

**Other utilities**

'Other utilities' describes a range of services such as water and sewage treatment works, associated pipeline reticulation, and other linear infrastructure including canals and power lines. Utility land uses generally fall within the 'Government' land use purpose of SPLUMA where it is defined as "use of land by national, provincial or municipal government to give effect to its governance role." This may, in some cases, be extended to parastatal companies such as water service boards and Eskom. In the case of renewable energy on private land, municipal zoning schemes are used. The different types of utilities have been discussed separately below.

Linear Structures: Pipelines, Canals, Catchment Transfers and Power Lines

These activities include large bulk water transfer schemes and catchment transfers, power lines, canals, pipelines (including oil and gas).

Activities involving catchment transfers and canals will affect flow regimes in rivers and wetlands. For this reason, they are not compatible with the management objective for CBA rivers.

Power lines, substations and pipelines can be compatible with the management objective of CBAs, and ESAs provided that appropriate design (above-ground pipelines, below-ground power lines, etc) and routing is informed by expert specialist studies, and that strict conditions, such as limited vegetation clearing, bird collision and electrocution avoidance are enforced.

Water projects and power stations

Activities involving water damming will affect flow regimes in rivers, wetlands and estuaries. For this reason, they are not compatible with the management objective for CBA rivers. Small scale damming of river systems in free flowing/flagship rivers or upstream and instream of fish sanctuaries should not be permitted.

Power stations are accompanied by the need for significant volumes of water and the generation of wastewater (thermal and chemical pollution) and air pollution emissions. This land use activity is therefore undesirable in CBAs and ESAs. Considering the need for water, avoiding rivers, coastline buffers or estuarine buffers may not be feasible.
In both cases, infrastructure located within CBAs must be accompanied by biodiversity offset design and implementation.

Waterworks and Wastewater Treatment Works (WWTW)

This category includes installations serving rural and urban areas including water and wastewater treatment and includes associated reticulation infrastructure e.g., pump stations and pipelines. Water

and WWTW's should not be located in CBAs or ESAs. WWTW's may have significant impacts on water quality, therefore discharge of effluent into Aquatic CBA 1 rivers should not be considered.

Renewable Energy

Renewable energy generation in the Eastern Cape mainly includes wind and solar (photovoltaic-PV). Other types of renewable energy generation include smaller biomass conversion (biogas and gasification) and generation of biodiesels from recycled oils.

Although the footprint of wind energy facilities is relatively small, the impact on bird and bat biodiversity may be considerable. Since the CBA map has been informed by these taxonomic groups it will reflect important areas for birds and bats. Considering that wind energy facilities are subject to the South African best practice guidelines for the monitoring of both taxonomic groups, wind energy facility may be considered in CBAs and ESAs in line with monitoring recommendations for birds and bats. Consideration of development, subject to expert studies of other biodiversity, in CBAs will require the development and implementation of biodiversity offsets.

Solar PV facilities are area-hungry activities which typically require considerable landscaping and the clearance of indigenous vegetation. Even if vegetation is left intact, a change in sunlight regime may alter the natural species composition. This activity is, therefore, not appropriate in CBAs or ESA1s. In some cases, it may be acceptable to utilise ESA2s, provided that connectivity is maintained in the development design.

Technologies such as biogas (reactors), gasification and biodiesel plants are typically undertaken on relatively small development footprints. The main impacts that need to be managed relate to air emissions
and waste streams. These technologies are, therefore, not compatible with CBA land/water management objectives, especially with respect to CBA rivers.

***Quarrying and Mining***

The quarrying and mining include all forms of mineral extraction and is sub-divided into three sub-categories:

- Prospecting and underground mining;
- Quarrying and opencast mining (includes strip mining, surface mining, dumping and dredging); and
- Associated mining infrastructure: residential areas, waste dumps, settling ponds and disposal sites, urban waste sites and landfill sites.

This land use zone corresponds to the SPLUMA scheduled 'mining' land use purpose.

None of the activities associated with these activities are compatible with biodiversity conservation and they should not be located in CBAs or ESAs.

The following additional conditions should be observed:

- Buffer widths should be determined and implemented using available policy and guidelines for all biodiversity features present; and

Any environmental management plan should align with the Mining and Biodiversity Guidelines (2014).

Elements of the proposed activity will intersect with predominantly ECBCP (2019) designated ESA 2 areas with and some ESA 1 areas potentially being affected. **See Figure 50**

In terms of the ECBCP Land Use Guidelines, the recommendation is that the ESA 2 areas "*must be maintained in current land use with no intensification"* and it is noted that "*these areas are not required to meet biodiversity targets, but they may still perform some function with respect to connectivity, ecosystem service delivery and climate change resilience"* For ESA 1 areas, the Land Use Guidelines recommend *"maintaining ecological function within the localised and broader landscape (a functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained)"*

The proposed activity does overall align with the recommended management recommendations since the footprints are largely within designated ESA 2 (i.e. already transformed) areas.

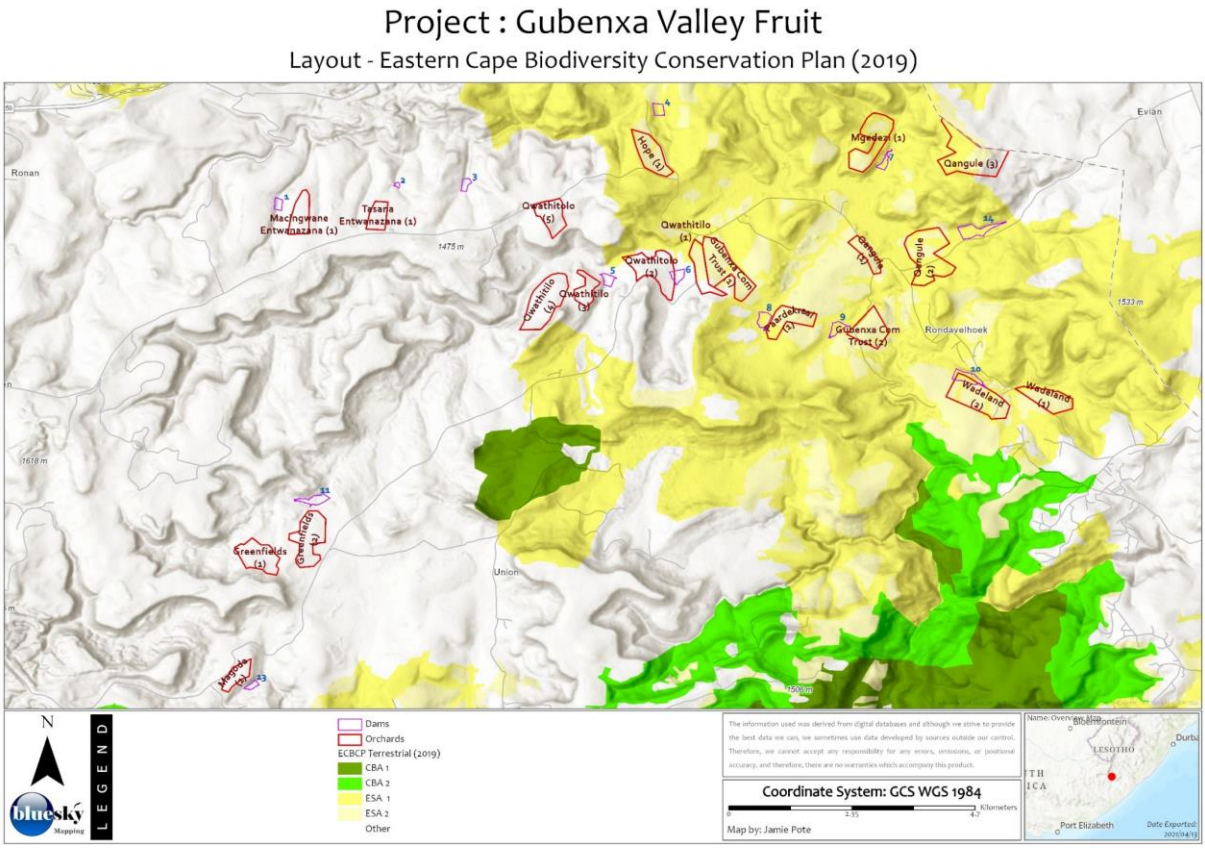



**Figure 50: Critical Biodiversity and Protected Areas (ECBCP 2019)**

## 7.13 **Heritage and Palaeontology**

The National Heritage Resources Act of 1999 (pp 12-14) protects a variety of heritage resources. These are resources are defined as follows:

1. **"**For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.
2. Without limiting the generality of subsection (1), the national estate may include—
    2.1. Places, buildings, structures and equipment of cultural significance;
    2.2. Places to which oral traditions are attached or which are associated with living heritage;
    2.3. Historical settlements and townscapes;
    2.4. Landscapes and natural features of cultural significance;
    2.5. Geological sites of scientific or cultural importance;
    2.6. Archaeological and palaeontological sites;
    2.7. Graves and burial grounds, including—
        2.7.1.Ancestral graves;
        2.7.2.Royal graves and graves of traditional leaders;
        2.7.3.Graves of victims of conflict;
        2.7.4.Graves of individuals designated by the Minister by notice in the Gazette;
        2.7.5.Historical graves and cemeteries; and
        2.7.6.Other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
3. Sites of significance relating to the history of slavery in South Africa;
    3.1. Movable objects, including—
4. Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
    4.1. Objects to which oral traditions are attached or which are associated with living heritage;
    4.2. Ethnographic art and objects;
    4.3. Military objects;
    4.4. objects of decorative or fine art;
    4.5. Objects of scientific or technological interest; and
    4.6. books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).

5. Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—
   5.1. Its importance in the community, or pattern of South Africa's history;
   5.2. Its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
   5.3. Its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
   5.4. Its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
   5.5. Its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
   5.6. Its importance in demonstrating a high degree of creative or technical achievement at a particular period;
   5.7. Its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
   5.8. Its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
   5.9. sites of significance relating to the history of slavery in South Africa"

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites. These criteria are:

**1. State of preservation of:**

- Organic remains:
  - Faunal
  - Botanical
- Rock art
- Walling
- Presence of a cultural deposit
- Features:
  - Ash Features
  - Graves
  - Middens

- Cattle byres
- Bedding and ash complexes

2. **Spatial arrangements:**

- Internal housing arrangements
- Intra-site settlement patterns
- Inter-site settlement patterns

3. **Features of the site:**

- Are there any unusual, unique or rare artefacts or images at the site?
- Is it a type site?
- Does the site have a very good example of a specific time period, feature, or artefact?

4. **Research:**

- Providing information on current research projects
- Salvaging information for potential future research projects

5. **Inter- and intra-site variability**

- Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?
- Can this particular site yield information about a community's social relationships within itself, or between other communities?

6. **Archaeological Experience:**

- The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

7. **Educational:**

- Does the site have the potential to be used as an educational instrument?
- Does the site have the potential to become a tourist attraction?
- The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

8. **Other Heritage Significance:**

- Palaeontological sites
- Historical buildings
- Battlefields and general Anglo-Zulu and Anglo-Boer sites

- Graves and/or community cemeteries
- Living Heritage Sites
- Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts.

The above significance ratings allow one to grade the site according to SAHRA's grading scale. This is summarised in **Table 24.**

**Table 24: SAHRA Gradings for Heritage Sites**

| SITE SIGNIFICANCE | FIELD RATING | GRADE | RECOMMENDED MITIGATION |
|---|---|---|---|
| **High Significance** | National Significance | Grade 1 | Site conservation / Site development |
| **High Significance** | Provincial Significance | Grade 2 | Site conservation / Site development |
| **High Significance** | Local Significance | Grade 3A / 3B | |
| **High / Medium Significance** | Generally Protected A | | Site conservation or mitigation prior to development / destruction |
| **Medium Significance** | Generally Protected B | | Site conservation or mitigation / test excavation / systematic sampling / monitoring prior to or during development / destruction |
| **Low Significance** | Generally Protected C | | On-site sampling monitoring or no archaeological mitigation required prior to or during development / destruction |

Umlando Archaeological Surveys and Heritage Management were appointed to undertake the Heritage Impact Assessment. Prior to the site inspection, a desktop survey was undertaken.
It was found that Prins (2010) undertook a survey in the general area for an ESKOM transmission line. Most of the line followed the existing roads. Prins noted some historical sites within the general study area.

No national monuments, battlefields, or historical cemeteries are known to occur in the area of the orchards or dams. However, some do occur nearby.

The Surveyor General Title Deed maps indicate that all of the farms, except two, were surveyed in 1913 and likely sold with Title Deeds shortly thereafter. This is significant as it most likely relates to "The Natives Land Act of 1913". This does not mean that the farms were not already on lease before 1913. The Title Deeds do however give an approximate date to some of the farms in the study area. The Deeds survey also suggests that many of the farms were occupied by white farmers from approximately 1914 onwards, and thus the buildings are older than 60 years in age. These buildings, even if in ruin, are thus protected by the heritage legislation.

The 1966 topographical map shows which farms in the study area have built features that could be affected by the dams and orchards. This is summarised in **Table 25**. There is an area in the topographical map shown being reserved for a church at Qwathitolo 1 dam. This church was not built, but could have been moved to the church at Blue Gum Vale A (a.k.a. Gubenxa). Qwathitolo 2 dam is noted for having a grave within the general vicinity. Qangule 2 orchards and Wadelands 2 have old buildings and/or ruins.

**Table 25: Table showing the summary of the 1966 topographical map**

| Farm Name | Dam No. | Historical Features In Dam | Historical Features Near Dam | Historical Features In Orchard | Historical Features Near Orchard | Description |
|---|---|---|---|---|---|---|
| **Macingwane** | 1 | No | No | No | Yes | Farm Clearview |
| **Tasana** | 2 | No | No | No | No | NA |
| **Hope** | 3 | No | No | NA | NA | NA |
| **Berg** | 4 | No | No | No | Yes | Farm Geluk |
| **Qwatsitolo** | 5 | No | No | No | No | NA |
| **Qwatsitolo** | 6 | No | No | No | Yes | Farm Sunnyside, apparent grave |
| **Mgedezi** | 7 | No | No | No | No | NA |
| **Paardekraal** | 8 | No | Yes | No | No | Farm Paardekraal |
| **Gubenxa Trust** | 9 | No | No | No | No | NA |
| **Wadelands** | 10 | No | No | Yes | No | Farm Wadelands Ruins |
| **Greenfields** | 11 | No | No | No | No | NA |
| **Magoda** | 13 | No | No | No | No | NA |
| **Qangule** | 14 | No | No | Yes | Yes | Farms Kortvlei, Albany & Afgunst |

The field survey was undertaken in February 2021. Isolated artefacts relating to the various Stone Ages are expected to occur throughout out the area, as well as late Iron Age artefacts. The intense cultivation

of the land would have destroyed, or displaced, most of the Late Iron Age sites as well as the 19th century Gubenxa community sites.

There are two main areas of heritage concern in the area:

- Rock art
    - Sandstone caves and overhangs
    - Possible archaeological deposit
- Historical buildings and cemeteries
    - Late 19th to 20th century
    - Farm family cemeteries

The below provides an overview of the findings:

**Table 26: Table showing an overview of the heritage related findings for the project**

| Farm name | Dam no. | No. of Plantations | Findings | Significance<br>Mitigation<br>SAHRIS Rating |
|---|---|---|---|---|
| Macingwane | 1 | 1 | No heritage sites were noted within the dam or orchard area | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |
| Tasana | 2 | 1 | No heritage sites were noted within the dam or orchard area. The orchard is in an existing maize field. | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |
| Hope | 3 | 1 | No heritage sites were noted within the dam or orchard area. | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |
| Berg | 4 | 0 | No heritage sites were noted within the dam area. The ruins of the Farm Geluk (**Figure 51**) occur approximately 35m from the high-water mark. No graves were noticed at this farm. The stone stellae that formed the farm boundary will be flooded. The farmhouse appears to be the original farmhouse with several additions. The original fruit | Significance: None, while the farmhouse and stellae are of low significance.<br>Mitigation: None<br>SARHIS Rating N/A |

| | | | | |
|---|---|---|---|---|
| | | | orchards still occur next to the house. | |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | 3 | No heritage sites were noted within the dam or orchard areas. | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | 2 | No heritage sites were noted within the dam or orchard areas. The Ruins of the Farm Sunnyside occur out of the dam high-water mark, as do the associated buildings and walls, all which are demolished **(Figure 52).** The 1966 1:50 000 topographical map has a grave marked just outside of the dam boundaries. This grave could not be located in the general area. The vegetation was very thick in the area closer to the house. If a grave occurs within the farmhouse perimeter, then it will not be affected by the dam. The grave on the map could also be a cartographer error, as it omitted a family cemetery 1.4km northeast at Farm Gubenxa.<br><br>The proposed orchards have been ploughed for several decades. | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |
| Mgedezi | 7 | 1 | No heritage sites were noted within the dam or orchard area.<br><br>The proposed orchard has been ploughed for several decades. | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |

| | | | | |
|---|---|---|---|---|
| Paardekraal | 8 | 1 | No heritage sites were noted within the dam or orchard area.<br><br>The proposed orchard has been ploughed for several decades. | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |
| Gubenxa Trust | 9 | 2 | No heritage sites were noted within the dam or orchard areas. | Significance: None<br>Mitigation: None<br>SARHIS Rating: N/A |
| Wadelands | 10 | 2 | No heritage sites were noted within the dam area. The dam area occurs in an area of dense alien invasive tree species. In Wadelands 2 Orchard, there are four currently used buildings and three ruins **(Figure 53; Table 27).** The ruins belong to the original Wadelands farm buildings. The ruins will have historical middens associated with them and are thus protected by the NHRA. Wadelands likely dates to 1913/1914. | Significance: The dam area and Wadelands Orchard 1 have no significance. Wadelands 2 orchard has buildings of low – to medium historical significance.<br>Mitigation: A 50m buffer radius should be placed around each of the Wadelands buildings near orchard 2. If any orchard is placed within this 50m buffer, or if the buildings will be destroyed, then further mitigation is required. Mitigation will be in the form of accurately recording the ruins and/or sampling/excavating the historical middens. This will need to be undertaken in winter when the grass is much shorter. A permit for damaging/destroying the ruins and/or the middens will be required from ECPHRA.<br>SARHIS Rating: 3b |
| Greenfields | 11 | 2 | No heritage sites were noted within the dam or orchard areas. The Greenfields Farm buildings are in ruin, but are not affected by the orchards. | Significance: None<br>Mitigation: None<br>SARHIS Rating N/A |
| Magoda | 13 | 1 | No heritage sites were noted within the dam or orchard area. | Significance: None<br>Mitigation: None<br>SARHIS Rating N/A |
| Qangule | 14 | 3 | No heritage sites were noted within the dam area; however, some built structures were | Significance: The dam area and Qangule Orchard 1 have low significance. Qangule 1 orchard has |

| | | | | |
|---|---|---|---|---|
| | | | noted in the orchard closest to the dam. The sandstone overhangs at the dam were surveyed; however, no rock art occurs on them. The farmhouse Afguns and its structures will be 14m away from the full supply level of Dam 13. The FSL may affect the buildings.<br><br>The remaining 2 orchards have no features of heritage significance.<br><br>At the Qangule Orchard closes to the dam, there are three ruins and one historical building. currently used buildings and three ruins **(Figure 54; Table 28).** The ruins belong to the original Albany farm buildings. The ruins will have historical middens associated with them and are thus protected by the NHRA. Albany probably dates to 1913/1914. Albany 3 appears to be the remnants of a farm labourer's settlement. It was still in use up to 2001. There are two structures just outside of the orchard. | buildings of low – to medium historical significance.<br>Mitigation: A 50m buffer radius should be placed around each of the Qangule buildings. If any orchard is placed within this 50m buffer, or if the buildings will be destroyed, then further mitigation is required. Mitigation will be in the form of accurately recording the ruins and/or sampling/excavating the historical middens. This will need to be undertaken in winter when the grass is much shorter. A permit for damaging/destroying the ruins and/or the middens will be required from ECPHRA.<br>SARHIS Rating: 3b |

**Figure 51: Geluk Farmhouse**

**Figure 52: Sunnyside Farm Buildings**


**Figure 53: Location of Built Structures and Ruins at Wadelands Orchard "2"**

**Table 27: Table showing the locations of built structures at Wadelands 2 orchard**

| Name | Latitude | Longitude |
|---|---|---|
| **Building 1** | 31°22'29.37"S | 28°13'41.98"E |
| **Building 2** | 31°22'23.58"S | 28°13'56.36"E |
| **Building 3** | 31°22'27.05"S | 28°13'57.55"E |
| **Building 4** | 31°22'27.96"S | 28°14'0.50"E |
| **Wadelands 1** | 31°22'25.58"S | 28°13'55.54"E |
| **Wadelands 2** | 31°22'28.22"S | 28°13'53.78"E |
| **Wadelands 3** | 31°22'24.84"S | 28°13'56.74"E |


**Figure 54: Location of Built Structures and Ruins at Qangule Orchard**

**Table 28: Table showing location of built structures at Qangule Orchard**

| Name | Latitude | Longitude |
|---|---|---|
| **Albany 1** | 31°21'4.61"S | 28°13'7.28"E |
| **Albany 2** | 31°21'5.84"S | 28°13'8.02"E |
| **Albany 3** | 31°21'8.41"S | 28°13'13.83"E |
| **Ruins** | 31°21'4.76"S | 28°13'10.05"E |
| **Kortvelei (outside)** | 31°20'55.17"S | 28°13'20.06"E |
| **Kortvelei LH (outside)** | 31°20'58.59"S | 28°13'24.75"E |
| **Blue Gum Vale (outside)** | 31°21'1.17"S | 28°12'56.33"E |

The main areas where impacts on heritage sites will occur are in two orchards. If the full extent of the orchards is used, then there will be a negative impact on historical buildings and middens. These buildings and middens probably date to at least 1913/1914 and are thus protected by the NHRA.

These features are not of such significance that they will prevent the expansion of the orchard; however, some form of mitigation is required, in addition to the permits. There are two options in the managements:

1. Create a 50m no-go buffer around each feature and the area is controlled against development.
2. Undertake mitigation and salvage the historical information before it is lost. This should be a staged approach.

The 50m buffer approach is the most practical; however, it is unlikely to be maintained if not regularly monitored/enforced. Irrigation pipes may also be excavated into the middens.

The next option is a staged approach of mitigation. I suggest the following occurs once the grass is burnt or near the end of winter when it is less dense:

1. Each built feature is accurately recorded by means of at least digital photographs.
2. The area is surveyed for the locations of the middens. These are assessed and mapped. Limited test-pit excavations are undertaken to determine the significance of each midden.
3. The aim of the excavations would be to obtain a sample from each midden.

The area is noted as being of very high palaeontological sensitivity. This project is to be constructed on soil overlying the Molteno Formation.

The Molteno Formation is Triassic (¬237-228 Ma) in age. This rock formed from sediment initially deposits be braided draining the rising Cape Fold Mountains to the south (Bordy et al., 2005) At their peak this mountain range was at least the height of the Himalays. Areas between the channels were characterized by swamps and marshes. Fine-grained material was able to settle here. Coal (Indwe Coal Field) formed in some of these areas (Jeffrey, 2005).

The Molteno formation is generally coarse-grained sandstones and less likely to contain fossils. However the finer-grained rocks are fossiliferous (Bordy et al., 2005) and contains plant and insect fossils (Anderson, 1974). The Molteno Formation contains fossils of 204 plant species and 333 insect species. It is one of the richest Upper Triassic-age plant and insect assemblages. The insect fauna contains well-preserved fossil insects which are very rare (Anderson and Anderson, 1997). The dominant fossil flora is associated with seven recognized habitat types, , two of these include *Dicroidium*, an extinct arboreal genus of seed fern that grew in either riparian forests or temperate woodlands. Nineteen species of *Dicroidium* alone have been recovered from the Molteno Formation (Anderson & Anderson, 1997).

The Molteno Formation is considered to have a high Palaeosensitivity.However excavation for this project will take place in soil overlying the Molteno Formation. Plant fossils and insect fossil are very unlikely to remain intact during erosion to form soil.

Should any excavation into the underlying Molteno Formation rock take place then a Palaeontological Field Visits, by a suitably qualified Palaeontologist, must take place.

If any fossils are found, a Palaeontologist must be notified immediately by the ECO and/or EAP and a site visit must be arranged at the earliest possible time with the Palaeontologist.

In the case of the ECO or the Site Manager becoming aware of suspicious looking palaeo-material:

- The construction must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.

- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed

(sorted, sub-sampled, labeled, and boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

## 7.14 **Socio-Economic Environment**

### 7.14.1 Social Characteristics

The Sakhisizwe Local Municipality is a category B municipality with an area of approximately 2 355 $km^2$ and is situated within the Chris Hani District Municipality of the Eastern Cape Province. The Municipality is the smallest in the district making up only 6% of the district area. Sakkhisizwe is a category B4 type with a largely rural component of 61% and a low revenue base.

According to the Sakhisizwe draft 2021-2022 Integrated Development Plan, the municipality supports 66 200 people which translates to 0.1% of the South Africa's total population but 7.6% of Chris Hani's total population. This total was pulled from 2018 population studys where further it was found that between 2008 and 2018 a population growth rate of 0.42% was experienced per annum which is low compared to the national growth rate of 1.16%. Comparatively it is nearly half of Chris Hanis growth rate of 0.67%. It is said to be projected that the population will rise to 68 900 by the year 2023.

According to the figure below, there is a significant larger share of working age people from ages 20 to 34 (24.8) which is projected to decline to 23.1%. The share of children between the ages of 0 and 14 years old was found to be at 31.8% in 2018 and is projected to decline to 29.2% in 2023. Female working population amounts to 10.9% comparatively lower compared to male working age group of 13.9%. Both these figures are expected to decline respectively in 2023 with the male working population still exceeding the female working population. However the total female population of 33800 exceeds that of the male population of 32300, translating to 95.5 males per 100 females.

POPULATION PYRAMID - SAKHISIZWE LOCAL MUNICIPALITY, 2018 VS. 2023 [PERCENTAGE]

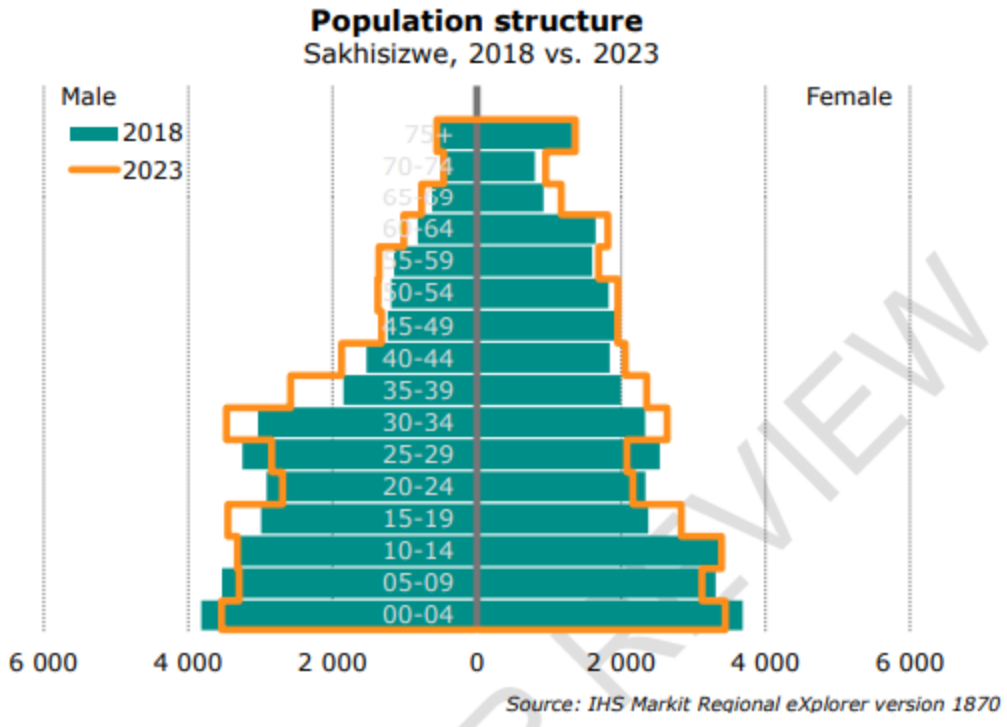



**Figure 55: Extract from the Sakhisizwe Local Municipality Draft 2021-2022 Integrated Development Plan Page 27**

According to the Sakhisizwe IDP, the population consists of 97.89% African people, 1.06% White people, 0.79% coloured people and 0.25% Asian people. The IDP notes that the population in general is decreasing in comparison to the growing rate of households and this the number of individuals within households is declining. In 2018, the municipality accounted for 17900 households which equates to an annual growth rate of 1.49% higher than the population rate for between the years of 2008 and 2018. Thus the average household size is by implication declining. Where it was further found that in 2008 the 4.1 individuals per household had declined to 3.7 people in 2018. Of these households 97.6% are African people with an average growth of African headed households of 1.53% per annum.

### 7.14.2 Economic Characteristics

The Gross Domestic Product acts as an indicator for economic performance in order to compare economic states.

The Sakhisizwe LM has a GDP of R2.14 billion recorded from 2018 which had seen an increase from 2008s R1.02 billion, contributing 6.72% to the Chris Hani District Municipalities GDP of R21.8 billion in 2018. Sakhisizwe has an annual GDP growth rate of -0.51% which is significantly lower than the Eastern Capes GDP grown rate of 0.78% in the short term. Long term however the municipality has a 0.57% growth rate which is just under half of the Chris Hani's growth rate of 1.15%. Additionally, in terms of contribution to the GDP of Chris Hani District the municipality ranks the lowest in the district only contributing a share of

6.72%. It is expected however that the Sakhisizwe LM will grow at an average annual rate of 0.60% from 2018 to 2023. Refer to Figure 56 and 57.

**GROSS DOMESTIC PRODUCT (GDP) - REGIONS WITHIN CHRIS HANI DISTRICT MUNICIPALITY, 2008 TO 2018, SHARE AND GROWTH**

| | 2018 (Current prices) | Share of district municipality | 2008 (Constant prices) | 2018 (Constant prices) | Average Annual growth |
|---|---|---|---|---|---|
| Sakhisizwe | 2.14 | *6.72%* | 1.26 | 1.33 | ***0.57%*** |
| Inxuba Yethemba | 5.39 | *16.97%* | 2.44 | 3.41 | ***3.39%*** |
| Intsika Yethu | 3.12 | *9.81%* | 2.00 | 1.92 | ***-0.40%*** |
| Emalahleni | 2.36 | *7.41%* | 1.39 | 1.45 | ***0.42%*** |
| Engcobo | 2.88 | *9.07%* | 1.90 | 1.79 | ***-0.56%*** |
| Enoch Mgijima | 15.90 | *50.03%* | 8.71 | 9.93 | ***1.32%*** |

*Source: IHS Markit Regional eXplorer version 1870*

**Figure 56: Extract from the Sakhisizwe Local Municipality Draft 2021-2022 Integrated Development Plan Page 38**

**GROSS VALUE ADDED (GVA) BY BROAD ECONOMIC SECTOR - SAKHISIZWE LOCAL MUNICIPALITY, 2018 [PERCENTAGE COMPOSITION]**

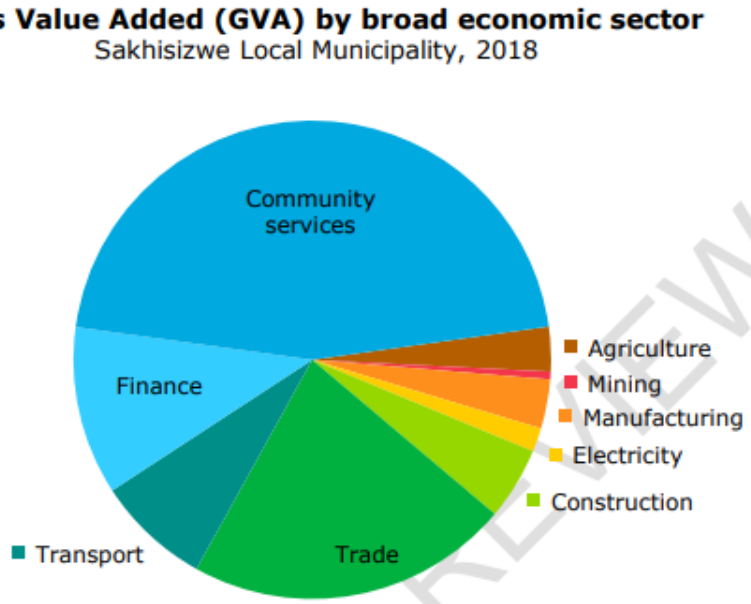



**Figure 57: Extract from the Sakhisizwe Local Municipality Draft 2021-2022 Integrated Development Plan Page 41**

# 8 PUBLIC PARTICIPATION PROCESS

The EIA Regulations specify that a public participation process must be conducted as an integral part of the EIA. This chapter outlines the public participation process followed in terms of the requirements contained in Section 41 of Government Notice No. R. 326 the 2014 EIA Regulations, as amended.

## 8.1 Notification of Interested and Affected Parties (I&AP's)

As stipulated in Section 41(b) of the EIA Regulations G.N. R. 326 written notice was sent to the following Interested and/or affected parties informing them of the proposed development.

### 8.1.1 Background Information Document (BID)

A Background Information Document (BID) containing a summary of the details of the proposed project and of the EIA process was distributed to all I&AP's on the 5 February 2021 (see Table 29 for I&AP list).

### 8.1.2 Notification of Landowners, Neighbours, Councillors, Municipality and Organs of State

Refer to Section 3.4 for details of landowners of various properties involved.

The Sakhisizwe Local Municipality and Chris Hani District Municipality in addition to other affected organs of state were informed via email of the proposed activity via a Background Information Document attached to a letter. Adjacent landowners were also notified this way. The notifications were distributed via email on 5 February 2021 **(See Appendix E for the I&AP Register)**.

Table 29: Notified Interested and Affected Parties

| |
|---|
| **APPLICANT** |
| Mkhuseli Magoda |
| Mlindelwa Tobias Ntseke |
| Lundi Kamma Delano |
| Loyiso Ketwa |
| Mantombazana Ndzende |
| Patuxolo clearance Macingwane |
| Victor Sabelo Qangule |
| Ncendile Tasana |
| Mbongeni Mgedezi |
| Makathini Payi |
| Mzonzima Wilson Mbanga |
| **MUNICIPALITIES** |
| Chris Hani District Municipality MM |
| Chris Hani District Municipality EM |
| Sakhisizwe Municipality MM |
| Sakhisizwe Municipality TSM |
| **GOVERNMENT DEPARTMENTS** |
| ECDRDAR |
| ECDRDAR |
| DEDEAT Chris Hani Region |
| DEDEAT Chris Hani Region |
| Eastern Cape Provincial Heritage Resources Authority |
| Department of Water and Sanitation |
| Civil Aviation Aithority |
| Department of Defence |
| **COMMUNITY** |
| Ward 1: Ward Councillor |
| Elliot/Ryno Farmers Association - Secretary |
| Other Local Farmers Association |
| **ADJACENT LANDOWNERS** |
| 1025 |
| 1030 |
| 1029 |
| 1100 |
| 1091 |

| |
|---|
| 1094 |
| 1050 |
| 7/149 |
| 9/149 |
| 11/149 |
| 149 |
| 152 |
| 7/149 |
| 155 |
| 160 |
| 171 |
| 173 |
| 197 |
| 201 |
| 220 |
| 222 |
| 289 |
| 261 |
| 289 |
| 232 |
| 233 |
| 246 |
| 334 |
| 292 |
| 302 |
| 311 |

***** Due to the POPI Act, we can no longer distribute personal information without a persons consent. For more clarification, please contact us.***

## 8.2 **Newspaper Notification**

Advertisements in English and isiXhosa detailing information about the project were placed in the Barkly East Reporter on 11 December 2020.

The advertisements were notifications with regards to the EIA process that was in progress, as well as calling for the registration of I&AP's for the project.

The advertisement provided I&AP's 30 days to register, excluding the period between 15 December and 5 January, and to submit their comments in writing to Indwe Environmental Consulting (see **Figure 58**).

THE REPORTER 11 DECEMBER 2020

In en Om Elliot

Hi there

Here we are at the end of a very long year. I sincerely hope that next year will be a better and more productive year.

Baie geluk aan Isak en Lorna Botha en Nellie Botha met die geboorte van hul kleinseun, Hardus. Geluk ook aan die ouers, Janus en Kalinka Botha. Mag die marmetjie vir jul baie vreugde bring.

Die spokie afskuiting was Saterdag en daar was heelwat verraaisings. Enigiemand wat belangstel om te spook kan vir Sasole Schmidt kontak. Baie dankie aan haar vir al haar hardewerk deur die jaar.

Die kersaandiens was treffend en baie mooi.

MOTH barn dance took place on Saturday at the club. Enjoyed by all between masks and sanitisers.

Ida Enduro is taking place in Ida again this weekend. It is usually a big event and participants come from far and wide. We hope they have a very successful function.

The Covid-19 cases in Elliot and surrounds are escalating sharply. People who get sick, get very sick, or they have no symptoms. Quite a few people have passed away in the hospital too. Stay safe and protect your loved ones.

Thank you to the staff of the Reporter for all the hard work during the year and for keeping us all up to date on the latest news in our area. It has been a hard year for all businesses.

Blessed Christmas and a happy new year to all.

*Till next year*
*Nancy*

Merry Christmas



## NOTICE OF PUBLIC PARTICIPATION PROCESS FULL SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENT

## PROPOSED DEVELOPMENT OF DECIDUOUS FRUIT PRODUCTION ON SEVERAL FARMS PART OF THE GUBENXA VALLEY TRUST IN THE GUBENXA VALLEY AREA OF SAKHISIZWE LOCAL MUNICIPALITY IN THE CHRIS HANI DISTRICT OF EASTERN CAPE.

The Department of Rural Development and Agrarian Reform intends to assist the Gubenxa Valley Trust consisting of 13 farm owners to develop and irrigate a deciduous fruit operation within the Gubenxa Valley near Elliot.

The intended scope of the project is to develop plantations/ orchards over several farms in addition to constructing 13 dams in order to aid in irrigating the orchards. In addition to the construction of the dams, supporting irrigation infrastructure such as pipelines, pump stations, balancing dams and internal plantation irrigation will be included.

Notice is given in terms of the National Environmental Management Act (Act 107 of 1998) Section 24(5), that thirteen (13) separate applications for environmental authorisation together with one (1) supporting Full Scoping and EIA report (stipulated by DEDEAT) be prepared in accordance with the 2014 EIA Regulations, as amended in 2017, and will be submitted to the Department of Economic Development, Environmental Affairs and Tourism (Chris Hani District Office).

Listed activities triggered include:
G.N. R. 327 Activities 9, 12, 13 & 27
G. N.R. 325 Activities 15 & 16
G.N. R. 324 Activities 14

Location of proposed dams (subject to change following hydrological analysis) include:

Farms RE/149, 7/149, 152, 161, 322, 304, 200 (De Wets), 287, 270 (Benmore), 234, 1032 (Greenfields), 1092, 216

**Applicants:**

P. Macingwane; N. Tasana; Qwathi-Tolo Farm Prop Holdings Pty Ltd; Berg Trust; M. Mgedezi; Blue Waves Prop Trust (M Payi); Gubenxa Community Trust (M. Mbanga); Wadelands Farming CC (M Ndzende); Bluewhisper 11 CC (Ntseke); M. Magoda; V. Qangule

Indwe Environmental Consulting has been appointed as an independent environmental practitioner to undertake the full Scoping and EIA for this project.

If you or your organisation would like to register as an Interested & Affected Party and take the opportunity to comment on the submission, then please ensure that you contact us with your details. All comments must be in writing and sent to Indwe Environmental within 30 days (excluding the period between 15 December and 5 January) of the appearance of this advert.

A Background Information Document will be sent on request.


**Megan Hugo**
**Indwe Environmental Consulting**
2 Ayr Place, Bonnie Doon
East London
5241
Tel: 043 555 0656
Fax: 086 513 9734
Email: megan@indwecon.co.za
Website: www.indwecon.co.za

Date of Advert: 11 December 2020

## ISAZISO NGENKQUBO YOTHATHA INXAXHEBA LULUNTU MAYELANA NGOFUNDO NOPHANDO NGOCHAPHAZELEKO LWENDALO NOKUSINGQONGILEYO

## UPHUHLISO OLUCETYWAYO LWEMVELISO YEZIQHAMO KWIFAMA EZIYI -13 KWINDAWO YASE GUBENXA VALLEY PHANTSI KOMASIPALATI WASEKHAYA I-SAKHISIZWE PHANTSI KWE-CHRIS HANI DISTRICT EMPUMA KOLONI

Isebe lase-Mpuma Koloni Lezophuhliso Lwamaphandle neZolimo (DRDAR) liceba ukuncedisa i-Trust yase- Gubenxa Valley enamalungu azimeleyo angabanikazi befama (13 farm owners) kwiphulo lokuvelisa bakhulise iziqhamo kulendawo yalapha- Gubenxa Valley kufuphi nendawo yase-Elliot.

Abanofama balishumi elinesithathu (13) funeka bencedisiwe ukuze baphuhle ngokupheleleyo balungelane nalomsebenzi wokuvelisa iziqhamo Lomsebenzi uquka : Ukwakhiwo lamadama okugcina amanzi ayi-13 wiowezifama ziyi- 13 , ukwakhiwo kwamasimi emveliso yeziqhamo kwanobuxhakaxhaka bokuncedisa.

EsiSaziso sikhutshwe ngokwemimiselo yomthetho ka zwelonke owongamele ulondolozo lwezendalo ongu- (Act 107 of 1998) Section 24(5), lisicelo mmme lwezendalo zidweruziwa zibeyi-13 zahlukane kwakunye nengxelo (1) emmandla ngochaphazeleko lweZendalo ezokuxhasa(ngokuchazwe liSebe elingu - DEDEAT)Le miqulu izakulungiswa ngokwemiqathango ye EIA ka 2014,njengokuba ikhutshwe ngokutsha kunyaka ka -2017, iyakuthi ifakwe kwi Offisi ezise (Chris Hani District) zeSebe Lwezophuhliso ,LweZendalo notyelelo.

Imisebenzi edweliswyo eyenza intshukumo, kodwa ayiphelelanga kule:
G.N. R. 327 Activity 9, 12, 13 & 27
G. N.R. 325 Activity 15 & 16
G.N. R. 324 Activity 14

**Indawo yeprojekthi:**

Farms RE/149, 7/149, 152, 161, 322, 304, 200 (De Wets), 287, 270 (Benmore), 234, 1032 (Greenfields), 1092, 216

**Abafaki zicelo:**

P. Macingwane; N. Tasana; Qwathi-Tolo Farm Prop Holdings Pty Ltd; Berg Trust; M. Mgedezi; Blue Waves Prop Trust (M Payi); Gubenxa Community Trust (M. Mbanga); Wadelands Farming CC (M Ndzende); Bluewhisper 11 CC (Ntseke); M. Magoda; V. Qangule

Inkampani i-Indwe Environmental consulting iqheshwe njengamagosa azimeleyo acebisa ngezendal xa kuqhutywe uphando olummandla ngochaphazeleka lwezendalo nokusingqongileyo kule Projekti

Ukuba ubani okanye iqumrhu lifuna ukubhaliswa njengonommdla okanye ochaphazelekayo ,nofuna ukufaka uluvo nceda udibabane namagosa kule dilesi ingezantsi phambi kokuba kuphele intsuku ezingamashumi amathathu Ngaphandle kwe-15 kuDisemba ukuya kwi-5 kaJanuwari. Umculu oqulathe ulwazi uyakuthunyelwa kulowo ucelileyo


**Megan Hugo**
**Indwe Environmental Consulting**
2 Ayr Place, Bonnie Doon
East London
5241
Tel: 043 555 0656
Fax: 086 513 9734
Email: megan@indwecon.co.za
Website: www.indwecon.co.za

Date of Advert: 11 December 2020

**Figure 58: Copy of the newspaper advertisement which appeared in the Barkly East Reporter on 11 December 2020.**

## 8.3 **Notice Boards**

Notice boards detailing information about the project, both in English and isiXhosa, and the EIA process were erected at the Gubenxa Valley turn off, off of the R56 as well as the at the main intersection of the internal gubenxa valley road (**Plates 1-2**).


**Plate 1: View of signboard at the turn off of the R56 onto the Gubenxa Valley Road.**


**Plate 2: Signboard at the at the intersection at the internal Gubenxa Valley Road.**

## 8.4 **Register of Interested and Affected Parties (I&AP's)**

In accordance with the requirements of Regulation 42, of Government Notice No. R 326, a register of I&AP's has been maintained and updated throughout this project. Kindly refer to **Appendix E** for a copy of the register.

## 8.5 **Comments and Response Report**

Copies of all I&AP correspondence are included in **Appendix G.**

All I&AP's comments have been recorded and responded to in the Comments and Response Report. Kindly refer to **Appendix F** for a copy of the Comments and Response Report.

## 8.6 **Public Meetings**

No public meeting has been conducted to date for the proposed project. During the initial public participation phase for the EIA notification phase, no comments were received from adjacent landowners who received Background Information Documents regarding the proposed dams or the local community. Key farmers involved in the Gubenxa Valley co-op were at progress meetings held by the DRDAR.

## 8.7 **Review of Draft Scoping Report**

A hard copy draft Scoping Report was placed at the Elliot DRDAR office in Elliot or at the Police Station directly across the road from the Elliot DRDAR office to allow for Interested and Affected Parties and other stakeholders to view and comment on the report. This document was also available in electronic format on the Indwe Environmental Consulting website (www.indwecon.co.za).

The main reason for placement of the report at the Elliot DRDAR offices was that majority of the stakeholders are local farmers and are likely to frequent the office on a normal basis. In addition, we opted to utilise a space that practises the required health protocols of physical distancing, hand sanitising upon entry and the wearing of masks. We also did not want to expose any potential elderly or sickly stakeholder to undue health risks by placing the documents at a busy public place where there would be frequent foot traffic etc. and therefore noted the Elliot DRDAR office as a less risky public domain.

All interested and affected parties were notified of the reports availability and comments were accepted over a 30 day comment period.

Comments were only received from DEDEAT during this period and these were as follows:

- The need and desirability of the proposed development has been noted.
- The development is line with Sakhisizwe Integrated Development Plan (2021-2022) and Chris Hani District Spatial Development Framework 2018.
- It has been noted that Indwe Environmental Consulting will not be conducting the Water Use License related application for the proposed development. However, proof that the application has been submitted and comments received from the relevant stakeholder needs to form part of both the Final Scoping Report and Environmental Impact Assessment Report Phase.
- On page 8 of the report kindly add activity 15 that is also triggered on GN R. 325.

- On page 18 of the report it has been noted that the EAP declaration is not on the Departmental template. Kindly use the Department template for EAP Declaration.
- The outlined specialist studies have been noted. It is advised that the specialist report be accompanied with specialist declaration on the Departmental template. The specialist studies should form part of the Draft EIR.
- The EAP must illustrate the type of public participation to be undertaken under Level 2 of the Covid-19 restrictions.
- The consent letter from Potelwa family trust must submitted to the department.
- Kindly indicate in the report the measures that will be in place to protect the heritage sensitivities on site?
- An annexure of responses to the Draft Scoping Report DEDEAT comments must be attached to the Final Scoping Report

## 8.8 **Final Scoping Report**

The final Scoping Report was prepared and submitted to DEDEAT. DEDEAT received the Final Scoping Report on 4 October 2021.

The DEDEAT formally accepted the Scoping Report with the following conditions:

- The specialist reports outlined in the plan of study must form part of the Environmental Impact Assessment Report
- The EAP/ Application must comply with the statement made in response to DEDEAT comments on DWS requirements and proof of consultation with the said department, which reads “The applications are anticipated to be made in due course once the scoping has been accepted the specialist studies completed in full.”. This information must form part of the EIR and before the finalisation of the EIA process and issuing of the final decision.

The letter of acceptance were dated and received on 2 and 4 November 2021 respectively (see **Appendix A**).

## 8.9 **Draft EIA Report**

A draft EIA Report (this report) will be submitted to DEDEAT and placed for a 30-day comment period for Interested and Affected Parties (I&APs) and Organs of State.

**A hard copy will be available at the Elliot DRDAR office in Elliot.** A copy of the draft EIA Report will also made available to I&APs electronically via the “Public Documents” tab on the Indwe Environmental Consulting website (www.indwecon.co.za)

## 8.10 **Final EIA Report**

Following the review of the draft EIA Report by I&AP's and Organs of State, all comments will be collated and responded to in the Comments and Response Section. The final EIA Report will be submitted to DEDEAT for their acceptance and authorisation.

## 8.11 **Environmental Authorisation**

Following submission of the final EIA report, DEDEAT will review and issue an environmental authorisation in favour or refusal of the development application. All registered Interested and Affected Parties will be notified with regards to the issue of the Environmental Authorisation and given the opportunity to lodge an appeal should they so wish.

# 9 METHODOLOGY IN ASSESSING IMPACTS

## 9.1 Introduction

During the technical assessment of the key issues that emerged through the Scoping process, it was found that the following specialist studies were necessary and were subsequently undertaken:

| Key Issue/ Concerns Raised | Section where issue is Addressed in EIA Report or Specialist Study |
|---|---|
| The transformation of the areas located for the dam sites as well as the orchards that do not comprise of previous cultivated lands may result in a loss of floral species as well as a loss of habitat for certain faunal species.<br><br>In order to evaluate the level of acceptability of the impact on the terrestrial biodiversity environment, a terrestrial biodiversity assessment with correlating impact assessment was conducted.<br><br>This was required in order to determine the potential presence of ecologically significant habitats or sensitive ecosystems within the proposed project footprint. Proposed mitigation and management measures must also be recommended in order to attempt to reduce/alleviate the identified potential impacts. | Terrestrial Biodiversity Assessment (Appendix D) and Section 7.10 to 7.12 |
| A baseline assessment, including the sourcing and processing of appropriate data pertaining to rainfall, evaporation, topography, land-cover, soils as well as regional and local hydrology, has been undertaken to determine the ecological water requirements (or ecological reserve determination) for 13 dams in the Gubenxa Valley.<br><br>The need for EWRs is due to the requirements of the National Water Act of 1998 (NWA, 1998) which establishes that all existing and future water users will require licencing which accounts for both basic human needs reserve and the ecological reserve (i.e. the water requirement before other users are permitted to abstract water). This assessment intended to inform the water use authorisation processes and specifically the quantification of the EWR. | Rapid Ecological Reserve Determination (Appendix D) and Section 7.7 |

| | |
|---|---|
| The Revised Desktop Reserve Model was then used to provide estimates of the EWR for the six EWR assessment<br>points. The results were determined for low flow and total flow requirements. | |
| The purpose of the Wetland Assessment to identify the location(s) of wetlands and the potential impacts of the dam activities on the functional and ecosystem services. In addition, the identification of potential wetlands that may be affected by the orchards is required in order to buffer or avoid these areas for planting as compact and continually wet soils are not conducive for deciduous fruit production | Wetland Assessment Report (Appendix D) and Section 7.9 and 7.10.4 |
| The purpose of the aquatic ecological assessment is to evaluate the impact that the Proposed Gubenxa Valley Trust will have on the aquatic ecosystem of the Nqancule River, Kuntwanazana River and the Kudidwayo River. This study also reports on the; general habitat integrity, riparian vegetation integrity, habitat conditions for aquatic macro-invertebrates, Fish community and to expand aquatic data for future reference.<br><br>This report serves to document the condition of the upstream (US) and Downstream (DS) monitoring sites within the Gubenxa Valley to assess the impact that the thirteen proposed dams will have on the prominent rivers in the valley. This report indicates the state of the river's ecological integrity during a time where ample rain had occurred within the area. The aim of the study is to evaluate the impacts that the proposed dams will have on the aquatic ecology of the main Rivers in the Gubenxa Valley. | Aquatic Ecological Report (Appendix D) and Section 7.7 |
| Potential palaeontological and heritage resources, such as graves, sites of archaeological importance, sites of cultural significance, may be impacted or disturbed by the establishment of the proposed project.<br><br>A specialist Phase 1 Palaeontological and Heritage Impact Assessment study was undertaken to identify any palaeontological and heritage features that may be disturbed by the development and | Phase 1 Palaeontological and Heritage (Appendix D) and Section 7.13 |

| | |
|---|---|
| associated mitigation measures provided to preserve and further guide the Applicant going forward. | |

## 9.2 **Impact Rating Methodology**

It is the goal of the impact assessment process to determine the significance of potential environmental impacts associated with the proposed development. The significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur. Each impact was evaluated individually, however the possibility of a cumulative impact was also considered and evaluated accordingly.

The criteria used to determine impact consequence are presented in the table below.

**Table 30: Criteria used to determine the consequence of the impact**

| Rating | Definition of Rating | Score |
|---|---|---|
| **A. Extent** - the area over which the impact will be experienced | | |
| Local | Confined to the site, or part thereof | 1 |
| Regional | The Region, be it cadastral, catchment, etc | 2 |
| International | Nationally or beyond | 3 |
| **B. Intensity** - the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources | | |
| Low | Site-specific and wider natural and/or social functions and processes are negligibly altered | 1 |
| Medium | Site-specific and wider natural and/or social functions and processes continue albeit in a modified way | 2 |
| High | Site-specific and wider natural and/or social functions or processes are severely altered | 3 |
| **C. Duration** - the timeframe over which the impact will be experienced and its reversibility | | |
| Short-term | Up to 2 years | 1 |
| Medium-term | 2 - 15 years | 2 |
| Long-term | >15 years | 3 |

The scores are then combined (A+B+C) to determine the Consequence Rating (**Error! Reference source n ot found.**).

**Table 31: Calculation of the consequence score**

| Combined Score (A+B+C) | 3 - 4 | 5 | 6 | 7 | 8 - 9 |
|---|---|---|---|---|---|
| Consequence Rating | Very Low | Low | Medium | High | Very High |

The probability of the impact occurring needs to be considered in order for the final significance rating to be informed by the specific context.

**Table 32: Probability Classification**

| **Probability** - the likelihood of the impact occurring | |
|---|---|
| Improbable | <40% chance of occurring |
| Possible | 40% - 70% chance of occurring |
| Probable | >70%- 90% chance of occurring |
| Definite | >90% chance of occurring |

The significance of the impact is attained by cross-referencing probability against consequence, as is tabulated below.

**Table 33: Impact Significance Ratings**

| Significance Rating | Possible Impact Combinations | |
|---|---|---|
| | Consequence and Probability | |
| Insignificant | Very Low | Possible |
| | Very Low | Improbable |
| Very Low | Very Low | Definite |
| | Very Low | Probable |
| | Low | Possible |
| | Low | Improbable |
| Low | Low | Definite |
| | Low | Probable |
| | Medium | Possible |
| | Medium | Improbable |
| Medium | Medium | Definite |
| | Medium | Probable |
| | High | Possible |
| | High | Improbable |
| High | High | Definite |
| | High | Probable |
| | Very High | Possible |
| | Very High | Improbable |
| Very High | Very High | Definite |
| | Very High | Probable |

Finally the impacts were also considered in terms of their status (positive or negative impact) and the confidence in the ascribed impact significance rating.

**Table 34: Status and Confidence classification**

| Status of Impact |
|---|

| | |
|---|---|
| Indication whether the impact is adverse (negative) or beneficial (positive) | + ve |
| | - ve |
| Confidence of Assessment | |
| The degree of confidence in predictions based on available information, the EAP's judgement and/or specialist knowledge. | Low |
| | Medium |
| | High |

The impact significance rating should be considered by authorities in their decision-making process based on the implications of ratings ascribed below:

**INSIGNIFICANT**: the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity/development.
**VERY LOW**: the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity/development.
**LOW**: the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity/development.
**MEDIUM**: the potential impact **should** influence the decision regarding the proposed activity/development.
**HIGH**: the potential impact **will** affect the decision regarding the proposed activity/development.
**VERY HIGH**: The proposed activity should only be approved under special circumstances.

Impacts (with mitigation) rated high or very high are shaded in red and orange, while medium are shaded in yellow and low impacts in shades of green.

### 9.2.1 Mitigation

In the report, practicable mitigation and optimisation measures are recommended and impacts were rated in the prescribed way both without and with the assumed effective implementation of mitigation and optimisation measures. Mitigation and optimisation measures are either:

**Essential**: must be implemented and are non-negotiable; and
**Optional**: must be shown to have been considered and sound reasons provided by the proponent if not implemented.

## 10 SPECIALIST STUDIES

This section provides a summary of the key findings of the specialist studies undertaken for this project.

**Table 35: Specialist studies conducted to inform the impact assessment process**

| Study | Purpose/ Issue/s Addressed |
|---|---|
| Terrestrial Biodiversity Assessment | A terrestrial biodiversity assessment was undertaken to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020.** The report was undertaken as supporting information as part of a greater environmental application process and will need to be compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity.<br><br>In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal (species) themes**, the report also includes these requirements.<br><br>The principles that guided this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources which are fundamental to sustainable development. |
| Aquatic Ecological Impact Assessment | Given the proximity of the dam in relation to tributaries and main rivers, the purpose of the aquatic ecological assessment is to evaluate the impact that the proposed project will have on the aquatic ecosystem of the Nqancule River, Kuntwanazana River and the Kudidwayo River. This study also reports on the; general habitat integrity, riparian vegetation integrity, habitat conditions for aquatic macro- |

| | |
|---|---|
| | invertebrates, Fish community and to expand aquatic data for future reference. This assessment serves to document the condition of the upstream (US) and Downstream (DS) monitoring sites within the Gubenxa Valley to assess the impact that the thirteen proposed dams will have on the prominent rivers in the valley. |
| Rapid Ecological Reserve Determination Study | Given the proximity of the dams in relation to tributaries and main rivers, the scope of work for this assessment to be achieved was the following:<br>• Baseline Assessment – This involves the sourcing of appropriate daily rainfall data, monthly evaporation data, topography, land-cover, as well as a regional and local hydrological assessment;<br>• Monthly Naturalised Runoff Assessment – This involves the estimation of naturalised runoff (streamflow) for each of the EWR assessment points;<br>• **Reserve Determination – This involves the development of a desktop reserve model to define the ecological water requirement for each of the EWR assessment points; and**<br>A technical report detailing the achieved scope of work. |
| Wetland Impact Assessment | Given the proximity of dams within existing tributaries and watercourses, the likelihood of wetlands relating to such watercourse is relatively high. As such, an assessment to identify the location of these wetlands and the potential impacts of the dam activities on the functional and ecosystem services are required to be investigated. In addition, the identification of potential wetlands that may be affected by the orchards is required in order to buffer or avoid these areas for planting as compact and continually wet soils are not conducive for deciduous fruit production. |

| | |
|---|---|
| | |
| Phase 1 Heritage and Palaeontological Assessment | According to the National Web Based Screening Tool, the site had a high sensitivity relating to the archaeological and cultural heritage.<br><br>Sites of heritage significance may be impacted on during the construction of the project and therefore a Phase 1 Heritage Impact Assessment was undertaken. |

## 10.1 **Terrestrial Biodiversity Assessment**

Mr Jamie Pote was appointed as the ecologist to undertake the Terrestrial Biodiversity Assessment which included flora and fauna components. A summary of the findings are as follows:

The following habitats can be differentiated:

1. Primary Grassland (intact and semi-intact)
2. Old Lands - Secondary Grassland (previously cleared)
3. Lands - Transformed (currently or recently cultivated)
4. Riparian – includes wetlands, weeps and long watercourses (these have not been differentiated, other than to indicate suitable habitat for aquatic species, as this assessment is for terrestrial biodiversity only).
5. Other transformed – roads, dwellings, etc

Mapping may not differentiate between cultivated and recently cultivated, as ploughing of lands is ongoing and, in a cycle, hence only old lands, where secondary regrowth is significant are mapped. All other cultivated areas are indicated as 'lands'. **Refer to Appendix B of the specialist report for more detailed descriptions of each orchard and dam site.**

An overall Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators was undertaken and includes the following key criteria:

- relative levels of *intactness* i.t.o. overall loss of indigenous vegetation cover.
- presence, diversity and abundance of *species of special concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.

- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

In summary for the overall project:

- Areas scoring an overall LOW sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. **Low sensitivity areas would include new lands and old lands where crops are being or have been cultivated; other transformed areas such as dwellings, roads and areas where dense alien tree invasion has significantly altered biophysical properties.**
- Areas scoring an overall MODERATE sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. **Moderate sensitivity areas would include areas of natural vegetation that have not been transformed or significantly degraded, including areas having low to moderate alien tree invasion where biophysical properties have not been significantly altered.**
- Areas scoring an overall HIGH sensitivity include those areas deemed to have a sensitivity, including being within intact Critical Biodiversity Areas and connectivity corridors, or are deemed critical habitat for fauna and/or flora species that are considered to be vulnerable. **High sensitivity terrestrial areas on site include rocky outcrops as well as wetland and riparian vegetation which will support a suite of faunal species not likely to be in the wider area.**
- Areas scoring an overall VERY HIGH sensitivity (No-Go Areas) include areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas or are critical habitat for any faunal species that is endangered or critically endangered. **No Very High sensitivity terrestrial areas were identified.**

A summary of overall sensitivity is indicated in Table 36 for orchards and Table 37 for dams. AS an overall indicator, sites having a third or less natural habitat are considered to have a low sensitivity, whereas sites having a third to half natural habitat are designated a medium sensitivity. Sites dominated by natural vegetation (i.e. substantially more than 50 %) are considered to have a high overall sensitivity. The more sensitive rocky outcrops and riparian vegetation will not be substantially affected by the orchards, as these areas are not suited to cultivation and would most likely be avoided.

**Table 36: Overall sensitivity summary per orchard block.**

| Feature | Description | Overall Sensitivity |
|---|---|---|
| Greenfields (1) | Orchards will result in loss of natural intact grassland habitat, comprising around a third of the site. | Medium |
| Greenfields (2) | Site is highly suitable as biodiversity impact will be minimal. Rocky outcrop would not be suitable for ploughing and should be excluded. | Low |
| Gubenxa Com Trust (1) | Site is highly suitable as biodiversity impact will be minimal. Drainage line would not be suitable for ploughing and should be excluded. | Low |

| Feature | Description | Overall Sensitivity |
|---|---|---|
| Gubenxa Com Trust (2) | Site is highly suitable as biodiversity impact will be minimal. Gravel roads would not be suitable for ploughing and should be excluded as well as small fragment on north side of gravel road (0.5 Ha). | Low |
| Hope (1) | Site is highly suitable as biodiversity impact will be minimal. | Low |
| Macingwane (1) | Site is suitable as biodiversity impact will be minimal. Rocky outcrops around the edge of the west side are unlikely to be affected as they are not suitable for cultivation. | Low |
| Magoda (1) | Site is suitable as biodiversity impact will be minimal. | Low |
| Mgedezi (1) | Intact grassland comprises a third the site. Large areas of transformed vegetation comprise the remainder. Riparian habitat along the watercourse is unlikely to provide suitable conditions for orchards so will likely be indirectly excluded. | Medium |
| Paardekraal (1) | Site is highly suitable as biodiversity impact will be minimal. Watercourses not suitable for orchards and will most likely be excluded. | Low |
| Qangule (1) | Site is highly suitable as biodiversity impact will be minimal. | Low |
| Qangule (2) | Site is suitable as loss of intact vegetation will be limited to approximately a third of the footprint. Riparian areas are unlikely to be suitable for cultivation. | Medium |
| Qangule (3) | Site is suitable as biodiversity impact will be minimal if rocky outcrops and riparian vegetation, both of which are not suitable, is avoided. | Medium |
| Qwathitolo (1) | Site is suitable as biodiversity impact will be minimal due to most of orchards being within areas already cultivated. The rocky outcrops are not suitable for ploughing and are likely to be avoided. | Low |
| Qwathitolo (2) | Site is suitable as biodiversity impact will be minimal due to most of orchards being within areas already cultivated. The riparian and aquatic areas are not suitable for orchards and are likely to be avoided. | Medium |
| Qwathitolo (3) | Site will result in loss of natural habitat. It is unlikely that rocky areas can be ploughed so these will be indirectly avoided. | High |
| Qwathitolo (4) | Site will result in loss of natural habitat. It is unlikely that rocky areas can be ploughed so these will be indirectly avoided, and drainage lines are generally unsuitable for orchards. | High |
| Qwathitolo (5) | Site is suitable as biodiversity impact will be minimal due to most of orchards being within areas already cultivated. The wetland area are not suitable for orchards and are likely to be avoided. | Low |
| Tasana (1) | Site is highly suitable as biodiversity impact will be minimal. | Low |
| Wadeland (1) | Site is highly suitable as biodiversity impact will be minimal. | Low |

| Feature | Description | Overall Sensitivity |
|---|---|---|
| Wadeland (2) | Site is highly suitable as biodiversity impact will be minimal. | Low |

**Table 37: Overall sensitivity summary per dam.**

| Site | Description | Overall Sensitivity |
|---|---|---|
| Dam 1 | Site will result in loss of some riparian vegetation and natural grassland. | Low |
| Dam 2 | Site will result in loss of some riparian vegetation and natural grassland. | Medium |
| Dam 3 | Site will result in loss of some riparian vegetation and natural grassland. | Medium |
| Dam 4 | Site will result in loss of some riparian vegetation and natural grassland. | Medium |
| Dam 5 | Site will result in loss of some riparian vegetation and natural grassland. | Low |
| Dam 6 | Site will result in loss of some riparian vegetation and natural grassland. | Medium |
| Dam 7 | Site will result in loss of some riparian vegetation and natural grassland. | Medium |
| Dam 8 | Construction of dam will result in loss of several watercourse channels and seep habitat. | Medium |
| Dam 9 | Development of site will result in loss of riparian vegetation and seep/grassland habitat. Extensive similar habitat in surrounding area. | Medium |
| Dam 10 | Site is suitable as biodiversity impact will be minimal due to already degraded conditions due to wattle invasion. | Medium |
| Dam 11 | Site is suitable as biodiversity impact will be minimal due to already degraded conditions due to wattle invasion. | Low |
| Dam 13 | Site is suitable as biodiversity impact will be minimal due to already degraded conditions due to wattle invasion and erosion. Upstream watercourse having small dam. | Low |
| Dam 14 | Site is suitable as biodiversity impact will be minimal due to already degraded conditions due to wattle invasion and erosion. | Medium |

- It is the conclusion of this terrestrial biodiversity assessment that the orchards and dams can be developed within acceptable terrestrial biodiversity impact limits.
- The implementation of the management actions relating to flora and fauna as well as post construction rehabilitation will minimise biodiversity impacts.
- Sensitive areas that should be avoided include rocky outcrops and riparian vegetation associated with watercourses, wetlands and seeps. These areas are unlikely to be suitable for orchards and should be avoided.

## 10.2 **Aquatic Ecological Impact Assessment**

BioBlue Environmental Sustainability conducted the Aquatic Ecological/ Biodiversity Assessment (Refer to Appendix D) in order to evaluate the impact of the proposed dams on the Nqancule, Kuntwanazana and Kudidwayo Rivers. This section includes the reporting of general habitat integrity, riparian vegetation

integrity, habitat conditions and fish communities. The condition of upstream and downstream monitoring sites for each dam site is included.

Site visits were conducted on 3rd of March until the 14th of March 2021 and it was noted that the area had sufficient summer rain.

Two (2) separate upstream and downstream monitoring sites were assessed within each stream where a proposed dam is suggested except one site where no macro-invertebrate evaluation was possible due to lack of habitat and running water. At some streams only a downstream assessment was conducted because the upstream region did not have all the necessary habitats available. The main rivers in which the proposed dams will have an influence are Nqancule River, Kuntwanazana River and the Kudidwayo River. The Present Ecological State (PES) for each monitoring point was calculated by using the South Eastern Uplands as reference ecoregion. The study area falls within the T11D and T11E Quaternary Catchment of the Mzimvubu – Tsitsikamma Water Management Area.

Most of the tributaries in which the proposed dams fall were in a good condition with minimal anthropogenic influences. At some of the tributaries there were invasive plants, cattle grazing and erosion of the stream banks. Some of the tributaries were characterised by wetlands resembling channelled valley bottoms. The main rivers were in a deteriorating state with a lot of alien invasive trees in the riparian zone with erosion on the riverbanks. Although riparian and instream conditions are not pristine, the rivers still housed a large abundance of sensitive species. It is suggested that the physical, chemical and ecological condition of the main rivers are maintain or increased. The catchment is heavily polluted by irrigation return flows, urban drainage, informal settlements; these anthropogenic impacts have resulted in an overall loss of biodiversity within river systems.

This assessment aims to set a baseline study for the proposed dams and ecologically evaluate each dam and its influence on the main River of which its apart. The results portray the spatial variability between the monitoring points as well as reference data from previous assessments conducted in the T11D and T11E catchment.

## 10.3 **Wetland Assessment**

BioBlue Environmental Sustainability (Pty) Ltd. were appointed to compile a wetland assessment report for the proposed 13 dam sites and wetland screenings and delineations for the 20 orchard sites within the Gubenxa valley.

The methodology consisted of a two-pronged approach. Firstly, a desktop study was undertaken for the study sites which was followed up by a field surveys to verify or “ground truth” the findings from the desktop study and to gain a deeper insight into the health, impacts and functioning of the wetland system to perform the wetland assessment. The field surveys were also necessary to delineate the boundaries of the wetland systems. The field surveys were conducted over a period of a week and half in March 2021. A full wetland assessment was undertaken for the wetlands within a 500m regulated area of the proposed dam walls on each of the proposed 13 dam sites. For the proposed 20 orchard sites only wetland screenings and delineations were carried out.

The Gubenxa valley in the Eastern cape province is a high rainfall area of South Africa and in conjunction with the undulating nature of the topography it is rich in aquatic environments such as wetlands from different HGM types and different order streams.

Many of the wetlands on the study sites were observed to harbour crane species such as Grey crowned cranes (*Balearica regulorum*) and Blue cranes (*Anthropoides paradiseus*). TWetland habitat is crucial for cranes as they use wetlands for breeding and foraging sites. The major impacts on the wetlands across the various sites are related to a range of agricultural activities such as construction of soil dams within the catchments of the wetland or in the wetland itself, overgrazing and trampling by livestock, establishment of crop fields and associated terraces. All of these impacts are not all present within each wetland on every study site, but all of the wetlands do have a combination of some of these impacts present. These agricultural activities are the drivers behind the establishment of preferential flow paths and various forms of erosion. In turn where erosion is prevalent it also makes it easier for alien invasive species to establish themselves. By far the major species of alien invasive present within the thirteen (13) study sites are Black wattle (*Acacia Mearnsii*). The Black wattle infestation is by far the most severe in the channelled valley bottom wetlands and the riparian zones of the rivers and streams. The hillslope seepage wetlands are to a large degree not impacted by alien invasive vegetation. The majority of the channelled valley bottom wetlands on the thirteen (13) study sites were once unchanneled valley bottom systems but has become channelled and incised trough the various degrading anthropogenic agricultural activities on site as well as in the wider catchment of these wetlands. Some of these wetland systems has moved from unchanneled to channelled and even to a point where some of these channelled systems shows signs of riparian characteristics due to the loss of valuable wetland soils through erosion and incision, with wetland soils confined to the margins outside of the channel and not in the channel itself. These systems are also heavily infested by Black wattle which established in the exposed drier non-wetland soils within the channel and its immediate banks. The once unchanneled valley bottom systems on the various study sites has undergone a process of degradation with each one being at a different phase of degradation that won't be stopped and reversed without the intervention of active rehabilitation measures. It is strongly advised that a wetland rehabilitation plan is developed by an aquatic ecologist that can be implemented so that the various aquatic habitats can be rehabilitated. Part and parcel of this plan should be an alien invasive eradication and monitoring plan which could potentially be implemented in conjunction with the Working for Water programme. The rehabilitation plan will not only improve the wetland and the other aquatic habitats health, the ecosystem goods and services they deliver, and improve biodiversity but also contribute to better quality of water. There is a possibility that the proposed dams will over time silt up due to the continuing degradation of the wetlands within its catchment. It is therefore advised that a siltation risk study is undertaken to ensure that the proposed dams are feasible over the long run.

It is clear from the PES scores of all the wetlands that none are in a pristine state, although the majority of these systems still possess a high degree of ecological integrity. This can be seen from the PES scores of B's and C's that the majority of the wetlands possess. These wetlands perform vital ecosystem services and provides habitat for various fauna and flora. It contributes to the water quality and quantity of the Kuntwanazana, Nqancule, and Kudidwayo rivers. It is important that these wetlands are conserved and managed to ensure that it continues play its vital role within the landscape.

Within the 500m regulated area from the proposed Gubenxa trust dam wall three NFEPA wetlands are present, two are classified as artificial and one as a natural channelled valley bottom wetland according to the BGIS database. During the field survey it was found that the two artificial wetlands referred to are actually one and it is in the form of manmade soil dam. The other NFEPA wetland was confirmed to be a natural wetland belonging to the channelled valley bottom HGM type. At the Gubenxa Trust dam

according to the proposed dam wall location and the preliminary flooding footprint received it is advised that the existing soil dam be rehabilitated and utilised for wetland offset. Within the 500m regulated area from the proposed Paardekraal dam wall two NFEPA wetlands are present, and both are classified as a channelled valley bottom wetland according to the BGIS database. According to the proposed dam wall location and the preliminary flooding footprint received it is advised to consider alternatives such as moving the dam wall downstream out of the NFEPA wetland to where the unchanneled valley bottom wetland is not as broad and more channelled. If this is not feasible and the dam wall is to remain in the proposed location, then additional wetland habitat should be established on the edges of the dam to ensure less impact on the habitat of the Grey crowned cranes which forage in these areas. This should be stipulated as a condition. Continuous monitoring should be conducted to minimise the impact on the wetland health and functioning and ecosystem services provided.

All buffer zone areas should be managed by implementing an appropriate fire management plan, burning buffer zone sections in an alternating fashion once every two years is recommended. Burning many grassland flowering plant species are dependent on heat and/or smoke to germinate their seeds and remain functional within their natural habitat. An appropriate buffer zone around the wetland would help ensure a large enough open surface area for infiltration and to protect the wetland from edge effects originating from agricultural activities. The 50m prescribed buffer zone, particularly associated with the orchards should be implemented to ensure that the negative edge effects associated with possible future development and agricultural activities do not negatively influence the ecological integrity and continued functioning of the wetlands. A 50 m wide buffer zone is advised to protect the wetlands from future detrimental influences of agricultural activities. **This buffer should also be implemented around the back flooding which will be caused by the dam wall as new wetland habitat will be created**. The buffer zone will help to ensure a sufficiently wet wetland hydrology to support its functions, as well as protect the wetlands' habitat and an adjacent portion of terrestrial habitat, in order to support indigenous biodiversity. Buffer zones create habitat and areas for foraging, breeding, and dispersal for various faunal species. Many species use buffer zones as corridors through which they move from one habitat to another.

## 10.4 **Rapid Ecological Reserve Determination**

Hydrologic Consulting was appointed through BioBlue Environmental Sustainability (Pty) Ltd (BioBlue) in association to undertake an ecological reserve determination pertaining to 13 dams.

In undertaking an ecological reserve determination (or defining the environmental water requirement – EWR), it will be possible to inform the potential abstraction or operational storage volumes for the proposed dams. The need for the EWR is due to the requirements of the National Water Act of 1998 (NWA, 1998) which establishes that all existing and future water users will require licencing which accounts for both basic human needs reserve and the ecological reserve (i.e. the water requirement before other users are permitted to abstract water). This report is consequently intended to inform the water use authorisation processes and specifically the quantification of the EWR.

For the Ecological Reserve Determination assessment six EWR assessment points were defined with one point within quaternary T11E and five points within quaternary T11D. These six points of assessment were utilised in preference to an assessment point at each of the 13 dams due to the following:

- Once an EWR is defined, the subsequent requirement is that streamflow be monitored at or close to the EWR point (for management purposes). Having many EWR points (one for each dam) would consequently increase monitoring and management requirements.
- EWRs become difficult to define for small river catchments (where streamflow is not well established), with a review of dam catchments suggesting that a few may fall into the aforementioned.
- The method by which EWRs are calculated, requires naturalised 'pre-development' streamflow. This streamflow data was sourced at from a dataset established from quaternary level data. Smaller catchments are consequently less likely to reflect the rainfall-runoff response of the quaternary catchment thereby increasing the potential for error within the EWR estimation.

A baseline assessment, including the sourcing and processing of appropriate data pertaining to rainfall, evaporation, topography, land-cover, soils as well as regional and local hydrology, was undertaken to determine the ecological water requirements (or ecological reserve determination) for 13 dams in the Gubenxa Valley. The need for EWRs is due to the requirements of the National Water Act of 1998 (NWA, 1998) which establishes that all existing and future water users will require licencing which accounts for both basic human needs reserve and the ecological reserve (i.e. the water requirement before other users are permitted to abstract water). **This report is consequently intended to inform the water use authorisation processes and specifically the quantification of the EWR and to provide further input into the final design stage of the proposed dams.**

The WR2012 quaternary level dataset of naturalised streamflow was used to produce estimates naturalised streamflow for each of the six EWR assessment points identified for this study. The rainfall-runoff response of the various subcatchments was assumed to be the same as the rainfall-runoff response for quaternary catchment within which they are position with linear down-scaling of the quaternary level results being adopted.

The Revised Desktop Reserve Model was then used to provide estimates of the EWR for the six EWR assessment points. The results were determined for low flow and total flow requirements. These have been presented as monthly and annual volumes in this report, with more detailed monthly flow duration curves presented in **Appendix B to Appendix G of the EWR Report in Appendix D.** These curves indicate the percentage time that streamflow, baseflow or the EWR (low flow and total flow) is equalled or exceeded.

Upon finalising the location of the final EWR point of assessment, It will be necessary to undertake streamflow monitoring to inform the application of the EWR. This report is concerned with the estimation of the EWR and does not discuss application of the EWR in detail. It is, however, recommended that once the location is finalised, the control points should be modelled using a hydraulic model that enables the conversion of the monthly total flow assurance curves, to a depth, enabling easier monitoring of streamflow and associated dam releases to meet the EWR.

A suitability qualified professional should be appointed to undertake the hydraulic modelling of the control point and the associated setup of the site's operational framework with regards to the implementation of the EWRs.

## 10.5 **Phase 1 Heritage and Palaeontological Impact Assessment**

Umlando Archaeological Surveys and Heritage Assessment were appointed to under the Phase 1 Heritage and Palaeontological Impact Assessment.

The findings of the assessment are provided in Section 7.11 of this document however to further summarise the main areas where impacts on heritage sites will occur are in two orchards. If the full extent of the orchards is used, then there will be a negative impact on historical buildings and middens. These buildings and middens probably date to at least 1913/1914 and are thus protected by the NHRA.

These features are not of such significance that they will prevent the expansion of the orchard; however, some form of mitigation is required, in addition to the permits. There are two options in the managements:

1. Create a 50m no-go buffer around each feature and the area is controlled against development.
2. Undertake mitigation and salvage the historical information before it is lost. This should be a staged approach.

The 50m buffer approach is the most practical; however, it is unlikely to be maintained if not regularly monitored/enforced. Irrigation pipes may also be excavated into the middens.

The next option is a staged approach of mitigation. The recommendation is that the following occurs once the grass is burnt or near the end of winter when it is less dense:

1. Each built feature is accurately recorded by means of at least digital photographs.
2. The area is surveyed for the locations of the middens. These are assessed and mapped. Limited test-pit excavations are undertaken to determine the significance of each midden.
3. The aim of the excavations would be to obtain a sample from each midden.

Refer to **Appendix D** for a copy of the report.

# 11 ISSUES AND IMPACT ASSESSMENT

This chapter provides an assessment of the impacts (including cumulative) associated with each issue and further includes mitigation measures to be implemented to reduce the significance of negative impacts.

## 11.1 General Activities causing environmental impacts

The following project related activities are likely to be the main cause of environmental impacts:

- Clearing area with heavy plant (bull dozers/ excavators and tractors)
- Bulk earthworks
- Stockpiling of spoil material
- Disposing of spoil material
- Stockpiling of cleared vegetation
- Construction of access and haul roads and other related earthworks, particularly where these cross areas of indigenous vegetation and watercourses/ drainage lines
- Concrete works
- Laydown areas
- Operation and maintenance

## 11.2 Summary of Issues / Impacts Raised or Identified

The following issues have been raised and identified:

1. Terrestrial Impacts on Biodiversity
2. Soil erosion
3. Ecological Water Requirements/ Water Quantity
4. Impact on Wetlands
5. Impacts on Aquatic Ecology
6. Pollution of surface and ground water systems (nutrient input)
7. Economic Impacts
8. Heritage & Palaeontological Impacts

## 11.3 Impact Assessment

### 11.3.1 Terrestrial Impacts on Biodiversity

(a) Construction

The main impacts likely to result from the proposed activity include the following:

1. Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
2. Loss of flora species of special concern during pre-construction site clearing activities. Numerous species of special concern are potentially present within the affected area, which could be destroyed during site preparation.
3. Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
4. Disturbances to ecological processes. Activity may result in disturbances to ecological processes.
5. Aquatic and Riparian processes. Diversion and increased velocity of surface water flows – Changes to the hydrological regime and increased potential for erosion. Impact of changes to water quality. Loss of riparian vegetation / aquatic habitat. Loss of species of special concern.
6. Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species.
7. Loss of faunal SSC due to construction activities: Activities associated with bush clearing and ploughing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

| **ISSUE:** | **TERRESTRIAL IMPACTS ON BIODIVERISTY** |
|---|---|
| **Project Phase** | **Construction** |
| **Impact** | **Loss of Natural Vegetation, Reduced Habitat Quality, Restriction of Fauna utilising the area** |
| **Nature** | Negative (direct, indirect and cumulative) |
| **Extent** | Local (1) |
| **Intensity** | Medium (2) |
| **Duration** | Medium Term (2) |
| **Consequence** | Medium |
| **Probability** | Definite |
| **Degree to which impact cannot be reversed** | Low- Medium |
| **Degree to which Impact may cause irreplaceable[7] loss of resources** | Low |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **Medium (-ve)** |
| **Significance Post Mitigation** | **Low (-ve)** |
| **Degree of Mitigation** | Medium |

[7] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

- All impacts are assessed to be of **medium** significance before mitigation and can be reduced to **low** with the implementation of the mitigation measures.
- Impacts (Faunal habitat and faunal species) relating to disturbance and displacement of vultures (*Gyps coprotheres*) potentially nesting on the cliffs in the vicinity of the site are deemed to be low, as these areas will not be directly affected, and disturbances will not be significantly above background agriculture disturbance that is currently in place. This impact is likely to be temporary during construction but may persist during operational, which is unknown.
- Impacts (Faunal habitat and faunal species) relating to disturbance and displacement of Sensitive species 9, is likely to be limited to temporary displacement during construction, as the species was noted to be a frequent visitor in disturbed areas, including cultivated lands, near dwellings and dams.
- Although none were confirmed, several flora species of conservation concern could potentially be present, most likely only within the patches of natural that would be disturbed. Since the vegetation unit is widespread and relatively uniform within the local area, the risk to any species is likely to be low. In addition the proportion of natural vegetation that will be transformed for the orchards and dams in comparison the area of habitat remaining is negligible.

In general, most direct impacts will have a moderate reversibility in the bushveld habitat, as well as transformed or degraded areas, except where hardening of surfaces or substantial removal of topsoil occurs.

The below table provides specific mitigation measures that must be implemented and adhered to. These must be considered to be conditions of the EA.

**Table 38: Specific Mitigation Measures and Recommendations**

| IMPACT | MITIGATION MEASURES |
|---|---|
| Vegetation | • Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place.<br>• Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place.<br>• Rocky outcrops should be avoided as they are not suitable for the proposed activity.<br>• Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses. |
| Flora Species | • A flora search and rescue is unlikely to be required.<br>• A single PNCO protected species was recorded, respective permit will be required for destruction. |
| Alien Invasive Species | • Alien trees must be removed from the site as per CARA/NEMBA requirements.<br>• A suitable weed management strategy to be implemented in construction and operation phases.<br>• After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust. |

| IMPACT | MITIGATION MEASURES |
|---|---|
| Erosion | • Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed.<br>• Topsoil must be stripped and stockpiled separately and replaced on completion.<br>• If natural vegetation re-establishment does not occur, a suitable grass must be applied. |
| Ecological Processes | • Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences. |
| Aquatic and Riparian processes | • Riparian vegetation surrounding watercourses and found within wetlands and seeps should be excluded from orchard footprints. |
| Faunal Habitat | • Blanket clearing of vegetation must be limited to the footprint.<br>• It is important that clearing activities are kept to the minimum and take place in a phased manner, where applicable. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas. |
| Faunal Processes | • The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to.<br>• Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of special concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity.<br>• Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these species are mobile and may thus move onto site once construction is underway. A reptile handler should be on call for such circumstances.<br>• Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including temporarily suspending works in the affected area) should be implemented. |
| Faunal Species | • A faunal search and rescue is unlikely to be required.<br>• No animals are to be harmed or killed during the course of operations.<br>• Workers are NOT allowed to snare any faunal species. |

(b) Operation

Once the dams have been completed and the dam coverage area has been inundated with water, the creation of a favourable habitat that supports biodiversity will be created. Local fauna and avifauna will utilise the area for foraging, breeding and movement more frequently than what is currently occurring. This is a positive impact and will impact local biodiversity significantly.

| **ISSUE:** | **TERRESTRIAL IMPACTS ON BIODIVERISTY** |
|---|---|
| **Project Phase** | **Operation** |
| **Impact** | **Creation of Favourable Habitat for Biodiversity** |
| **Nature** | Positive (direct) |
| **Extent** | Regional (2) |
| **Intensity** | Medium (2) |
| **Duration** | Long term (3) |
| **Consequence** | High (7) |
| **Probability** | Definite |
| **Degree to which impact cannot be reversed** | Low |
| **Degree to which Impact may cause irreplaceable[8] loss of resources** | N/A |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **High (+ve)** |
| **Significance Post Mitigation** | N/A |
| **Degree of Mitigation** | N/A |

### 11.3.2 Impact on Soils

The clearance of vegetation for orchards, and ripping activities will require clearing and earthworks to enable leveling and contouring of the site, which implies the movement or removal of topsoil and sub-surface material. This will alter the ground level and topography of the site.

Construction/excavation will expose the soil, which may wash off into drainage lines, riparian areas and water courses during high rainfall events during the construction phase. Exposed soils may also be exposed to wind erosion.

[8] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

| ISSUE: | IMPACT ON SOILS |
|---|---|
| **Project Phase** | **Construction and Operation** |
| **Impact** | **Soil Erosion, Pollution of Soils etc.** |
| **Nature** | Negative (direct, indirect and cumulative) |
| **Extent** | Local (1) |
| **Intensity** | Medium (2) |
| **Duration** | Long Term (3) |
| **Consequence** | Medium (6) |
| **Probability** | Possible |
| **Degree to which impact cannot be reversed** | Medium |
| **Degree to which Impact may cause irreplaceable[9] loss of resources** | Medium |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **Medium (-ve)** |
| **Significance Post Mitigation** | **Low (-ve)** |
| **Degree of Mitigation** | Medium |

Essential Mitigation Measures:

- Ridging to occur within orchards which are parallel to the contour.
- Erosion prevention measures on steeper slopes during establishment
- Steeper slopes (1:5 and steeper) are to be avoided for establishment of orchards
- Stormwater management measures are to be included in roadways
- The point of stormwater release is to be stabilised

### 11.3.3 Ecological Water Requirements/ Water Quantity

The National Water Act of 1998 (NWA, 1998) establishes that all existing and future water users will require licencing which accounts for both basic human needs reserve and the ecological reserve (i.e. the water requirement before other users are permitted to abstract water). The potential utilisation of streamflow is accordingly the difference between natural streamflow and the requirements of the two reserves. Variability in natural streamflow (e.g. due to seasonal changes, floods or drought), means that the potential utilisation of streamflow, fluctuates. The approach to defining environmental water requirements (i.e. the ecological reserve) consequently needs to consider the natural variability in streamflow and the requirement that a sufficient portion of the variable streamflow be set aside to preserve river biota and habitats. System yield models (usually associated with water supply schemes in

[9] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

large catchments) have been designed to account for the ecological reserve; however, many smaller catchments have no system yield model available.

The Reserve refers to the quantity and quality of water required to (i) supply basic human needs and (ii) protect aquatic ecosystems. The ecological component of the Reserve (i.e. water to protect aquatic ecosystems), refers to water quantity and water quality within the following four components: groundwater; wetlands; rivers; and estuaries. The water quantity component for a river will typically refer to the flows and flow patterns (magnitude, timing and duration) needed to maintain a river ecosystem within acceptable limits of change, or the specified Ecological Category.

Operation of the dams will impede the natural flow of water and disrupt the sediment regime. This has implications for reduced flooding and siltation downstream, affecting the various ecological components that make up the reserve. Water flows are presently affected by changes in land use, including water diversions and storage upstream.

Most of the affected streams are tributaries of the Nqancule River, Kuntwanazana River and the Kudidwayo River except the Greenfields dam which is proposed to be built in the Nqancule River.

| **ISSUE:** | **EWR/ WATER QUANTITY** |
|---|---|
| **Project Phase** | **Construction and Operation** |
| **Impact** | **Reduction in Water Quantity in the Catchment/ Reserve** |
| **Nature** | Negative (direct and cumulative) |
| **Extent** | Regional (1) |
| **Intensity** | Low (1) |
| **Duration** | Long Term (3) |
| **Consequence** | Low (5) |
| **Probability** | Definite |
| **Degree to which impact cannot be reversed** | Low |
| **Degree to which Impact may cause irreplaceable[10] loss of resources** | Medium |
| **Confidence level** | Medium |
| **Significance Pre- Mitigation** | **Low (-ve)** |
| **Significance Post Mitigation** | **Low (-ve)** |
| **Degree of Mitigation** | Moderate |

The Gubenxa area receives significant rainfall whereby the dam sizes and designs have ensured that the outflows remain similar and peak flows are only marginally reduced following the construction of the

[10] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

dams. All dams are designed to ensure EWR releases, high flows etc. The dams are considered relatively small storage dams for a fruit production project of this nature.

### 11.3.4 Impact on Wetlands

a) Planning Phase

| ISSUE: | IMPACTS ON WETLANDS |
|---|---|
| **Project Phase** | **Planning** |
| **Impact** | **Hydrology, EWR** |
| **Nature** | Negative (Indirect and cumulative) |
| **Extent** | Local (1) |
| **Intensity** | Medium (2) |
| **Duration** | Short Term (1) |
| **Consequence** | Very Low (4) |
| **Probability** | Definite |
| **Degree to which impact cannot be reversed** | Low |
| **Degree to which Impact may cause irreplaceable[11] loss of resources** | Medium |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **Very Low (-ve)** |
| **Significance Post Mitigation** | **Very Low (-ve)** |
| **Degree of Mitigation** | High |

Mitigation Measures:

- The design of the dam wall, inlet and outlet, its placement, should be undertaken by a suitably qualified hydrological engineer which has a good understanding of the ecological requirements of aquatic systems. The dam wall and its associated infrastructure must not be a catalyst and source for contamination, sedimentation eutrophication and increased erosion of the wetland up and downstream of the dam wall. **(Hydrological Engineers have all been utilised in the design of the dams)**
- Complete an Environmental Water Requirement (EWR) or Flow Requirement assessment to determine the required environmental releases from the dam to sustain river and wetland functions downstream. This must be done, or the dam will have a fatal flaw and must then not be allowed to be constructed. **(An EWR has been undertaken which will further inform the final dam designs and WUL process which will be undertaken by ECDRDAR )**

[11] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

b) Construction Phase

The construction phase of any project is critical in the sense that this is where major environmental damaged can be caused to ecosystems and their associated habitats. Hydrocarbons such as fuels or lubricants spilled from construction vehicles, construction materials that are not properly stockpiled, and litter deposited by construction workers may be washed into wetlands and surface water bodies. Stripping of topsoil will result in increased runoff of sediment from the site into watercourses associated with the study area. Should appropriate toilet facilities not be provided for construction workers at the construction crew camps, the potential exists for surface water resources and the surrounding environment to be contaminated by raw sewage.

| **ISSUE:** | **IMPACTS ON WETLANDS** |
|---|---|
| **Project Phase** | **Construction** |
| **Impact** | **Contamination of wetlands, Soil erosion, Sedimentation** |
| **Nature** | Negative (direct, indirect and cumulative) |
| **Extent** | Local (1) |
| **Intensity** | High (3) |
| **Duration** | Medium Term (2) |
| **Consequence** | Medium (6) |
| **Probability** | Probable |
| **Degree to which impact cannot be reversed** | Medium |
| **Degree to which Impact may cause irreplaceable[12] loss of resources** | Medium |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **Medium (-ve)** |
| **Significance Post Mitigation** | **Low (-ve)** |
| **Degree of Mitigation** | High |

The following mitigation measures should be employed during the **construction phase** of the proposed dam:

- The construction of the proposed dam wall and its associated infrastructure should occur during the dry season in the months of May, June, July and August when the flow is low and the rainfall non-existent to minimal.
- During the construction phase the flow of water must still be allowed to flow downstream.
- Make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas.

[12] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

- Runoff from roads must be managed to avoid erosion and pollution problems. Where excessive loose sediment is created, attenuation swales and / or soils screens should be installed.
- Construction vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants.
- Vegetation and soil must be retained in position for as long as possible and removed immediately before construction/earthworks commences.
- A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide, and insecticides, as appropriate, in well-ventilated areas.
- Storage of potentially hazardous materials should be above any 100-year flood line, or as agreed with the Environmental Control Officer (ECO). These materials include fuel, oil, cement, bitumen etc.
- Sufficient care must be taken when handling these materials to prevent pollution.
- Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils.
- Oil residue shall be treated with oil absorbent such as Drizit or similar and this material removed to an approved waste site.
- Concrete and cement, is to be mixed only on an impermeable surface such as a batching tray with raised sides and not on exposed soil.
- Concrete and tar shall only be mixed on mixing trays and in areas which have been specially demarcated for this purpose.
- All concrete and tar that is spilled outside these areas shall be promptly removed by the Contractor and taken to an approved landfill.
- After all the concrete/tar mixing is complete all waste concrete / tar shall be removed from the batching area and disposed of at an approved dumpsite.
- Storm water shall not be allowed to flow through the batching area.
- Cement sediment shall be removed from time to time and disposed of in a manner as instructed by the ECO.
- All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring.
- Portable septic toilets are to be provided and maintained for construction crews.
- Maintenance must include their removal without sewage spillage.
- Portable septic toilets are to be located outside of the 1:100-year flood line.
- Under no circumstances may ablutions occur outside of the provided facilities.
- No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority.
- In the case of pollution of any surface or groundwater, the Regional Representative of the Department of Water Affairs and Sanitation (DWS) must be informed immediately.
- Where construction in close proximity to sewer lines is unavoidable then excavations must be done by hand while at all times ensuring that the soil beneath the sewer lines is not destabilised.
- Store all litter carefully so it cannot be washed or blown into any of the water resources within the study area.
- Provide bins for construction workers and staff at appropriate locations, particularly where food is consumed.
- The construction site should be cleaned daily, and litter removed.
- Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering; and
- Backfill must be compacted to form a stabilised and durable blanket.

- Re-vegetation of disturbed areas must be undertaken with site indigenous species and in accordance with the instructions issued by the Environmental Control Officer (ECO). Areas where soil compaction or ruts developed should be rehabilitated.
- An environmental awareness training programme should be implemented by contractor to educate the staff and construction crews.
- Any proclaimed weed or alien species that germinates during the contract period shall be cleared by hand before flowering.
- Imported fill material should be monitored during and after construction for the presence of any alien species. Any such species should be removed immediately.
- Infilling, excavation, drainage, dumping of building material should not occur in the wetland or within 50m of the wetland boundary.
- Avoid construction activities in wetlands at all costs except for the proposed dam sites through proper demarcation. The Contractor has a responsibility to inform all staff of the need to be vigilant against any practice that will have a harmful effect on wetlands and other aquatic habitats which occur on site as well as off site. This information shall form part of the Environmental Education Programme to be affected by the Contractor, including the following:
    - Emergency plans must be in place in case of pollutant spillages into wetland systems.
    - All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds. It should also only be stored for the minimum amount of time necessary.
    - Erosion control of all banks must take place so as to reduce erosion and sedimentation into river channels or wetland areas.
    - Silt traps and culverts should be regularly maintained and cleared so as to ensure effective drainage.
    - Littering and contamination of water sources during construction must be mitigated by effective construction camp management.
    - All construction materials including fuels and oil should be stored in a demarcated area that is contained within a bunded impermeable surface to avoid spread of any contamination. The storage areas should be constructed as far away as practically possible outside of wetlands or wetland buffer zones.
    - Washing and cleaning of equipment should also be done within a bermed area, in order to trap any cement or plaster and avoid excessive soil erosion.
    - These sites must be rehabilitated prior to commencing the operational phase.
    - The disturbance of any fauna and flora should be avoided at all costs.
    - The construction should occur outside the breeding season (spring and summer months) of the crane species in the region.

c) Operation Phase

| **ISSUE:** | **IMPACTS ON WETLANDS** |
|---|---|
| **Project Phase** | **Operation** |
| **Impact** | **Soil erosion, Sedimentation, Invasive Alien Encroachment, Degradation of wetlands** |
| **Nature** | Negative (direct, indirect and cumulative) |
| **Extent** | Regional (2) |

| ISSUE: | IMPACTS ON WETLANDS |
|---|---|
| **Project Phase** | **Operation** |
| **Impact** | **Soil erosion, Sedimentation, Invasive Alien Encroachment, Degradation of wetlands** |
| **Intensity** | Medium (2) |
| **Duration** | Medium Term (2) |
| **Consequence** | Medium (6) |
| **Probability** | Probable |
| **Degree to which impact cannot be reversed** | Medium |
| **Degree to which Impact may cause irreplaceable[13] loss of resources** | Medium |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **Medium (-ve)** |
| **Significance Post Mitigation** | **Low (-ve)** |
| **Degree of Mitigation** | High |

The following mitigation measures should be employed during the **operational phase**:

- Regular inspection of the dam inlet and outlet points to ensure no erosion occurs.
- It is critical that an alien vegetation control programme is implemented, as there are already dense infestations present within many of the channelled valley bottom wetlands and riparian areas. Encroachment of alien vegetation could in all likelihood increase as a result of the construction process disturbances. Rehabilitation of disturbed areas, utilising indigenous wetland vegetation species, will assist in reducing the impact of construction.
- During the operational phase vehicles must remain on designated roads and must not drive in the wetland areas or the edge of the dam as new wetland systems would have established there.
- Ensure no new access roads are created by clearing vegetation to get to the dam wall. This will destroy habitat and could lead over time to erosion and higher sedimentation loads ending up in the wetland as well as leading to the proposed dam silting up. The sediment would be transported as runoff from these newly created tracks or roads.
- Ensure that proper grazing management practices are implemented and that there is adhered to the prescribed carrying capacity for livestock and game in accordance with the size of the wetland, its associated buffer zone area, and the climatic conditions of the region.
- The only activities that should occur within the wetland buffer zone is controlled grazing that adheres to a sound grazing management plan.
- Ensure farm workers are aware of the importance of wetlands as well as what to do to avoid their degradation through regular awareness programs.
- Farm vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants.

[13] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

- No encroachment should be allowed to occur on the wetland and its buffer zone.
- The dam wall should be inspected on a regular basis for any signs of weakness that could lead to failure and appropriate maintenance should be carried out to ensure continued integrity.
- The releases from the dam as prescribed by the Environmental Water Requirement (EWR) must be adhered to and records must be kept, verifying that these releases took place.

### 11.3.5 Impact on Aquatic Ecology/ Biodiversity

The integrity of each of the watercourse systems are directly influenced by the intactness of the riparian vegetation and associated habitat.

The overall Eco-Status of the Kuntwanazana River, Nqancule and Kudidwayo River can be classified as moderately to severely impacted with a few exceptions. A medium Ecological Importance and high Sensitivity (EIS) for the catchment. **The number of functional habitat types are medium and species diversity is high due to alien vegetation within the riparian zone causing unstable riverbanks, loss of marginal vegetation and erosion.** The aquatic species diversity is functioning in a poor condition when compared to the expected diversity with ideal habitats. Great improvement to the ecological class can be made if alien vegetation is removed and riparian zones are replanted.

It is therefore recommended that all management measures should aim to improve the health class in the long run to a Class B. It is expected that the construction activities proposed to take place at the site would have an impact on the site. Management actions are proposed to compromise for the loss of habitat upstream that habitat gain should be established downstream.

The construction of the dams all have the potential to further disturb the riparian vegetation and associated habitat. Impacts which potentially can occur are as follows:

- Disturbance of riparian zone
- Loss of riparian habitat
- Loss of species of special concern

a) Construction and Operation

| ISSUE: | IMPACT ON AQUATIC ECOLOGY/ BIODIVERSITY |
|---|---|
| **Project Phase** | **Construction and Operation** |
| **Impact** | **Disturbance of riparian zone, Loss of riparian habitat, Loss of species of SCC** |
| **Nature** | Negative (direct, indirect and cumulative) |
| **Extent** | Regional (2) |
| **Intensity** | Medium (2) |
| **Duration** | Medium Term (2) |
| **Consequence** | Medium (6) |
| **Probability** | Possible |

| ISSUE: | IMPACT ON AQUATIC ECOLOGY/ BIODIVERSITY |
|---|---|
| **Project Phase** | **Construction and Operation** |
| **Impact** | **Disturbance of riparian zone, Loss of riparian habitat, Loss of species of SCC** |
| **Degree to which impact cannot be reversed** | Medium |
| **Degree to which Impact may cause irreplaceable[14] loss of resources** | Low |
| **Confidence level** | High |
| **Significance Post Mitigation** | **Low (-ve)** |
| **Significance Post Mitigation** | **Very Low (-ve)** |
| **Degree of Mitigation** | Medium |

It will be the responsibility of the applicant to ensure that the control measures are implemented effectively to ensure that no further degradation of the receiving environment will take place. It is however the responsibility of the Local Municipality to ensure an improvement is done in the catchment as a whole. The applicant is only responsible for their activities and cannot be held liable for any other impacts that might occur from other water use activities. This will aid in improving their surrounding and receiving environment and help contribute to an improved health class for the aquatic ecosystem. Some of these management actions include the following aspects:

- Clear alien invasive plants from riparian zones.
- Replant riparian zones with endemic plant species
- Stabilize riverbanks.
- Control run-off that might occur to ensure that no wastewater or agricultural run-off enters the drainage line from the development; and
- It is recommended that Surface water monitoring needs to be done on a monthly basis during construction and on a bi-annual basis during operation for the first 2 years.
- It is recommended that an Aquatic Ecological Assessment be conducted on a bi-annual basis during construction and directly after construction has been completed.
- Monitor and control water use and abstraction to ensure that the ecological reserve is determined and maintained. It is the responsibility of the applicant to implement ecological releases downstream.

### 11.3.6 Pollution of Surface and Groundwater systems (nutrient input)

Once operational, the regular addition of fertilisers to the orchard areas will alter the chemical constituency of soils. Excess fertilisers could pollute ground and surface water.

The biggest issue facing the use of chemical fertilizers is groundwater contamination. Nitrogen fertilizers break down into nitrates and travel easily through the soil. Because it is water-soluble and can remain in groundwater for decades, the addition of more nitrogen over the years has an accumulative effect.
Optimum nutrient levels listed on soil test results represent the range at which plant growth is maximized. Nutrient levels that are above optimum do not improve plant growth. In addition, excessive nutrients can

[14] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

cause adverse effects on plant growth, increase the potential for environmental contamination due to leaching, and represents a waste of resources.

Superphosphate has a negative effect on free-living nitrogen-fixing bacteria, which may be favoured by "mild" fertilizers such as bone meal when added to stubble mulch or straw. Soil microbes and soil animals need mineral nutrients like plants do. Chemical fertilizer may help soil life, and soil life helps fertilizers and their availability for plants and microbes. Thus, cellulose-decomposing bacteria need phosphorus and calcium, but the availability of zinc and phosphorus depends on soil life. The efficiency of chemical fertilizers, however, decreases with decreasing soil life.

Using too much of fertilizers in the soil can alter the fertility of the soil by increasing the acid levels in the soil. Which is why it is recommended to get a soil test done at least once in every 3 years so that you can keep a track whether or not you are using the right amount of fertilizers. The levels of soil pH varies from 0-14, wherein 0 is considered to be the most acidic and 14 being the most basic. 7 is considered to be neutral. The ideal soil pH varies from plant to plant and can be altered by bringing in some changes.

Nitrogen-containing fertilizers can cause soil acidification when added. This may lead to decreases in nutrient availability which may be offset by liming.

| **ISSUE:** | **POLLUTION OF SURFACE AND GROUNDWATER SYSTEMS (NUTRIENT INPUT)** |
|---|---|
| **Project Phase** | **Operation** |
| **Impact** | **Contamination of soils, eutrophication etc.** |
| **Nature** | Negative (direct, indirect and cumulative) |
| **Extent** | Local (1) |
| **Intensity** | Medium (2) |
| **Duration** | Long Term (3) |
| **Consequence** | Medium (6) |
| **Probability** | Possible |
| **Degree to which impact cannot be reversed** | High |
| **Degree to which Impact may cause irreplaceable[15] loss of resources** | Medium |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **Medium (-ve)** |
| **Significance Post Mitigation** | **Low (-ve)** |
| **Degree of Mitigation** | Medium |

Essential Mitigation Measures:

[15] A resource for whicSh no reasonable substitute exists, such as Red Data species and their habitat requirements

- Fertilizers are to be applied responsibly in accordance with standard guidelines for the deciduous fruit industry and only when needed. Soil is of high quality in the area and therefore use of fertilizers should be low.
- Organic fertilizers are preferred.
- Consultation with ECDRDAR and the Elliot branch should be undertaken when the decision to utilise fertilizers is made.
- Storage of fertilizer to be at least 500m from any and all watercourses.
- Storage should be covered at all times and stormwater channeled away from the storage area is essential.
- Notification to adjacent landowners who utilise water resources upstream should be made aware of fertilizer use in order to obtain any early warning signs of contamination.

### 11.3.7 Economic Impact

The project will ultimately involve a large economic investment into the deciduous fruit industry of the Eastern Cape. The dams will allow for the significant increase in production which will allow for greater input into the South African market.

Employment opportunities during the construction period will be significant and it is likely that significant job opportunities will be created in the local communities for the construction of the dams. Furthermore, the dams will allow for the increase in production which may require an increase in labour force.

Key impacts associated with the project include:

- Economic Investment into the area
- Establishing the deciduous fruit industry in the Eastern Cape
- Establishing emerging farmers within the industry
- Job creation for the community

The provisional construction related costs of the dams themselves are the following:

| Farm | Dam No. | **Preliminary Construction Costs** |
|---|---|---|
| Macingwane | 1 | **R 5 479 569.00** |
| Tasana | 2 | **R 4 832 269.00** |
| Hope | 3 | **R 8 692 251.00** |
| Berg | 4 | **R 5 430 433.00** |
| Qwatsitolo/ Qwathi-Tolo 1 | 5 | **R 18 400 000.00** |
| Qwatsitolo/ Qwathi-Tolo 2 | 6 | **R 20 200 000.00** |
| Mgedezi | 7 | **R 29 300 000.00** |
| Paardekraal | 8 | **R 12 300 000.00** |
| Gubenxa Trust | 9 | **R 14 900 000.00** |
| Wadelands | 10 | **R 29 435 230.13** |
| Greenfields | 11 | **R 22 672 357.00** |
| Magoda | 13 | **R 12 052 717.15** |
| Qangule | 14 | **R 38 205 494.27** |

The dams alone have a construction value of approximately R 255 Million which would be a massive capital injection into the local area and local suppliers.

(a) Construction

| ISSUE: | ECONOMIC IMPACT |
|---|---|
| **Project Phase** | **Construction** |
| **Impact** | **Job Creation, Local Revenue** |
| **Nature** | Positive (Direct and Indirect) |
| **Extent** | Regional (2) |
| **Intensity** | Medium (2) |
| **Duration** | Medium Term (2) |
| **Consequence** | Medium (6) |
| **Probability** | Definite |
| **Degree to which impact cannot be reversed** | Low |
| **Degree to which Impact may cause irreplaceable[16] loss of resources** | N/A |
| **Confidence level** | High |
| **Significance Pre Mitigation** | **High (+ve)** |
| **Significance Post Mitigation** | N/A |

(b) Operation

Once the storage dam is complete, the reliability of water for irrigation during dry periods will increase crop productivity substantially, reduce crop losses significantly, and reduce times of uncertainty that result in economic and revenue losses which decrease the local farmers ability to operate as a sustainable commercial entity.

| ISSUE: | ECONOMIC IMPACT |
|---|---|
| **Project Phase** | **Operation** |
| **Impact** | **As above.** |
| **Nature** | Positive (Direct, Indirect and Cumulative) |
| **Extent** | Regional (2) |
| **Intensity** | High (3) |

[16] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

| ISSUE: | ECONOMIC IMPACT |
|---|---|
| **Project Phase** | **Operation** |
| **Impact** | **As above.** |
| **Duration** | Long Term (3) |
| **Consequence** | Very High (8) |
| **Probability** | Definite |
| **Degree to which impact cannot be reversed** | Low |
| **Degree to which Impact may cause irreplaceable[17] loss of resources** | N/A |
| **Confidence level** | High |
| **Significance Pre Mitigation** | **Very High (+ve)** |
| **Significance Post Mitigation** | N/A |

### 11.3.8 Heritage and Palaeontological Impacts

The main areas where impacts on heritage sites will occur are in two orchards. If the full extent of the orchards is used, then there will be a negative impact on historical buildings and middens. These buildings and middens probably date to at least 1913/1914 and are thus protected by the NHRA.

These features are not of such significance that they will prevent the expansion of the orchard; however, some form of mitigation is required, in addition to the permits.

| ISSUE: | HERITAGE IMPACTS |
|---|---|
| **Project Phase** | **Construction** |
| **IMPACT:** | **Palaeontological and Archaeological** |
| **Nature** | Negative (direct) |
| **Extent** | Site (1) |
| **Intensity** | Low (1) |
| **Duration** | Short Term (1) |
| **Consequence** | Very Low (3) |
| **Probability** | Definite |
| **Degree to which impact cannot be reversed** | High |
| **Degree to which Impact may cause irreplaceable[18] loss of resources** | High |

[17] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

[18] A resource for which no reasonable substitute exists, such as Red Data species and their habitat requirements

| ISSUE: | HERITAGE IMPACTS |
|---|---|
| **Project Phase** | **Construction** |
| **Confidence level** | High |
| **Significance Pre- Mitigation** | **Very Low (-ve)** |
| **Significance Post Mitigation** | **Very Low (-ve)** |
| **Degree of Mitigation** | High |

There are two options in the managements:

1. Create a 50m no-go buffer around each feature and the area is controlled against development.
2. Undertake mitigation and salvage the historical information before it is lost. This should be a staged approach.

The 50m buffer approach is the most practical; however, it is unlikely to be maintained if not regularly monitored/enforced. Irrigation pipes may also be excavated into the middens.

The next option is a staged approach of mitigation. The recommendation is that the following occurs once the grass is burnt or near the end of winter when it is less dense:

1. Each built feature is accurately recorded by means of at least digital photographs.
2. The area is surveyed for the locations of the middens. These are assessed and mapped. Limited test-pit excavations are undertaken to determine the significance of each midden.
3. The aim of the excavations would be to obtain a sample from each midden.

### 11.4 **Impact Assessment Summary**

The following table provides a summary of the impact assessment significance pre- and post- mitigation.

| No | ISSUE & ASPECT | PHASES | SIGNIFICANCE WITHOUT MITIGATION | SIGNIFICANCE WITH MITIGATION |
|---|---|---|---|---|
| **1** | **Terrestrial Impacts on Biodiversity** | | | |
| 1.1 | *Loss of Natural Vegetation, Reduced Habitat Quality, Restriction of Fauna utilising the area* | Construction | **Medium (-ve)** | **Low (-ve)** |
| 1.2 | *Creation of a favourable habitat for biodiversity* | Operation | **High (+ve)** | |
| **2** | **Impact on Soils** | | | |
| 2.1 | | Construction and Operation | **Medium (-ve)** | **Low (-ve)** |

| | | | | |
|---|---|---|---|---|
| **3** | **Ecological Water Requirements/ Water Quantity** | | | |
| 3.1 | *Reduction in Water Quantity in the Catchment/ Reserve* | Construction & Operation | **Low (-ve)** | **Low (-ve)** |
| **4** | **Impact on Wetlands** | | | |
| 4.1 | *Hydrology, EWR* | Planning | **Very Low (-ve)** | **Very Low (-ve)** |
| 4.2 | *Contamination of wetlands, Soil erosion, Sedimentation* | Construction | **Medium (-ve)** | **Low (-ve)** |
| 4.3 | *Soil erosion, Sedimentation, Invasive Alien Encroachment, Degradation of wetlands* | Operation | **Medium (-ve)** | **Low (-ve)** |
| **5** | **Impact on Aquatic Ecology/ Biodiversity** | | | |
| | *Disturbance of riparian zone, Loss of riparian habitat, Loss of species of SCC* | Construction & Operation | **Low (-ve)** | **Very Low (-ve)** |
| **6** | **Pollution of Surface and Groundwater Systems (nutrient input)** | | | |
| | *Contamination of soils, eutrophication etc.* | Operation | **Medium (-ve)** | **Low (-ve)** |
| **7** | **Economic Impacts** | | | |
| 7.1 | *Job Creation, Local Revenue* | Construction | **High (+ve)** | |
| 7.2 | *Job Creation, Local Revenue* | Operation | **Very High (+ve)** | |
| **8** | **Heritage and Palaeontological Impacts** | | | |
| 8.1 | | Construction | **Very Low (-ve)** | **Very Low (-ve)** |

The above table summarises the impact assessment conducted in Section 11. It can be seen that all high and medium negative impacts can be reduced to at worst Medium and Low negative impacts with mitigation.

The essential mitigation measures are focused around the following key areas of intervention:

1. Clearing of vegetation is restricted to the development footprint
2. Disturbance to watercourses should be monitored and restricted to immediate area where possible
3. EWR releases are vital to ensure sustainability within the catchments
4. Ensuring erosion protection measures are put in place at all vulnerable locations (steep slopes,

5. watercourse crossings).
6. Spoil and stockpiling management should be restricted to specific area
7. Invasive Alien Plant management should be long term and continuous
8. Fertilizer use should be monitored and carefully managed particularly in areas where watercourses exist.

None of the anticipated negative impacts can be reduced in significance and therefore there are no fatal flaws associated with the development of the project.

Three positive impacts were Job Creation (Economic Impact), Local Revenue (Economic Impact) and the creation of a habitat that will increase biodiversity (Terrestrial Impact on Biodiversity) which were assessed to be of High to Very High Positive Significance. These are considered key impacts which are critical in motivating the sustainability of the project.

## 12 ASSUMPTIONS AND KNOWLEDGE GAPS

The following assumptions and knowledge gaps have an influence on the assessment of the impacts in the EIA:

- The assessment assumes that the findings of the specialist studies undertaken for this development proposal are factually correct.

- In addition, any sensitive heritage resources that are subsurface which will only be discovered once excavations commence and are reported to the appropriate authority and will be treated in accordance of their advice.

# 13 ENVIRONMENTAL IMPACT STATEMENT

## 13.1 **Motivation for the Need and Desirability of the Proposed Activity**

The Eastern Cape agricultural sector has identified an area in the cold northern part of the province where deciduous fruit is grown, with the hope of employing thousands of workers in the next few years. The area, Gubenxa Valley, is 1419m above sea level – which is ideal for fruit farming – and is situated between Elliot and Ugie.

According to Census of Commercial Agriculture 2020, "the total income for commercial agriculture industry in 2017 was R27.0 billion, which was 380% higher than R5.6 billion recorded for 2007. In 2017, the major contributor to total income was farming of animals (R15.0 billion or 55.6%), followed by **horticulture** (R6,1 billion or 22.7%)". The StatsSA 2020 Report on Commercial Agriculture depicts a sad reality that 65% smallholder producers contribute about 7% into provincial GDP and only about 12% of jobs, while 5.7% large commercial farmers contributes 62 % in GDP and 50% of jobs. Sarah Baartman has the largest provincial share in terms of number of commercial farms at 38.8%, generating 47.5% income and 55.5% employment. **This is followed by Chris Hani with 21.4% farms, generating 12.6% income and 14.4% employment.** In third position is Nelson Mandela Bay with 14.1% farms, generating 14.1% income and 3.2 % employment; Amathole with 10.7% farms, generating 8.8% income and 14.4% employment; and Alfred with 1,4% farms, generating 1.0% income and 1.1 % employment.

The role of smallholder producers contributing to local revenue generation, skills development and job creation is significant in rural areas that are relatively isolated from large cities and towns.

The "Boompie Project" case study is an important success story to add onto this providing further motivation as to the importance of providing previously disadvantaged farmers an opportunity be a key role player in the industry while ensuring the sustainable production of products is achieved in order to sustain local livelihoods.

The landowners involved in this project own the land themselves and hold title deeds and therefore any risk surrounding land security is low. In addition, the local farmers are significantly supported by the Eastern Cape Department of Rural Development and Agrarian Reform that has an office in Elliot. The farmers are part of the Gubenxa Valley Co-Operative and a pilot project run by Mr Lundi Kama of Gubenxa Valley in Elliot of which 1 700 apple trees were planted in 2017 has been successful.

Qualified and experienced Engineers, Hydrologists and Geotechnical professionals have been appointed to assist ECDRDAR in the design of the dams. This provides further motivation regarding the sustainability and safety of the dams that are proposed to be constructed.

A large portion of the orchards are existing lands that were previously cultivated and have been used or slightly increased. A small proportion of the proposed orchards are virgin lands.

The dam sites are located on properties owned by the farmers and adjacent and downstream landowners are majority owned by the same individuals or families.

## 13.2 **Municipal Planning Policy**

Being recognised in the local municipality's IDP and in line with the Spatial Development Framework, it must be concluded that the project is not in conflict with the municipality's vision and planning for the study area.

### 13.2.1 EAP's Opinion on Authorisation of the Activity

In the absence of proposed mitigation the key outstanding issues mentioned above could result in serious natural and socio-economic environmental degradation as reflected in the medium negative impacts. This being said, the mitigation measures recommended in Chapter 11 are adequate to ensure that all negative impacts are neutralised in some instances and reduced in others. It is therefore the opinion of the EAP that the development should be authorised to proceed. The positive impacts will be beneficial and enhance the sustainability of the project.

### 13.2.2 Preferred Alternative

This assessment has concluded that the preferred alternative (being the only alternative presented) as is proposed in the site development plan (Appendix C) is the preferred alternative and that the development proceed in accordance with the planned phases.

### 13.2.3 Recommendations

The following conditions should be included in the environmental authorisation:

- The Water Use Licence must be obtained from the DWS.
- All Dam Safety related approvals to be in place through DWS
- A suitability qualified professional should be appointed to undertake the hydraulic modelling of the control point and the associated setup of the site's operational framework with regards to the implementation of the EWRs.
- Surface water monitoring should continue during the construction and post construction phases and once when rehabilitation activities have been completed. Thereafter, it can be conducted on a quarterly basis.
- A Wetland Rehabilitation Plan compiled bu an aquatic ecologist would significantly contribute to restoring the wetlands in the area whilst addressing the significant invasion of alien invasive vegetation that is currently occuring within the area.
- At the Gubenxa Trust dam according to the proposed dam wall location and the preliminary flooding footprint received it is advised that the existing soil dam be rehabilitated and utilised for wetland offset.
- At the Paardekraal Dam addition wetland habitat should be established on the edges of the dam to ensure less impact on the habitat of the Grey crowned cranes which forage in the area.

- The 50m prescribed buffer zone should be implemented to ensure that the negative edge effects associated with possible future development and agricultural activities do not negatively influence the ecological integrity and continued functioning of the wetlands.
- In terms of Heritage, a 50m no-go buffer around each feature and the area is applied and salvage the historical information before it is lost. This should be a staged approach.
- Should the 50m buffer around heritage features not be possible each built feature should be accurately recorded by means of at least digital photographs and the area is surveyed for the locations of the middens. These are to be assessed and mapped and the relevant SAHRA permit applied for.
- A flora search and rescue should be undertaken to remove any flora that could be used for rehabilitation prior to the construction period.
- All dam sites should be surveyed for any potential bird nesting sites prior to disturbance.
- All permits must be obtained in terms of the Provincial Nature Conservation Ordinance should there be any disturbance to a protected or threatened and endangered species
- As a pre-requisite, the Environmental Management Programme should be implemented to govern construction activities and the operational activities. The EMP should, at the least, include the following points and/or the mitigation measure prescribed in Chapter 11 and should be completed with DEDEATs recommendations and conditions of approval.
- A suitably qualified person with experience in large scale residential construction projects is to be employed as Environmental Control Officer and is to oversee the activities associated with construction, audit these activities and provide the Competent Authorities with audit reports.

## 14 CONCLUSIONS AND WAY FORWARD

This report details the findings of the Scoping and Environmental Impact Assessment process for the proposed construction of 13 dams and associated orchards to accommodate the development of deciduous fruit production on several farms part of the Gubenxa Valley Trust in the Gubenxa Valley area in line with the site development plans included in Appendix C.

No fatal flaws were identified that should prevent the project from gaining approval in terms of the 2014 EIA Regulations, as amended, as promulgated under the National Environmental Management Act, Act 107 of 1998. Various recommendations have been stipulated which should be met prior to construction commencing.

All registered IAP's will be given the opportunity to comment on this draft EIAR for a 30 day comment period.

This draft EIA Report will be amended with comment and the final is to be submitted to DEDEAT for their review, evaluation and response regarding the application for environmental authorisation.

Once an environmental authorisation is issued, all registered IAPs will be notified and the appeal process will be outlined accordingly

Electronic copies of this draft EIA Report are available from the Indwe Environmental Consulting CC website:- www.indwecon.co.za

Indwe Environmental Consulting
2 Ayr Place
Bonnie Doon
East London
5247
Tel: 043 555 0656
Fax: 086 513 9734
Email: megan@indwecon.co.za

## 15 REFERENCES


Desmet & Hawley 2020. Eastern Cape Biodiversity Plan 2019: Technical Notes

ECBCP (2019) Eastern Cape Biodiversity Conservation Plan Handbook. Department of Economic Development and Environmental Affairs (King Williams Town). Compiled by G. Hawley, P. Desmet and D. Berliner.

Hortgro. 2020. Key Deciduous Fruit Statistics 2020. Hortgro Services, Paarl.

ORLOFF A (2006) Soil Moisture Monitoring. How and why? In a Nutshell May/June 2006, SAMAC [see http://www.samac.org.za].

The National Agricultural Marketing Council and Commark Trust. Sub-sector study- Deciduous Fruit

Noar, S.M. (2006). A 10-year retrospective of research in health mass media campaigns: where do we go from here? Journal of Health Communication, 11, 1-22.

Rieger, Mark. (2007). Introduction to Fruit Crops. Ciencia e Investigación Agraria. 34. 53. 10.7764/rcia.v34i1.384.

Sikuka, W. 2017. South Africa- Republic of Fresh Deciduous Fruit Semi Annual Update on the South African Deciduous Fruit Supply and Demand

Taylor, N.J., Annandale, J.G., Vahrmeijer, J.T. and Gush, M.B. 2014. Understanding the dynamics of citrus water use. In: ISHS Acta Horticulturae 1058: X International Symposium on Integrating Canopy, Rootstock and Environmental Physiology in Orchard Systems, Stellenbosch, 3-6 December 2012

Taylor, N.J. and Gush, M.B. 2014. The water use of selected fruit tree orchards (Volume 1): Review of available knowledge. WRC REPORT NO. 1770/1/14 ISBN 978-1-4312-0574-5

Troskie, D. 2014. The value of working together: A case study of the Deciduous Fruit Industry. Elsenburg Journal. Volume 11 No 1, 2014.

Sakhisizwe Integrated Development Plan 2021/ 2022

South African National Biodiversity Institute (2006- 2018). The vegetation map of South Africa, Lesotho and Swasiland, Mucina, L., Rutherford, M.C. and Powrie, L.W. (Editors).

## APPENDIX A:

## SCOPING ACCEPTANCE

## APPENDIX B:

## ENVIRONMENTAL MANAGEMENT PROGRAMME

## APPENDIX C:

## SITE DEVELOPMENT PLAN

C1- GENERAL LOCALITY
C2- GROUPING 1 DAMS LOCALITY
C3- GROUPING 2 DAMS LOCALITY
C4- GROUPING 3 DAMS LOCALITY
C5- MACINGWANE DAM LAYOUT
C6- TASANA DAM LAYOUT
C7- HOPE DAM LAYOUT
C8- BERG DAM LAYOUT
C9- QWATSITOLO/ QWATHI-TOLO 1 DAM LAYOUT
C10- QWATSITOLO/ QWATHI-TOLO 2 DAM LAYOUT
C11- MGEDEZI DAM LAYOUT
C12- PAARDEKRAAL DAM LAYOUT
C13- GUBENXA TRUST DAM LAYOUT
C14- WADELANDS DAM LAYOUT
C15- GREENFIELDS DAM LAYOUT
C16- MAGODA DAM LAYOUT
C17- QANGULE  DAM LAYOUT

# C1- GENERAL LOCALITY

# C2- GROUPING 1 DAMS LOCALITY

# C3- GROUPING 2 DAMS LOCALITY

C4- GROUPING 3 DAMS LOCALITY

# C5- MACINGWANE DAM LAYOUT

# C6- TASANA DAM LAYOUT

# C7- HOPE DAM LAYOUT

# C8- BERG DAM LAYOUT

# C9- QWATSITOLO/ QWATHI-TOLO 1 DAM LAYOUT

# C10- QWATSITOLO/ QWATHI-TOLO 2 DAM LAYOUT

# C11- MGEDEZI DAM LAYOUT

# C12- PAARDEKRAAL DAM LAYOUT

# C13- GUBENXA TRUST DAM LAYOUT

# C14- WADELANDS DAM LAYOUT

# C15- GREENFIELDS DAM LAYOUT

# C16- MAGODA DAM LAYOUT

C17- QANGULE  DAM LAYOUT

**APPENDIX D:**

**SPECIALIST REPORTS**

D1- TERRESTRIAL BIODIVERSITY ASSESSMENT
D2- HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED DAMS AND ORCHARDS
D3- AQUATIC ECOLOGICAL ASSESSMENT
D4- RAPID ECOLOGICAL RESERVE DETERMINATION
D5- WETLAND ASSESSMENT REPORT
D6- PRELIMINARY DESIGN REPORT FOR MACINGWANE, TASANA, HOPE & BERG INCL. YIELD ANALYSIS REPORT
D7- PRELIMINARY DESIGN REPORT FOR QWATHI-TOLO 1, QWATHI- TOLO 2, MGEDEZI, PAARDEKRAAL, GUBENXA TRUST
D8- PRELIMINARY DESIGN REPORT FOR WADELANDS, GREENFIELDS, EENSAAM (NO LONGER INCLUDED IN PROJECT), MAGODA QANGULE INCL HYDROLOGY & YIELD ANALYSIS REPORT

# D1- TERRESTRIAL BIODIVERSITY ASSESSMENT

# D2- HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED DAMS AND ORCHARDS

# D3- AQUATIC ECOLOGICAL ASSESSMENT

# D4- RAPID ECOLOGICAL RESERVE DETERMINATION

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D8- PRELIMINARY DESIGN REPORT FOR WADELANDS, GREENFIELDS, EENSAAM (NO LONGER INCLUDED IN PROJECT), MAGODA QANGULE INCL HYDROLOGY & YIELD ANALYSIS REPORT

## APPENDIX E:

## I&AP REGISTER

## APPENDIX F:

## COMMENTS AND RESPONSE REPORT

## APPENDIX G:

## I&AP CORRESPONDENCE

## APPENDIX H:

## EAP DECLARATION