**ANNEXURE M:**

*Access Agreement*

[EXECUTION VERSION]

# SERVITUDE OF RIGHT OF WAY

granted by

## THE TRUSTEES OF MERCEDES TRUST

to

## SANWIL INVESTMENTS (PTY) LIMITED

and

## HARK PROPERTIES (PTY) LTD

raubenheimers Attorneys

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# INDEX
# SERVITUDE OF RIGHT OF WAY



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# SERVITUDE OF RIGHT OF WAY

## 1 PARTIES

1.1 The parties to this agreement are -

1.1.1 the trustees of Mercedes Trust;

1.1.2 Sanwil Investments (Pty) Ltd; and

1.1.3 Hark Properties (Pty) Limited.

1.2 The parties agree as set out below.

## 2 INTERPRETATION

2.1 In this agreement, unless inconsistent with or otherwise indicated by the context –

2.1.1 **"the/this agreement"** means this document, including the appendices to this document;

2.1.2 **"the dominant tenements"** means portion 4 and portion 139;

2.1.3 **"the effective date"** means the date on which this agreement is signed by the party signing last in time;

2.1.4 **"the grantees"** means Sanwil in respect of portion 4 and Hark in respect of portion 139;

2.1.5 **"the grantor"** means the trustees for the time being of Mercedes Trust, T698/1992, being the registered owner of the servient tenement;

2.1.6 **"Hark"** means Hark Properties (Pty) Ltd registration number 2011/13404/07;

2.1.7 **"the locality plan"** means the plan annexed to this agreement as Annexure A indicating the servitude;

2.1.8 **"the parties"** means all the parties to this agreement;

2.1.9 **"portion 139"** means portion 139 of the farm Gwaing 208, George, owned by Hark;

2.1.10 **"portion 34"** means portion 34 of the farm Gwaing 208, George, owned by Airports Co Ltd registration number 1993/00414/06;



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2.1.11 "**portion 4**" means portion 4 of the farm Gwaing 208, George, owned by Sanwil;

2.1.12 "**Sanwil**" means Sanwil Investments (Pty) Ltd registration number 2021/570526/07;

2.1.13 "**the servient tenement**" or "**portion 129**" means portion 129 of the farm Gwaing No 208, George, owned by the grantor;

2.1.14 "**the servitude**" means means the servitude right of way depicted in red on Annexure A, stretching from the future underpass below the future Western Bypass (N2) indicated on Annexure A up to the Western boundary of portion 4;

2.1.15 "**the servitude area**" means the area over which the servitude road stretches as depicted on the layout plan;

2.1.16 "**the signature date**" means the date of signature of this agreement by the last party signing;

2.1.17 any reference to the singular includes the plural and *vice versa*;

2.1.18 any reference to natural persons includes legal persons and *vice versa*;

2.1.19 any reference to a gender includes the other genders.

2.2 The clause headings in this agreement have been inserted for convenience only and shall not be taken into account in its interpretation.

2.3 Words and expressions defined in any sub-clause shall, for the purposes of the clause of which that sub-clause forms part, bear the meaning assigned to such words and expressions in that sub-clause.

2.4 If any provision in a definition is a substantive provision conferring rights or imposing obligations on any party, effect shall be given to it as if it were a substantive clause in the body of the agreement, notwithstanding that it is only contained in the interpretation clause.

2.5 If any period is referred to in this agreement by way of reference to a number of days, the days shall be reckoned exclusively of the first and inclusively of the last day unless the last day falls on a day which is not a business day (being a day other than a Saturday, Sunday or South African public holiday), in which case the last day shall be the next succeeding business day.

2.6 This agreement shall be governed by and construed and interpreted in accordance with the law of the Republic of South Africa.



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## 3 INTRODUCTION

3.1 The parties are adjoining landowners.

3.2 The grantees require access over the servient tenement to the dominant tenements.

3.3 The grantor, as owner of the servient tenement, is prepared to grant to the grantees a right of way for a road over the servient tenement to the dominant tenements.

3.4 The 3 (three) owners of portions 4, 129 and 139 all require a right of way over portion 34 to provide access to their said properties.

3.5 The parties acknowledge that the future western bypass referred to in clause 2.1.14 will change the nature of access to the subject properties for each of the parties, and this agreement will contribute to ensuring the Western Cape Government that their efforts and financial undertaking to secure the access from the R404 over Portion 34 (referred to in clause 4.2) to these properties will then serve all the properties jointly.

## 4 GRANT OF SERVITUDE

4.1 The grantor, as owner of the servient tenement, hereby as from the date of fulfilment of the suspensive condition referred to in clause 5 gives and grants unto and in favour of the grantees, as owners of the dominant tenements, in perpetuity, a praedial servitude of right of way over the servient tenement for a road along the servitude area on the terms and conditions set out in this agreement, and the grantees hereby acknowledge and accept the aforesaid servitude.

4.2 The servitude shall run parallel to the future western boundary of portion 129. Depending on construction and maintenance considerations, the width of the servitude area shall at no place exceed 10 (ten) meters and the road width shall not exceed 5 (five) meters.

4.3 It is recorded that –

4.3.1 portions 4, 129 and 139 all require a right of way access over portion 34 for access to the respective properties;

4.3.2 the access road over portion 34 consists of two portions namely the portion stretching from road R404 over portion 34 up to the western boundary of portion 129 and a portion of the road stretching from the western boundary of portion 129 to the southern boundary of portion 4;



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4.3.3 the owner of portion 129 gains access to portion 129 over portion 34 with the consent of the owner of portion 34, but without a servitude of right of way being registered over portion 34 in favour of portion 129;

4.3.4 the grantor is agreeable to allowing the grantees, with the consent of the owner of portion 34, to also use the road over portion 34 used by it for access to its quarry on erf 129, to the extent required by the grantees.

## 5 SUSPENSIVE CONDITION

The granting of the servitude referred to in clause 4.1 is subject to the suspensive condition that the owner of portion 34 shall grant to the grantor a right of way over portion 34 to the servient tenement on the basis that the owners of the dominant tenements shall equally have access over portion 34 to the dominant tenements.

## 6 COMPENSATION

No amount shall be payable by the grantee to the grantor for the servitude provided for in terms of this agreement.

## 7 INDEMNITY

The grantor shall not be liable to the grantees or any third party for any damages whatsoever and howsoever arising which may arise from the use of the servitude road, or for any damages arising out of injuries which may be sustained by any third party, and the grantees hereby indemnify the grantor against all and any such claims and liability, including the costs to defend or settle any such claims : Provided that the grantees shall not be liable for any loss or damage caused by the grantor or any person in respect of whom the grantor has vicarious liability.

## 8 REGISTRATION

8.1 The servitude shall be registered in general terms : Provided that should the servitude area be surveyed, the servitude shall be registered in accordance with the Surveyor-General approved diagrams.

8.2 The parties shall, immediately after the effective date, sign all documents and do all things necessary to procure registration of the provisions of this agreement against the title deeds of the servient tenement and that of the dominant tenements.



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8.3 The registration referred to in clause 8.1 shall be carried out by Raubenheimers Inc attorneys of George and the land surveying work concerned shall be carried out by the land surveyors appointed by the grantees, subject to the grantor's approval.

8.4 The parties shall, when called upon by the other of them or its representative to do so, hand over the title deed and diagrams relating to its property concerned and assist the other party in obtaining such other documents or consents as may be necessary to attain registration of the terms of this agreement in the Deeds Registry.

8.5 The costs arising from and in connection with the registration contemplated in clause 8.1 shall be borne by the grantees.

## 9 PARTIES' GENERAL RIGHTS AND OBLIGATIONS

9.1 The grantees shall be entitled to use the existing road(s) over the servitude area and to the extent that it may be necessary that the servitude road be built, the grantees shall construct the road after consultation with the grantor and bear the costs in respect thereof.

9.2 The grantees shall, in using the servitude road, comply with the following conditions:

9.2.1 Portion 4 shall use the servitude road for purposes of constructing the wastewater treatment works to be established on the remainder of portion 4 and thereafter only for operational purposes to service and maintain the utility services established on the remainder of portion 4;

9.2.2 In respect of portion 139 the servitude road may only be used for agricultural purposes.

9.2.3 The use of the servitude road may not negatively impact on the quarrying operations performed on portion 129.

9.2.4 The road required to be built by the grantees over the servitude area must be such that it provides to the grantor access to the northwest corner of the quarry on the servient tenement.

9.2.5 For the avoidance of doubt, it is provided that the use of the servitude road and the vehicles and traffic concerned may not interfere with the traffic and/or the operation of the quarry on the servient tenement.

9.2.6 The grantees must at all times observe the grantor's access control arrangements in respect of the servient tenement and in particular will not be allowed access between the hours 17:00 to 07:00 of the



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next day daily and on Saturdays and Sundays unless authorised thereto by the grantor.

9.3 The grantees undertake that they will not object against the statutory allowed mining activities conducted on the servient tenement and nor will they object to any application for the renewal of any mining license or authorisation in respect of the quarry on the servient tenement.

## 10 CO-OPERATION

10.1 The parties undertake to sign all documents and to do all such other things as shall be necessary or requisite to give proper and due effect to the terms of this agreement or any matter arising therefrom according to its intent and purposes.

10.2 Either party ("**the non-defaulting party**") may at any time carry out any of the other party's ("**the default party**") obligations in terms of this agreement which the defaulting party has failed to carry out within a reasonable time after being required by the non-defaulting party to do so, and the non-defaulting party may at its sole discretion exercise such right in addition to or instead of (but without prejudice to) any other right which it may have in terms hereof and the defaulting party shall pay to the non-defaulting party on demand all costs and expenses incurred by the non-defaulting party in carrying out the defaulting party's neglected obligations.

10.3 The defaulting party hereby authorises the non-defaulting party with power of substitution to sign all the necessary documents on its behalf to give effect to the non-defaulting party's power in terms of clause 10.2.

10.4 Notwithstanding any other provisions of this agreement, the parties shall cooperate with one another to procure a servitude right of way over portion 34 in order to serve both portion 129 and the dominant tenements.

## 11 ARBITRATION

11.1 Should any dispute (other than a dispute in respect of which urgent relief may be obtained from a court of competent jurisdiction) arise between the parties in the widest sense in connection with -

11.1.1 the formation or existence of;

11.1.2 the carrying into effect of;

11.1.3 the interpretation or application of the provisions of;



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11.1.4 the parties' respective rights and obligations in terms of or arising out of;

11.1.5 the validity, enforceability or rectification of; or

11.1.6 any documents furnished by the parties pursuant to the provisions of this agreement,

that dispute shall, unless resolved amongst the parties, be referred to and be determined by arbitration in terms of this clause 10, provided that a party to the dispute has demanded the arbitration by written notice to the other party.

11.2 The arbitration shall be held -

11.2.1 at George;

11.2.2 with only the representatives and legal representatives of the parties to the dispute present thereat;

11.2.3 otherwise in terms of the Arbitration Act, No 42 of 1965, it being the intention that the arbitration shall be held and completed within 30 (thirty) days after it was demanded.

11.3 The arbitrator shall be, if the matter in dispute is principally -

11.3.1 a legal matter, a practicing advocate or attorney of at least 10 (ten) years' standing;

11.3.2 any other matter, any independent person, agreed upon between the parties.

11.4 Should the parties fail to agree whether the dispute is principally a legal or other matter within 7 (seven) days after the arbitration was demanded, the matter shall be deemed to be a legal matter.

11.5 Should the parties fail to agree on an arbitrator within 7 (seven) days after the expiry of the period referred to in clause 11.4, the arbitrator shall be appointed at the request of any party to the dispute by the Chairperson of the South Cape Society of Advocates.

11.6 The decision of the arbitrator shall be final and binding on the parties and may be made an order of any competent court at the instance of any of the parties to the dispute.

11.7 The parties hereby consent to the jurisdiction of the Cape Provincial Division of the High Court of South Africa Eastern Circuit Local Division in respect of any proceedings arising out of this agreement not subject to arbitration in terms of this clause.



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11.8 The provisions of this clause -

11.8.1 constitute an irrevocable consent by the parties to any proceedings in terms hereof and no party shall be entitled to withdraw therefrom or claim at any such proceedings that it is not bound by such provisions;

11.8.2 are severable from the rest of this agreement and shall remain in effect despite the termination of or invalidity for any reason of this agreement.

11.9 This clause shall not preclude any party from obtaining relief by way of motion proceedings on an urgent basis or from instituting any interdict, injunction or any similar proceedings in any court of competent jurisdiction pending the decision of the arbitrator.

## 12 BREACH

12.1 Should either party ("**the party in default**") breach any term, condition, undertaking or warranty contained in this agreement and fail to remedy such breach within 10 (ten) days (or such reasonable longer period as may be necessary) after receipt of a written notice from the other of them ("**the innocent party**"), requiring such breach to be remedied, then, without prejudice to any other rights that it may have in terms of this agreement, the innocent party shall be entitled to forthwith institute legal proceedings for specific performance and to claim damages from the party in default.

12.2 Save for the provisions of clause 6.2, no party shall be entitled to terminate this agreement and the parties' remedies shall be restricted to the remedies provided for under clause 12.1 or as stated elsewhere in this agreement.

## 13 NOTICES AND DOMICILIA

13.1 The parties choose as their *domicilia citandi et executandi* their respective addresses set out in this clause for all purposes arising out of or in connection with this agreement at which addresses all processes and notices arising out of or in connection with this agreement, its breach or termination may validly be served upon or delivered to the parties.

13.2 For purposes of this agreement the parties' respective addresses shall be –

13.2.1 Grantor at Herbie Oosthuizen & Associate, 71 Montagu Street
Mossel Bay 6500
e-mail: geraldine@holaw.co.za



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13.2.2 Grantees at c/o Sanwil Investments (Pty) Ltd, Infrastructure Consulting Engineers CC, Crestway Office Park, Block D, 1st Floor, Hotel Street, Persequor Park, Pretoria
e-mail : debruyn@iceisp.co.za,

or at such other address of which the party concerned may notify the other/s in writing provided that no street address mentioned in this sub-clause shall be changed to a post office box or poste restante.

13.3 Any notice given in terms of this agreement shall be in writing and shall -

13.3.1 if delivered by hand be deemed to have been duly received by the addressee on the date of delivery;

13.3.2 if transmitted by e-mail be deemed to have been received by the addressee on the day following the date of dispatch,

unless the contrary is proved.

13.4 Notwithstanding anything to the contrary contained or implied in this agreement, a written notice or communication actually received by one of the parties from another including by way of facsimile transmission shall be adequate written notice or communication to such party.

## 14 WHOLE AGREEMENT

This agreement constitutes the whole agreement between the parties as to the subject matter hereof and no agreements, representations or warranties between the parties other than those set out herein are binding on the parties.

## 15 VARIATION

No addition to or variation, consensual cancellation or novation of this agreement and no waiver of any right arising from this agreement or its breach or termination shall be of any force or effect unless reduced to writing and signed by all the parties or their duly authorised representatives.

## 16 SUCCESSORS-IN-TITLE

16.1 This agreement binds the parties' successors-in-title and assigns and the parties warrant that they will inform their successors-in-title and assigns of the provisions of this agreement.

16.2 All references in this agreement to the grantees shall for all purposes be deemed to include the grantees' successors-in-title and assigns and bind the owners from time to time of the dominant tenement.



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## 17 SUPERSESSION

17.1 This document supersedes and replaces any agreements regarding the subject matter hereof previously entered into by the parties prior to the signing of this agreement.

17.2 This agreement shall for all purposes be deemed to have taken effect on the signature date (as defined in clause 2.1.18) and no agreement shall be binding unless signed by the parties.

17.3 The provisions of this clause 17 shall endure notwithstanding the termination of this agreement.

## 18 COSTS

18.1 Each party shall bear its own legal costs in connection with the drafting of this agreement and all attendance in connection therewith.

18.2 The grantees shall bear the costs of the registration of the servitude in the Deeds Registry.

| NAME | HEREIN REPRESENTED BY THE UNDERMENTIONED SIGNATORIES, WHO WARRANT THAT THEY HAVE BEEN DULY AUTHORISED THERETO | DATE | PLACE | SIGNATURE |
|---|---|---|---|---|
| The Trustees of Mercedes Trust | Werner | 4/6/2025 | George | |
| Sanwil Investments (Pty) Limited | Jacob Daniël De Bruyn Joubert | 08/07/2025 | Pretoria | |
| Hark Properties (Pty) Ltd | J D Wheeler | 07/07/2025 | Johannesburg | |



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**ANNEXURE A**

# THE LOCALITY PLAN

**(Clause 2.1.7)**



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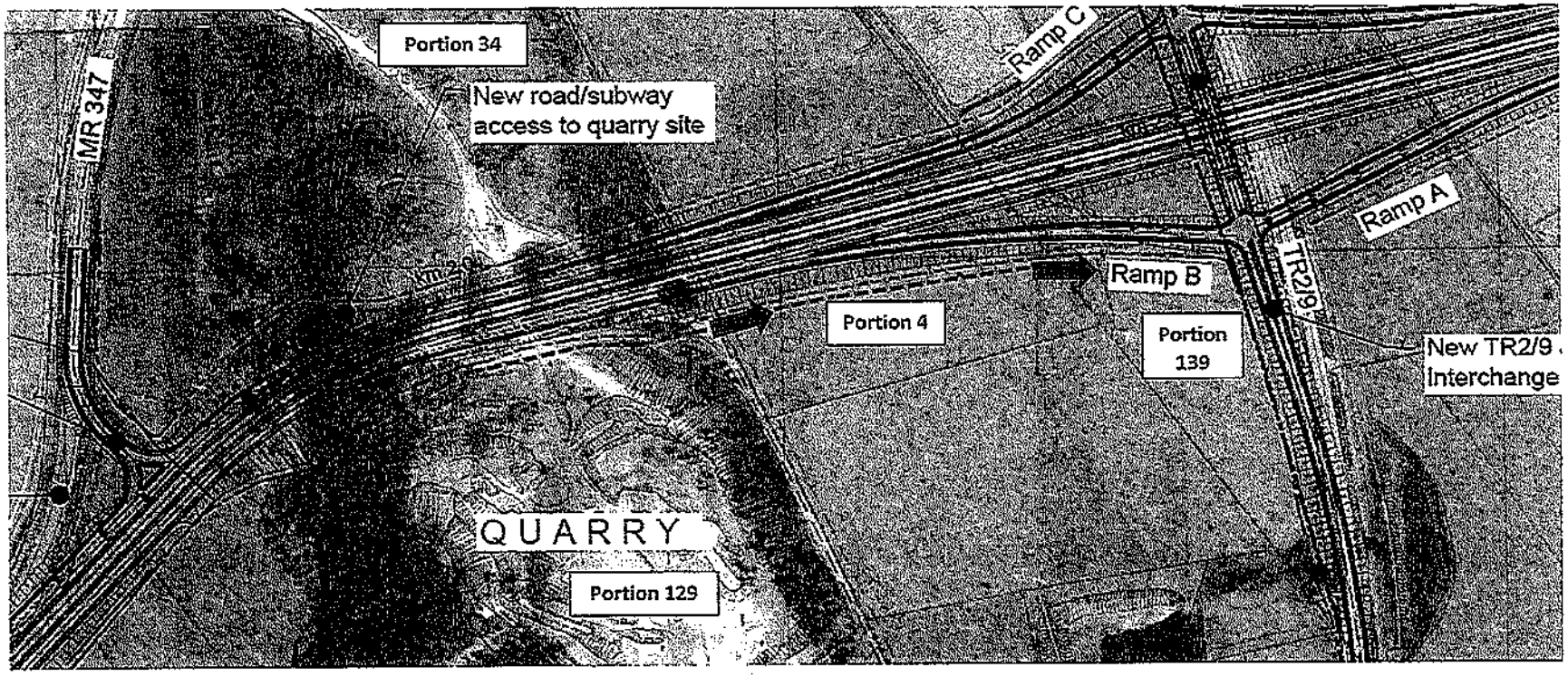
## Access with Western Bypass

**Layout showing proposed access after construction of the Western Bypass to Portions 4 and 139 over Portions 34 and 129 of farm 208, George. This uses the existing quarry access off the R404.**




---- Servitude road to be established adjacent or close-to the future Western Bypass boundary to the East of the road reserve. This will utilise the quarry access from the R404, to be formalised through the implementation of the Western Bypass.

**ANNEXURE N:**

*Biodiversity Statement*

# Appendix G5: Terrestrial Biodiversity Assessment

**DECLARATION OF THE SPECIALIST**

**Note:** Duplicate this section where there is more than one specialist.

I, Marietjie Landman, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

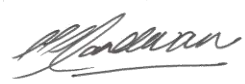
- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - ~~am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.



30 May 2025

Signature of the Specialist: Date:

na

Name of company (if applicable):

# TERRESTRIAL BIODIVERSITY, PLANT SPECIES AND ANIMAL SPECIES ASSESSMENT

## LIGHT INDUSTRIAL DEVELOPMENT ON THE REMAINDER OF PORTION 110 OF GWAYANG 208, GEORGE LOCAL MUNICIPALITY, WESTERN CAPE

**Prepared by** Drs Marietjie Landman and B. Adriaan Grobler
Summerstrand • Gqeberha
Email: mlandman@mandela.ac.za; adriaan.grobler85@gmail.com

**Prepared for** Mr Michael Elston
Bodorp • George
Email: md.elston@gmail.com

**March 2025**

Draft Report V2

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## APPENDICES

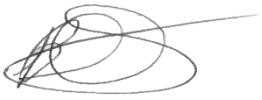
## REPORT DETAILS

Marietjie Landman and Adriaan Grobler are independent consultants with no business, financial, personal, or other interest in the proposed project beyond fair remuneration for work performed in connection with the project. There are no circumstances that compromise their objectivity in performing this work.

This terrestrial biodiversity, plant and animal species assessment was prepared in compliance with the protocols for specialist assessments and minimum report content requirements for environmental impacts on terrestrial biodiversity[1] and plant and animal species[2] in terms of the National Environmental Management Act (1998, as amended).

The report is prepared exclusively for M Elston and is subject to all confidentiality, copyright, and intellectual property law of South Africa.

**Dr Marietjie Landman**
Qualifications: BSc Hons (Zoology), PhD (Ecology)
Experience: 19 years as a consulting ecologist (abridged *Curriculum Vitae* in Appendix 1).
Registered Professional Natural Scientist (No 147461)



**Dr B. Adriaan Grobler**
Qualifications: BSc Hons (Botany), PhD (Ecology)
Experience: 13 years as a consulting plant ecologist (abridged *Curriculum Vitae* in Appendix 1).
Registered Professional Natural Scientist (No 135960) , Certified Ecological Restoration Practitioner (No 0851)

[1] Published in Government Notice 320 in Government Gazette 43110 of 20 March 2020.
[2] Published in Government Notice 1150 in Government Gazette 43855 of 30 October 2020.

**COMPLIANCE WITH THE PROTOCOLS (AS AMENDED) FOR SPECIALIST ASSESSMENTS AND MINIMUM REPORT CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY, PLANT SPECIES AND ANIMAL SPECIES.**

| | |
|---|---|
| Details of the scientists that prepared the report. | Appendix 4 |
| A confirmation that the site is of "low" sensitivity for terrestrial biodiversity, plant species and animal species. | Sections 3.4, 4.4 |
| An indication of whether or not the proposed development will have an impact on sensitive terrestrial biodiversity, or plant species and animal species of conservation concern. | Sections 3.4, 4.4 |
| A description of the duration, date and season of the site investigation, and the relevance of the season to the outcome of the assessment. | Sections 3.1, 4.1 |
| A description of the methodology used to verify terrestrial biodiversity, plant species and animal species sensitivities on site, including the equipment and modelling used where relevant. | Sections 3.1, 4.1 |
| A baseline description of the biodiversity and ecosystems of the site. | Sections 3.2, 3.3, 4.2 |
| A description of assumptions made and uncertainties or gaps in knowledge or data. | Sections 3.1, 4.1 |
| Any proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme. | Sections 3.5, 4.4 |
| Any conditions to which this statement is subjected. | Sections 3.1, 4.1 |

## 1. BACKGROUND AND TERMS OF REFERENCE

This terrestrial biodiversity, plant species and animal species assessment was commissioned by M Elston to inform a Basic Assessment process for a proposed light industrial development on the remainder of Portion 110 of Gwayang 208, located in the Support Zone of George Airport in the Western Cape (Figure 1).

Although the Department of Forestry, Fisheries and the Environment's National Web-based Environmental Screening Tool identified the project area as important for terrestrial biodiversity (Sensitivity rating: Very high), plant species (Sensitivity rating: Medium) and animal species (Sensitivity rating: High), a site sensitivity verification indicated that this rating is not appropriate for these themes and that sensitivity is instead Low. This means that a compliance statement report (rather than an impact assessment) can be prepared and submitted when applying for environmental authorisation in terms of the National Environmental Management Act (1998, as amended) and the Environmental Impact Assessment Regulations (2014, as amended).


**Figure 1: Location of the project area northeast of George Airport in the George Local Municipality, Western Cape.**

This report, therefore, covers the following aspects:

- An assessment of the terrestrial ecosystems on site, including their threat status, protection level, and potential suitability for plant and animal Species of Conservation Concern (SCC).

- A desktop assessment of the plant and animal species that potentially occur on site, including SCC. Animal species covers amphibians, reptiles, mammals, and birds, and important invertebrate species identified in the Screening Report.
- An assessment of sensitive ecosystems or habitats that may be affected by the proposed project.
- An assessment of the potential project-related impacts on terrestrial biodiversity, plant species and animal species.
- Management recommendations for mitigating impacts during the construction and operational phases.

## 2. PROJECT DESCRIPTION

The proposed project will entail a light industrial development (warehousing, storage) to the northeast of George Airport on the remainder of Portion 110 of Gwayang 208 (Figure 2). The development footprint is expected to cover up to 5.2 hectares of the available 34.9 hectares, while the remaining undeveloped areas will either be rezoned as private open spaces (0.86 hectares) or retained for agricultural use.

Because existing water and sanitation infrastructure on site is limited, additional infrastructure will be developed. This may include a constructed wetland for the treatment of wastewater and covered reservoirs for storing harvested rainwater. If implemented, this infrastructure will be located within a dedicated utility zone on Portion 110, covering 2.99 hectares. The constructed wetland (Phragmifiltre® technology) is a nature-based alternative for wastewater treatment, utilizing microbes that colonize reedbeds in a wetland system. The system generally has little to no standing surface water (Joubert 2024). In contrast, conventional wastewater treatment works (WWTW) typically lack reedbeds and have open water.

Three alternatives for the treatment and conveyance of wastewater have been proposed:

| | |
|---|---|
| Alternative 1A: (preferred) | Develop a utility zone on Portion 110 to treat wastewater from the development, George Airport Business Park, and George Airport using constructed wetlands. Services cross Portion 34 of Gwayang 208. |
| Alternative 1B: | Develop a utility zone on Portion 110 to treat wastewater form the development only. This does not include wastewater treatment for the Business Park and Airport, which would need to be done separately. This is the preferred alternative if approval for Alternative 1A is not obtained timeously. |
| Alternative 2: | Treat wastewater from the development at the approved WWTW on Portion 4 of Gwayang 208. |
| Alternative 3: | Treat wastewater at the Gwayang WWTW (not preferred). |

Water supply to the development will be from three sources, including municipal (20%), harvested rainwater (30%), and recirculated treated and disinfected wastewater (50%):

- Municipal supply — Preferred: Directly from the municipal bulk supply line on the western side of the R404. Alternative: Link into the George Airport Business Park supply system. Services cross Portion 34 of Gwayang 208.
- Harvested rainwater — Harvested rainwater from roofs will be stored in covered reservoirs at the utility zone.

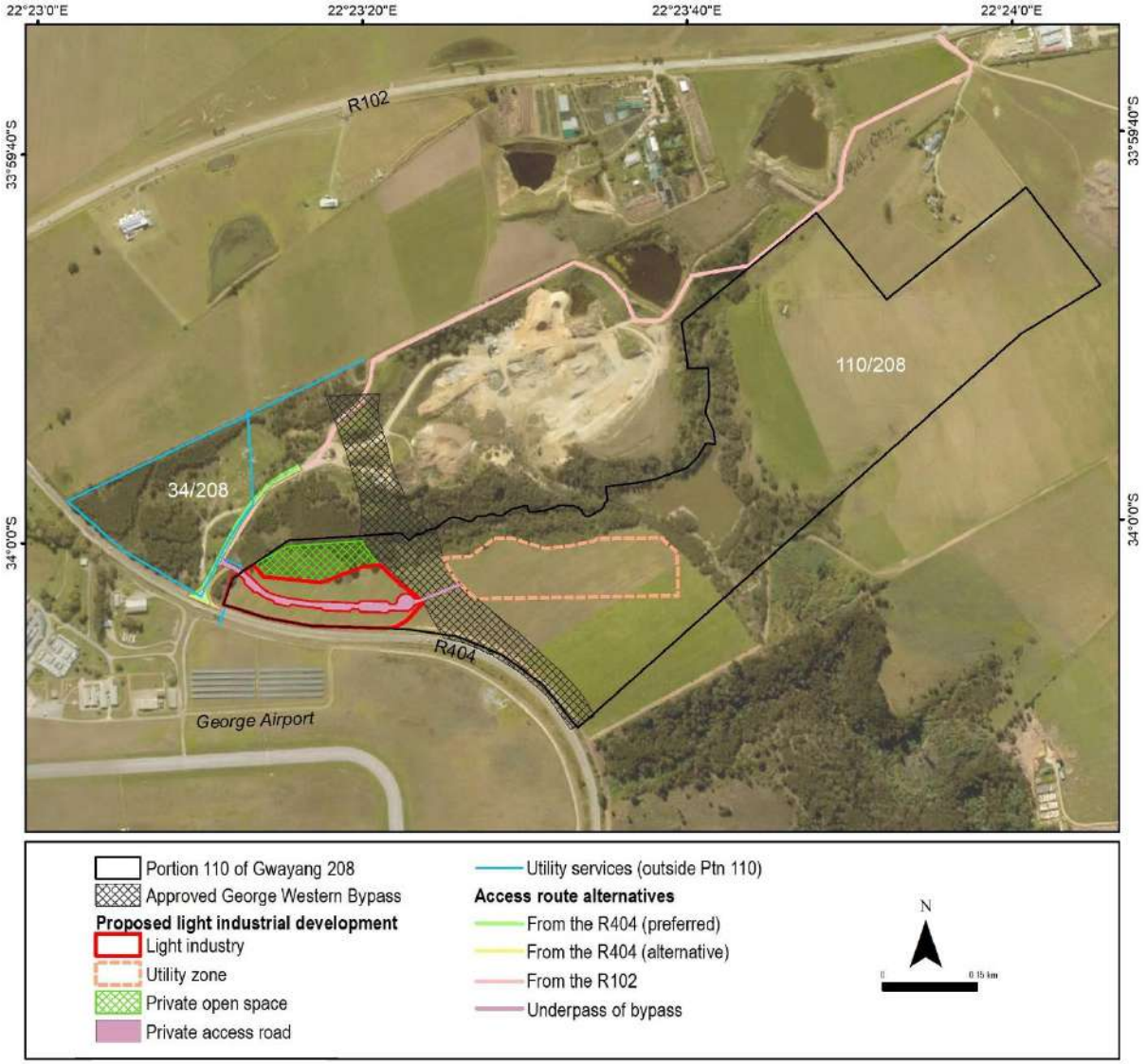



**Figure 2: Proposed layout of the light industrial development, including utility services and access.**

- Treated wastewater
  - Alternative 1: Treated wastewater supply form Portion 110 to the George Airport Business Park.
  - Alternative 2: Treated wastewater supply from Portion 4 to Portion 110.

Several access alternatives are available for the proposed development. In the future, the approved George Western Bypass will also cross Portion 110, potentially offering additional access options to the utility zone. The proposed access alternatives include:

- Light industrial
  - Alternative 1: (preferred) From the R404 via the existing quarry road. Crosses Portions 34 of Gwayang 208.
  - Alternative 2: Access from the R404 along a route closer to the boundary of Portion 110. Crosses Portion 34.

- Utility zone, without Western Bypass

  Alternative 1: (preferred) Direct access between the light industrial and utility zone.
  Alternative 2: Use existing access from R102.

- Utility zone, with Western Bypass

  Alternative 1: (preferred) Direct access between the light industrial and utility zone using future underpass of Bypass.
  Alternative 2: Use existing access from R102.

# 3. TERRESTRIAL BIODIVERSITY AND PLANT SPECIES COMPLIANCE STATEMENT

## 3.1 Methodology

### *3.1.1 Desktop study*

Terrestrial ecosystems were identified from the following sources:

- The Vegetation Map of South Africa, Lesotho and Swaziland 2018 version (VEGMAP; SANBI, 2006–2018, 2018a);
- The vegetation map for the Garden Route Biodiversity Sector Plan (GRBSP; Vlok et al., 2008).

Ecosystem threat statuses and protection levels, where available, were identified from:

- The 2018 National Biodiversity Assessment (2018 NBA; SANBI, 2018b; Skowno et al., 2019);
- The 2010 Garden Route Biodiversity Sector Plan (GRBSP; Holness et al., 2010; Vromans et al., 2010).

Plant SCC that could occur at the site were identified from the following sources:

- The Screening Tool (https://screening.environment.gov.za);
- The online Red List of South African Plants v. 2024 (SANBI, 2012–2024) (http://redlist.sanbi.org);
- Observations submitted to the iNaturalist online biodiversity database (https://www.inaturalist.org);
- The Botanical Database of Southern Africa (http://posa.sanbi.org/);
- The Global Biodiversity Information Facility (https://www.gbif.org/).

Regional conservation priority areas were identified from the following sources:

- The 2017 Western Cape Biodiversity Sector Plan (WCBSP; Pool-Stanvliet et al., 2017);
- The 2017 National Protected Areas Expansion Strategy (NPAES; Government of South Africa, 2016);
- The latest versions of the South African Protected Areas Database (SAPAD 2024 Q3) and the South African Conservation Areas Database (SACAD 2024 Q3) (https://egis.environment.gov.za/ ).

Historical aerial and satellite imagery used to investigate the landuse history of the site and were obtained from the following sources:

- Google Earth Pro version 7.3.6.9796;
- The Chief Directorate: National Geo-Spatial Information data portal (http://cdngiportal.co.za).

### *3.1.2 Site inspection*

During the survey, habitats were assessed for their ecological condition and surveyed for their dominant and typical component plant species. All habitats were photographed using a GPS-enabled camera. Further details of the site inspection for this study are provided in Table 3.1 and Appendix 1.

**Table 3.1: Site inspection details for this study.**

| | |
|---|---|
| **Date:** | 11 September 2024 |
| **Duration:** | 6 hours |
| **Season:** | Spring |
| **Season Relevance:** | As the site falls in the coastal, temperate climate, year-round rainfall zone, seasonality is muted and thus the phenology of plants and vegetation is also muted in comparison with more seasonal regions. The spring sampling is considered appropriate as most plant species were identifiable. |

### *3.1.3 Assumptions and Limitations*

The following assumptions and limitations apply to the findings of this investigation:

- It is assumed that all third-party information used (e.g., spatial data, satellite imagery) was correct at the time of generating this report;
- The site inspection was restricted to a single season, namely spring, but no additional seasonal samplings are deemed necessary (see Table 3.1);
- The site inspection focused on Remainder of Portion 110 Gwayang 208, and assessments of proposed linear activities falling outside of this property rely primarily on desktop data.

## 3.2 Results – Terrestrial biodiversity

### *3.2.1 Terrestrial Ecosystems*

Terrestrial ecosystems that historically occurred at the site, as identified by various mapping projects, are indicated in Table 3.2 and Figure 3.1. According to available information, the site likely supported a Fynbos-biome ecosystem with a relatively high abundance of grass species. The 2010 GRBSP vegetation map identifies this ecosystem as Wolwedans Grassy Fynbos, while the national typology of the VEGMAP 2018 identifies it as Garden Route Granite Fynbos. Both these ecosystems were assessed as being Critically Endangered, while the 2018 NBA indicated that Garden Route Granite Fynbos is currently unprotected. Typical component species of these ecosystems are listed in Appendix 2.

**Table 3.2: Historical terrestrial ecosystems identified at the site by relevant mapping projects.**

| Source | Ecosystem name | Threat status | Protection level |
|---|---|---|---|
| 2010 GRBSP | Wolwedans Grassy Fynbos | Critically Endangered | – |
| VEGMAP 2018 / 2018 NBA | Garden Route Granite Fynbos | Critically Endangered | Not Protected |

The following terrestrial habitats were recognised during the site investigation (Figure 3.2):

- Agricultural fields – Most of the site, particularly the southern section, is covered by irrigated pastures dominated by exotic kikuyu grass, *Cenchrus clandestinus*. This area has been ploughed and subjected to severe topsoil disturbance dating back at least 67 years (see Figure 3.3).
- Alien invasive vegetation – Banks of drainage lines on site are covered by dense stands of alien invasive plants. The vegetation canopy is dominated by black wattle (*Acacia mearnsii*), blackwood (*Acacia melanoxylon*) and cluster pine (*Pinus pinaster*), while bugweed (*Solanum mauritianum*) is common in the sub-canopy and along the fringes. The weedy indigenous species *Gomphocarpus physocarpus*, *Nidorella ivifolia* and *Osteospermum moniliferum* also occur in this habitat. Stands of alien invasive plants have persisted in the local landscape for at least 67 years (see Figure 3.3).
- Secondary grassland – Areas subjected to intense disturbance, including to the topsoil, now support vegetation dominated by grasses (not assessed during site inspection).
- Degraded fynbos – An area of species-depauperate fynbos occurs along the north-facing slope in the western sector of the site. The most common species were the tall shrubs *Anthospermum aethiopicum, Erica glandulosa* subsp. *glandulosa* and *Passerina falcifolia*, and the low shrubs *Helichrysum cymosum* subsp. *cymosum*, *Helichrysum foetidum*, *Helichrysum patulum*, *Helichrysum petiolare*, *Nidorella*

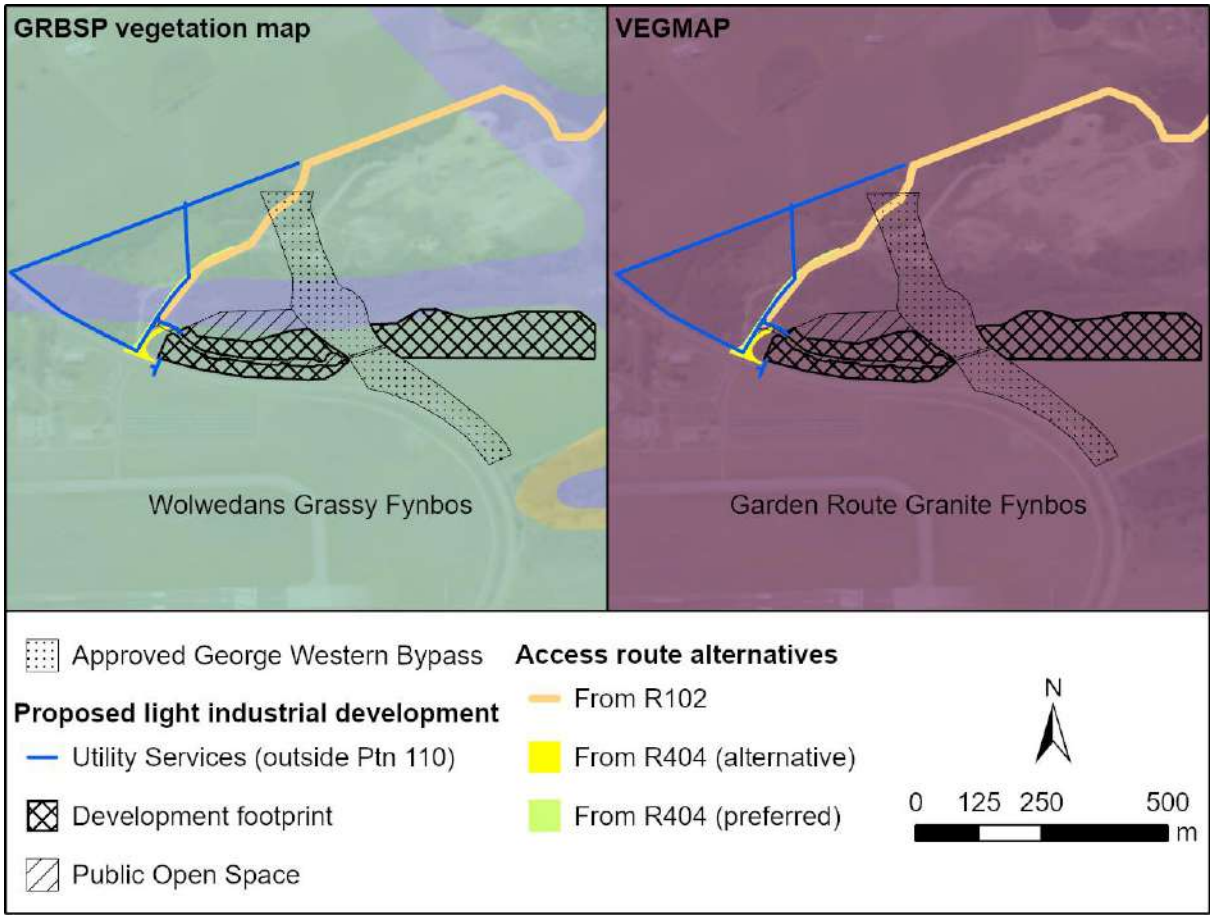



**Figure 3.1: Terrestrial ecosystems occurring on site according to relevant mapping exercises.**

- *ivifolia* and *Selago corymbosa*. These species are all small-seeded and typically indicate historical disturbance in fynbos ecosystems (e.g., inappropriate fire regimes, topsoil disturbance). The absence of species belonging to the *Proteaceae* and *Restionaceae* (both seeders and sprouters) is noteworthy and also suggests that this habitat has been subjected to recurrent disturbance. Furthermore, the establishment of several typical thicket plant species (e.g., *Pterocelastrus tricuspidatus, Rhamnus prinoides, Searsia pallens* and *Searsia rehmanniana*) indicate that ecologically appropriate fire regimes have been disrupted.
- Degraded thicket – Patches of species-depauperate thicket vegetation occur between the agricultural fields and drainage line (alien invasive vegetation). Common species are typically bird-dispersed shrubs and include *Grewia occidentalis, Gymnosporia buxifolia, Pterocelastrus tricuspidatus, Rhamnus prinoides* and *Searsia rehmanniana,* as well as the alien-invasive *Acacia melanoxylon* and *Solanum mauritianum*. While this has been mapped as a distinct habitat, it is likely that these thicket patches have established in areas that historically harboured fynbos vegetation, but where ecologically appropriate fire regimes have been disrupted (see above).
- Wetlands – Aquatic ecosystems, including wetlands, were mapped and assessed as part of the Aquatic Biodiversity Site Sensitivity Verification Report prepared by Upstream Consulting (2024).

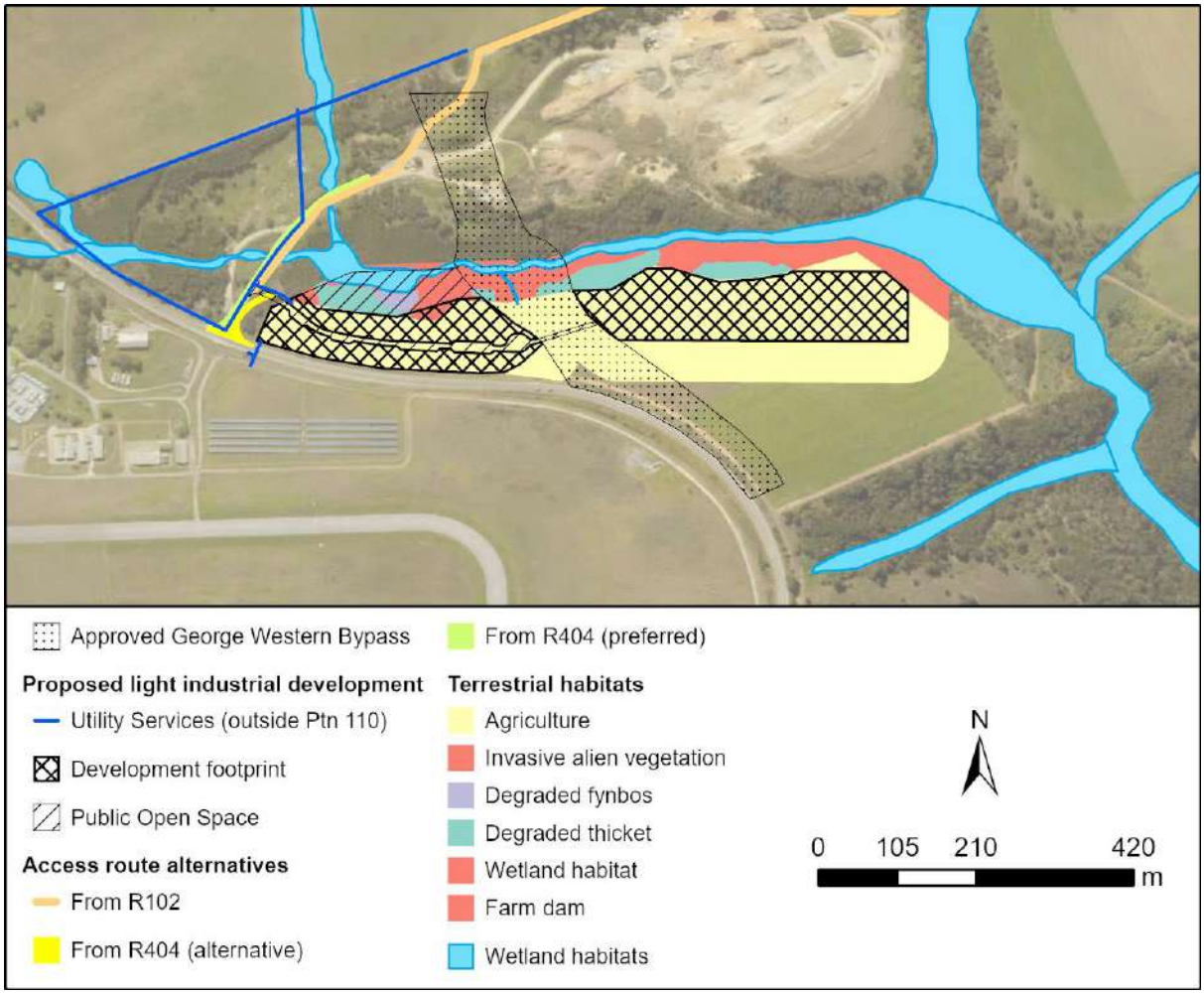



**Figure 3.2: Terrestrial habitats on site. Wetland habitats mapped by Upstream Consulting (2024).**

**Figure 3.3: Aerial photograph from 1957 of the landscape around the site (yellow outline).**

### 3.2.2 *Priority Conservation Areas*

*Critical Biodiversity Areas and Ecological Support Areas*

The 2017 WCBSP identifies both Critical Biodiversity Areas (CBA1, CBA2) and Ecological Support Areas (ESA2) at the site (Figure 3.4). Areas mapped as CBA1 and CBA2 are portions of ecosystems in a natural and degraded condition, respectively, that are required to meet biodiversity targets for the maintenance of hydrological processes. Areas mapped as ESA2 are not essential for meeting biodiversity targets, but they play an important role in supporting the functioning of adjacent CBAs.

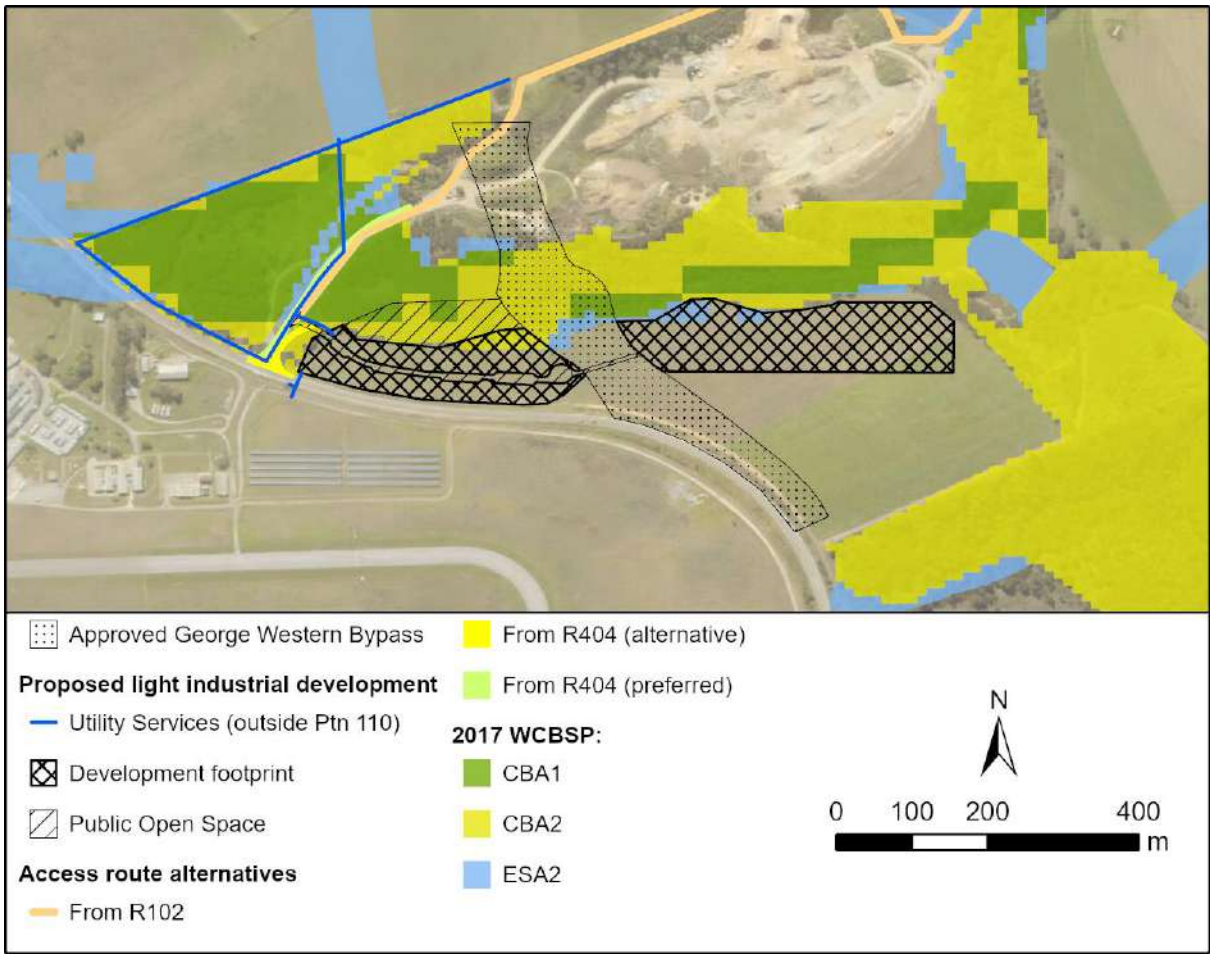



**Figure 3.4: Critical Biodiversity Areas (CBA1, CBA2) and Ecological Support Areas (ESA2) according to the 2017 Western Cape Biodiversity Sector Plan (WCBSP).**

Based on the results of the site inspection and following the wetland buffer zones recommended by Upstream Consulting (2024), and using the typology of the 2017 WCBSP, a field-verified map of CBAs and ESAs was produced for the study area (Figure 3.5). Here, degraded terrestrial ecosystems (Alien Invasive Vegetation, Degraded Fynbos, Degraded Thicket) falling in the wetland buffer zones constitute CBA2, while fields used for agriculture constitute ESA2. The management objectives of these conservation area categories are shown in Table 3.3.

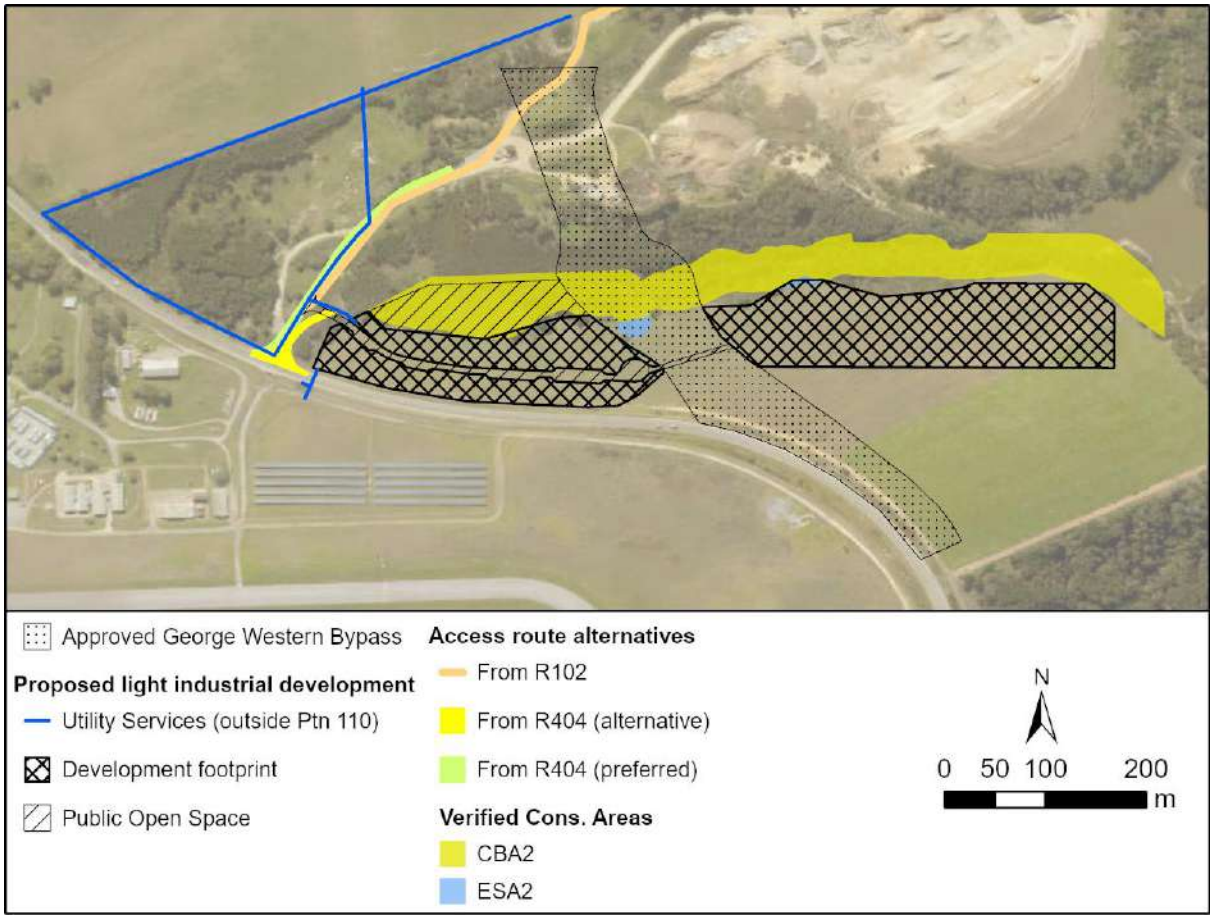



**Figure 3.5: Field-verified Critical Biodiversity Areas (CBA2) and Ecological Support Areas (ESA2) at the site.**

**Table 3.3: Management objectives of Critical Biodiversity Areas (CBA2) and Ecological Support Areas (ESA2) as recommended by the 2017 WCBSP.**

| Category | Management Objectives |
|---|---|
| CBA2 | Maintain in a functional, natural or near-natural state, with no further loss of natural habitat. These areas should be rehabilitated. |
| ESA2 | Restore and/or manage to minimise impact on ecological infrastructure functioning; especially soil and water-related services. |

*Protected Areas and Conservation Areas*

No Protected Areas or focus areas for National Protected Area expansion occur near the site. The closest Protected Area is Kwelanga Private Nature Reserve, which lies about 9.5 km southeast of the site. Note that the site occurs in the Garden Route Biosphere Reserve.

## 3.3 Results – Plant species

A total of 10 plant species of conservation concern (SCC) were identified as possibly occurring on site, although the site inspection showed that suitable habitat existed there for only one species, namely *Erica unicolor* subsp. *mutica* (Table 3.4). This species was, however, not recorded on site. The site inspection coincided with peak flowering time of *E. unicolor* subsp. *mutica*, and there is a high degree of confidence that it would have been recorded during the survey if the site supported a population of this species.

Given the current degraded state of terrestrial habitats at the site, and the long history of transformation and degradation in the surrounding landscape (Figure 3.3), the likelihood of the site supporting viable populations of any plant SCC is low.

**Table 3.4: Plant species of conservation concern and their likelihood of occurring on site. Information on sensitive species have been obscured. Status: CR, Critically Endangered; EN, Endangered; VU, Vulnerable.**

| Family | Species | Status | Habitat | Likelihood | Justification |
|---|---|---|---|---|---|
| Aizoaceae | *Lampranthus pauciflorus* | EN | Rocky coastal slopes and clayish hills. | Low | No suitable habitat. |
| Ericaceae | *Erica unicolor* subsp. *mutica* | EN | Lowlands and lower south and north-facing slopes in fynbos. | Low | Limited suitable habitat, not recorded. |
| Proteaceae | *Leucospermum glabrum* | EN | Wet south slopes in sandstone fynbos. | Low | No suitable habitat. |
| Rutaceae | *Diosma passerinoides* | VU | Dry clayish soils in renosterveld, associated with patches of silcrete. | Low | No suitable habitat. |
| Rutaceae | *Euchaetis albertiniana* | EN | Coastal sands and limestones. | Low | No suitable habitat. |
| - | *Sensitive species A* | EN | Renosterveld-thicket mosaic, in gravely, clay soil. | Low | No suitable habitat. |
| - | *Sensitive species B* | CR | Renosterveld with karroid elements. | Low | No suitable habitat. |
| - | *Sensitive species C* | EN | Renosterveld and sparse grasslands. | Low | No suitable habitat. |
| - | *Sensitive species D* | EN | Lowland sandy flats, stabilised dunes and coastal rock promontories. | Low | No suitable habitat. |
| - | *Sensitive species E* | VU | Dry to moist slopes, up to 200 m. | Low | No suitable habitat. |

## 3.4 Site sensitivity verification

While no areas on site were identified as sensitive in terms of the Plant Species theme, there are portions of the site that qualify as CBA2 and ESA2 in the framework of the 2017 WCBSP, and these areas are of High and Medium sensitivity, respectively, in terms of the Terrestrial Biodiversity theme (Figure 3.6). These areas are important for meeting provincial biodiversity targets for hydrological processes and development in these areas should be avoided. Note, however, that the designation of Private Open Space is permissible as long as the management activities set out for this area align with management objectives recommended for CBA2 and ESA2, as set out in Table 3.3.

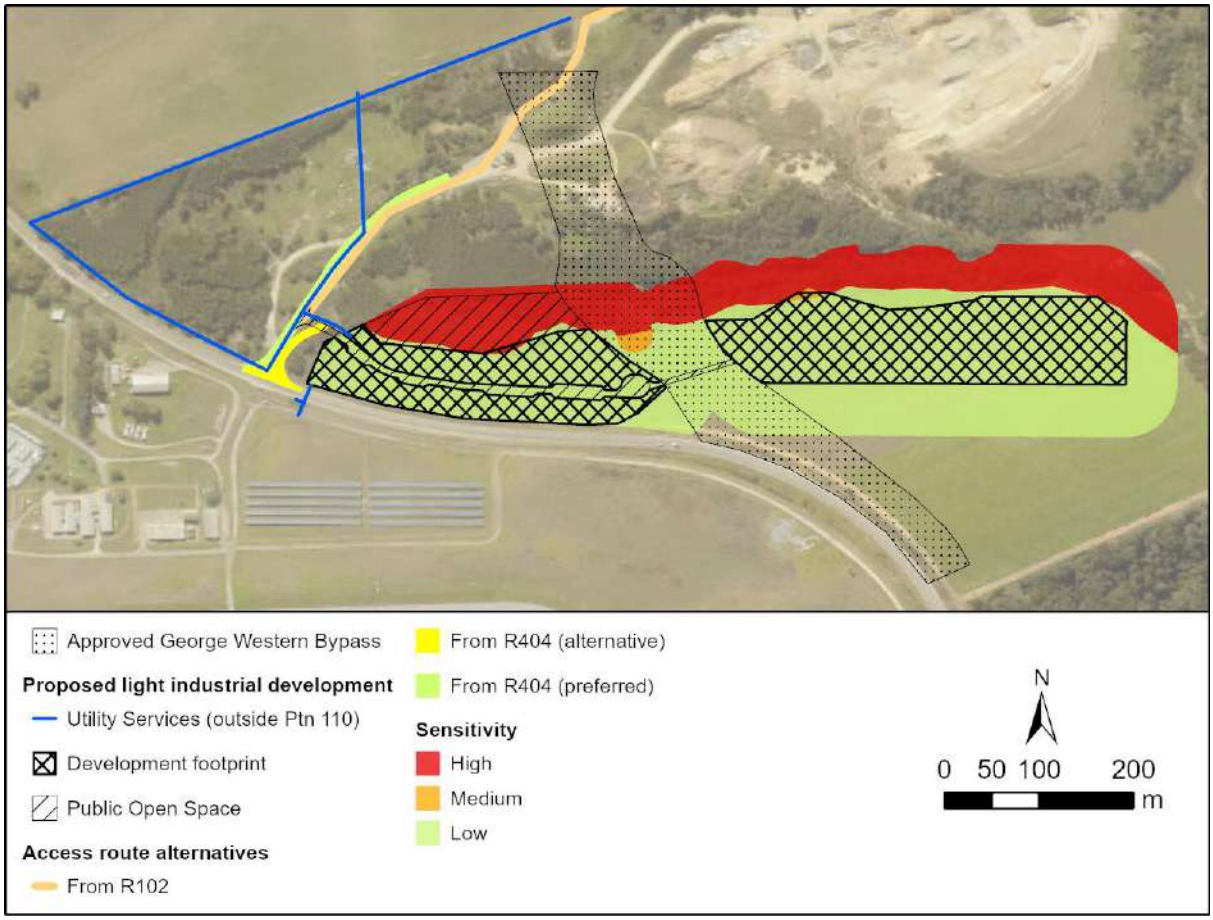



**Figure 3.6: Environmental sensitivity of the site in terms of the Terrestrial Biodiversity and Plant Species themes. An amended development site that avoids areas of High and Medium sensitivity is indicated.**

## 3.5 Impact management actions

The following management actions are proposed to limit and mitigate ecological impacts of the proposed development on Terrestrial Biodiversity and Plant Species:

- Areas of High and Medium sensitivity must be excluded from development footprints. The preferred access route (off the existing R404) is unlikely to have significant negative impacts on Terrestrial Biodiversity and Plant Species.
- An Alien Invasive Plant management plan must be developed for the site under investigation (i.e., including portions outside of the construction area), in accordance with the National Environmental Management: Biodiversity Act (Act No. 10 of 2004), and included in the Environmental Management Programme of the proposed development. Control methods for the eradication of alien invasive species must be implemented in such a way that it prevents harm to the surrounding environment.
- A vegetation rehabilitation plan must be developed for areas demarcated as CBA2 and ESA2 (High sensitivity) within the site and included in the Environmental Management Programme of the proposed development. This plan should be developed and implemented in parallel with the site's Alien Invasive Plant management plan. Its primary objective must be to rehabilitate and maintain the CBA2 and ESA2 portions of the site in a semi-natural state, using adjacent areas of remnant fynbos and thicket on site as reference conditions.

- General compliance with the National Environmental Management Act (Act No. 107 of 1998) in terms of Duty of Care.

# 4. ANIMAL SPECIES COMPLIANCE STATEMENT

## 4.1 Approach to the assessment

### *4.1.1 Desktop assessment*

To identify the animal species (amphibians, reptiles, mammals, and birds) that could potentially occur in the project area, a desktop assessment of the broad habitats was conducted. Habitat types were identified using the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina and Rutherford 2011, South African National Biodiversity Institute 2006-2018) and recent satellite and aerial imagery (2024 Google Earth Imagery, 2022 George Municipality Imagery).

Potential animal species occurrences were determined using the following resources:

- Amphibians: Du Preez and Carruthers (2017) and the Frog Atlas of Southern Africa (FrogMap[3]).
- Reptiles: Alexander and Marais (2007) and the Reptile Atlas of Southern Africa (ReptileMap[3]).
- Mammals: Skinner and Chimimba (2005), Monadjem et al. (2020), and the Mammal Atlas of Southern Africa (MammalMap[3]).
- Birds: Southern African Bird Atlas Project 2 (SABAP2[4], Harrison et al. 1997).
- iNaturalist[5] and the Global Biodiversity Information Facility (GBIF)[6]

Species of Conservation Concern (SCC) were defined to include species assessed according to the IUCN Red List Criteria as Critically Endangered, Endangered, Vulnerable, Near Threatened, or Data Deficient, as well as range-restricted species that are nationally listed as Rare or Extremely Rare. Identification of SCC was based on the following resources:

- IUCN Red List of Threatened Species[7].
- Red List of South African Species[8], supported with data from the South African amphibian (Measey 2011), reptile (Tolley et al. 2023), mammal (Child et al. 2016a), and bird (Taylor et al. 2015) conservation assessments.
- Species listed in terms of Section 56 of the National Environmental Management: Biodiversity Act (NEMBA) (2004, as amended) and regulated by the Threatened or Protected Species (TOPS) Regulations (2007, as amended)[9].

Several SCC identified by the Department of Forestry, Fisheries and the Environment's National Web-based Environmental Screening Tool required specific consideration in the assessment:

[3] http://vmus.adu.org.za
[4] http://sabap2.adu.org.za
[5] http://inaturalist.org
[6] http://gbif.org
[7] http://iucnredlist.org
[8] http://speciesstatus.sanbi.org
[9] Published in Government Notice 3012 in Government Gazette 47984 of 3 February 2023

| Group | Species | Sensitivity rating* |
|---|---|---|
| Amphibians | Knysna leaf-folding frog *Afrixalus knysnae* | Medium |
| Mammals | Sensitive species 8 | Medium |
| Birds | Knysna warbler *Bradypterus sylvaticus* | High |
| | African marsh harrier *Circus ranivorus* | High |
| | Denham's bustard *Neotis denhami* | High |
| Invertebrates | Yellow-winged agile grasshopper *Aneuryphymus montanus* | Medium |

* Medium, the site might contain suitable habitat for the species (based on spatial models) but there are no recent distribution records. High, recent (post–2002) distribution records and potentially suitable habitat are available for the species at the site.

In addition to SCC, the assessment also identified animal species protected under other international, national, and provincial legislation, including:

- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)[10].
- The NEMBA and regulated by the TOPS Regulations (Criteria: Protected species).
- The Nature and Environmental Conservation Ordinance (NCO) (Ordinance 19 of 1974).

The inclusion of animal species on CITES Appendices (I–III), TOPS Lists (Criteria: Protected species), and NCO Schedules (1–2) does not necessarily reflect the species' conservation status. Many common species are included on these lists even though their conservation status may not be of demonstrated concern. Where appropriate, a permit/s is required for the capturing or killing of species that are included on CITES, TOPS, and NCO lists.

Finally, the assessment identified alien and invasive animal species using the Alien and Invasive Species Lists of the NEMBA[11].

### *4.1.2 Site assessment*

A site assessment was conducted to verify the potential suitability of the project area for animal species, especially SCC (Appendix 1). Key activities during the site assessment included:

- Verifying the occurrence and status of habitat types identified during the desktop assessment and identifying fine-scale habitats on site that were not recognised.
- Recording evidence of animal species occurrences (sightings, presence of spoor, dung, refuges). These data are generally not reported on to avoid the influence of false negatives (i.e., species that are present on site but not detected) over the short site assessment.
- Assessing the extent of current anthropogenic threats (not project related) on animal communities in the project area.

### *4.1.3 Assumptions and limitations of the approach*

The following assumptions and limitations apply to this assessment:

[10] http://cites.org
[11] Published in Government Notice 1003 in Government Gazette 43726 of 18 September 2020.

- Understanding of the proposed project is based on information provided by the client.
- No formal field surveys were conducted for any animal species considered in the assessment, and there are gaps in the available species distribution data used in the assessment. However, the approach of matching habitat characteristics with species distribution data and habitat requirements is a robust way of dealing with information gaps.
- The site visit took place over the course of one day in September 2024 (austral spring). While habitats were generally in a good condition for assessment, multiple site visits are typically preferred to gain a comprehensive understanding of the opportunities and limits for animal species. Nonetheless, the approach followed in the assessment is sufficiently robust to account for animal opportunities that might have been missed during the site visit.
- Because the likelihood of detecting animal SCC in the field is often low even with optimal search methods, the precautionary principle was applied when assessing habitat suitability for these species in the assessment. That is, if potentially suitable habitat exists in proximity of known locations for the species, and anthropogenic threats are low, then the species was assumed to be present.
- Information presented in this assessment has reference to the project area only and cannot be applied to any other area.

## 4.2. Results

### *4.2.1 Broad habitat types*

Although Mucina and Rutherford (2011, as part of the Vegetation Map of South Africa, Lesotho and Swaziland) identified the likely presence of a dense, ericoid dominated shrubland with grasses on granite-derived soils in the project area, the site lacks most, if not all, of the characteristic elements of these habitats. Instead, habitats at and adjacent to the project area have been largely transformed for agriculture (Figure 4.1, Plate 4.1). The proposed development footprint comprises almost entirely (91%) of undulating, irrigated agricultural fields that have been ploughed over several decades. The likelihood of restoring the original habitats is extremely low (Section 3).

A non-perennial drainage line runs along the northern and northeastern margins of the development footprint, flowing toward the Gwaing River. Habitats along this drainage line have been extensively modified, with dense stands of alien invasive plants (black wattle *Acacia mearnsii*, blackwood *Acacia melanoxylon*, cluster pine *Pinus pinaster*, bugweed *Solanum mauritianum*) firmly established. These invasive species disrupt ecological processes such as soil and water dynamics, nutrient cycling, and fire regimes (e.g., Le Maitre et al. 2011), ultimately leading to significant shifts in animal communities (McKinney and Lockwood 1999, Proches et al. 2008, Clusella-Trullas and Garcia 2017). Although islands of thicket (key species: *Grewia occidentalis, Gymnosporia buxifolia, Pterocelastrus tricuspidatus, Rhamnus prinoides*, *Searsia rehmanniana*) and fynbos (key species: *Anthospermum aethiopicum, Erica glandulosa, Passerina falcifolia*, various *Helichrysum* species) habitats occur amongst the invasive plants, these habitats have been modified, are species-poor, and are vulnerable to livestock grazing and trampling, and further alien plant encroachment. At the bottom of the drainage line, a small wetland system with reeds and sedges persists, while several open farm dams are scattered across the landscape surrounding the project area, including one within the alien-invaded drainage line.

Habitats to the west of the project area, where proposed linear infrastructure intersects, have similarly been transformed for agriculture or through other anthropogenic disturbances. Where disturbances have occurred, dense stands of alien invasive plants are already well established. Areas with more recent disturbances may be dominated by grasses (i.e., secondary grassland habitats); however, these habitats are likely to experience alien encroachment in the future if no control measures are implemented.

A detailed assessment of the aquatic habitats in the vicinity of the project area is provided in the Aquatic Biodiversity Assessment (Fordham 2025). In line with the No-Go buffer established by this assessment and the Terrestrial Biodiversity Assessment (Section 3), the proposed development avoids drainage lines and other associated aquatic systems at the site.

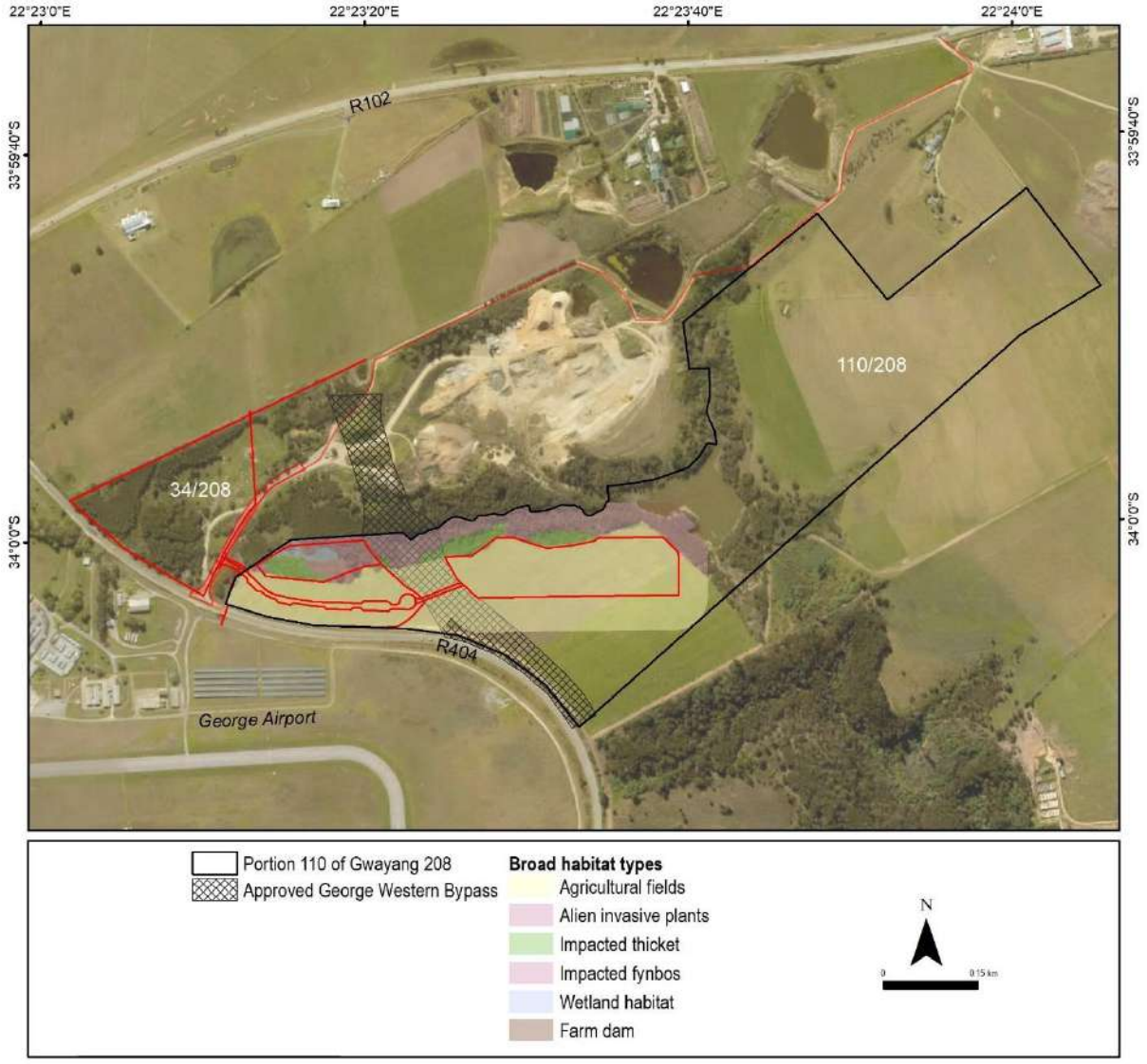



**Figure 4.1: Broad habitat types overlapping the project area.** Habitat types were mapped in a 50 m buffer around the development footprint.

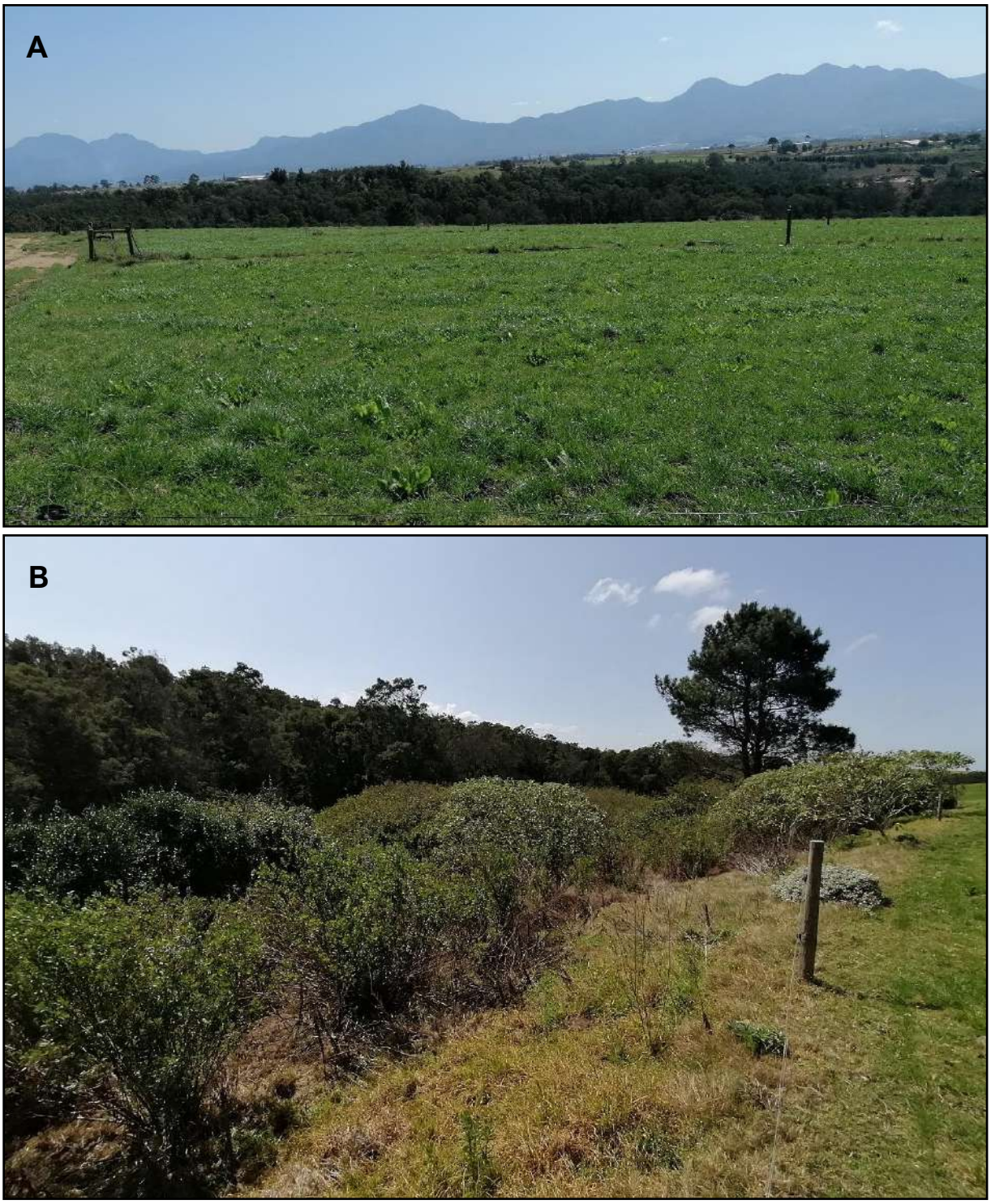



**Plate 4.1: Examples of the broad habitat types overlapping the project area.** A, Agricultural fields, B, Dense stands of alien invasive plants (background) and Impacted thicket (foreground).

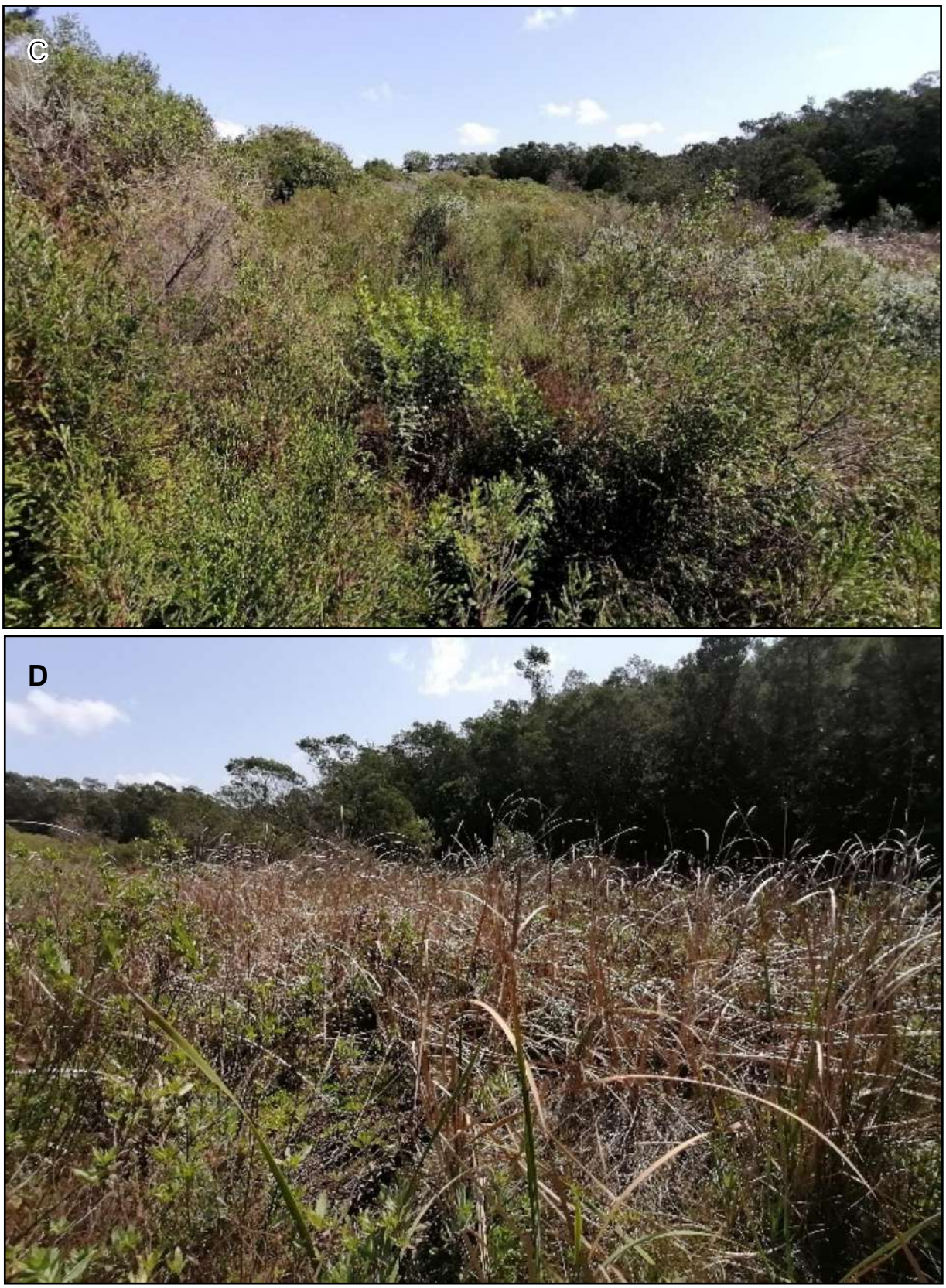



**Plate 4.1 (continue.): Examples of the broad habitat types overlapping the project area.** C, Impacted fynbos, D, Wetland habitat (see also Fordham 2025).

### *4.2.2 Status of animal species*

The assessment identified six animal SCC that could potentially occur in the project area, including five bird species and one mammal species. The threat status, habitat requirements, and relevance of the project area for these SCC species are described in Table 4.1. No amphibian or reptile SCC are expected to occur. Additionally, five of the six SCC identified by the Screening Tool are unlikely to occur in the project area.

While it is possible that some animal SCC could potentially occur in the project area, the likelihood is low (Table 4.1). This reflects the diversity of anthropogenic threats (not project related) impacting on animal communities, including:

- Habitat loss, transformation, and fragmentation due to agriculture, grazing by domestic livestock, and encroachment by alien plants. Roads (R102, R404, several farm roads) and fences further fragment habitats and modify animal movements.
- Disturbance to animal species due to anthropogenic activities adjacent to the project area, including operations at the mine (heavy machine and truck movement, noise pollution) on the northern boundary and George Airport on the southwestern boundary.
- Harvesting of medium and large-sized mammals and large birds by local people.

Thus, while the Screening Tool identified the project area as important for animal species (Sensitivity rating: High), this rating is not appropriate for the animal groups considered in the assessment and sensitivity for these groups is instead Low.

Some species that potentially occur in the project area are protected under CITES, TOPS (Criteria: Protected species), and the NCO (Table 4.2). Where applicable, a permit is required for the capture and relocation of protected species during the construction phase of the project. For example, tortoises, listed on Schedule 2 of the NCO will require permits for their capture where necessary. Similarly, a permit is required for activities that disturb protected bird species, particularly during the breeding season. Sites with eggs or chicks are considered to be protected sites. Permit applications must be submitted to CapeNature (The Western Cape Nature Conservation Board), and relocations should be to suitable habitats near the project area.

No alien invasive animal species listed in terms of the NEMBA were recorded on site.

**Table 4.1: Assessment of animal species of conservation concern that potentially occur in the project area.** LOO, Likelihood of occurrence in the project area.

| | Species | Screening Tool | Threat status | Threat criteria | Habitat requirements | Relevance of the project area for the species | LOO |
|---|---|---|---|---|---|---|---|
| **Amphibians** | Knysna leaf-folding frog *Afrixalus knysnae* | Medium | Global & SA Red List: Endangered | B | Coastal Afromontane forest and fynbos mosaics of the Southern Cape. Requires high water quality for breeding[1,2,3]. | Given that there is no suitable habitat for the species in the project area, the species is unlikely to occur. | Unlikely |
| **Mammals** | African striped weasel *Poecilogale albinucha* | - | SA Red List: NT | C | Rare and secretive species with wide habitat tolerance: forest, grassland, fynbos, and agricultural landscapes. Prefers grassy areas. Vulnerable to predation by dogs and is often harvested for traditional medicine.[4,5] | Project area only marginally suitable as specialist prey base likely depleted. Small project area unlikely to be important for the species. | Low |
| | Sensitive species 8 | Medium | SA Red List & TOPS: VU | B,C | Rare and secretive species occuring in a wide range of forested and wooded habitats. Habitat transformation usually causes populations to collapse.[4,6] | Given that there is no suitable habitat for the species in the project area, the species is unlikely to occur. | Unlikely |
| **Birds** | Blue crane *Anthropoides paradiseus* | - | Global Red List: VU<br>SA Red List: NT | A | Open grassland, grassland-karoo ecotones, and agricultural landscapes. Roosts in wetlands or dams[7]. | Use of project area limited to occasional foraging. Disturbances from the airport likely discourages use of the project area. Small project area unlikely to be important for the species. | Low |
| | Knysna warbler *Bradypterus sylvaticus* | High | Global & SA Red List : VU | A,B,C | Secretive species occurring along Afrotemperate forest edges and drainage lines in forest habitats[7]. | Given that drainage habitats along the margins of he project area are severely modified by the establihsment of alien invasive plants, the species is unlikely to occur. | Unlikely |
| | Knysna woodpecker *Campethera notata* | - | Global & SA Red List: NT | C | Dense arboreal habitats along the coast, including evergreen forest, dense woodands, and stands of alien trees. Hole nesters[7]. | Species is vulnerable to human impacts, including agricultural development. Use of the project area likely limited to when more suitable habitat is not available. Small project area unlikely to be important for the species. | Low |
| | African marsh harrier *Circus ranivorus* | High | SA Red List: Endangered | A,C | Requires permanent wetlands in grasslands and fynbos for foraging, roosting, and nesting[7]. | Given the lack of extensive wetlands in the vicinity of the project area, the species is unlikely to occur. | Unlikely |
| | Lanner falcon *Falco biarmicus* | - | SA Red List: VU | A,C | Wide habitat tolerance, preferring open habitats. Cliff-nester, but can also use trees and pylons for breeding[7]. | Very limited ocurrence records for the species in the vicinity of the project area. Use of the project area limited to occasional foraging. Disturbances from the airport likely discourage use of the project area. Small project area unlikely to be important for the species. | Low |
| | Denham's bustard *Neotis denhami* | High | Global Red List: NT<br>SA Red List & TOPS: VU | A,C | Coastal and subcoastal fynbos, open karoo and grassland and agricultural landscapes[7]. | Use of project area limited to occasional foraging. Disturbances from the airport likely discourage use of the project area. Small project area unlikely to be important for the species. | Low |
| | Secretarybird *Sagittarius serpentarius* | - | Global & SA Red List : VU | A,C | Open grassland and scub. Roosts/nests in trees[7]. | Use of project area limited to occasional foraging. Disturbances from the airport likely discourage use of the project area. Small project area unlikely to be important for the species. | Low |
| **Insects** | Yellow-winged agile grasshopper *Aneuryphymus montanus* | Medium | Global & SA Red List: VU | B | Fynbos habitats on rocky slopes to the west of Kareedouw in the Cape region.[8,9] | While there is very little in the way of reliable habitat associations on which to base habitat requirements for the species, there is no suitable habitat for the species in the project area and it is therefore unlikely to occur. | Unlikely |

EN, Endangered; VU, Vulnerable; NT, Near Threatened

[1]Measey 2011; [2]Du Preez and Carruthers 2017; [3]De Lange 2019; [4]Skinner and Chimimba 2005; [5]Child et al. 2016b; [6]Child et al. 2016a; [7]Taylor et al. 2005; [8]Brown 1960; [9]Hochkirck et al. 2018.

**Table 4.2: Animal species protected under other international, national, and provincial legislation that potentially occur in the project area.** CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora; NEMBA (TOPS), National Environmental Management: Biodiversity Act (2004) (Threatened or Protected Species Regulations); NCO, Nature and Environmental Conservation Ordinance (1974).

| Species | CITES | NEMBA (TOPS) | NCO |
|---|---|---|---|
| **Amphibians** | | | Schedule 2 |
| **Reptiles** | | | |
| Most reptiles, and | | | Schedule 2 |
| Angulate tortoise *Chersina angulata* | App II | | |
| Parrot-beaked dwarf tortoise *Homopus areolatus* | App II | | |
| Leopard tortoise *Stigmochelys pardalis* | App II | | |
| **Mammals** | | | |
| All Bats, except *Rousettus aegyptiacus* | | | Schedule 2 |
| Caracal *Caracal caracal* | App II | | |
| Vervet monkey *Chlorocebus pygerythrus* | App II | | |
| Greater musk shrew *Crocidura flavescens* | | | Schedule 2 |
| Forest shrew *Myosorex varius* | | | Schedule 2 |
| **Birds** | | | |
| Most birds, and | | | Schedule 2 |
| Blue crane *Anthropoides paradiseus* | App II | Protected | |
| Spotted eagle-owl *Bubo africanus* | App II | | |
| Lanner falcon *Falco biarmicus* | App II | | |
| Peregrine falcon *Falco peregrinus* | App I | | |
| Denham's bustard *Neotis denhami* | App II | | |

**Listing definitions:**
CITES App I, Species that are the most endangered among CITES-listed animals and are threatened with extinction. CITES generally prohibits international trade in specimens of these species.
CITES App II, Species that are not currently threatened with extinction but that may become so unless trade is controlled.
NCO Schedule 1, Endangered wild animals.
NCO Schedule 2, Protected wild animals.

## 4.3 Assessment of project alternatives

Several alternatives have been proposed for the treatment and conveyance of wastewater, water supply, and access to the development (Figure 2). However, since habitats at and adjacent to the project area are already extensively modified and the area is generally of low sensitivity for animal species, the choice of project alternatives is expected to have minimal impact. Nevertheless, standard best practices should guide these choices:

- Avoid placing infrastructure within sensitive No-Go areas (Section 3, Fordham 2025)
- Minimize the construction of new infrastructure by utilizing existing infrastructure where practically possible. This includes road infrastructure for access to the development.
- Linear infrastructure should follow the shortest, most direct route, and be placed within existing servitudes where possible.
- Utilise existing road infrastructure (i.e., the existing quarry road) as much as possible for access to the development.

- Nature-based alternatives for wastewater treatment should be preferred over conventional wastewater treatment works. See Daniels (2025) for the potential influence of the proposed wastewater treatment and water storage infrastructure on birds and bird-aircraft strike risks.

### 4.4 Compliance statement

Although the Department of Forestry, Fisheries and the Environment's National Web-based Environmental Screening Tool identified the project area as important for animal species (Sensitivity rating: High), the site sensitivity verification indicated that this rating is not appropriate for the animal groups (i.e., amphibians, reptiles, mammals, birds, and important invertebrate species identified by the Screening Tool) considered in the assessment. Instead, sensitivity for these groups is Low. The likelihood of animal SCC occurring on site is low, due to the low suitability of the available habitat and extensive anthropogenic threats to animal communities and animal-mediated processes. Consequently, potential impacts from the proposed project on animal SCC can be considered negligible.

While no additional management actions are recommended for the Environmental Management Programme beyond those that are considered standard good practise, it is recommended that an Invasive Plant Control and Management Plan be developed and implemented to eradicate these species in the vicinity of the project area. The plan should be developed by a qualified specialist.

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# 6. APPENDICES

**Appendix 1: GPS track in relation to the project area during the site assessment.**

## Appendix 2. Typical and important component species of terrestrial ecosystems that may have historically occurred on site.

| Garden Route Granite Fynbos | | Wolwedans Grassy Fynbos | |
|---|---|---|---|
| Growth form | Species | Growth form | Species |
| Tall Shrubs | *Passerina corymbosa* | Tall Shrubs | *Passerina falcifolia* |
| Tall Shrubs | *Cliffortia serpyllifolia* | Tall Shrubs | *Leucadendron eucalyptifolium* |
| Tall Shrubs | *Protea coronata* | Tall Shrubs | *Protea neriifolia* |
| Tall Shrubs | *Protea lanceolata* | Low Shrubs | *Erica sparsa* |
| Tall Shrubs | *Protea neriifolia* | Low Shrubs | *Phylica axillaris* |
| Low Shrubs | *Erica discolor* var. *speciosa* | Geophytic Herb | *Brunsvigia josephinae* |
| Low Shrubs | *Erica peltata* | Geophytic Herb | *Gladiolus emiliae* |
| Low Shrubs | *Phylica confusa* | | |
| Low Shrubs | *Syncarpha paniculata* | | |
| Low Shrubs | *Agathosma ovata* | | |
| Low Shrubs | *Anthospermum prostratum* | | |
| Low Shrubs | *Aspalathus asparagoides* | | |
| Low Shrubs | *Cliffortia falcata* | | |
| Low Shrubs | *Cullumia bisulca* | | |
| Low Shrubs | *Erica canaliculata* | | |
| Low Shrubs | *Erica diaphana* | | |
| Low Shrubs | *Erica formosa* | | |
| Low Shrubs | *Eriocephalus africanus* | | |
| Low Shrubs | *Hermannia angularis* | | |
| Low Shrubs | *Leucadendron salignum* | | |
| Low Shrubs | *Lobelia tomentosa* | | |
| Low Shrubs | *Metalasia pungens* | | |
| Low Shrubs | *Mimetes cucullatus* | | |
| Low Shrubs | *Pelargonium fruticosum* | | |
| Low Shrubs | *Relhania calycina* | | |
| Succulent Shrub | *Lampranthus sociorum* | | |
| Semiparasitic Shrubs | *Osyris compressa* | | |
| Semiparasitic Shrubs | *Thesium virgatum* | | |
| Semiparasitic Epiphytic Shrub | *Viscum capense* | | |
| Geophytic Herb | *Schizaea pectinata* | | |
| Graminoids | *Tetraria cuspidata* | | |
| Graminoids | *Brachiaria serrata* | | |
| Graminoids | *Eragrostis capensis* | | |
| Graminoids | *Ficinia nigrescens* | | |
| Graminoids | *Heteropogon contortus* | | |
| Graminoids | *Pentaschistis eriostoma* | | |
| Graminoids | *Restio triticeus* | | |
| Graminoids | *Themeda triandra* | | |

**Appendix 3: Plant taxa recorded within a 2 km radius of the site, extracted from the iNaturalist online biodiversity database (https://www.inaturalist.org/).**

| Family | Species | Family | Species |
|---|---|---|---|
| Amaranthaceae | *Alternanthera pungens* | Fabaceae | *Vicia sativa* |
| Amaranthaceae | *Chenopodium album* | Fagaceae | *Quercus acutissima* |
| Amaranthaceae | *Exomis microphylla* | Geraniaceae | *Geranium incanum* |
| Amaryllidaceae | *Cyrtanthus carneus* | Geraniaceae | *Geranium ornithopodon* |
| Anacardiaceae | *Searsia pallens* | Geraniaceae | *Pelargonium alchemilloides* |
| Anacardiaceae | *Searsia tomentosa* | Hypnaceae | *Hypnum cupressiforme* |
| Anacardiaceae | *Searsia pallens* | Iridaceae | *Aristea* sp. |
| Apiaceae | *Centella asiatica* | Iridaceae | *Chasmanthe aethiopica* |
| Araceae | *Lemna minor* | Iridaceae | *Gladiolus tristis* |
| Araceae | *Zantedeschia aethiopica* | Iridaceae | *Hesperantha falcata* |
| Asparagaceae | *Agave americana* | Iridaceae | *Micranthus plantagineus* |
| Asparagaceae | *Ledebouria sp.* | Iridaceae | *Moraea collina* |
| Asparagaceae | *Yucca gloriosa* | Iridaceae | *Tritonia securigera* |
| Asphodelaceae | *Caesia contorta* | Iridaceae | *Tritoniopsis caffra* |
| Asphodelaceae | *Tulista kingiana* | Iridaceae | *Watsonia knysnana* |
| Asteraceae | *Arctotheca prostrata* | Iridaceae | *Watsonia laccata* |
| Asteraceae | *Arctotis acaulis* | Juncaceae | *Juncus capillaceus* |
| Asteraceae | *Bidens pilosa* | Juncaceae | *Juncus effusus* |
| Asteraceae | *Cirsium vulgare* | Malvaceae | *Grewia occidentalis* |
| Asteraceae | *Cotula australis* | Malvaceae | *Hermannia sp.* |
| Asteraceae | *Cotula coronopifolia* | Malvaceae | *Malva parviflora* |
| Asteraceae | *Erigeron sumatrensis* | Malvaceae | *Sida rhombifolia* |
| Asteraceae | *Felicia erigeroides* | Meliaceae | *Melia azedarach* |
| Asteraceae | *Helichrysum cymosum* | Nephrolepidaceae | *Nephrolepis cordifolia* |
| Asteraceae | *Helichrysum dasyanthum* | Nymphaeaceae | *Nymphaea nouchali* |
| Asteraceae | *Helichrysum foetidum* | Onagraceae | *Ludwigia palustris* |
| Asteraceae | *Helichrysum odoratissimum* | Onagraceae | *Oenothera biennis* |
| Asteraceae | *Helichrysum patulum* | Onagraceae | *Oenothera oehlkersi* |
| Asteraceae | *Helichrysum petiolare* | Orchidaceae | *Disa comosa* |
| Asteraceae | *Helminthotheca echioides* | Orchidaceae | *Disa cylindrica* |
| Asteraceae | *Hypochaeris radicata* | Orchidaceae | *Disperis capensis* var. *capensis* |
| Asteraceae | *Metalasia acuta* | Orchidaceae | *Eulophia cochlearis* |
| Asteraceae | *Nidorella ivifolia* | Orchidaceae | *Evotella carnosa* |
| Asteraceae | *Onopordum acanthium* | Orchidaceae | *Holothrix villosa* subsp. *villosa* |
| Asteraceae | *Osteospermum moniliferum* | Orchidaceae | *Satyrium erectum* |
| Asteraceae | *Plecostachys polifolia* | Oxalidaceae | *Oxalis caprina* |
| Asteraceae | *Pseudognaphalium luteoalbum* | Oxalidaceae | *Oxalis ciliaris* |
| Asteraceae | *Pulicaria scabra* | Oxalidaceae | *Oxalis punctata* |
| Asteraceae | *Senecio ilicifolius* | Phytolaccaceae | *Phytolacca octandra* |
| Asteraceae | *Senecio purpureus* | Pinaceae | *Pinus pinaster* |
| Asteraceae | *Senecio tamoides* | Plantaginaceae | *Plantago lanceolata* |
| Asteraceae | *Seriphium virgatum* | Poaceae | *Arundo donax* |
| Asteraceae | *Sonchus asper* | Poaceae | *Cenchrus clandestinus* |
| Asteraceae | *Tagetes minuta* | Poaceae | *Chloris gayana* |
| Asteraceae | *Taraxacum officinale* | Poaceae | *Chloris virgata* |
| Basellaceae | *Anredera cordifolia* | Poaceae | *Cortaderia selloana* |
| Brassicaceae | *Lepidium africanum* | Poaceae | *Cymbopogon pospischilii* |
| Brassicaceae | *Raphanus raphanistrum* | Poaceae | *Cynodon dactylon* |
| Campanulaceae | *Lobelia erinus* | Poaceae | *Eleusine coracana* |
| Campanulaceae | *Monopsis unidentata* | Poaceae | *Eragrostis curvula* |
| Campanulaceae | *Wahlenbergia procumbens* | Poaceae | *Eragrostis plana* |
| Casuarinaceae | *Casuarina cunninghamiana* | Poaceae | *Hyparrhenia hirta* |
| Celastraceae | *Gymnosporia buxifolia* | Poaceae | *Megathyrsus maximus* |
| Commelinaceae | *Commelina africana* | Poaceae | *Paspalum dilatatum* |
| Convolvulaceae | *Dichondra micrantha* | Poaceae | *Paspalum urvillei* |
| Convolvulaceae | *Ipomoea cairica* | Poaceae | *Phragmites australis* |

| Family | Species | Family | Species |
|---|---|---|---|
| Crassulaceae | *Adromischus maculatus* | Poaceae | *Polypogon monspeliensis* |
| Cyperaceae | *Cyperus congestus* | Poaceae | *Sporobolus africanus* |
| Cyperaceae | *Cyperus longus* | Poaceae | *Stenotaphrum secundatum* |
| Cyperaceae | *Cyperus papyrus* | Podocarpaceae | *Afrocarpus falcatus* |
| Cyperaceae | *Cyperus polystachyos* | Polygonaceae | *Persicaria decipiens* |
| Cyperaceae | *Cyperus polystachyos* subsp. *polystachyos* | Polygonaceae | *Rumex acetosella* |
| Cyperaceae | *Cyperus textilis* | Polygonaceae | *Rumex crispus* |
| Cyperaceae | *Cyperus thunbergii* | Primulaceae | *Lysimachia arvensis* |
| Cyperaceae | *Eleocharis limosa* | Pteridaceae | *Cheilanthes viridis* |
| Cyperaceae | *Isolepis* sp. | Pteridaceae | *Pteris tremula* |
| Dennstaedtiaceae | *Pteridium aquilinum* subsp. *capense* | Rosaceae | *Rubus affinis* |
| Dioscoreaceae | *Dioscorea sylvatica* | Rubiaceae | *Anthospermum aethiopicum* |
| Ericaceae | *Erica caffra* | Rubiaceae | *Anthospermum spathulatum* |
| Ericaceae | *Erica discolor* var. *speciosa* | Salviniaceae | *Azolla filiculoides* |
| Ericaceae | *Erica glandulosa* subsp. *glandulosa* | Sapindaceae | *Acer negundo* |
| Ericaceae | *Erica peltata* | Scrophulariaceae | *Selago corymbosa* |
| Ericaceae | *Erica sparsa* | Solanaceae | *Brugmansia sp.* |
| Euphorbiaceae | *Euphorbia ophthalmica* | Solanaceae | *Cestrum laevigatum* |
| Euphorbiaceae | *Ricinus communis* | Solanaceae | *Datura stramonium* |
| Fabaceae | *Acacia mearnsii* | Solanaceae | *Physalis peruviana* |
| Fabaceae | *Acacia melanoxylon* | Solanaceae | *Solanum chenopodioides* |
| Fabaceae | *Acacia saligna* | Solanaceae | *Solanum linnaeanum* |
| Fabaceae | *Aspalathus asparagoides* subsp. *asparagoides* | Solanaceae | *Solanum mauritianum* |
| Fabaceae | *Lotus subbiflorus* | Solanaceae | *Solanum nigrum* |
| Fabaceae | *Medicago sativa* | Stilbaceae | *Halleria lucida* |
| Fabaceae | *Melilotus albus* | Thymelaeaceae | *Passerina falcifolia* |
| Fabaceae | *Podalyria myrtillifolia* | Thymelaeaceae | *Struthiola myrsinites* |
| Fabaceae | *Psoralea stachyera* | Typhaceae | *Typha capensis* |
| Fabaceae | *Sesbania punicea* | Verbenaceae | *Lantana camara* |
| Fabaceae | *Trifolium arvense* | Verbenaceae | *Verbena bonariensis* |
| Fabaceae | *Trifolium repens* | Zygophyllaceae | *Roepera fulva* |

## Appendix 4. Specialist Curriculum Vitae and SACNASP registration.

**DECLARATION OF THE SPECIALIST**

**Note:** Duplicate this section where there is more than one specialist.

I, **Barend Adriaan Grobler**, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

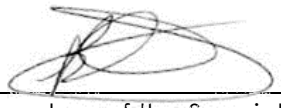
- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.



**07 June 2025**

Signature of the Specialist: Date:

**N/A**

Name of company (if applicable):

**ANNEXURE O:**

*Aquatic Assessment*

# Appendix G6: Aquatic Biodiversity Impact Assessment

Upstream Consulting

Aquatic specialist services

- Cell: 072 444 8243
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www.upstreamconsulting.co.za

# AQUATIC BIODIVERSITY IMPACT ASSESSMENT

for the proposed

## LIGHT INDUSTRIAL DEVELOPMENT ON THE REMAINDER OF PORTION 110 OF THE FARM GWAYANG NO 208, GEORGE

**DATE**: 25 June 2025

Version 3

**PREPARED FOR:**

IS Projects cc
PO Box 186
Persequor Park
PRETORIA, 0020

**PREPARED BY:**

Debbie Fordham
Upstream Consulting
25 Blommekloof St, George, 6529
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# *Executive Summary*

In November 2024, Debbie Fordham of Upstream Consulting undertook an aquatic biodiversity impact assessment for the proposed development of a light industrial zone on the Remainder of Portion 110 of Farm Gwayang No. 208, in George. The study determined that the development proposal would significantly impact a channelled valley bottom wetland and encroach into the recommended aquatic buffer zone. In response to these concerns, the layout has been revised to avoid the watercourse and buffer area, thereby substantially reducing potential impacts on aquatic biodiversity.

Based on the updated impact assessment, no fatal flaws have been identified from an aquatic biodiversity perspective. The potential impacts are now considered low to moderate in significance and can be effectively managed through the recommended mitigation measures, rehabilitation, and stringent monitoring efforts.

# *Specialist Assessment Protocol Index*

***Report reference to Table 1 - Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity***

| 2. Aquatic Biodiversity Specialist Assessment | |
|---|---|
| 2.1. The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP), with expertise in the field of aquatic sciences. | Debbie Fordham SACNASP Registration number 119102 (Ecology) |
| 2.2. The assessment must be undertaken on the preferred site and within the proposed development footprint. | Section 1- Introduction 1.1 –Location & 1.2 – Project description |
| 2.3. The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects: | |
| 2.3.1. a description of the aquatic biodiversity and ecosystems on the site, including; | Section 6 – Affected Environment Section 7 - Results |
| (a) aquatic ecosystem types; and<br>(b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns; | Section 6.1 – The Drainage Network Section 7.1 – Identified habitat |
| 2.3.2. the threat status of the ecosystem and species as identified by the screening tool; | Very High 1.4 -Screening tool results Section 6.5 – Conservation context Section 6.4 - SAIIAE |
| 2.3.3. an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or sub catchment, a strategic water source area, a priority estuary, whether or not they are free-flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area); and | Section 6 – Affected Environment |
| 2.3.4. a description of the ecological importance and sensitivity of the aquatic ecosystem including: | Section 7. Delineated aquatic habitat Section 6 & 7 – Affected Environment & Results |
| (a) the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and<br>(b) the historic ecological condition (reference) as well as present ecological state of rivers (in-stream, riparian and floodplain | Section 6.1 – Drainage network Section 7.1 – Identified aquatic habitat Section 6.7 –Historic land use |

| | |
|---|---|
| habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater). | |
| 2.4. The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate. | Section 7 – Results |
| 2.5. Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions: | |
| 2.5.1. is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal? | Refer to Section 9 – Impact assessment and tables |
| 2.5.2. is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present? | |
| 2.5.3. how will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include: | Section 8 – Identified Impacts |
| (a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);<br>(b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub-catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns);<br>(c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and<br>(d) to what extent will the risks associated with water uses and related activities change; | Section 8.2 –Flow pattern changes<br>8.3 - Erosion and Sedimentation<br>Section 8.1 – Loss of riparian habitat<br>Section 8.4 Water Quality impacts |
| 2.5.4. how will the proposed development impact on the functioning of the aquatic feature? This must include: | Section 9 – Impact Significance Assessment |
| (a) base flows (e.g. too little or too much water in terms of characteristics and requirements of the system);<br>(b) quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over-abstraction or instream or off-stream impoundment of a wetland or river);<br>(c) change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchannelled valley-bottom wetland to a channelled valley-bottom wetland);<br>(d) quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);<br>(e) fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and | Refer to Section 9 – Impact assessment and tables<br><br>Section 8 – Identified Impacts<br><br>Section 9 Impact Assessment |

| | |
|---|---|
| (f) the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.); | |
| 2.5.5. how will the proposed development impact on key ecosystems regulating and supporting services especially: | Medium Impact (after mitigation)<br>Section 9 – Impact Significance Assessment |
| (a) flood attenuation;<br>(b) streamflow regulation;<br>(c) sediment trapping;<br>(d) phosphate assimilation;<br>(e) nitrate assimilation;<br>(f) toxicant assimilation;<br>(g) erosion control; and<br>(h) carbon storage? | Section 8 – discussion of identified impacts |
| 2.5.6. how will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site? | Section 8 and Impact Table of Section 9 |
| 2.6. In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to:<br>(a) size of the estuary;<br>(b) availability of sediment;<br>(c) wave action in the mouth;<br>(d) protection of the mouth;<br>(e) beach slope;<br>(f) volume of mean annual runoff; and<br>(g) extent of saline intrusion (especially relevant to permanently open systems). | Section 7.1.1 – Gwaing River |
| 2.7. The findings of the specialist assessment must be written up in an Aquatic Biodiversity Specialist Assessment Report that contains, as a minimum, the following information: | |
| 2.7.1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; | Appendix 2 – Specialist curriculum vitae |
| 2.7.2. a signed statement of independence by the specialist; | Below Declaration of Independence –Page vi |
| 2.7.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; | 4.2 – Site assessment<br>Section 4 – Approach and methodology<br>Section 5 - Assumptions |
| 2.7.4. the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant; | Section 4 – Approach and methodology |

# Declaration of Independence

SPECIALIST REPORT DETAILS

This report has been prepared as per the requirements of the Environmental Impact Assessment Regulations and the National Environmental Management Act (Act 107 of 1998), any subsequent amendments and any relevant National and / or Provincial Policies related to biodiversity assessments. This also includes the minim requirements as stipulated in the National Water Act (Act 36 of 1998), as amended in Water Use Licence Application and Appeals Regulations, 2017 Government Notice R267 in Government Gazette 40713 dated 24 March 2017, which includes the minimum requirements for an Aquatic Biodiversity Report.

**Report Author**: Debbie Fordham (Ecology 119102)
**Report Reviewer**: Colin Fordham (400166/14 Ecology)

**Expertise / Field of Study**: Internationally certified Professional Wetland Scientist and registered SACNASP ecologist, with over 10 years' of working experience, specialising in aquatic ecology. Debbie holds a M.Sc. degree in Environmental Science from Rhodes University, by thesis, entitled: The geomorphic origin and evolution of the Tierkloof Wetland, a peatland dominated by *Prionium serratum* in the Western Cape. She is a member of scientific organisations such as the Society of Wetland Scientists (SWS), the South African Wetland Society (SAWS), and the Southern African Association of Geomorphologists (SAAG).

I, **Debbie Fordham** declare that this report has been prepared independently of any influence or prejudice as may be specified by the National Department of Environmental Affairs Fisheries and Forestry and or Department of Water and Sanitation.

Signed:…  ..... Date:…25 June 2025……

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# 1 INTRODUCTION

Debbie Fordham of Upstream Consulting has been appointed by IS Projects cc to undertake an aquatic biodiversity impact assessment for the proposed development of a light industrial zone on the Remainder of Portion 110 of Farm Gwayang No. 208, in George, Western Cape. There are areas within the site which are identified by the National Web-based Environmental Screening Tool as having "Very High" aquatic sensitivity. Following site sensitivity verification, this sensitivity rating was confirmed, and an aquatic biodiversity impact assessment was conducted to inform the NEMA environmental authorisation process.

## 1.1 BACKGROUND

An aquatic impact assessment was conducted in November 2024 for the proposed development of a light industrial zone on the Remainder of Portion 110 of Farm Gwayang No. 208, in George. The initial assessment evaluated the potential impacts of the proposed development on identified aquatic habitats, including an incised channelled valley bottom wetland and severely modified seep wetlands. The assessment highlighted key concerns such as habitat loss, hydrological changes, erosion, and water quality impacts, and it provided mitigation recommendations to minimise these risks.

Based on the findings and recommendations of the November 2024 assessment and several project meetings, refinements have been made to the development layout, including adjustments to infrastructure footprint and road access. It is therefore recommended that this report be read in conjunction with the 2024 aquatic biodiversity impact report.

This report serves as an update to the previous assessment, incorporating an evaluation of the revised layout. While the methodology, study area, and core findings remain consistent with the initial assessment, this report presents updated impact tables and mitigation strategies reflecting the refined development proposal.

## 1.2 LOCATION

The study area is located approximately 7 km southwest of the city of George, along the R404 Road, directly east of the George Airport. The development is proposed on the eastern half of the remainder of portion 110 of Farm Gwayang No. 208. The site is situated on a north-facing hillslope used for irrigated livestock pasture. It drains towards a tributary of the Gwaing River. Refer to Figure 1. The proposal is for the development of a light industrial zone (predominantly warehousing and storage facilities, with no planned noxious uses) with a development footprint of approximately 4 ha on the 34.99 ha property.

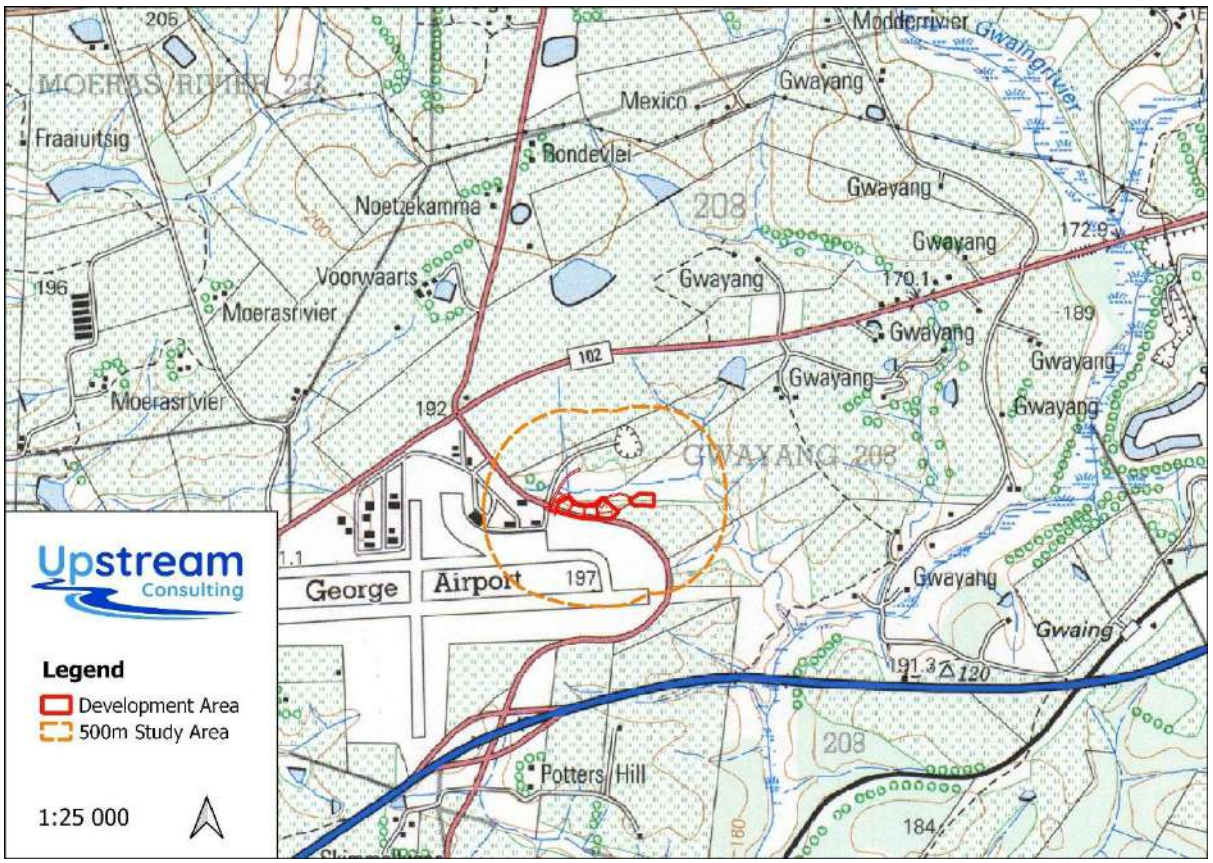


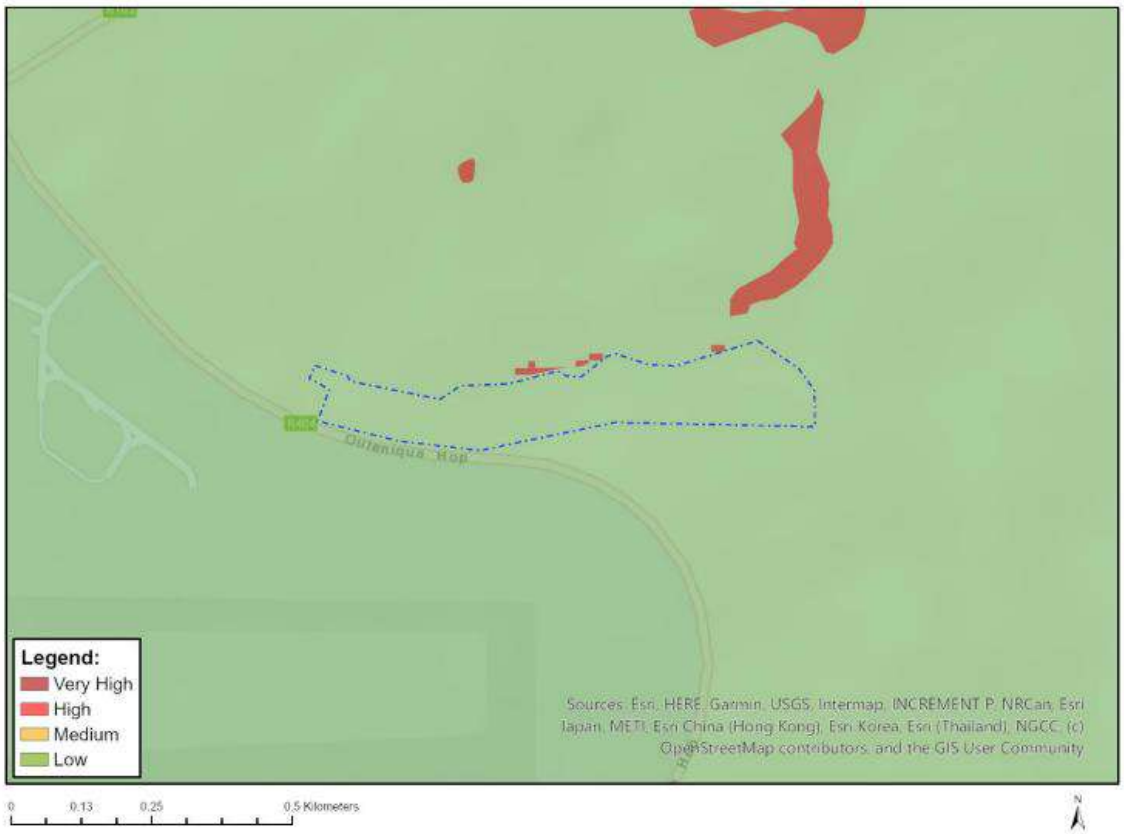

*Figure 1: The location of the site, and 500m radius study area, in relation to the R404 Road, George Airport, and the Gwaing River*

## 1.3 SCREENING TOOL RESULTS

The National Web based Environmental Screening Tool was utilised for this proposal in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended, to screen the proposed site for any environmental sensitivity. The Screening Tool identifies related exclusions and/ or specific requirements including specialist studies applicable to the proposed site. The Screening Tool allows for the generating of a Screening Report referred to in Regulation 16 (1) (v) of the Environmental Impact Assessment Regulations 2014, as amended whereby a Screening Report is required to accompany any application for Environmental Authorisation. Requirements for the assessment and reporting of impacts of development on aquatic biodiversity are set out in the 'Protocol for the assessment and reporting of environmental impacts on aquatic biodiversity published in Government Notice No. 648, Government Gazette 45421, on the 10 of May 2020.

According to the Screening Report, the site has areas of “Very High” aquatic sensitivity and requires the assessment and reporting of impacts on Aquatic Biodiversity (Figure 2). The site verification confirmed this sensitivity rating due to the presence of watercourses in the study area. Therefore, the Aquatic Biodiversity Impact Assessment report was required and has been compiled in accordance with the latest NEMA Minimum Requirements and Protocol for Specialist Aquatic Biodiversity Impact Assessment (10 May 2020).

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY




| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low Sensitivity |
| Very High | CBA: Wetland |

*Figure 2: DFFE Screening Tool sensitivity result for aquatic biodiversity theme*

# 2 PROJECT DESCRIPTION

## 2.1 DEVELOPMENT LAYOUT PLAN

The proposal is to develop agricultural land alongside the R404 Road near the George Airport for airport support services. The Gwayang Local Spatial Development Framework (GLSDF) has earmarked the area between the George Airport and proposed George Western Bypass Road as an Airport Support Zone. The northern part of the Airport Support Zone, on Portions 4, 30, 31, 32 and 139, is currently being developed. These properties are being jointly

developed as the George Airport Business Park. Therefore, in alignment with the GLSDF and proposed zoning of the broader area, it is proposed to develop the western portion of the Remainder of Portion 110 of Farm 208 as a light industrial site for "airport support services" such as logistics, warehousing, etc.

The proposed Western Bypass road bisects the property, in a north south direction, and the area east of the future road is intended to remain as agriculturally zoned land. However, to support the required services associated with the development (and potentially the broader area) it is proposed to construct a utilities area on the portion to the east of the bypass. This will be for a wetland wastewater treatment system and a water harvesting storage area.

Refer to Figure 3 showing the proposed subdivision plan and Figure 4 showing the general layout – Plan No. GASZ-SC1-100-021 (Infrastructure Consulting Engineers, 2025).

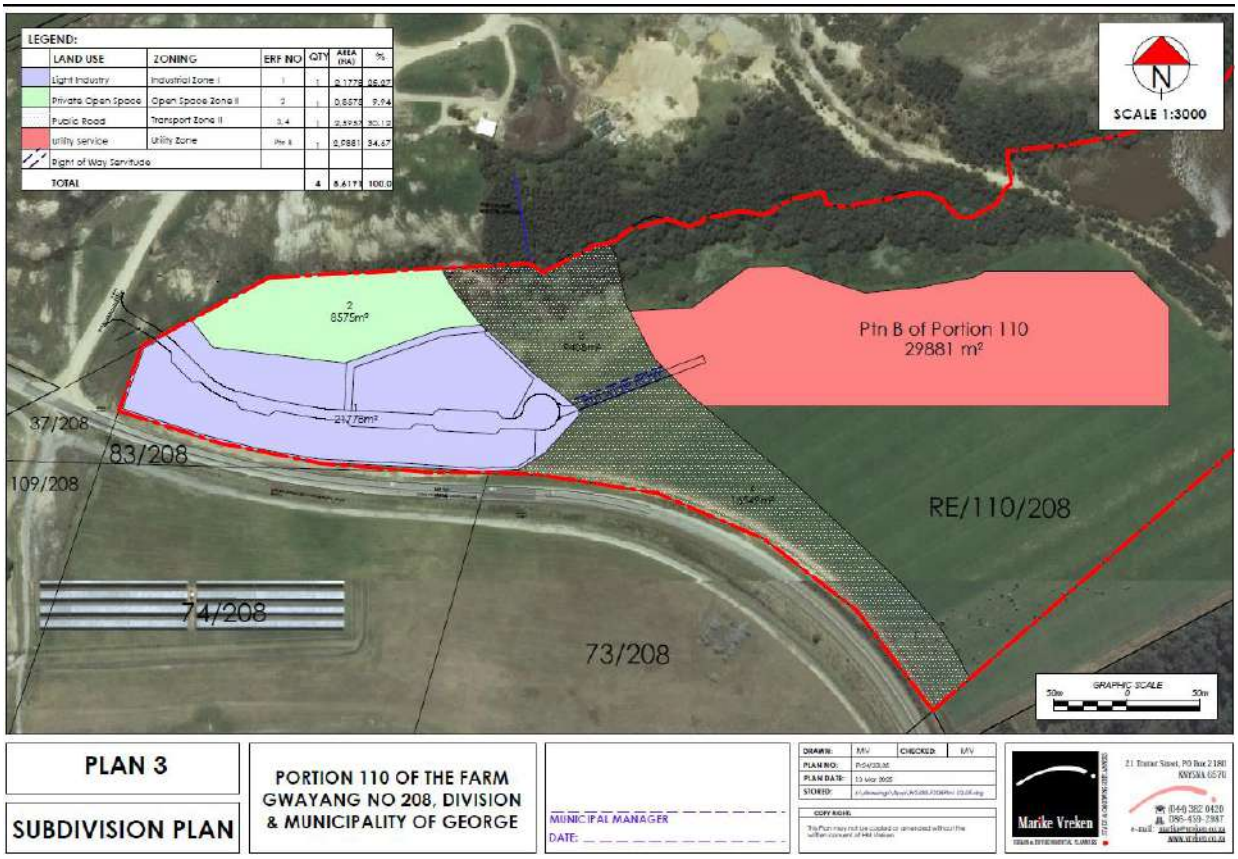



*Figure 3: The subdivision plan (2025) indicating the area proposed for light industrial development along the R404 Road and the utilities area on the eastern side of the proposed Western Bypass Road.*

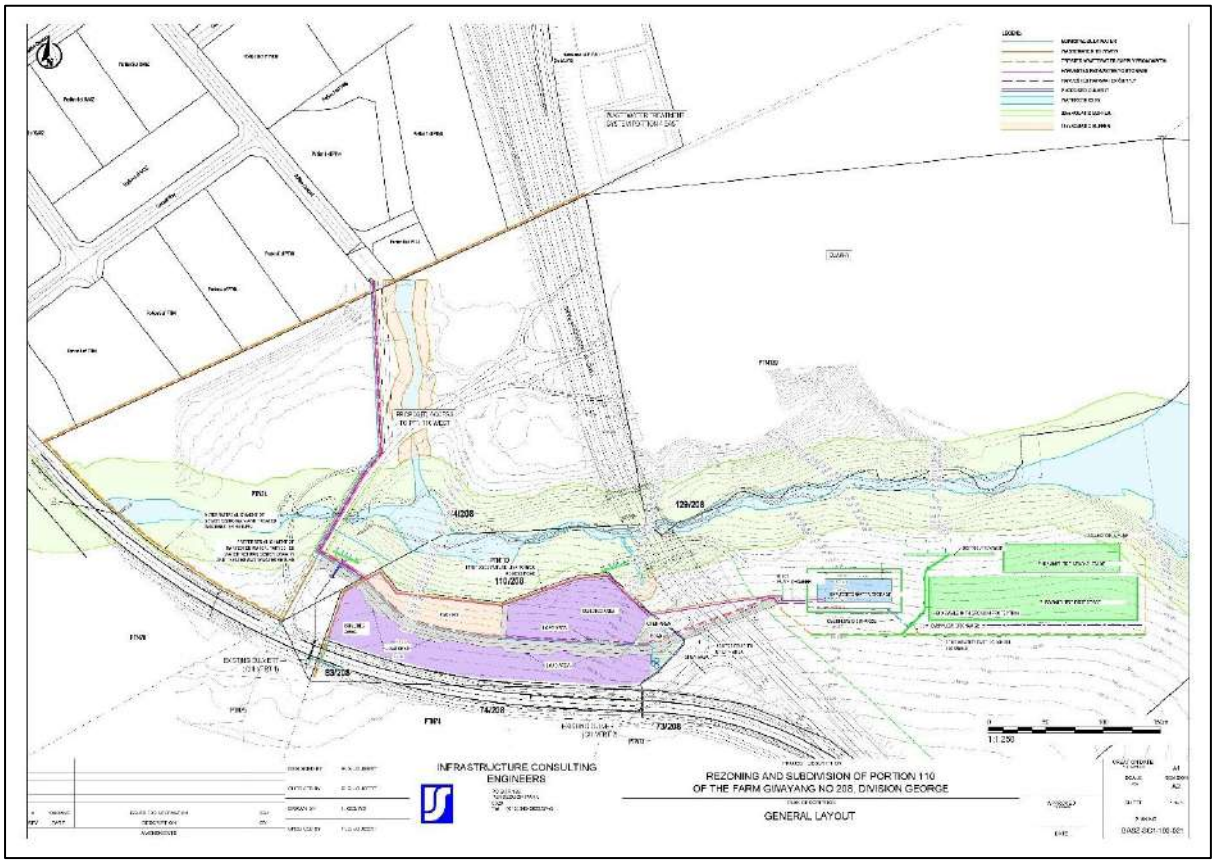



*Figure 4: Site Development Plan No. GASZ-SC1-100-021 (Infrastructure Consulting Engineers, 2025).*

## 2.2 SERVICES ALTERNATIVES

Several alternative options were provided for assessment with regards to service infrastructure. These are listed below (as provided by EAP). However, there is an overall preferred option.

The overall preferred development scenario involves the Utilities Zone, to be constructed on the eastern side of the future by-pass road, with capacity to treat the wastewater of the development as well as wastewater from surrounding developments. This requires a Phragmifiltre reedbed wetland treatment system of 8300m³ to treat sewage to General Limits. Some of the treated wastewater will be recycled back for reuse as greywater, while 164000m³ per annum will be discharged towards the downslope watercourse via a distribution weir. Refer to Figure 5.

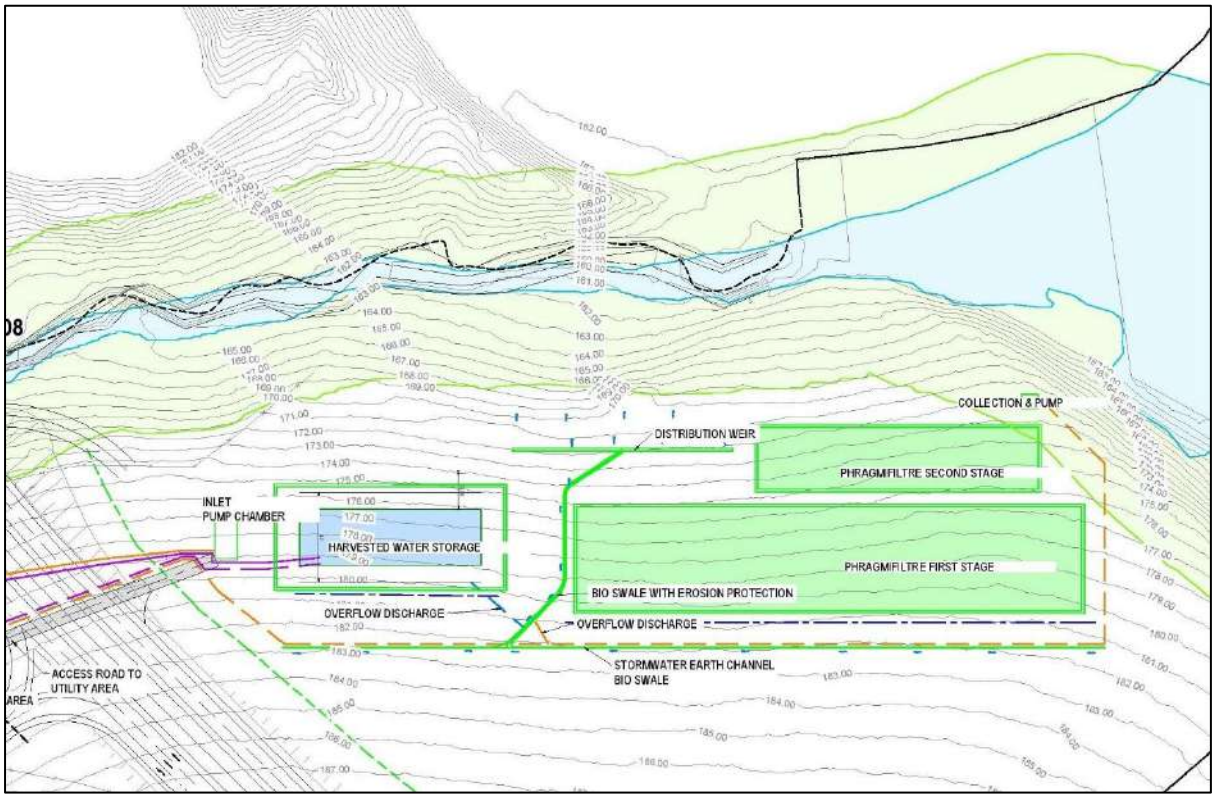



*Figure 5: Except from the Layout Plan showing the preferred alternative Utilities Zone specifically*

### 2.2.1 Sewer

1. Alternative 1A (preferred): Utility Zone on Ptn B of 110/208 – treat effluent from Business Park & Airport too (approved WWTW on 4/208 falls away)
    - *George Business Park & Airport need to 'buy in' (see supporting letter from the Business Park)*
    - *Services need to cross 34/208 – landowner permission (ACSA)*
    - *Services from Business Park have been aligned to avoid watercourse and buffer area (see updated Plan)*
    - *Optimal re-use of treated effluent and rainwater harvesting; no need to pump sewerage effluent*
    - *Will need to apply for services infrastructure between the Business Park & Airport & Ptn 110 – see updated services plan*
    - Alternative 1B (preferred in the event that ACSA does not grant approval OR if timelines do not align for the Business Park development) –
    - *This will cater only for services for the Ptn 110 development (reduced opportunities for sustainable water use)*
    - *All infrastructure (for this application) will be within Ptn 110*
    - *There will be 2 WWTW - on Ptn 4 and Ptn 110 – consider contamination risk*
2. Alternative 2: Effluent from 110/208 sent to WWTW on 4/208 (not yet developed)
    - *Services need to cross 34/208 – landowner permission needed – except for alternative alignment*

- *Alternative alignment (avoids Ptn 34) – along internal roads / road reserve of R404.*
- *Effluent will need to be pumped to 4/208*
- *Services infrastructure will need to cross a watercourse*
- *WWTW capacity on Ptn 4 will be able to handle flow from Ptn 110. If capacity increase is required, necessary amendments will be applied for.*

3. Alternative 3: Effluent from 110/208 sent to Gwayang WWTW (*not preferred*

### 2.2.2 Water

Connecting to municipal water (20% of demand)

1. Alternative 1 (preferred): separate bulk connection (not via PoA) onto municipal bulk line, western side of R404
2. Alternative 2: Developer joins Business Park PoA – link into Business Park internal system downstream of PoA bulk water metre
    - *ACSA approval for services to cross Ptn 34*

Reticulated treated effluent (back to point of use):

1. Either from Ptn 110 east to Business Park, or from Ptn 4 east to Ptn 110 (depending on sewer alternative)

Storage of harvested rainwater

1. Alternative 1: reservoir on 110/208 Utility Zone (Ptn B)

### 2.2.3 Access

Ptn 110 west (Light industrial)

- Alternative 1 (preferred) - use existing quarry road off R404
    - Landowner permission needed (ACSA)
    - Spacing and distance for Ptn 110 access is fine as shown, just getting TIA revised.
- Alternative 2 - realign access road from R404 intersection, closer to the Ptn 110 boundary (as per the alternative previously shown)

Ptn 110 east (Utilities) - without Western Bypass

- Alternative 1 - cross over directly from proposed cul-de-sac circle on Ptn 110 west. (preferred)
- Alternative 2 - use existing Ptn 110 access from the R102 (over Portions 102, 129, 111)

Ptn 110 east (Utilities) - with Western Bypass

- Alternative 1b - cross over directly from proposed Ptn 110 west, using the future underpass as proposed by WCG in the preliminary design for the Bypass. (preferred)
- Alternative 2b - use existing Ptn 110 access from the R102 (over Portions 102, 129, 111)

# 3 RELEVANT LEGISLATION

The protection of water resources is essential for sustainable development and therefore many policies and plans have been developed, and legislation promulgated, to protect these sensitive ecosystems. The proposed project must abide by the relevant legislative requirements. Table 1 below shows an outline of the environmental legislation relevant to the project.

**Table 1: Relevant environmental legislation**

| Legislation | Relevance |
|---|---|
| South African Constitution 108 of 1996 | The constitution includes the right to have the environment protected |
| National Environmental Management Act 107 of 1998 | Outlines principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state. Chapter 1(4r) states that sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure. Section 24 of NEMA requires that the potential impact on the environment, socio-economic conditions and cultural heritage of activities that require authorisation, must be investigated and assessed prior to implementation, and reported to the authority. |
| Environmental Impact Assessment (EIA) Regulations | The 2014 regulations have been promulgated in terms of Chapter 5 of NEMA and were amended on 7 April 2017 in Government Notice No. R. 326. In addition, listing notices (GN 324-327) lists activities which are subject to an environmental assessment. |
| The National Water Act 36 of 1998 | The proposed project requires water use authorisation in terms of Chapter 4 and Section 21 of the National Water Act No. 36 of 1998, and this must be secured prior to the commencement of activities. Chapter 4 of the National Water Act addresses the use of water and stipulates the various types of licensed and unlicensed entitlements to the use of water. |
| Conservation of Agricultural Resources Act (Act 43 of 1983) | The Conservation of Agricultural Resources Act (CARA) is to provide for the conservation of the natural agricultural resources by the maintenance of production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. |
| National Environmental Management: | This is to provide for the management and conservation of South Africa's biodiversity through the protection of species and |

| | |
|---|---|
| Biodiversity Act No. 10 of 2004 | ecosystems; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits. |
| Gwayang Local Spatial Development Framework (GLSDF) | The GLSDF guides the future development of the Gwayang area and the George Airport. The GLSDF states the objective as "The objective of the GLSDF is to compile a Local Spatial Development Framework with development guidelines for the orderly utilization of land and management of land uses along the airport corridor, with due regard to the current spatial development policies and the Council's Economic Revitalization Policy." The site is located outside of the urban edge within an area indicated as Airport Support Zone. The GLSDF includes for the development of the major road system. The George Western Bypass forms part of the future road masterplan. This road is planned to cross Portion110 to the east of the proposed light industrial development. |

# 4 TERMS OF REFERENCE

- Contextualization of the study area in terms of important biophysical characteristics and the latest available aquatic conservation planning information (including but not limited to the South African Inventory of Inland Aquatic Ecosystems (SAIIAE), vegetation, CBAs, Threatened ecosystems, any Red data book information, NFEPA data, broader catchment drainage and protected areas).
- Desktop delineation and illustration of all watercourses within and surrounding the study area utilising available site-specific data such as aerial photography, contour data and water resource data.
- Prepare a map demarcating the respective watercourses or wetland/s, within the study area. This will demonstrate, from a holistic point of view the connectivity between the site and the surrounding regions, i.e. the hydrological zone of influence while classifying the hydrogeomorphic type of the respective water courses / wetlands in relation to present land-use and their current state. The maps depicting demarcated waterbodies will be delineated to a scale of 1:10 000, following the methodology described by the DWS.
- A risk/screening assessment of the identified aquatic ecosystems to determine which ones will be impacted upon and therefore require ground truthing and detailed assessment.
- Ground truthing, identification, delineation and mapping of the aquatic ecosystems in terms of the Department of Water and Sanitation (DWAF 2008) *Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas*.
- Classification of the identified aquatic ecosystems in accordance with the, 'National Wetland Classification System for Wetlands and other Aquatic Ecosystems in South Africa' (Ollis *et al.* 2013) and WET-Ecoservices (Kotze *et al*. 2009).

- Conduct a Present Ecological State (PES), functional importance assessment and Ecological Importance and Sensitivity (EIS) assessment of the delineated wetland and riparian habitats.
- Identification, prediction and description of potential impacts on aquatic habitat during the construction and operational phases of the project. Impacts are described in terms of their extent, intensity, and duration. The other aspects that must be included in the evaluation are probability, reversibility, irreplaceability, mitigation potential, and confidence in the evaluation.
- All direct, indirect, and cumulative impacts for each alternative will be rated with and without mitigation to determine the significance of the impacts.
- Recommend actions that should be taken to avoid impacts on aquatic habitat, in alignment with the mitigation hierarchy, and any measures necessary to restore disturbed areas or ecological processes.
- Rehabilitation guidelines for disturbed areas associated with the proposed project and monitoring.

# 5 APPROACH AND METHODS

This study followed the approaches of several national guidelines with regards to wetland/ riparian assessment. See Appendix 1. The following approach to the aquatic habitat assessment is undertaken:

## 5.1 DESKTOP ASSESSMENT METHODS

The contextualization of the study area was undertaken in terms of important biophysical characteristics and the latest available aquatic conservation planning information (i.e. existing data for coastal management lines, NFEPA identified rivers and wetlands, critical biodiversity areas (WBSP 2023), estuaries, vegetation units, ecosystem threat status, catchment boundaries, geology, land uses, etc.) in a Geographical Information System (GIS). A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018 (Van Deventer *et al.* 2018).

The SAIIAE offers a collection of data layers pertaining to ecosystem types and pressures for both rivers and inland wetlands. National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018. It is imperative to develop an understanding of the regional drainage setting and longitudinal dynamics of the watercourses and the coastal dynamic. The conservation planning information aids in the determination of the level of importance and sensitivity, management objectives, and the significance of potential impacts.

Following this, desktop delineation and illustration of all watercourses within the study area was undertaken utilising available site-specific data such as aerial photography, contour data and water resource data. Digitization and mapping were undertaken using QGIS 3.40.0 "Bratislava" GIS software. These results, as well as professional experience, allowed for the identification of sensitive habitat that could potentially be impacted by the project and therefore required ground truthing and detailed assessment.

## 5.2 BASELINE ASSESSMENT METHODS

A site assessment was conducted in September 2024 to confirm desktop findings, gather additional information, and define the boundaries of the aquatic habitat. A second site assessment was conducted in February 2025. General observations were made with regards to the vegetation, fauna and current impacts. The identified aquatic ecosystems were classified in accordance with the, '*National Wetland Classification System for Wetlands and other Aquatic Ecosystems in South Africa'* (Ollis *et al*. 2013) and *WET-Ecoservices* (Kotze *et al*. 2009).

Infield delineation was undertaken with a hand-held GPS (Figure 6), for mapping of any potentially affected aquatic ecosystems, in alignment with standard field-based procedures in terms of the Department of Water and Sanitation (DWAF 2008) *Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas*. The delineation is based upon observations of the landscape setting, topography, vegetation and soil characteristics (using a hand held soil auger for wetland soils).


*Figure 6: Map showing the GPS tracks associated with the site assessment*

Determination of the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) assessment of the delineated river/riparian habitats was undertaken utilising:

- Qualitative Index of Habitat Integrity (IHI) tool adapted from (Kleynhans, 1996) – PES
- DWAF (DWS) River EIS tool (Kleynhans, 1999) - EIS

Determination of the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) assessment of the delineated wetland habitat was undertaken utilising:

- The health/condition or Present Ecological State (PES) of the wetland was assessed using the WET-Health assessment tool Version 2 (Macfarlane *et al.* 2020), which is based on an understanding of both catchment and on-site impacts and the impact that these aspects have on system hydrology, geomorphology and the structure and composition of wetland vegetation.
- The WET-Ecoservices tool (Kotze *et al*., 2020) is utilised to assess the goods and services that the individual wetlands under assessment provide, thereby aiding informed planning and decision-making. Wetland benefits can be classified into goods/products (directly harvested from wetlands), functions/ services (performed by wetlands), and ecosystem scale attributes. The tool provides guidelines for scoring the importance of a wetland in delivering each of 15 different ecosystem services (including flood attenuation, sediment trapping and provision of livestock grazing).

## 5.3 IMPACT ASSESSMENT METHODS

The approach adopted is to identify and predict all potential direct and indirect impacts resulting from an activity from planning to rehabilitation. Thereafter, the impact significance is determined. Impact significance is defined broadly as a measure of the desirability, importance and acceptability of an impact to society (Lawrence, 2007). The degree of significance depends upon three dimensions: the measurable characteristics of the impact (e.g. intensity, extent and duration), the importance societies/communities place on the impact, and the likelihood / probability of the impact occurring. Unknown parameters are given the highest score as significance scoring follows the Precautionary Principle. A methodology for assigning scores to the respective impacts is described in Appendix 1.

Cumulative impacts affect the significance ranking of an impact because the impact is taken in consideration of both onsite and offsite sources. For example, pollution making its way into a river from a development may be within acceptable national standards. Activities in the surrounding area may also create pollution which does not exceed these standards. However, if both onsite and offsite pollution activities take place simultaneously, the total pollution level may exceed the standards. For this reason, it is important to consider impacts in terms of their cumulative nature.

### 5.4 MITIGATION AND MONITORING

Actions are thereafter recommended to prevent and mitigate the identified impacts on aquatic habitat, in alignment with the mitigation hierarchy, as well as any measures necessary to restore disturbed areas or ecological processes. No-Go Areas will be determined, and any necessary monitoring protocol will be developed. Refer to Appendix 3 for Draft Monitoring Plan.

# 6 ASSUMPTIONS AND LIMITATIONS

- Aquatic ecosystems vary both temporally and spatially. Once-off surveys such as this can miss certain ecological information due to seasonality, thus limiting accuracy and confidence. However, the two site assessments are considered sufficient.
- The locations of the proposed activities were provided by the client.
- While disturbance and transformation of habitats can lead to shifts in the type and extent of aquatic ecosystems, it is important to note that the current extent and classification is reported on here.
- All soil/vegetation/terrain sampling points were recorded using a Garmin Montana Global Positioning System (GPS) and captured using Geographical Information Systems (GIS) for further processing.
- Infield soil and vegetation sampling was only undertaken within a specific focal area around the proposed activities, while the remaining watercourses were delineated at a desktop level with limited accuracy.
- No detailed assessment of aquatic fauna/biota (e.g. fish, invertebrates, microphytes, etc.) was undertaken and not deemed necessary.
- The vegetation information provided is based on observation not formal vegetation plots. As such species documented in this report should be considered as a list of dominant and/or indicator wetland/riparian species. Refer to the terrestrial specialist reports for further details on site vegetation.
- The scope of work did not include water quality sampling and the water quality characteristics were inferred from the biophysical characteristics of the area and catchment land uses. However, water quality monitoring must form part of the project.
- The assessment of impacts and recommendation of mitigation measures was informed by the site-specific ecological concerns arising from the field survey and based on the assessor's working knowledge and experience with similar projects. The degree of confidence is considered high.
- It is assumed that the mitigation measures detailed in this report will be adhered to and that the wastewater treatment system will effectively treat effluent to appropriate standards and within the General Limits before discharging it into the environment.

# 7 STUDY AREA

The desktop/ screening study was informed by the available datasets relevant to water resources, as well as historic and the latest aerial imagery, to develop an understanding of the fluvial processes of the study area. A significant amount of the latest spatial data has been provided through the products of the 2018 National Biodiversity Assessment (NBA). The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa. It is used to inform policies, strategies and actions in a range of sectors for managing and conserving biodiversity more effectively. The desktop study was followed by the detailed site assessment. The relevant spatial information regarding the site is summarised in Table 2 and described in detail below.

*Table 2: Summary of desktop information*

| | | |
|---|---|---|
| **Site details** | Site coordinates | 34° 0'2.97"S; 22°23'12.91"E |
| | Location | Portion 110 of Gwayang No 208, George, Western Cape |
| | Description | Proposed development east of the George airport, bordering a tributary to Gwaing River |
| | Topography | Undulating plains on coastal plateau with incised valleys |
| | Elevation | 165-190 m.a.s.l |
| **Ecoregions** | Freshwater Ecoregion of the World | Cape Fold |
| | SA Ecoregion Level 1 | 22 Southern Coastal Belt |
| | SA Ecoregion Level 2 | 22.02 |
| **Climate** | KG Climate Zones | Temperate without dry season warm summer |
| | Rainfall pattern | All year rainfall |
| | Rainfall Intensity | Zone 4 (very high) |
| | Mean annual precipitation | 805 mm/year |
| | Mean annual evaporation | 1400 mm/year |
| | Mean Annual Run-off | 162,72 mm/year |
| **Soils and geology** | Geology | Maalgaten Granite of the Cape Granite Suite (George Pluton) |
| | Lithology | Deformed blue-grey and pinkish grey, megacrystic granite and augen gneissic granite |
| | Soil Runoff Potential | A/B (low) |
| | Soil Type (DAFF) | Soils with a marked clay accumulation, strongly structured and a non-reddish colour. |

| | | |
|---|---|---|
| **National Vegetation Map** | Type | Garden Route Granite Fynbos |
| | Biome | Fynbos |
| | Bioregion | Eastern Fynbos-Renosterveld Bioregion |
| **Catchment** | Quaternary catchment | K30B |
| | Area (km2) | 139 |
| | Major river | Gwaing River |
| **Management Areas** | WMA | Breede_Gouritz |
| | Sub WMA | Coastal Gouritz |
| | River Management Unit | Gwaing |
| **Strategic Water Source Areas** | Surface water | - |
| | Groundwater | - |
| **Conservation** | Conservation areas | Garden Route Biosphere Reserve |
| | WCBSP | CBA1 Aquatic on site |
| **NBA 2018: Wetland inventory** | Nearest wetland on NWM5 | Unchannelled valley-bottom wetland |
| | PES | A/B (Unmodified natural/ largely natural with few modifications) |
| | ETS | Critically endangered |
| | PL | Poorly Protected |
| **NBA 2018: River inventory** | Nearest 1:500 000 river line | Gwaing River |
| | Geomorphological zone | Upper foothills |
| | Present Ecological State | Largely Modified (D) |
| | Ecosystem Threat Status | Critically endangered |
| | Ecosystem Protection Level | Poorly Protected |

The general biophysical characteristics of the study area are described in the site sensitivity report and summarised below.

## 7.1 CLIMATE AND GEOLOGY

George experiences a temperate oceanic climate, classified as Cfb under the Köppen-Geiger climate classification. This type of climate is characterised by mild temperatures and evenly distributed precipitation throughout the year. George receives an average annual rainfall of about 700 to 900 mm, making it one of the wetter areas in the Western Cape. Rainfall is relatively evenly distributed throughout the year, with a slight peak during the autumn and spring months.

According to the geology map 3322 CD George, the study area is underlain by Gneissic Granite from the Maalgaten Formation, part of the George Pluton. This geological formation consists

of high-grade metamorphic rocks that are known for their hardness and durability. Such rocks typically produce soils with low permeability due to their dense and compact nature.

## 7.2 VEGETATION

The national vegetation map (SANBI 2018 VEGMAP) shows the site as located within the Garden Route Granite Fynbos vegetation unit. According to Mucina and Rutherford (2006), this unit is characterised by a unique assemblage of plant species and ecological features associated with the underlying granite geology of the Garden Route region. The Garden Route Granite Fynbos is classified as Critically Endangered B1(i) due to various threats including habitat loss due to development, invasive species, and climate change. The vegetation type is narrowly distributed with high rates of habitat transformation. However, much of the development footprint is located on transformed vegetation (irrigated livestock pasture). Nearer to the valley bottom there is indigenous thicket and fynbos habitat remaining, however, large areas are infested with alien invasive plant species such as Bugweed and Black Wattle trees.

## 7.3 THE DRAINAGE NETWORK

The study area lies within the Southern Coastal Belt DWA Level 1 Ecoregion and DWS quaternary catchment K30B of the Breede Gouritz Catchment Management Area. The Gwaing River is the largest river in this catchment. Refer to Figure 7. It is an upper foothills geomorphically zoned river reach with perennial flow. It is located approximately 2 km downstream of the site. When mapping the river lines relative to the site, the NBA 2018 Rivers data only identifies the perennial Gwaing River. However, the 1:50 000 cadastral NGI river line data show a non-perennial drainage line flowing alongside the northern boundary of the development area in a west to east direction towards the Gwaing River. The nation river inventory shows that the Gwaing River was classed within the ‘C’ PES category (Moderately Modified) in the 1999 determinations, however, it has deteriorated in health and the 2018 NBA classes the river in the ‘D’ PES category as it is Largely Modified from the natural reference state. The NBA 2018 data also indicates that this river type is Critically Endangered and Poorly Protected.

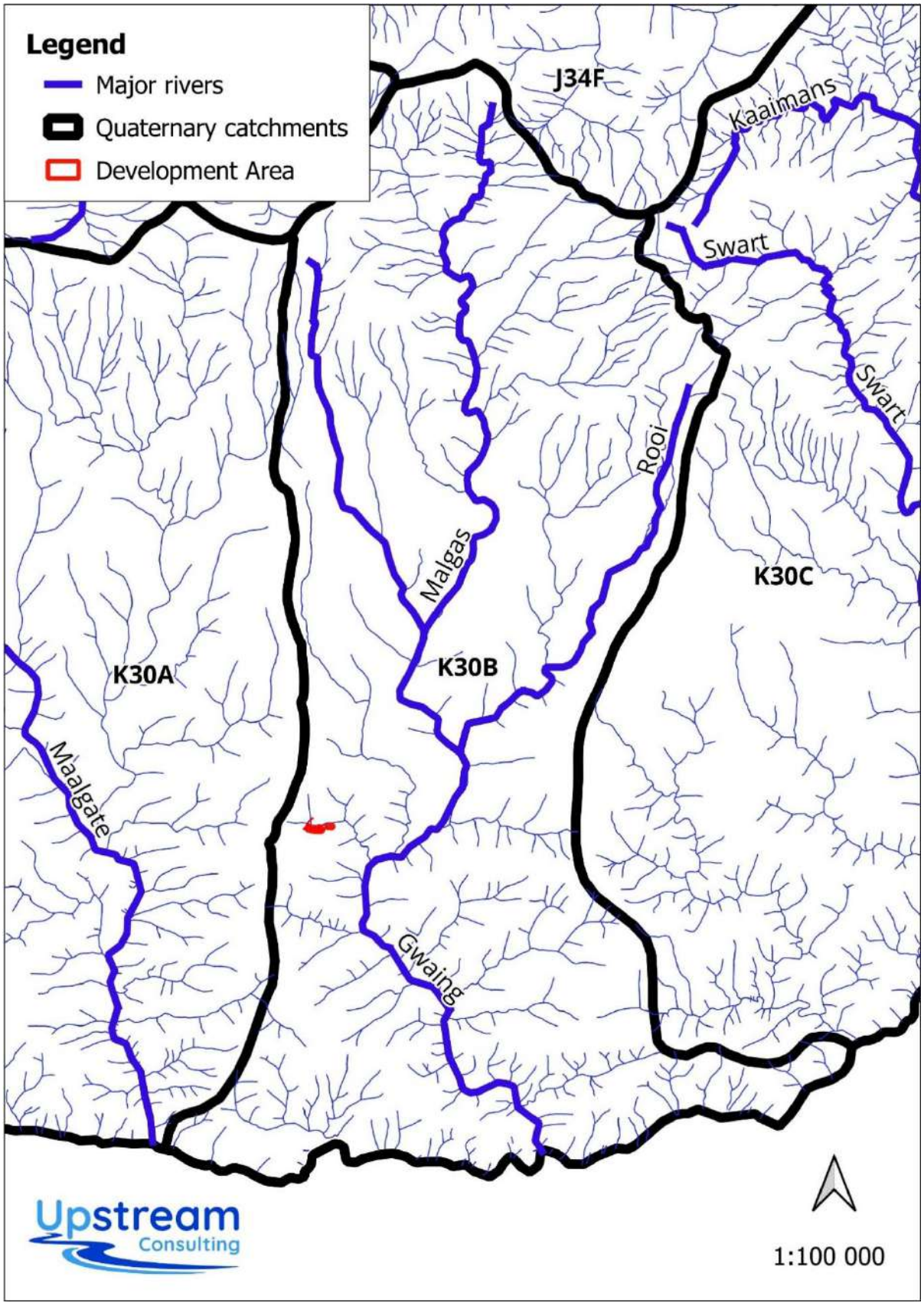



*Figure 7: The study area in relation to the drainage network*

## 7.4 NATIONAL WETLAND AND RIVER INVENTORIES

The National Wetland Map 5 (NWM5) includes inland wetlands and estuaries, associated with river line data and many other data sets. The map indicates the presence of an unchannelled valley bottom wetland in the drainage line downslope of the proposed development. Refer to Figure 8. The Gwaing River is mapped as channelled valley bottom wetland. The wetland falls within the Eastern Fynbos-Renosterveld Bioregion (Valley-bottom). This wetland type is listed as poorly protection and critically endangered.

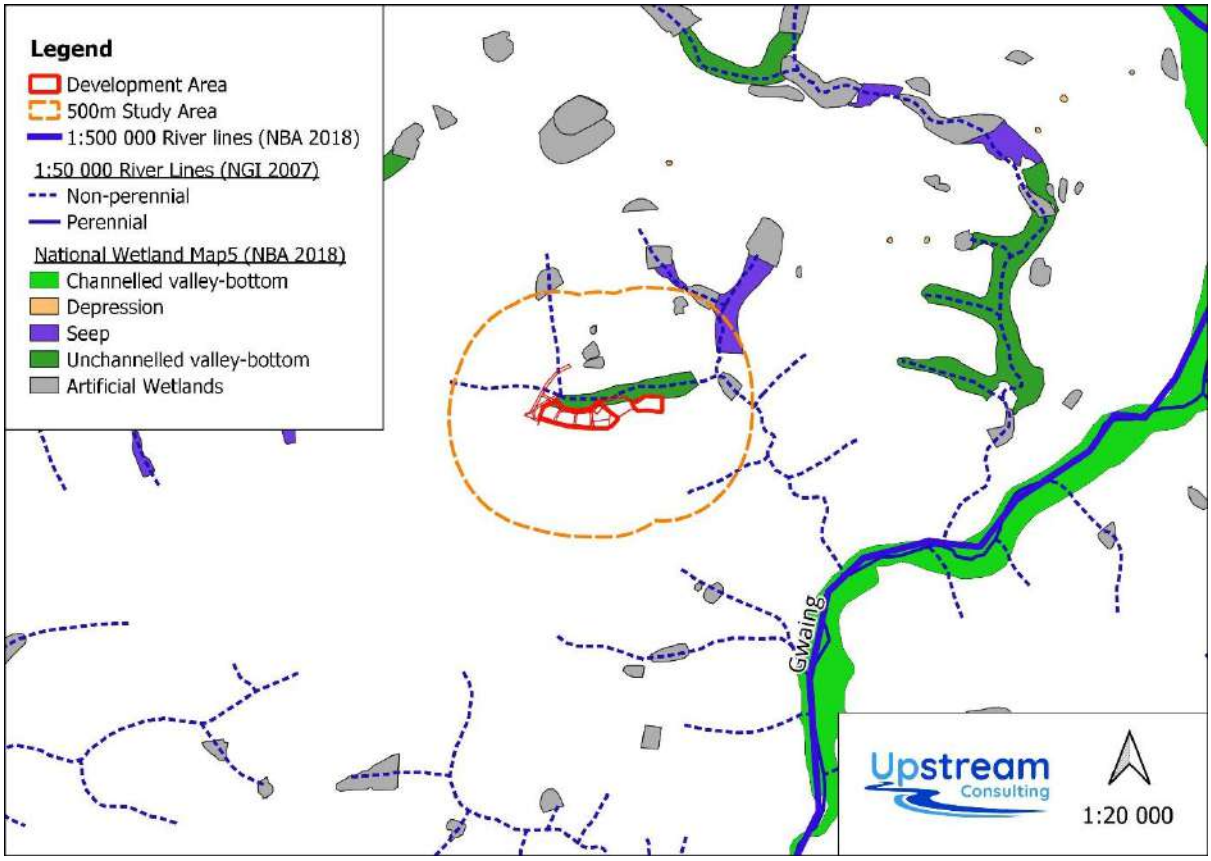



*Figure 8: The site in relation to the national wetlands map 5 (Van Deventer et al. 2018)*

## 7.5 CRITICAL BIODIVERSITY AREAS

Figure 9 shows the biodiversity priority areas mapped by the 2017 Western Cape Biodiversity Spatial Plan (Pool-Stanvliet *et al.* 2017) relative to the study area. It indicates that there is CBA1 Wetland and ESA1 Wetland/River habitat within and near the site. Figure 10 shows the site in relation to the CBAs of the 2023 WCBSP (Cape Nature, 2023). In the 2023 plan there is significantly less wetland habitat shown by the map. Site assessment results rather support the 2017 dataset.

The Western Cape Biodiversity Spatial Plan (WCBSP) identifies biodiversity priority areas, Critical Biodiversity Areas, Ecological Support Areas (ESAs) and Other Natural Areas (ONA),

which, together with Protected Areas (PA), are important for the persistence of a viable representative sample of all ecosystem types and species, as well as the long-term ecological functioning of the landscape as a whole. The primary purpose of a map of CBAs and ESAs is to guide decision-making about where best to locate development.

Downstream habitat of significant ecological importance includes the estuary at the river mouth. The Gwaing River estuary is defined in the 2018 National Biodiversity Assessment (SANBI, 2019) as a small, temporarily closed estuarine system located within the warm temperate biogeographic region on the southern Cape coastline. The size of the estuary, as defined by the estuarine functional zone (EFZ), is approximately 10.6 ha, extending over a length of approximately 1.4 km.

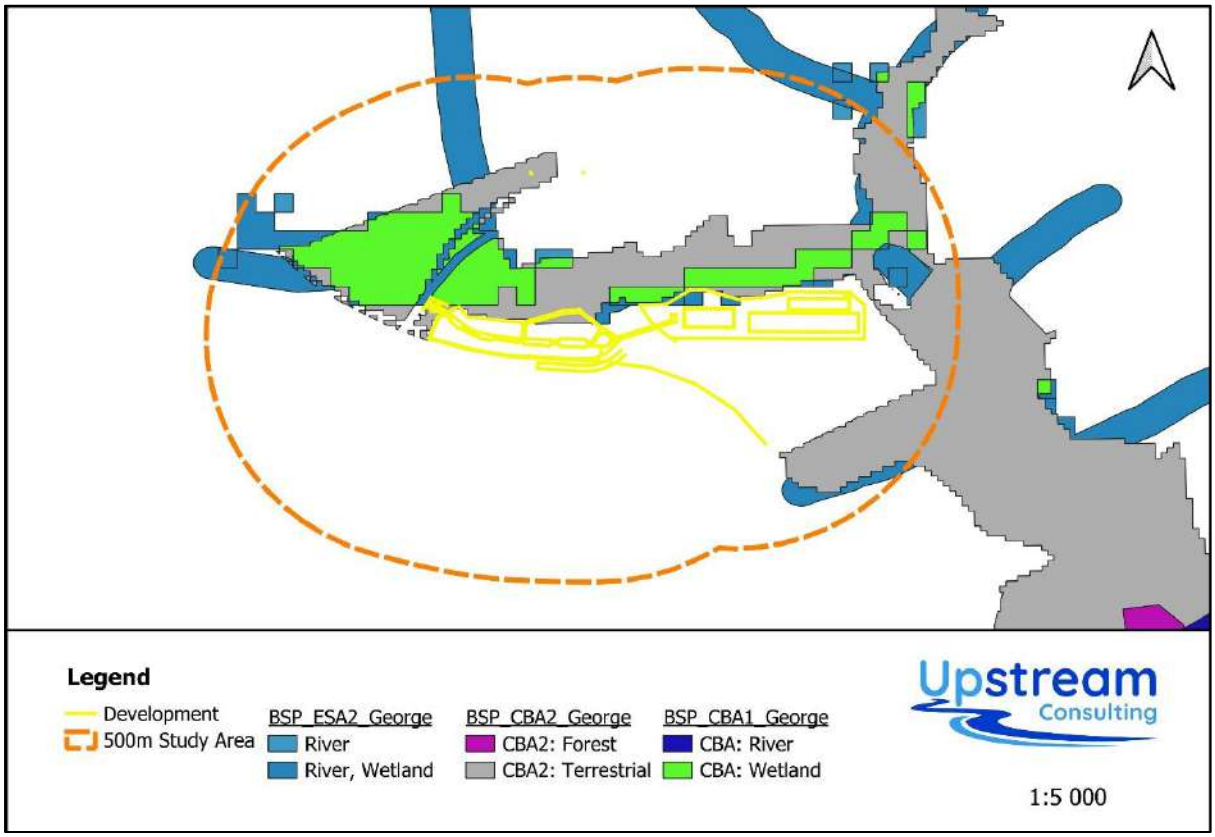



*Figure 9: Map of the site in relation to aquatic biodiversity priority areas identified in the WCBSP (Pence, 2017)*

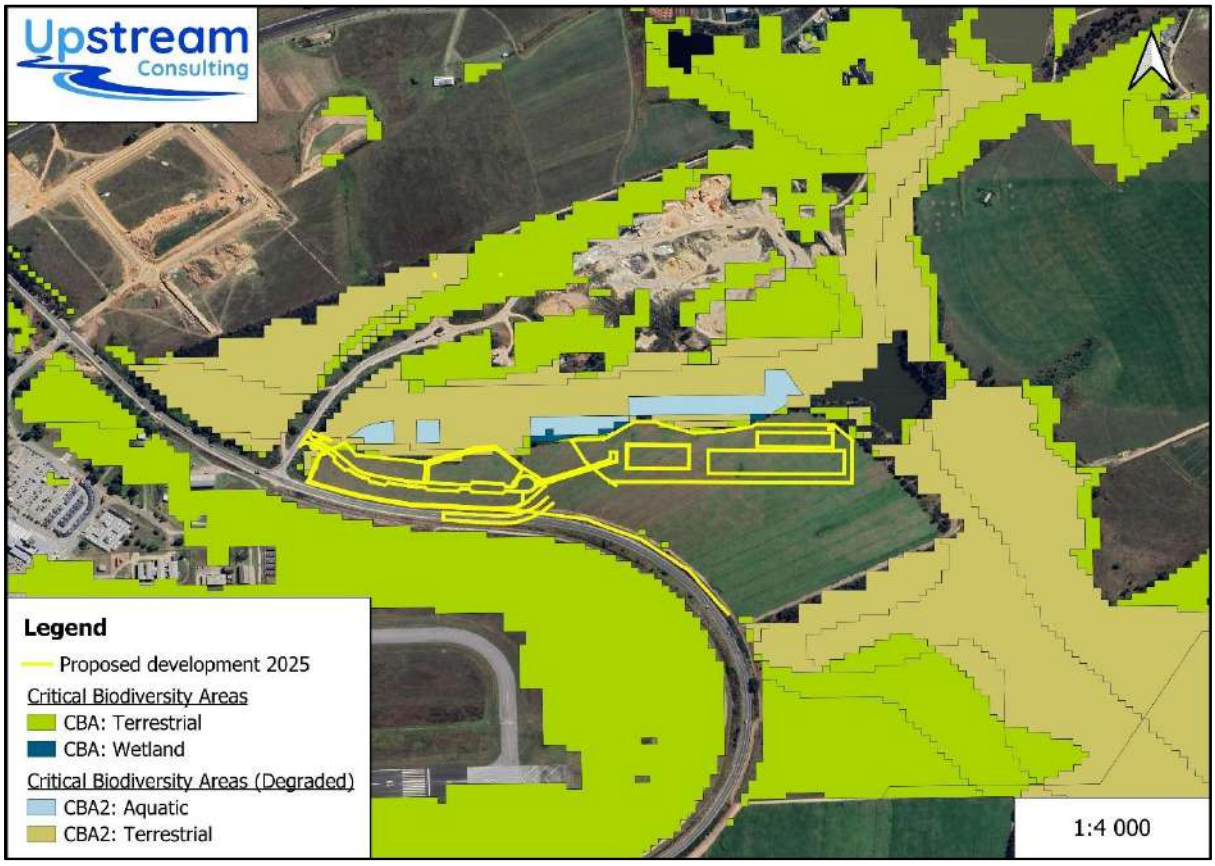



*Figure 10: Map of the site in relation to the 2023 WCBSP (CapeNature 2023)*

## 7.6 HISTORIC CONTEXT

Almost half (49.5%) of the George Local Municipality has been transformed, of which 22.9% is under intensive agriculture and 14.2% consists of plantations. The site and surrounding area have been subjected to land use cover changes for many decades. The drainage lines have been disturbed by agricultural practices and road infrastructure. Historic imagery also shows the increasing infestation of alien invasive tree species over the past decade.

Refer to Figure 11 showing aerial photography of the study area in 1957. While the airport upstream of the site, and the dam downstream of the development area are not yet constructed, the site has been cleared for agricultural use and there is limited riparian vegetation remaining. There is evidence of alien invasive trees already established within the drainage lines, of which many have been straightened.

*Figure 11: Aerial photograph of the site from 1957*

# 8 RESULTS

The aquatic habitats within a 500 metre radius of the proposed development were identified and mapped on a desktop level utilising available data. In order to identify the wetland/river types, using Kotze *et al.* (2009) and Ollis *et al*. (2013), a characterisation of hydrogeomorphic (HGM) types was conducted. Following the desktop findings, the infield site assessment (conducted in September 2024) confirmed the location and extent of these systems. Subsequent screening provided an indication of which of these systems may potentially be impacted upon by the project.

The findings are detailed in the site sensitivity report and summarised in the section below.

## 8.1 SITE ASSESSMENT

Based on the DFFE Screening Tool, the site has areas of Very High Aquatic Biodiversity sensitivity which correspond with drainage areas. This sensitivity rating was confirmed following site verification. The site verification specialist findings were informed by a site visit undertaken in September 2024.

It was determined that the majority of the development footprint is located upon the hillslope of transformed vegetation used as an irrigated pasture. Refer to Plate 1. However, there is a band of untransformed thicket and fynbos habitat (approximately 50m in width) between the field and a channelled valley bottom wetland in the drainage line downslope. Refer to Plate 2.

It was determined that there are five watercourses within the 500m radius study area. Due to their risk of being impacted by the development, only the boundaries of the downslope wetland and a critically modified seep tributary were delineated and mapped in detail. This information was then compared to historical imagery, current wetland and river inventories, critical biodiversity areas, and 1: 50 000 topocadastral surveys of the site. A baseline map of aquatic habitat was then developed (Figure 12).

*Plate 1: The proposed development site covered with irrigated pasture grasses and the trees within the drainage line downslope*

*Plate 2: The edge of the transformed field and beginning of thicket and fynbos vegetation downslope towards the valley bottom wetland – acting as an important buffer from land disturbance*

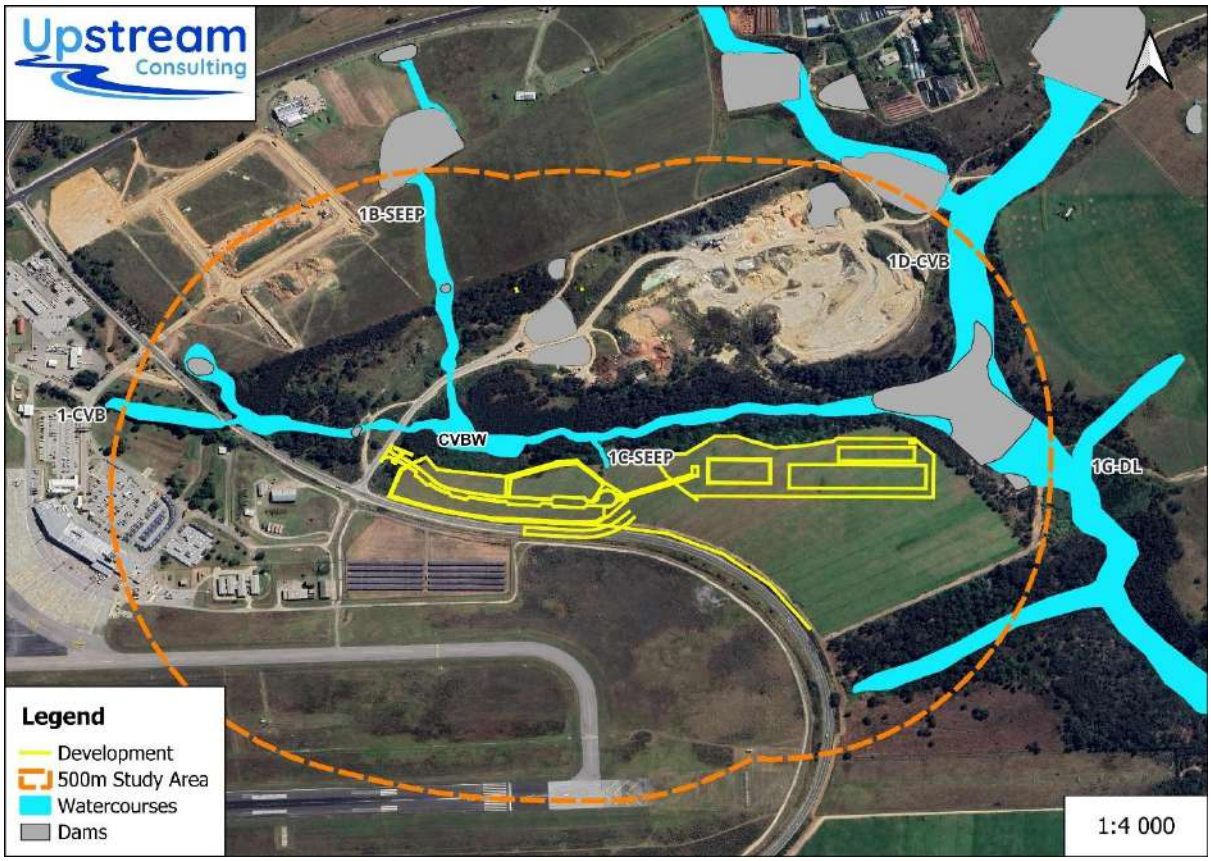



*Figure 12: Mapped aquatic habitat within the 500m radius study area relative to the development area*

The aquatic habitats within the study area were separated into hydrogeomorphic units for classification and assessment. It was determined that the HGM-1 channelled valley bottom wetland, and HGM -1C (seep wetland) are at risk of being impacted by the development. Refer to Figure 13.

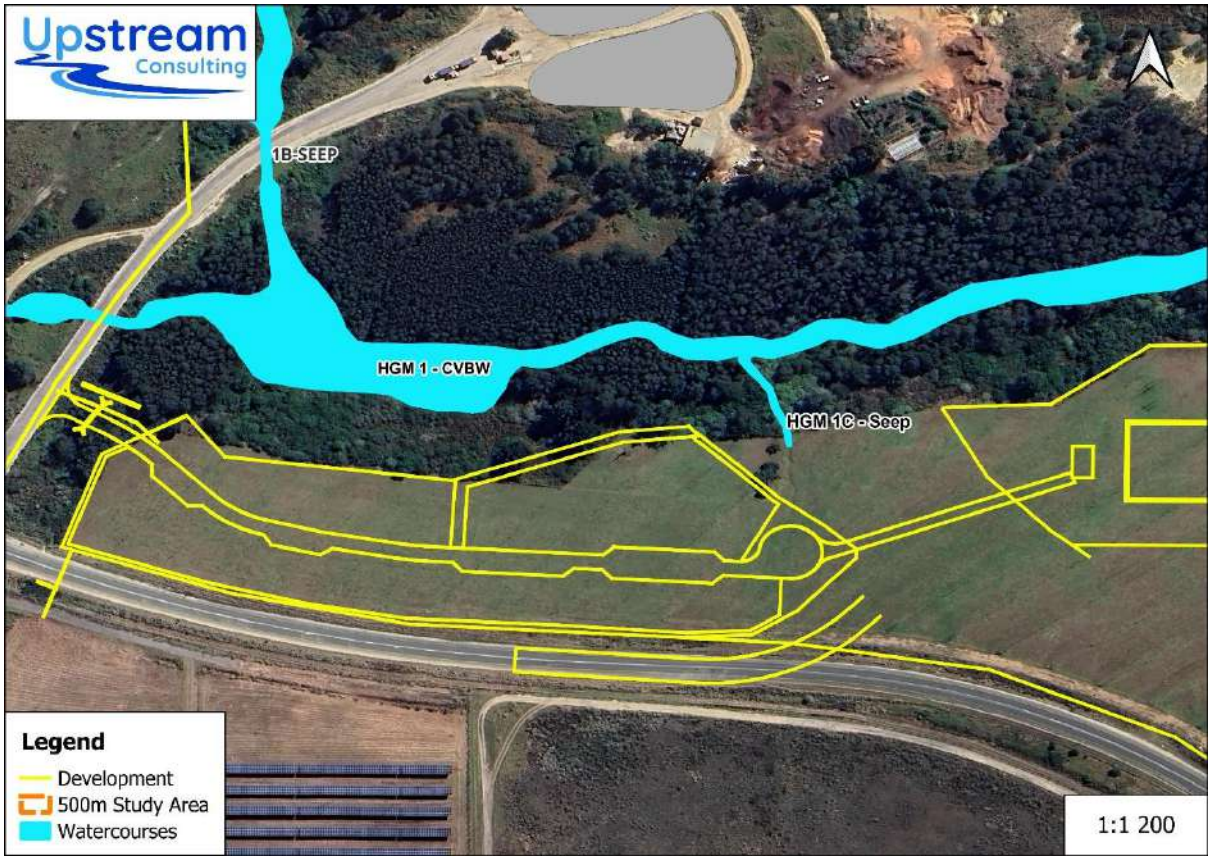



*Figure 13: Map of the delineated aquatic habitat within the study area following site verification*

## 8.2 DESCRIPTION OF AFFECTED AQUATIC HABITAT

The channelled valley bottom wetland is shown as an unchannelled system in the national wetland inventory. While this may have been the reference condition, the development in the catchment, and the infestation of alien invasive trees, has resulted in a deeply incised channel. Only a small portion of the wetland habitat remains as the integrity deteriorates in a downstream direction. However, the watercourse can supply important ecosystem services, and the present ecological state should be improved to supply these demands. Potential immediate interventions would include alien invasive species removal and stabilisation of the eroded channel. Following which, the cause of the incision could be addressed by improved stormwater management from the surrounding land uses.

The seep wetland is severely modified, and only marginal wetland characteristics remain. Due to the land transformation and habitat loss in the upper areas, a gully has formed at the confluence with the HGM1 channelled valley bottom wetland. This system provides negligible

ecosystem services but should be stabilised to prevent any further impact upon the HGM1 watercourse. This would include measures to improve stormwater management and halt erosion.

In summary, the development has potential to indirectly and directly impact upon wetland habitat within the study area. The sensitivity rating for the CVBW (HGM1) downslope of the site is High. However, the seep wetland near the site is Low. Therefore, it is important that the valley bottom wetland be avoided, rehabilitated, and afforded an aquatic buffer area. Additionally, construction and operational phase impacts, such as habitat loss and altered hydrological inputs/patterns must be mitigated against.

Refer to Plates 3 to 8 for photographs of the watercourses which will be impacted upon by the development.

*Plate 3: Remaining wetland habitat of HGM1 (dominated by reeds and sedges) downslope of the development area supported by lateral subsurface hillslope seepage as well as connectivity to the valley bottom channel.*

*Plate 4: The incised channel within the HGM1 wetland downslope of the development site*

*Plate 5: The critically modified habitat downstream on HGM1, no longer supporting wetland habitat, and dominated by Black Wattle trees and Bugweed, near the development area*

*Plate 6: The severely modified HGM1C seep wetland which joins the CVBW (HGM1) downslope via a gully*


*Plate 7: The gully at the confluence of the HGM1C seep and incised HGM1 CVBW channel*

*Plate 8: The HGM 1 CVBW channel flowing downstream of the proposed development area (deteriorating in a longitudinal direction with remaining functional wetland habitat only located upstream along the proposed road)*

### 8.2.1 PES Assessment

The Present Ecological State (PES) of a river, watercourse or wetland represents the extent to which it has changed from the reference or near pristine condition (Category A) towards a highly impacted system where there has been an extensive loss of natural habit and biota, as well as ecosystem functioning (Category E).

As discussed in the section above, the HGM1-CVBW has been subjected to habitat loss and disturbance, erosion, and alien tree species infestation. These impacts upon the watercourse have resulted in a Largely Modified state from the reference condition. Therefore, the wetland falls within the 'D' category for PES. Refer to Table 3 for a summary of PES scores for HGM1-CVBW. The recommended management objective is to improve the PES to a 'C' category.

The seep wetland is severely modified ('F' PES) with no remaining ecological functioning other than being a conduit for surface runoff from the portion of irrigated field into the CVBW downslope. EIS assessment for this HGM unit was not undertaken as it is not within an ecological state which can provide or support any significant ecosystem services to society.

*Table 3: Summary of PES assessment for HGM1-CVB*

| | Wetland PES Summary | | | |
|---|---|---|---|---|
| Wetland name | Unnamed | | | |
| Assessment Unit | HGM1 CVBW | | | |
| Wetland area (Ha) | 1,5 Ha | | | |
| PES Assessment | HYDROLOGY | GEOMORPHOLOGY | WATER QUALITY | VEGETATION |
| Impact Score | 3,9 | 6,2 | 1,5 | 5,1 |
| PES Score (%) | 61% | 38% | 85% | 49% |
| Ecological Category | C | E | B | D |
| Combined Impact Score | 4,2 | | | |
| Combined PES Score (%) | 58% | | | |
| Combined Ecological Category | D | | | |
| Hectare Equivalents | 0,9 Ha | | | |
| Confidence | Moderate to high: Site Assessment based but level 1 | | | |

### 8.2.2 EIS Assessment

Wetlands and riparian areas are globally threatened ecosystems and are well-recognized for the ecosystem services which they supply. Furthermore, these ecosystems make potentially important ecosystem services contributions to several broad-scale imperatives of government, including: water resource management; biodiversity conservation; human safety and disaster resilience; socio-economic development and poverty elimination; and climate change mitigation and adaptation. Individual wetland/riparian areas differ according to their characteristics, contexts and the particular suite of ecosystem services which they supply to society (Kotze *et al*. 2020). Thus, there is a need to assess and compare wetland/riparian areas in terms of ecosystem services delivery.

A WET-Ecoservices (Version 2) field-based assessment was undertaken to assess the ecosystem services supplied by the HGM units (Kotze *et al.* 2020). The assessment technique has recently been revised and now distinguishes clearly both ecosystem services' supply and the demand for all ecosystem services. This helps determine the potential of the wetland or river for delivering ecosystem services, by understanding its capacity to produce a service while also considering the societal demand for that service. In addition to this, the assessment also provides for demonstrating the ecosystem services associated with a 'future state'. In order to clearly indicate the potential for this wetland to provide certain ecosystem services, the rehabilitated state was used as 'future state' as opposed to a deteriorated system which would provide even fewer services.

The assessment shows that the channelled valley bottom wetland (HGM1-CVBW) has, in its present state ('D' PES), has an overall low importance, excepting for the provision of streamflow regulation (Moderately High importance) and carbon storage (Moderate importance). Refer to Table 4 and visual representation in diagram of Figure 14. However,

should the ecological state of the wetland be improved to a 'C' through rehabilitation, alien plant clearance, and improved management, then there is potential for the wetland to obtain High importance for streamflow regulation services, Moderately High importance for carbon storage, and Moderate importance for biodiversity support services. Refer to Figure 14.

*Table 4: Summary of Ecosystem Service Assessment for the channelled valley bottom wetland*

| | | Present State | | | | Future State | | | |
|---|---|---|---|---|---|---|---|---|---|
| ECOSYSTEM SERVICE | | Supply | Demand | Importance Score | Importance | Supply | Demand | Importance Score | Importance |
| REGULATING AND SUPPORTING SERVICES | Flood attenuation | 0,6 | 1,4 | 0,0 | Very Low | 0,9 | 1,4 | 0,1 | Very Low |
| | Stream flow regulation | 2,7 | 3,0 | 2,7 | Moderately High | 3,0 | 3,0 | 3,0 | High |
| | Sediment trapping | 1,0 | 1,5 | 0,3 | Very Low | 1,4 | 1,5 | 0,6 | Very Low |
| | Erosion control | 0,7 | 1,8 | 0,1 | Very Low | 1,7 | 1,8 | 1,1 | Low |
| | Phosphate assimilation | 0,9 | 1,5 | 0,2 | Very Low | 1,4 | 1,5 | 0,6 | Very Low |
| | Nitrate assimilation | 0,9 | 1,5 | 0,2 | Very Low | 1,3 | 1,5 | 0,6 | Very Low |
| | Toxicant assimilation | 1,9 | 1,5 | 1,2 | Low | 1,4 | 1,5 | 0,6 | Very Low |
| | Carbon storage | 2,0 | 2,7 | 1,8 | Moderate | 2,6 | 2,7 | 2,4 | Moderately High |
| | Biodiversity maintenance | 0,9 | 2,0 | 0,4 | Very Low | 2,7 | 2,0 | 2,2 | Moderate |
| PROVISIONING | Water for human use | 1,5 | 2,0 | 1,0 | Low | 1,5 | 2,0 | 1,0 | Low |
| | Harvestable resources | 2,0 | 0,3 | 0,7 | Very Low | 2,0 | 0,3 | 0,7 | Very Low |
| | Food for livestock | 1,5 | 2,0 | 1,0 | Low | 1,0 | 2,0 | 0,5 | Very Low |
| | Cultivated foods | 2,3 | 0,0 | 0,8 | Very Low | 1,7 | 0,0 | 0,2 | Very Low |
| CULTURAL | Tourism and Recreation | 0,8 | 0,0 | 0,0 | Very Low | 1,5 | 0,0 | 0,0 | Very Low |
| | Education and Research | 0,8 | 0,0 | 0,0 | Very Low | 2,3 | 0,7 | 1,1 | Low |
| | Cultural and Spiritual | 1,0 | 0,0 | 0,0 | Very Low | 2,0 | 0,0 | 0,5 | Very Low |

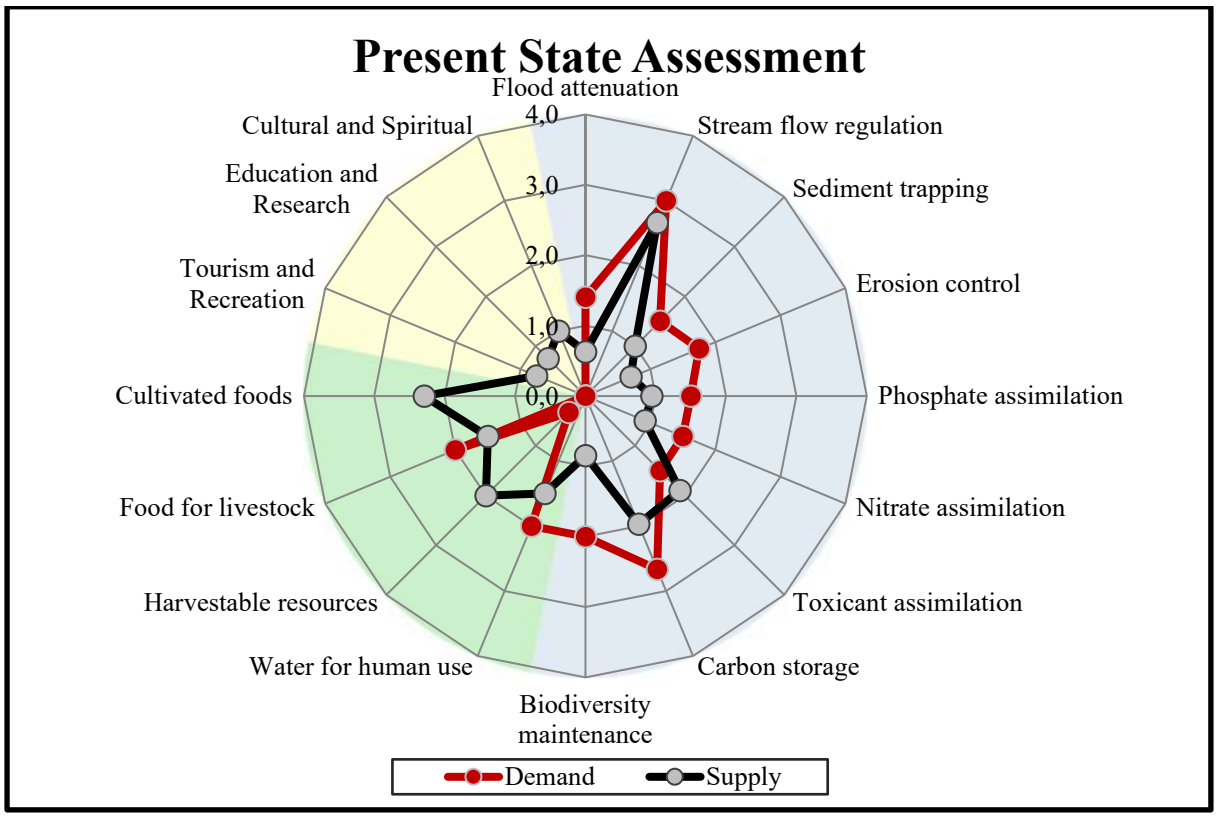



*Figure 14: Spider diagram showing the demand and supply of various ecosystem services by the CVB wetland in the present ecological state*

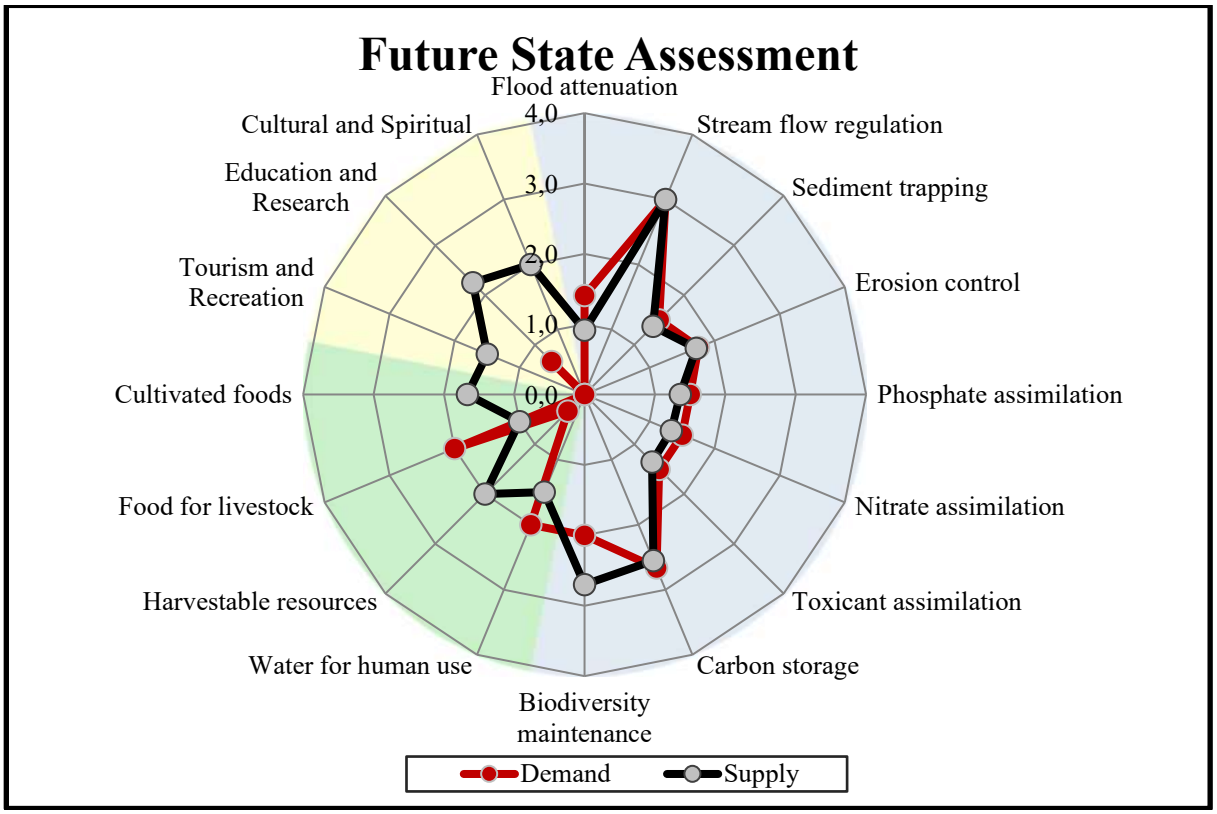



*Figure 15: Spider diagram showing the demand and supply of various ecosystem services for the CVB wetland in a future rehabilitated state*

## 8.3 AQUATIC BUFFER ZONES

In order to recommend constraints to habitat disturbance, aquatic buffer areas were determined. An aquatic impact buffer zone is defined as a zone of vegetated land designed and managed so that sediment and pollutant transport carried from source areas via diffuse surface runoff is reduced to acceptable levels (Macfarlane and Bredin 2016). Currently there are no formalised riverine or wetland buffer distances provided by the provincial authorities and as such the buffer model as described Macfarlane & Bredin (2017) for wetlands, rivers and estuaries was used.

The model recommended a 33m buffer width from the CVBW. While this buffer line can be amended in some areas to account for transformed or degraded land, it is recommended that the development activities remain 33m away from the delineated edge of riparian habitat. While the buffer tool indicates a recommended buffer of 15m from the seep, this system is severely compromised and could rather be integrated into the stormwater management system.

Refer to Tables below for the results of the buffer tool and Figure 16 below for the recommended aquatic buffer map. The buffer widths are based on the 'after mitigation' or 'with mitigation' scenario and assume that mitigation measures will be implemented and monitored.

*Table 5: Buffer tool results for HGM1 -CVBW*

| | |
|---|---|
| **Construction Phase** | **33** |
| **Operational Phase** | **24** |
| **Final aquatic impact buffer requirement** | **33** |

*Table 6: Buffer tool results for HGM1C -SEEP*

| | |
|---|---|
| **Construction Phase** | **15** |
| **Operational Phase** | **15** |
| **Final aquatic impact buffer requirement** | **15** |

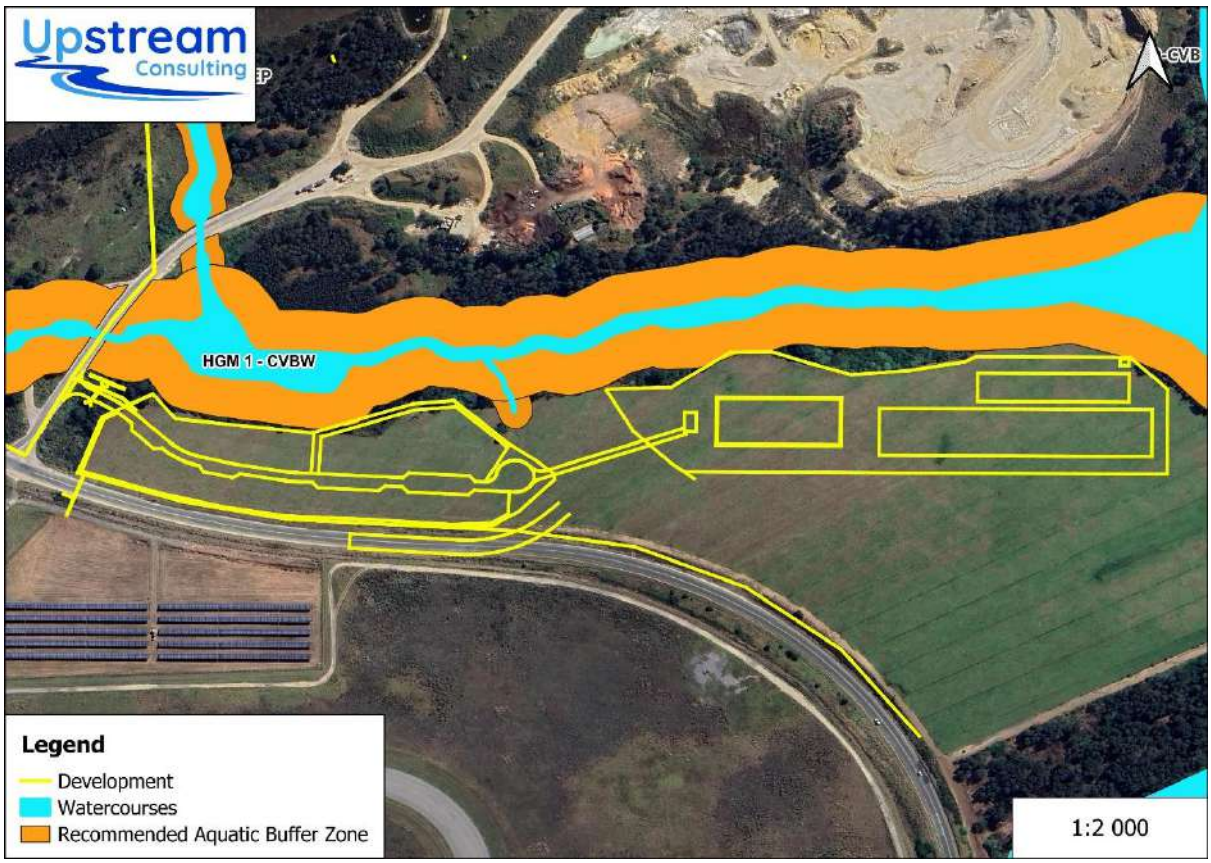



*Figure 16: Recommended aquatic buffer areas*

## 8.4 POTENTIAL IMPACTS

Aquatic ecosystems are particularly vulnerable to human activities and these activities can often result in irreversible damage or longer term, cumulative changes. The significance of an impact to the environment or ecosystem can only be assessed in terms of the change to ecosystem services, resources and biodiversity value associated with that system or component being assessed. The approach adopted is to identify and predict all potential direct and indirect impacts resulting from an activity from planning to rehabilitation. Thereafter, the impact significance is determined.

The direct and indirect impacts associated with the project were identified and grouped into four encapsulating impact categories where associated or interlinked impacts are grouped. Therefore, the potential impacts assessed, which are indirect in nature, include:

- Impact 1: Loss or disturbance of aquatic habitat and biota
- Impact 2: Alterations to the hydrological regime
- Impact 3: Sedimentation and erosion
- Impact 4: Changes to surface water quality
- Impact 5: Cumulative impacts on the aquatic resources of the area, including the Gwaing River downstream

### 8.4.1 Aquatic habitat disturbance

The disturbance or loss of aquatic vegetation and habitat refers to the direct physical destruction or disturbance of aquatic habitat caused by earthworks, vegetation clearing, and encroachment and colonisation of habitat by invasive alien plants. The development is in close proximity to the remaining wetland habitat along the valley bottom watercourse and construction has potential to physically disturb habitat. There is also potential for invasive alien plants to colonise these disturbed areas in the operational phase and out-compete indigenous vegetation. Without mitigation, the impact can result in further deterioration in freshwater ecosystem integrity, and a reduction in the supply of ecosystem services.

### 8.4.2 Hydrological changes

The project will result in changes in the quantity, timing and distribution of water inputs and flows within the downslope watercourses. The changes will be initiated during construction but are mostly experienced in the operational phase.

Hardened/artificial infrastructure will alter the natural processes of rainwater infiltration and surface runoff, promoting increased volumes and velocities of storm water runoff, which can be detrimental to watercourses receiving concentrated flows from the area. According to the SANRAL (2006), urbanisation typically increases the runoff rate by 20 -50%, compared with natural conditions. Increased volumes and velocities of storm water draining from the development and discharging into down-slope watercourses can alter the natural ecology of the systems, increasing the risk of erosion and channel incision/scouring. Stormwater management during operation will be critical in ensuring that runoff characteristics mimic the natural scenario and do not lead to increased floodpeaks and flow velocities which could lead to increased erosion and sedimentation risks that could potentially affect the downstream system. This impact can be reduced by the harvesting of rainwater and a professionally designed stormwater management plan incorporating the SUDS principles.

Apart from surface runoff, any discharge from the wastewater treatment works, constructed wetland treatment system, or storage reservoir will increase the volume of water in the valley bottom watercourse. Increasing the water supply to a watercourse from a wastewater treatment plant (WWTP) can have a variety of ecological impacts which result from hydrological alterations which lead to flow regime changes and erosion. Significant increases in water discharge can alter the natural flow regime, potentially disrupting the life cycles of aquatic organisms adapted to specific flow conditions. Increased water flow can cause erosion of riverbanks and disturb sediment balance, impacting habitats and water quality. The hydrological impacts indirectly result in biological impacts such as species composition changes and the altered conditions may provide opportunities for invasive species to establish and outcompete indigenous species. It is highly probable that the development of this catchment is resulting in increased flow and changes to flood peak in the channel.

### 8.4.3 Erosion and sedimentation

Sedimentation and erosion refers to the alteration in the physical characteristics of wetlands and rivers as a result of increased turbidity and sediment deposition, caused by soil erosion and earthworks that are associated with construction activities, as well as instability and collapse of unstable soils during project operation. These impacts can result in the deterioration of aquatic ecosystem integrity and a reduction/loss of habitat for aquatic dependent flora & fauna.

During construction, the project will require clearance of vegetation and significant earthworks on the property resulting in soil disturbance and land cover changes in the catchment. Vegetation clearing and exposure of bare soils upslope of the aquatic habitat during construction will decrease the soil binding capacity and cohesion of the upslope soils and thus increase the risk of erosion and sedimentation downslope. This may cause the burying of aquatic habitat and also cause aquatic faunal fatalities.

Ineffective site stormwater management, particularly in periods of high runoff, can lead to soil erosion from confined flows. This is evident where the vegetation of the seep has been transformed to pasture grass, the irrigation has increased water inputs, and it has resulted in a gully forming at the toe of the seep where it enters the valley bottom. This will occur along the length of the system should surface runoff be concentrated and directed towards the valley bottom. Formation of rills and gullies form from increased concentrated runoff. This increase in volume and velocity of runoff increases the particle carrying capacity of the water flowing over the surface.

Where soil erosion problems and bank stability concerns initiated during the construction phase are not timeously and adequately addressed, these can persist into the operational phase of the development project and continue to have a negative impact on downstream water resources in the study area. The increase in hardened surface by the development will be considerable and, if not mitigated against, will result in further erosion/sedimentation in the wetland. Surface runoff and velocities will be increased, and flows may be concentrated by stormwater infrastructure. Stormwater design and management during operation will be critical in ensuring that runoff characteristics mimic the natural scenario and do not lead to increased floodpeaks and flow velocities which could lead to increased erosion and sedimentation risks that could potentially affect the downstream watercourses. Erosion below any discharge outlets, stormwater or effluent, must be prevented.

### 8.4.4 Water quality

Urbanization of the catchment and its associated stormwater runoff is a threat to aquatic biodiversity not only because of the increased hydrological disturbance and habitat loss, but also because of an increased delivery of pollutants to watercourses. Water and/or soil pollution cause negative changes in the physical, chemical and biological characteristics of water resources (i.e. water quality). This can result in possible deterioration in aquatic ecosystem integrity and a reduction in, or loss of, species of conservation concern (i.e. rare,

threatened/endangered species). The result is only disturbance tolerant species remaining. Additionally, litter indirectly decreases the aesthetic value of the aquatic habitats.

During construction there are a number of potential pollution inputs into the aquatic habitat (such as hydrocarbons and raw cement). Additionally, construction on the steep slope can result in in sediments and building material being washed downslope into the water. These pollutants alter the water quality parameters such as turbidity, nutrient levels, chemical oxygen demand and pH. These alternations impact the species composition of the systems, especially species sensitive to minor changes in these parameters. Hydrocarbons including petrol/diesel and oils/grease/lubricants associated with construction activities (machinery, maintenance, storage, handling) may potentially enter the nearby watercourse by means of surface runoff or through dumping by construction workers.

In the operational phase, contaminated stormwater runoff may enter the watercourse. If contaminated stormwater runoff or sewage enters the watercourse, it can lead to eutrophication, excess plant growth causing changes to community dynamics, hypoxia (oxygen depletion) as well as inhibit the growth of bacteria that play an important role in removing nitrogen from water (and affecting the Gwaing River downstream).

The discharge of treated effluent from wastewater treatment works (WWTW) into watercourses can have several ecological, chemical, and physical impacts. The degree of impact depends on the quality of the treated effluent, the volume of discharge, the capacity of the river to assimilate the effluent, and the sensitivity of the river's ecosystem. The ecological impacts include the potential for nutrient enrichment (eutrophication) and the alteration of aquatic communities (biodiversity loss from changes in water quality and the encroachment of alien invasive plant species). Physio-chemical impacts can result from discharges altering the pH, temperature, and oxygen levels of the river, impacting the solubility and toxicity of other pollutants and affecting the health of aquatic organisms.

Additionally, if not prevented, litter, and contaminants, including sand, silt, and dirt particles, will enter storm water runoff and can pollute the downslope watercourses. Micro-litter such as cigarette butts may travel through certain stormwater grids and grids may not be regularly cleared.

Sewage infrastructure in close proximity to watercourses always poses a long-term threat to the water quality and ecological health of aquatic ecosystems due to the relatively high likelihood that surcharge events will occur at some point in the future. A complete shift in the structure and composition of aquatic biotic communities is the result, as well as a general degradation in water resource quality that could have negative impacts to human users. Pump stations and pipelines near watercourse increase the risk of surface water pollution. Therefore, when considering the services alternatives for the project, assuming that all options treat the wastewater to the same compliance level, options which localise treatment of the broader area resulting in fewer wastewater treatment works but also with the least number of pumpstations,

are preferential. Additionally, designs and technology which have a lower risk of malfunction or discharge water will reduce potential impacts. Setting such infrastructure back as far as possible from watercourses also significantly decreases the risk of pollution.

### 8.4.5 Cumulative impacts

Cumulative impacts on the environment can result from broader, long-term changes and not only as a result of a single activity. They are rather from the combined effects of many activities overtime. Rivers are longitudinal systems where different reaches interact in a continuum along the length of the river. Activities in the upper reaches influence the processes of the lower reaches and it must therefore be viewed as a whole. Watercourses are set apart from many other ecosystem types by the degree to which they integrate with and are influenced by the surrounding landscape, or catchment. The physical, chemical and biological characteristics of any river are determined almost entirely by the nature of its catchment and the activities, human and natural, that take place in it (Davies and Day 1998).

Widespread land use conversion at a catchment scale can dramatically alter the flow rates, water quality and sediment regimes of watercourses. This is the case for the study area. The catchment has been impacted by human activities for a long period of time (refer to historic imagery), largely for agriculture, quarrying, and transport infrastructure. Additionally, the drainage lines of the region are infested with alien invasive trees which, amongst other impacts, outcompete indigenous riparian vegetation and accelerate bank erosion. The cumulative impact of past activities in the catchment has resulted in wide-spread habitat degradation. The impacts have affected the entire downstream length of the system with a highly modified sediment regime and change in flood peaks all the way down to the Gwaing River mouth.

The outlook, without intervention, is the continuation of this downward trend in ecological integrity, and loss of ecosystem services, due to an increasing population and urbanisation combined with the impacts of climate change. Figure 16 shows the area mapped for proposed zoning in the Gwayang Local SDF. The area around the airport has already been earmarked for development, including this site on the eastern area of portion 110, and the Airport Business Park is currently in construction to the north. Additionally, the Western Bypass Road, and other smaller roads, are proposed to be constructed across this watercourse. Cumulatively, without any know interventions planned, these activities are going to result in water resource deterioration over time, due to direct habitat loss, and indirectly from water quantity and quality changes in the catchment. The cumulative impact of the project upon aquatic biodiversity is of medium significance.

If wastewater is not treated at the municipal treatment works, it is recommended that, to reduce cumulative impacts, that the utilities zone be developed for use of the surrounding urban activities as well as this development, instead of multiple treated effluent discharge points.

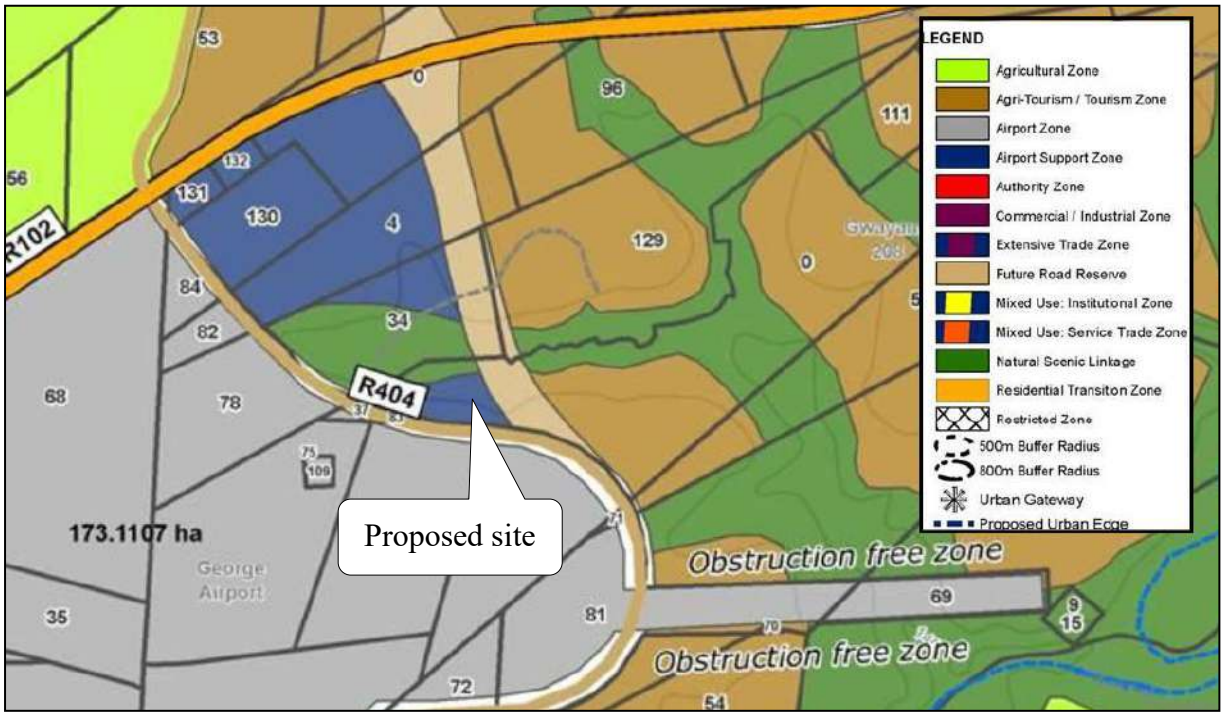



*Figure 17: Extract Gwayang Local SDF*

The recommended management objective for the watercourse is to improve the ecological state. However, this management objective conflicts with the plans for increased urban development in the area, which is already resulting in negative cumulative impacts upon water resources and aquatic biodiversity. Therefore, to counter these cumulative impacts it is important to include buffer zones in development layouts and improve the management of the remaining wetland habitats. Each development is responsible for accommodating sensitive ecological areas and managing stormwater runoff appropriately. Should all activities in the catchment adopt this approach then the cumulative risk is greatly reduced.

Due to the degraded state of some of the watercourses in the area, positive impacts are achievable should rehabilitation of watercourses be undertaken in tandem with development. The rehabilitation and monitoring of the watercourses may benefit aquatic biodiversity and the conservation of the watercourses. Rehabilitation may never achieve the pre-impacted ecological state, but it will have positive outcomes to regain some ecosystem services and processes functioning.

## 8.5 DISCUSSION OF SERVICES ALTERNATIVES:

The hydrological regime of the valley bottom wetland has already been modified, with an estimated overall increase in water inputs from irrigation and stormwater runoff in the catchment. This has largely resulted in habitat loss from erosion. Development of land to hard surfaces will further increase surface water runoff volumes and the velocity of flow into the receiving watercourses. Stormwater runoff from developments is also often released downslope through concentrated flow paths. These changes in flow quantity, timing and

patterns, can result in changes to the hydrological regime, sedimentation and erosion. Adversely, should the rainwater be harvested and surface runoff from the area captured and stored, there may be a reduction in lateral water inputs to the valley bottom wetland. However, an increase in the volume and concentration of surface runoff through localised flow paths is likely to have a more significant negative impact than any potential reduction. Therefore, the preferred alternative involving rainwater harvesting and the reuse of treated wastewater is also the preferred proposal from an aquatic biodiversity impact perspective. Additionally, these practices reduce the cumulative impact upon water resources associated with municipal water supply. Should there be any connection to Portion 4 via pipelines for water reticulation, as opposed to reticulation on Portion 110 only, there would be a slight increase in the risk of physically impacting aquatic habitat due to the need for watercourse pipeline crossings. But this additional impact can be mitigated to acceptable levels. The difference in impact significance between storing water generated from the site and surrounding area in the utilities area or whether it is just captured and stored in a smaller reservoir on the industrial zoned site, is deemed as negligible.

The consolidation of the treatment facility of wastewater from the larger area at one locality, whether in the utilities area or Portion 4, is supported. Two discharge points into one watercourse is discouraged.

# 9 IMPACT SIGNIFICANCE

It was determined that, after mitigation, the overall impacts associated with the project are of **Low to Medium** negative significance to aquatic biodiversity. Refer to impact tables below, as well as impact assessment methodology in Appendix 2. The No-Go Alternative was determined to have no new impacts upon aquatic biodiversity, but the trajectory of change is poor without rehabilitation.

There are no fatal flaws associated with the latest layout, as it has adopted a buffer zone and included additional stormwater management measures. Mitigation must focus on preventing:

- physical disturbance of the buffer zone and wetland during construction activities,
- sediment-laden/ contaminated stormwater runoff from entering the watercourse,
- erosion from concentrated, high-velocity flow paths at stormwater outlets or discharge points,
- increased stormwater runoff from entering the watercourse from hardened surfaces, and,
- untreated or poor-quality wastewater from being discharged into the buffer or watercourse itself.

Table 7: Impact assessment summary for Impact 1 – Disturbance of aquatic habitat biota

| **Impact Phase:** Construction phase | | | | | |
|---|---|---|---|---|---|
| **Nature of the impact**: The disturbance of aquatic vegetation and habitat refers to direct physical destruction or disturbance which can result in further deterioration in freshwater ecosystem integrity, and a reduction in the supply of ecosystem services. | | | | | |
| **Description of Impact:** Habitat disturbance / degradation due to construction activities entering the buffer area accidentally or material falling downslope and burying habitat. | | | | | |
| Impact Status: Negative | | | | | |
| | E | D | R | M | P |
| Without Mitigation | Local | Long-term | Recoverable | Moderate | Probable |
| Score | 2 | 4 | 3 | 3 | 3 |
| With Mitigation | Site | Medium-term | Reversible | Low | Low probability |
| Score | 1 | 3 | 1 | 2 | 2 |
| Significance Calculation | Without Mitigation | | With Mitigation | | |
| S=(E+D+R+M)*P | Medium Impact (36) | | Low Impact (14) | | |

Table 8: Impact assessment summary for Impact 2 – Changes to the hydrological regime

| **Impact Phase:** Operation | | | | | |
|---|---|---|---|---|---|
| **Nature of the impact**: Possible increase in surface water runoff/ patterns on form and function during the construction and into the operational phase, i.e. changes to the hydrological regime. The impact can result in further deterioration in freshwater ecosystem integrity, and a reduction in the supply of ecosystem services. | | | | | |
| **Description of Impact:** The increase in hard surface areas, and changes to the microtopography of the site, will increase concentrated surface water runoff toward the watercourse. Poor stormwater management could result in localised changes to flows (volume) that would result in form and function changes within aquatic habitat. Additionally, treated wastewater will be discharged towards the valley bottom and increase channel hydroperiod. | | | | | |
| Impact Status: Negative | | | | | |
| | E | D | R | M | P |
| Without Mitigation | Local | Permanent | Recoverable | Moderate | Highly probable |
| Score | 2 | 5 | 3 | 3 | 4 |
| With Mitigation | Local | Permanent | Reversible | Low | Probable |
| Score | 2 | 5 | 1 | 2 | 3 |
| Significance Calculation | Without Mitigation | | With Mitigation | | |
| S=(E+D+R+M)*P | Medium Impact (52) | | Low Impact (30) | | |

Table 9: Impact assessment summary for Impact 3 – Sedimentation and erosion

| **Impact Phase:** Construction and Operation | | | | | |
|---|---|---|---|---|---|
| **Nature of the impact**: Changes to hydrological regimes that could also lead to sedimentation and erosion, that could also occur in the operational phase. These impacts can result in the deterioration of aquatic ecosystem integrity and a reduction/loss of habitat for flora & fauna. | | | | | |
| **Description of Impact:** Construction near the watercourse and concentrated stormwater flow paths and altered flow patterns causing increased erosion and sedimentation. Mitigation assumes adoption of buffers and appropriate stormwater management. | | | | | |
| Impact Status: Negative | | | | | |
| | E | D | R | M | P |
| Without Mitigation | Local | Long term | Irrecoverable | Moderate | Highly likely |
| Score | 2 | 4 | 5 | 3 | 4 |
| With Mitigation | Local | Medium term | Recoverable | Low | Probable |
| Score | 2 | 3 | 3 | 2 | 3 |
| Significance Calculation | Without Mitigation | | With Mitigation | | |
| S=(E+D+R+M)*P | Medium Impact (56) | | Low Impact (30) | | |

Table 10: Impact assessment summary for Impact 4 –Changes to surface water quality

| **Impact Phase:** Construction and Operation | | | | | |
|---|---|---|---|---|---|
| **Nature of the impact**: Potential impact on localised surface water quality | | | | | |
| **Description of Impact:** During all phases of the project there is potential for surface runoff to be contaminated and enter the watercourses, especially during flood events. The discharge of treated wastewater will alter the water characteristics. This can result in possible deterioration in aquatic ecosystem integrity and species diversity. | | | | | |
| Impact Status: Negative | | | | | |
| | E | D | R | M | P |
| Without Mitigation | Regional | Permanent | Recoverable | High | High probability |
| Score | 3 | 5 | 3 | 4 | 4 |
| With Mitigation | Local | Permanent | Reversible | Moderate | Probable |
| Score | 2 | 5 | 1 | 3 | 3 |
| Significance Calculation | Without Mitigation | | With Mitigation | | |
| S=(E+D+R+M)*P | Medium Impact (60) | | Medium Impact (33) | | |

Table 11: Cumulative impact assessment for aquatic biodiversity

| **Cumulative Impact:** Cumulative impacts on the aquatic resources of the area | | | | | |
|---|---|---|---|---|---|
| **Description of Cumulative Impact:** Increased urban development is resulting in local habitat loss and changing the hydrology and water quality of the catchment. Mitigation assumes the implementation of buffer zones, stormwater management plans, and best practice wastewater handling. | | | | | |
| Impact Status: Negative | | | | | |
| | E | D | R | M | P |
| Without Enhancement | Regional | Permanent | Recoverable | Moderate | Highly Probable |
| Score | 3 | 5 | 3 | 3 | 4 |
| With Enhancement | Local | Permanent | Recoverable | Low | Probable |
| Score | 2 | 5 | 3 | 2 | 3 |
| Significance Calculation | Without Enhancement | | With Enhancement | | |
| S=(E+D+R+M)*P | Medium Impact (56) | | Medium Impact (36) | | |

# 10 MITIGATION

The mitigation of negative impacts on biodiversity and ecosystem goods and services is a legal requirement for authorisation purposes and must take on different forms depending on the significance of the impact and the specific area being affected. Mitigation requires the adoption of the precautionary principle and proactive planning that is enabled through a mitigation hierarchy. Its application is intended to strive to first avoid disturbance of ecosystems and loss of biodiversity, and where this cannot be avoided altogether, to minimise, rehabilitate, and then finally offset any remaining significant residual negative impacts on biodiversity (DEA 2013). Any potential risks must be managed and mitigated to ensure that no deterioration to the water resource takes place. Standard management measures should be implemented to ensure that any on-going activities do not result in a decline in water resource quality.

Mitigation measures related to the impacts associated with the activities are intended to augment standard/generic mitigation measures included in the project-specific Environmental Management Programme (EMP). The monitoring of the activities is essential to ensure the mitigation measures are implemented. Therefore, compliance with the mitigation recommendations must be audited by a suitably qualified independent Environmental Control Officer with an appropriately timed audit report. Monitoring during construction should focus on adherence to the aquatic buffer zone (No-Go area) and sediment control, while water quality monitoring should be the focus of operational phase monitoring. Refer to Appendix 3 for a draft monitoring plan.

## 10.1 WATER POLLUTION MITIGATION

- Ensure that the WWTW complies with all relevant water quality standards and regulations. Regular inspections and audits by regulatory authorities can enforce compliance and identify any areas needing improvement. Also refer to Appendix 3 for draft monitoring plan guidelines.
- Habitat restoration of the wetland through alien plant eradication and halting erosion.
- Using the best possible technology and designs for wastewater treatment.
- The reuse of the effluent, recommended above, will also contribute to mitigating against cumulative water quality and quantity change impacts.
- The Department of Water Affairs regional office should be notified, as soon as possible, of any significant chemical spill or leakage to the environment where there is the potential to contaminate surface water or groundwater.
- Stormwater exit points must include a best management practice approach to trap any additional suspended solids and pollutants originating from the proposed development. Also include the placement of stormwater grates (or similar). The use of grease traps/oil separators to prevent pollutants from entering the environment from stormwater is recommended. To ensure the efficiency of these, they must be regularly maintained.
- Inlet protection measures to capture solid waste and debris entrained in storm water entering the storm water management system (inlet protection devices) will be incorporated into the design of the system and could include the use of either curb inlet/inlet drain grates and/or debris baskets/bags.
- It is also important to note that storm water infrastructure will likely require regular on-going maintenance in the form of silt, debris/litter clearing in order to ensure their optimal functioning.
- If there are pump stations, reasonable measures must be taken to provide back-up for mechanical, electrical, operational or process failure and malfunction at pump stations. At a minimum there should be an alarm system to warn of an electrical failure and sufficient standby equipment to provide for reasonable assurance that the infrastructure can be fully functional within at least 24 hours. Emergency power shall be provided that will prevent overflows from occurring during any power outage. Installing permanent generators at each station is strongly advised.
- Pump stations will need to be placed within a suitably lined, impermeable concrete bunded area with the capacity to hold untreated waste water in an emergency and provide for sufficient time for maintenance staff to address any faults/ problems. This is to limit the risk of untreated sewage overflowing in the event of any leakage or accidental spillage at the pump station.
- Implement continuous monitoring systems to regularly check the quality of the treated effluent
- Establish strict maintenance protocols to ensure that all treatment equipment and infrastructure are functioning optimally, preventing any bypass or failure in the treatment process.
- Develop and implement emergency response plans to address accidental discharges or treatment failures. This includes having backup systems in place and protocols for immediate action to contain and mitigate any potential impacts on the river.

## 10.2 SEDIMENTATION AND EROSION MITIGATION

- The stormwater management infrastructure must be designed to ensure the runoff from the development is not contaminated before entering the surrounding area. Effective stormwater management must include effective stabilisation of exposed soil.
- Stabilise any erosion features upslope of watercourses and do not concentrate flows into wetland
- Prevent erosion at outlet and design structure accordingly
- Do not encroach into wetland habitat with excavations or drains
- Sedimentation must be minimised with appropriate measures. Any construction causing bare slopes and surfaces to be exposed to the elements must include measures to protect against erosion using covers, silt fences, sandbags, earthen berms etc.
- All stockpiles must be protected and located in flat areas where run-off will be minimised and sediment recoverable.
- Construction must have contingency plans for high rainfall events during construction. Even in the operational phase, measures to contain impacts caused during high rainfall events must be planned for and available for use.
- It is encouraged that a river rehabilitation plan and alien plant control programme be compiled to ensure that the buffer area is revegetated with indigenous plant species in the correct manner. The area must be maintained through alien invasive plant species removal (which is the landowner's responsibility regardless of mitigation associated with this project) and the establishment of indigenous vegetation cover to filter run-off before it enters the aquatic habitat.

## 10.3 MITIGATION OF HYDROLOGICAL CHANGES

- A stormwater management plan must be developed in the preconstruction phase, detailing the stormwater structures and management interventions that must be installed to manage the changes to surface water flows.
- When developing a stormwater management plan for the site, it will be critical that due consideration is given to the collection and treatment of stormwater prior to discharge into the natural environment. It is therefore recommended that the stormwater management plan be developed with appropriate ecological input and be developed based on Sustainable Drainage Systems (SUDS). The SUDS systems attempt to maintain or mimic the natural flow systems as well as prevent the wash-off of urban pollutants to receiving waters.
- Soft infrastructure must be considered where practical. For example, permeable surfaces can be done via permeable concrete block pavers (such as Amorflex), brick pavers, stone chip, and gravel and may contribute to slowing surface flows (especially if maintained). Baffles in the stormwater conduits are effective. Stormwater managed by the development could be discharged into porous channels / swales ('infiltration channels or basins') running near parallel or parallel to contours within and along the edge of the development. This will provide for some filtration and removal of urban pollutants (e.g. oils and hydrocarbons), provide some attenuation by increasing the time runoff takes to reach low points, and reduce the energy of storm water flows within the stormwater system through increased roughness when compared with pipes and concrete V-drains.

- The stormwater management infrastructure must be designed to ensure the runoff from the development is not highly contaminated or concentrated before entering the surrounding area. Any stormwater retention ponds or berms must be located outside of the buffer area.
- The adoption of the 33m aquatic buffer zone between the development infrastructure and HGM1.
- Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil. Contingency plans must be in place for high rainfall events which may occur during construction.
- If flower/plant beds are to be established adjacent to hard surfaces, then these should be designed to receive storm water from hardened surfaces and should be planted with robust indigenous species that to contribute to storm water management objectives.
- Storm water should be harvested onsite from roofed surfaces thus reducing the quantity (volume) of water received by downstream water resources as surface flow.
- The project will need to comply with all regulations of the National Water Act (Act 36 of 1998), including the protection of downstream users, and minimise any potential ecological impacts upon water resources.

## 10.4 MITIGATION OF AQUATIC HABITAT DISTURBANCE

- A construction method statement must be compiled and available on site. It must consider the buffer zone and include methods to avoid unnecessary disturbance and prevent material being washed downslope into the river.
- The edges of the development area relative to the aquatic habitat must be clearly staked-out and demarcated prior to construction commencing.
- Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- Access to and from the development area should be either via existing roads or within the construction servitude. Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.
- Following construction, it is important to stabilise any steep, bare areas on the slope and river banks via geotextiles and/or revegetation.
- It is the contractor's responsibility to continuously monitor the area for newly established alien species during the contract and establishment period, which if present must be removed. Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas. Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use.
- Where vegetation has been cleared in the buffer and open ground in the riparian area has resulted (i.e. where indigenous vegetation has been replaced by dense alien plant infestations), it is recommended that cover components be reinstated appropriately. Only indigenous species are to be considered.
- Refer to Draft Monitoring Plan in Appendix 3.

# 11 CONCLUSION

An aquatic impact assessment was conducted in November 2024 for the proposed development of a light industrial zone on the Remainder of Portion 110 of Farm Gwayang No. 208, in George. The initial assessment evaluated the potential impacts of the proposed development on identified aquatic habitats, including an incised channelled valley bottom wetland and severely modified seep wetlands. The assessment highlighted key concerns such as habitat loss, hydrological changes, erosion, and water quality impacts, and it provided mitigation recommendations to minimise these risks.

Based on the findings and recommendations of the November 2024 assessment and several project meetings, changes have been made to the development proposal, including removing infrastructure from the wetland and buffer areas in the layout. The new site development plan was reviewed and assessed for aquatic biodiversity impacts. It was determined that, after mitigation, the overall impacts associated with the new layout are of **Low to Medium** negative significance to aquatic biodiversity.

There are no fatal flaws associated with the latest layout, as it has adopted a buffer zone and included additional stormwater management measures. Mitigation must focus on preventing:

- physical disturbance of the buffer zone and wetland during construction activities,
- sediment-laden/ contaminated stormwater runoff from entering the watercourse,
- erosion from concentrated, high-velocity flow paths at stormwater outlets or discharge points,
- increased stormwater runoff from entering the watercourse from hardened surfaces, and,
- untreated or poor-quality wastewater from being discharged into the buffer or watercourse itself.

Provided that recommended mitigation measures are adhered to, the development is deemed as acceptable by the specialist.

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# APPENDIX 1 –DETAILED METHODOLOGY

For reference the following definitions are as follows:

- **Drainage line**: A drainage line is a lower category or order of watercourse that does not have a clearly defined bed or bank. It carries water only during or immediately after periods of heavy rainfall i.e. non-perennial, and riparian vegetation may not be present.
- **Perennial and non-perennial:** Perennial systems contain flow or standing water for all or a large proportion of any given year, while non-perennial systems are episodic or ephemeral and thus contains flows for short periods, such as a few hours or days in the case of drainage lines.
- **Riparian**: the area of land adjacent to a stream or river that is influenced by stream-induced or related processes. Riparian areas which are saturated or flooded for prolonged periods would be considered wetlands and could be described as riparian wetlands. However, some riparian areas are not wetlands (e.g. an area where alluvium is periodically deposited by a stream during floods but which is well drained).
- **Wetland**: 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 under normal circumstances supports or would support vegetation typically adapted to life in saturated soil (Water Act 36 of 1998); land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants and animals living at the soil surface (Cowardin *et al*., 1979).
- **Water course**: as per the National Water Act means -

(a) a river or spring;
(b) a natural channel in which water flows regularly or intermittently;
(c) a wetland, lake or dam into which, or from which, water flows; and
(d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks

## 12.1 WETLAND DELINEATION AND HGM TYPE IDENTIFICATION

Wetland delineation includes the confirmation of the occurrence of wetland and a determination of the outermost edge of the wetland. The outer boundary of wetlands was identified and delineated according to the Department of Water Affairs wetland delineation manual 'A Practical Field Procedure for Identification and Delineation of Wetland and Riparian Areas' (DWAF, 2005a). Wetland indicators were used in the field delineation of the wetlands: position in landscape, vegetation and soil wetness (determined through soil sampling with a soil auger and the examining the degree of mottling).

Four specific wetland indicators were used in the detailed field delineation of wetlands, which include:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur.
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation.
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

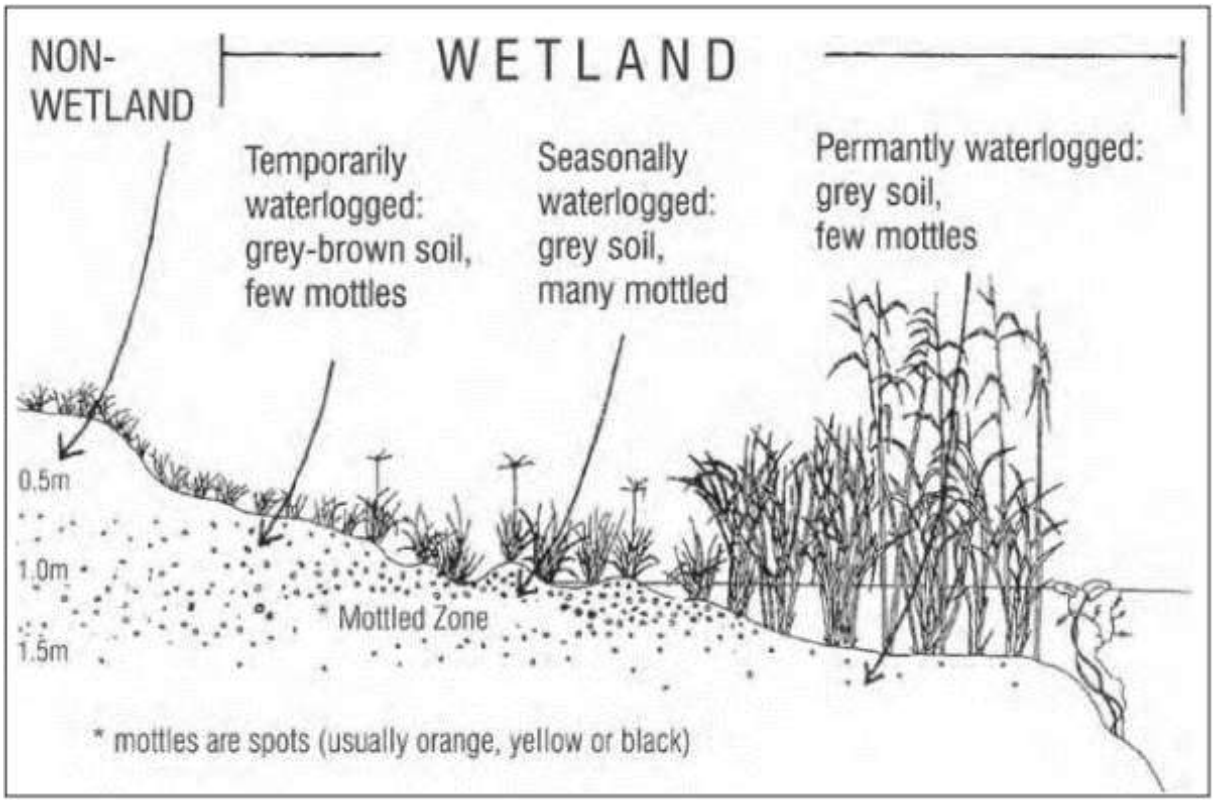


Figure A12.1a: Cross section through a wetland, indicating how the soil wetness and vegetation indicators change as one moves along a gradient of decreasing wetness, from the middle to the edge of the wetland. Source: Donovan Kotze, University of KwaZulu-Natal.

According to the wetland definition used in the National Water Act, vegetation is the primary indicator, which must be present under normal circumstances. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role. The reason is that vegetation responds relatively quickly to changes in soil moisture regime or management and may be transformed; whereas the morphological indicators in the soil are far more permanent and will hold the signs of frequent saturation long after a wetland has been drained (perhaps for several centuries).

The permanent, seasonal and temporary wetness zones can be characterised to some extent by the soil wetness indicators that they display (Table A12.1a)

A12.1a: Soil Wetness Indicators in the various wetland zones

| Temporary Zone | Seasonal Zone | Permanent Zone |
|---|---|---|
| Minimal grey matrix (<10%) | Grey matrix (<10%) | Prominent grey matrix |
| Few high chroma mottles | Many low chroma mottles present | Few to no high chroma mottles |
| Short periods of saturation (less than three months per annum) | Significant periods of wetness (at least three months per annum) | Wetness all year round (possible sulphuric odour) |

Table A12.1b: Relationship between wetness zones and vegetation types and classification of plants according to occurrence in wetlands

| Vegetation | Temporary Wetness Zone | Seasonal Wetness Zone | Permanent Wetness Zone |
|---|---|---|---|
| Herbaceous | Predominantly grass species; mixture of species which occur extensively in non-wetland areas, and hydrophilic plant species which are restricted largely to wetland areas | Hydrophilic sedges and grasses restricted to wetland areas | Dominated by: (1) emergent plants, including reeds (*Phragmites australis*), a mixture of sedges and bulrushes (Typha capensis), usually >1m tall; or (2) floating or submerged aquatic plants. |
| Woody | Mixture of woody species which occur extensively in non-wetland areas, and hydrophilic plant species which are restricted largely to wetland areas. | Hydrophilic woody species restricted to wetland areas | Hydrophilic woody species, which are restricted to wetland areas. Morphological adaptations to prolonged wetness (e.g. prop roots). |
| Symbol | Hydric Status | Description/Occurrence | |
| Ow | Obligate wetland species | Almost always grow in wetlands (>90% occurrence) | |
| Fw/F+ | Facultative wetland species | Usually grow in wetlands (67-99% occurrence) but occasionally found in non-wetland areas | |
| F | Facultative species | Equally likely to grow in wetlands (34-66% occurrence) and non-wetland areas | |
| Fd/F- | Facultative dryland species | Usually grow in non-wetland areas but sometimes grow in wetlands (1-34% occurrence) | |
| D | Dryland species | Almost always grow in drylands | |

In order to identify the wetland types, using Kotze *et al.* (2009) and Ollie *et al*. (2013), a characterisation of hydrogeomorphic (HGM) types was conducted. These have been defined based on the geomorphic setting of the wetland in the landscape (e.g. hillslope or valley bottom, whether drainage is open or closed), water source (surface water dominated or sub-surface water dominated), how water flows through the wetland (diffusely or channelled) and how water exits the wetland (Figure A12.1b).

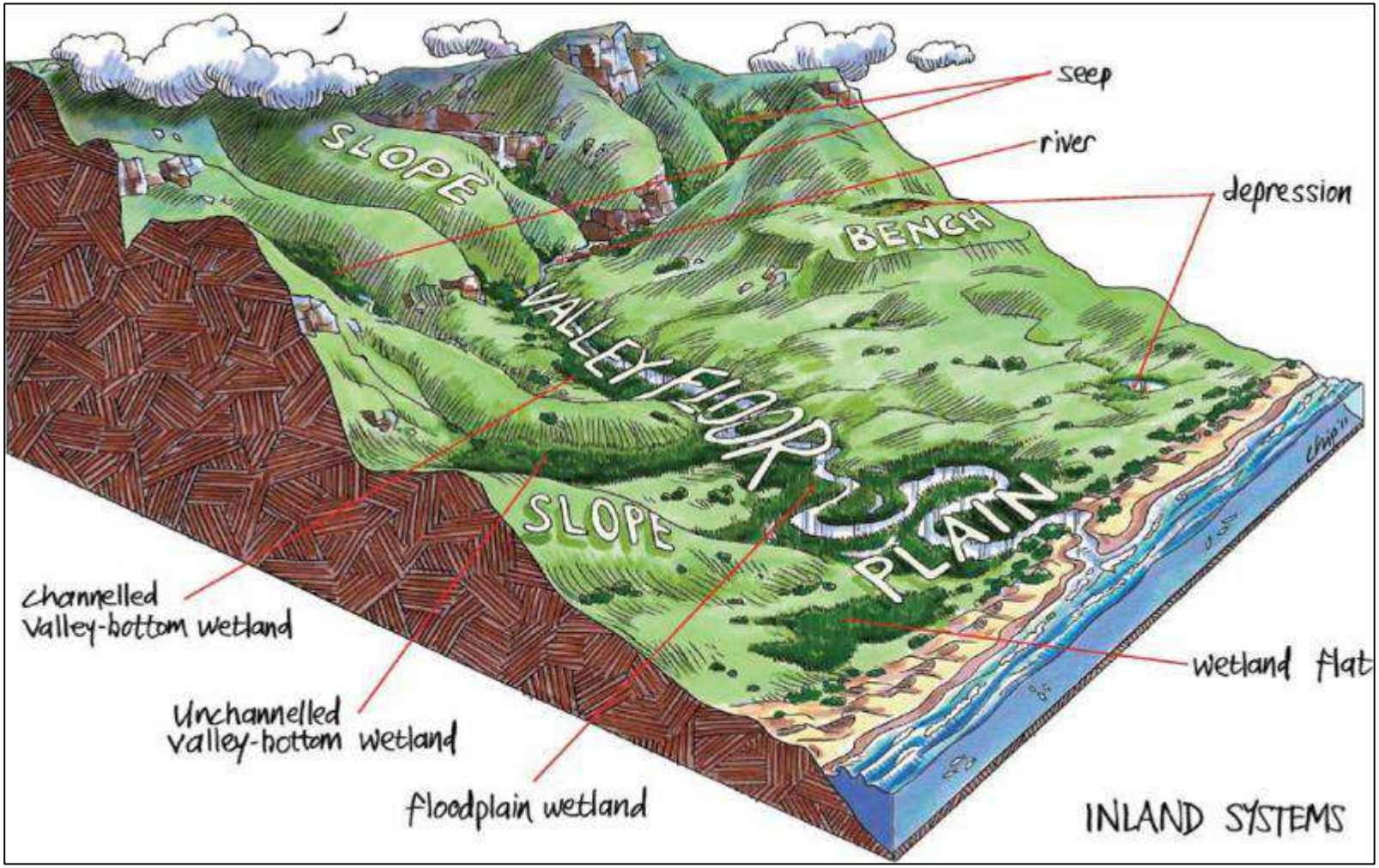


Figure A12.1b: Illustration of wetland types and their typical landscape setting (From Ollie et al. 2013)

## 12.2 DELINEATION OF RIPARIAN AREAS

Riparian zones are described as “the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent areas” i , Riparian zones can be thus be distinguished from adjacent terrestrial areas through their association with the physical structure (banks) of the river or stream, as well as the distinctive structural and compositional vegetation zones between the riparian and upland terrestrial areas (Figure 12.2a). Unlike wetland areas, riparian zones are usually not saturated for a long enough duration for redoxymorphic features to develop. Riparian zones instead develop in response to (and are adapted to) the physical disturbances caused by frequent overbank flooding from the associated river or stream channel.

Like wetlands, riparian areas can be identified using a set of indicators. The indicators for riparian areas are: - **Landscape position**; - Alluvial soils and recently deposited material; - **Topography** associated with riparian areas; and - **Vegetation** associated with riparian areas. Landscape Position As discussed above, a typical landscape can be divided into 5 main units), namely the: - Crest (hilltop); - Scarp (cliff); - Midslope (often a convex slope); - Footslope (often a concave slope); and - Valley bottom. Amongst these landscape units, riparian areas are only likely to develop on the valley bottom landscape units (i.e. adjacent to the river or stream channels; along the banks comprised of the sediment deposited by the channel). Alluvial soils are soils derived from material deposited by flowing water, especially in the valleys of large rivers. Riparian areas often, but not always, have alluvial soils. Whilst the presence of alluvial soils cannot always be used as a primary indicator to accurately delineate riparian areas, it can be used to confirm the topographical and vegetative indicators. Quaternary alluvial soil deposits are often indicated on geological maps, and whilst the extent of these quaternary alluvial deposits usually far exceeds the extent of the contemporary riparian zone; such indicators are useful in identifying areas of the landscape where wider riparian zones may be expected to occur.

Topography and recently deposited material associated with riparian areas The National Water Act definition of riparian zones refers to the structure of the banks and likely presence of alluvium. A good indicator of the presence of riparian zones is the presence of alluvial deposited material adjacent to the active channel (such as benches and terraces), as well as the wider incised “macro-channels” which are typical of many of southern Africa’s eastern seaboard rivers. Recently deposited alluvial material outside of the main active channel banks can indicate a currently active flooding area; and thus the likely presence of wetlands. Vegetation associated with riparian areas unlike the delineation of wetland areas, where redoxymorphic features in the soil are the primary indicator, the identification of riparian areas relies heavily on vegetative indicators. Using vegetation, the outer boundary of a riparian area can be defined as the point where a distinctive change occurs: - in species composition relative to the adjacent terrestrial area; and - in the physical structure, such as vigour or robustness of

growth forms of species similar to that of adjacent terrestrial areas. Growth form refers to the health, compactness, crowding, size, structure and/or numbers of individual plants.

As with the delineation approach for wetlands, the field delineation method for riparian areas focuses on two main indicators of riparian zones: - **Vegetation Indicators**, and - **Topography** of the banks of the river or stream.

Additional verification can be obtained by examining for any recently alluvial deposited material to indicate the extent of flooding and thus obtain at least a minimum riparian zone width. The following procedure should be used for delineation of riparian zones: A good rough indicator of the outer edge of the riparian areas is the edge of the macro channel bank. This is defined as the outer bank of a compound channel, and should not be confused with the active river or stream channel bank. The macro-channel is an incised feature, created by uplift of the subcontinent which caused many rivers to cut down to the underlying geology and creating a sort of "restrictive floodplain" within which one or more active channels flow. Floods seldom have any known influence outside of this incised feature. Within the macro-channel, flood benches may exist between the active channel and the top of the macro channel bank. These depositional features are often covered by alluvial deposits and may have riparian vegetation on them. Going (vertically) up the macro channel bank often represents a dramatic decrease in the frequency, duration and depth of flooding experienced, leading to a corresponding change in vegetation structure and composition.

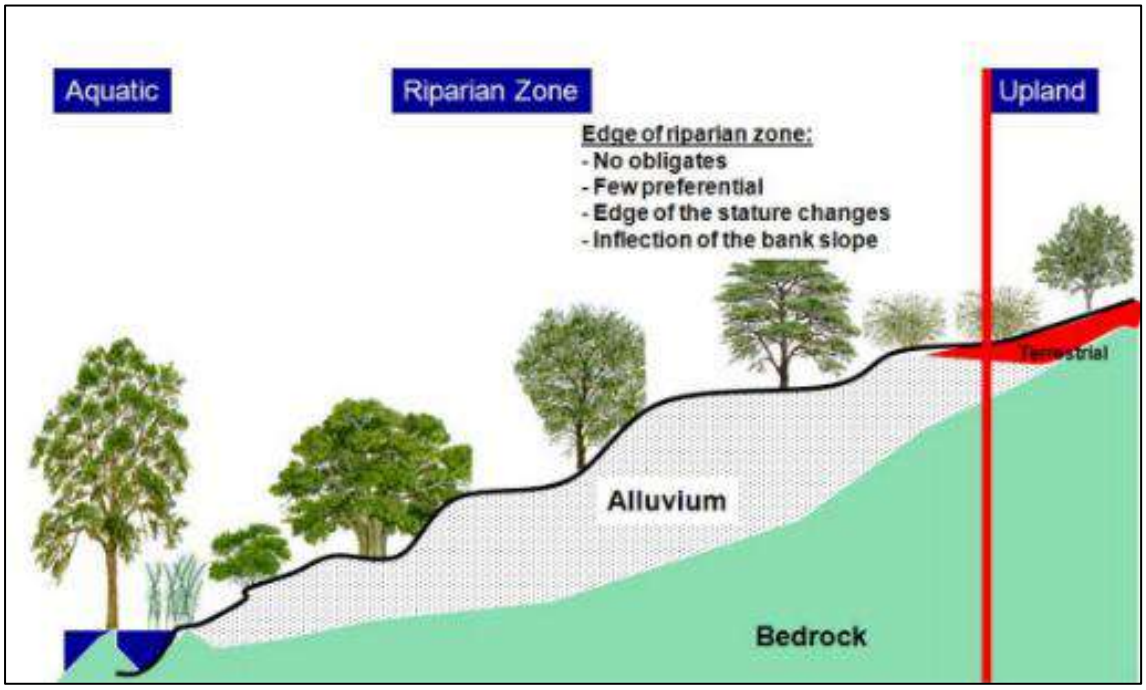


Figure A12.2a: A schematic diagram illustrating the edge of the riparian zone on one bank of a large river. Note the coincidence of the inflection (in slope) on the bank with the change in vegetation structure and composition. The edge of the riparian zone coincides with an inflection point on the bank; where there are not obligates upslope; few preferential. The boundary also coincides with the outer edge of the stature differences (DWAF 2008).

## 12.3 PRESENT ECOLOGICAL STATE (PES) – WETLANDS

WET-Health assists in assessing the health of wetlands using indicators based on geomorphology, hydrology and vegetation. For the purposes of rehabilitation planning and assessment, WET-Health helps users understand the condition of the wetland in order to determine whether it is beyond repair, whether it requires rehabilitation intervention, or whether, despite damage, it is perhaps healthy enough not to require intervention. It also helps diagnose the cause of wetland degradation so that rehabilitation workers can design appropriate interventions that treat both the symptoms and causes of degradation. WET-Health is tailored specifically for South African conditions and has wide application, including assessing the Present Ecological State of a wetland.

WET-Health is a tool designed to assess the health or integrity of a wetland. Wetland health is defined as a measure of the deviation of wetland structure and function from the wetland's natural reference condition. This technique attempts to assess hydrological, geomorphological and vegetation health in three separate modules.

**Hydrology** is defined in this context as the distribution and movement of water through a wetland and its soils. This module focuses on changes in water inputs as a result of changes in catchment activities and characteristics that affect water supply and its timing, as well as on modifications within the wetland that alter the water distribution and retention patterns within the wetland.
**Geomorphology** is defined in this context as the distribution and retention patterns of sediment within the wetland. This module focuses on evaluating current geomorphic health through the presence of indicators of excessive sediment inputs and/or losses for clastic (minerogenic) and organic sediment (peat).
**Vegetation** is defined in this context as the vegetation structural and compositional state. This module evaluates changes in vegetation composition and structure as a consequence of current and historic onsite transformation and/or disturbance.

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present State score. The tool attempts to standardise the way that impacts are calculated and presented across each of the modules. This takes the form of assessing the spatial extent of impact of individual activities and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact (Table A12.2a).

Impact scores obtained for each of the modules reflect the degree of change from natural reference conditions. Resultant health scores fall into one of six health categories (A-F) on a gradient from "unmodified/natural" (Category A) to "severe/complete deviation from natural" (Category F) as depicted in Table A12.2b, below. This classification is consistent with DWAF categories used to evaluate the present ecological state of aquatic systems.

An overall wetland health score was calculated by weighting the scores obtained for each module and combining them to give an overall combined score using the following formula:

Overall health rating = [(Hydrology*3) + (Geomorphology*2) + (Vegetation*2)] / 7

This overall score assists in providing an overall indication of wetland health/functionality which can in turn be used for recommending appropriate management measures.

Table A12.2a: Guideline for interpreting the magnitude of impact on integrity

| Impact Category | Description | Score |
|---|---|---|
| None | No discernible modification or the modification is such that it has no impact on this component of wetland integrity. | 0 – 0.9 |
| Small | Although identifiable, the impact of this modification on this component of wetland integrity is small. | 1 – 1.9 |
| Moderate | The impact of this modification on this component of wetland integrity is clearly identifiable, but limited. | 2 – 3.9 |
| Large | The modification has a clearly detrimental impact on this component of wetland integrity. Approximately 50% of wetland integrity has been lost. | 4 – 5.9 |
| Serious | The modification has a highly detrimental effect on this component of wetland integrity. Much of the wetland integrity has been lost but remaining integrity is still clearly identifiable. | 6 – 7.9 |
| Critical | The modification is so great that the ecosystem processes of this component of wetland integrity are almost totally destroyed, and 80% or more of the integrity has been lost. | 8 – 10 |

Table A12.2b. Health categories used by WET-Health for describing the integrity of wetlands (after Macfarlane et al., 2008).

| Impact Category | Description | Range | Pes |
|---|---|---|---|
| None | Unmodified, natural. | 0 – 0.9 | A |
| Small | 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. | 1 – 1.9 | B |
| Moderate | Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. | 2 – 3.9 | C |
| Large | Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred. | 4 – 5.9 | D |

| | | | |
|---|---|---|---|
| Serious | The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural | 6 – 7.9 | E |
| Critical | Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota | 8 – 10 | F |

## 12.4 WETLAND FUNCTIONAL IMPORTANCE (GOODS AND SERVICES)

WET-EcoServices is used to assess the goods and services that individual wetlands provide, thereby aiding informed planning and decision making. It is designed for a class of wetlands known as palustrine wetlands (i.e. marshes, floodplains, vleis or seeps). The tool provides guidelines for scoring the importance of a wetland in delivering each of 20 different ecosystem services (including flood attenuation, sediment trapping and provision of livestock grazing). The first step is to characterise wetlands according to their hydro-geomorphic setting (e.g. floodplain). Ecosystem service delivery is then assessed either at Level 1, based on existing knowledge or at Level 2, based on a field assessment of key descriptors (e.g. flow pattern through the wetland).

The overall goal of WET-EcoServices is to assist decision makers, government officials, planners, consultants and educators in undertaking quick assessments of wetlands, specifically in order to reveal the ecosystem services that they supply. This allows for more informed planning and decision making. WET-EcoServices includes the assessment of several ecosystem services (listed in Table A12.4a) - that is, the benefits provided to people by the ecosystem.

| | | | | |
|---|---|---|---|---|
| Ecosystem services supplied by wetlands | Indirect benefits | Regulating and supporting benefits | Flood attenuation | The spreading out and slowing down of floodwaters in the wetland, thereby reducing the severity of floods downstream |
| | | | Streamflow regulation | Sustaining streamflow during low flow periods |
| | | | Water quality enhancement benefits: Sediment trapping | The trapping and retention in the wetland of sediment carried by runoff waters |
| | | | Water quality enhancement benefits: Phosphate assimilation | Removal by the wetland of phosphates carried by runoff waters |
| | | | Water quality enhancement benefits: Nitrate assimilation | Removal by the wetland of nitrates carried by runoff waters |
| | | | Water quality enhancement benefits: Toxicant assimilation | Removal by the wetland of toxicants (e.g. metals, biocides and salts) carried by runoff waters |
| | | | Water quality enhancement benefits: Erosion control | Controlling of erosion at the wetland site, principally through the protection provided by vegetation. |
| | | | Carbon storage | The trapping of carbon by the wetland, principally as soil organic matter |
| | Direct benefits | **Biodiversity maintenance[1]** | | Through the provision of habitat and maintenance of natural process by the wetland, a contribution is made to maintaining biodiversity |
| | | Provisioning benefits | Provision of water for human use | The provision of water extracted directly from the wetland for domestic, agriculture or other purposes |
| | | | Provision of harvestable resources | The provision of natural resources from the wetland, including livestock grazing, craft plants, fish, etc. |
| | | | Provision of cultivated foods | The provision of areas in the wetland favourable for the cultivation of foods |
| | | Cultural benefits | Cultural heritage | Places of special cultural significance in the wetland, e.g., for baptisms or gathering of culturally significant plants |
| | | | Tourism and recreation | Sites of value for tourism and recreation in the wetland, often associated with scenic beauty and abundant birdlife |
| | | | Education and research | Sites of value in the wetland for education or research |

Table A12.4a: Ecosystem services assessed by WET-Ecoservices

## 12.5 PRESENT ECOLOGICAL STATE (PES) – RIPARIAN

Habitat is one of the most important factors that determine the health of river ecosystems since the availability and diversity of habitats (in-stream and riparian areas) are important determinants of the biota that are present in a river system (Kleynhans, 1996). The 'habitat integrity' of a river refers to the "maintenance of a balanced composition of physic-chemical and habitat characteristics on a temporal and spatial scale that are comparable to the characteristics of natural habitats of the region" (Kleynhans, 1996). It is seen as a surrogate for the assessment of biological responses to driver changes.

DWAF have developed a modified IHI, designed to accommodate the time constraints associated with desktop assessments or for instances where a rapid assessment of river conditions is required. The protocol does not distinguish between instream and riparian habitat and addresses six simple metrics to obtain an indication of Present Ecological State (PES). Each of the criteria are rated on a scale of 0 (close to natural) to 5 (critically modified) (Table A1.1) according to the following metrics:

- Bed modification
- Flow modification
- Inundation

- Bank condition
- Riparian zone condition
- Water quality modification

This assessment was informed by (i) a site visit where potential impacts to each metric were assessed and evaluated and (ii) an understanding of the catchment feeding the river and landuses / activities that could have a detrimental impact on river ecosystems.

Table A1.1: The rating scale for each of the various metrics in the assessment

| Rating Score | Impact Class | Description |
|---|---|---|
| 0 | None | No discernible impact or the modification is located in such a way that it has no impact on habitat quality, diversity, size and variability. |
| 0.5 - 1.0 | Low | The modification is limited to very few localities and the impact on habitat quality, diversity, size and variability are also very small. |
| 1.5 - 2.0 | Moderate | The modifications are present at a small number of localities and the impact on habitat quality, diversity, size and variability are also limited. |
| 2.5 - 3.0 | Large | The modification is generally present with a clearly detrimental impact on habitat quality, diversity, size and variability. Large areas are, however, not influenced. |
| 3.5 - 4.0 | Serious | The modification is frequently present and the habitat quality, diversity, size and variability in almost the whole of the defined area are affected. Only small areas are not influenced. |
| 4.5 - 5.0 | Critical | The modification is present overall with a high intensity. The habitat quality, diversity, size and variability in almost the whole of the defined section are influenced detrimentally. |

The six metric ratings of the HGM under assessment are then averaged, resulting in one value. This value determines the Habitat Integrity PES category for the HGM (Table A1.2).

Table A1.2: The habitat integrity PES categories

| Habitat Integrity PES Category | Description |
|---|---|
| A: Natural | Unmodified, natural. |
| B: Good | Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged. |
| C: Fair | Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged. |

| | |
|---|---|
| D: Poor | Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred. |
| E: Seriously modified | Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive. |
| F: Critically modified | Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible. |

## 12.6 ECOLOGICAL IMPORTANCE & SENSITIVITY – RIPARIAN

The ecological importance of a wetland/river is an expression of its importance to the maintenance of biological diversity and ecological functioning on local and wider scales. Ecological sensitivity (or fragility) refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (resilience) (Kleynhans & Louw, 2007; Resh et al., 1988; Milner, 1994). Both abiotic and biotic components of the system are taken into consideration in the assessment of ecological importance and sensitivity (Table A1.3).

The scores assigned to the criteria in Table A1.3 were used to rate the overall EIS of each mapped unit according to Table A1.4, below, which was based on the criteria used by DWS for river eco-classification (Kleynhans & Louw, 2007) and the WET-Health wetland integrity assessment method (Macfarlane et al., 2008).

Table A1.3: Components considered for the assessment of the ecological importance and sensitivity of a riparian system. An example of the scoring has also been provided.

| Ecological Importance and Sensitivity assessment (Rivers) | | |
|---|---|---|
| Determinants | | Score (0-4) |
| BIOTA & HABITATS (RIPARIAN & INSTREAM) | Rare & endangered (range: 4=very high - 0 = none) | 0,5 |
| | Unique (endemic, isolated, etc.) (range: 4=very high - 0 = none) | 0,0 |
| | Intolerant (flow & flow related water quality) (range: 4=very high - 0 = none) | 0,5 |
| | Species/taxon richness (range: 4=very high - 1=low/marginal) | 1,5 |
| RIPARIAN & INSTREAM HABITATS | Diversity of types (4=Very high - 1=marginal/low) | 1,0 |
| | Refugia (4=Very high - 1=marginal/low) | 1,5 |
| | Sensitivity to flow changes (4=Very high - 1=marginal/low) | 1,0 |
| | Sensitivity to flow related water quality changes (4=Very high - 1=marginal/low) | 1,0 |

| | | |
|---|---|---|
| | Migration route/corridor (instream & riparian, range: 4=very high - 0 = none) | 1,0 |
| | Importance of conservation & natural areas (range, 4=very high - 0=very low) | 2 |
| MEDIAN OF DETERMINANTS | | 1,00 |
| ECOLOGICAL IMPORTANCE AND SENSITIVITY CATEGORY (EIS) | | LOW, EC=D |

Table A1.4: The ratings associated with the assessment of the EIA for riparian areas

| Rating | Explanation |
|---|---|
| None, Rating = 0 | Rarely sensitive to changes in water quality/hydrological regime |
| Low, Rating =1 | One or a few elements sensitive to changes in water quality/hydrological regime |
| Moderate, Rating =2 | Some elements sensitive to changes in water quality/hydrological regime |
| High, Rating =3 | Many elements sensitive to changes in water quality/ hydrological regime |
| Very high, Rating =4 | Very many elements sensitive to changes in water quality/ hydrological regime |

## 12.7 IMPACT SIGNIFICANCE ASSESSMENT METHODOLOGY

Description and determination of the significance of the predicted impacts in terms of the criteria below to ensure a consistent and systematic basis for the decision-making process. Significance is numerically quantified on the basis score of the following impact parameters:

1. ***Extent*** **(E)** of the impact: The geographical extent of the impact on a given environmental receptor.
2. ***Duration*** **(D)** of the impact: The length of permanence of the impact on the environmental receptor.
3. ***Reversibility*** **(R) of the impact**: The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change
4. ***Magnitude*** **(M)** of the impact: The degree of alteration of the affected environmental receptor.
5. ***Probability*** **(P)** of the impact: The likelihood of the impact actually occurring.

A widely accepted numerical quantification of significance is the formula:
S=(E+D+R+M)*P
Where: Significance=(Extent+Duration+Reversibility+Magnitude) * Probability

The significance of environmental impacts is determined and ranked by considering the criteria presented in **Table 12.1A** below. All criteria are rank according to 'Very Low', 'Low', 'Moderate', 'High' and 'Very High' and are assigned scores of 1 to 5 respectively.

Table 182.1A: Defining the significant in terms of the impact criteria.

| Impact Criteria | Definition | Score | Criteria Description |
|---|---|---|---|
| Extent (E) | Site | 1 | Impact is on the site only |
| | Local | 2 | Impact is localized inside the activity area |
| | Regional | 3 | Impact is localized outside the activity area |
| | National | 4 | Widespread impact beyond site boundary. May be defined in various ways, e.g. cadastral, catchment, topographic |
| | International | 5 | Impact widespread far beyond site boundary. Nationally or beyond |
| Duration (D) | Immediate | 1 | On impact only |
| | Short term | 2 | Quickly reversible, less than project life. Usually up to 5 years. |
| | Medium term | 3 | Reversible over time. Usually between 5 and 15 years. |
| | Long term | 4 | Longer than 10 years. Usually for the project life. |
| | Permanent | 5 | Indefinite |
| Magnitude (M) | Very Low | 1 | No impact on processes |
| | Low | 2 | Qualitative: Minor deterioration, nuisance or irritation, minor change in species/habitat/diversity or resource, no or very little quality deterioration.<br>Quantitative: No measurable change; Recommended level will never be exceeded. |
| | Moderate | 3 | Qualitative: Moderate deterioration, discomfort, Partial loss of habitat /biodiversity /resource or slight or alteration.<br>Quantitative: Measurable deterioration; Recommended level will occasionally be exceeded. |
| | High | 4 | Qualitative: Substantial deterioration death, illness or injury, loss of habitat /diversity or resource, severe alteration or disturbance of important processes.<br>Quantitative: Measurable deterioration; Recommended level will often be exceeded |
| | Very High | 5 | Permanent cessation of processes |
| Reversibility (R) | Reversible | 1 | Recovery which does not require rehabilitation and/or mitigation. |
| | Recoverable | 3 | Recovery which does require rehabilitation and/or mitigation. |

| Impact Criteria | Definition | Score | Criteria Description |
|---|---|---|---|
| | Irreversible | 5 | Not possible, despite action. The impact will still persist, and no mitigation will remedy or reverse the impact. |
| Probability (P) | Improbable | 1 | Not likely at all. No known risk or vulnerability to natural or induced hazards |
| | Low Probability | 2 | Unlikely; low likelihood; Seldom; low risk or vulnerability to natural or induced hazards |
| | Probable | 3 | Possible, distinct possibility, frequent; medium risk or vulnerability to natural or induced hazards. |
| | Highly Probable | 4 | Highly likely that there will be a continuous impact. High risk or vulnerability to natural or induced hazards |
| | Definite | 5 | Definite, regardless of prevention measures. |

The *significance* (s) of potential impacts identified according to the criteria above has been colour coded for the purpose of comparison. This colour coding will be used in impact tables.

| Significance is deemed Negative (-) | | |
|---|---|---|
| 0 - 30 | 31 - 60 | 61 - 100 |
| Low | Medium | High |

# APPENDIX 2- SPECIALIST CV

CURRICULUM VITAE
Debra Jane Fordham

Cell: 0724448243
Email: debrajanefordham@gmail.com
Date of birth: 26th August 1987
Country of origin: South Africa
ID Number: 8708260094081

Professional profile
Debbie is a registered ecologist (119102), with over 8 years of working experience, largely specialising in aquatic ecology. She has authored over 80 reports and applications and she constantly contributes to the scientific and local community. Most of her projects involve (as a minimum) in-depth wetland and river field delineation (including soil investigations via augering, vegetation identification, and classifying the hydrological characteristics), laboratory analysis (such as water quality and sediment analysis), classification, characterisation, ecological health and ecosystem functioning assessments (using the latest available tools), as well as impact rating, buffer determinations, mitigation recommendations and detailed rehabilitation plans. She is highly proficient using GIS software to incorporate accurate spatial analysis and visual aids (No Go Area maps etc.) into her reports.

Debbie holds a M.Sc. degree in Environmental Science from Rhodes University, by thesis, entitled: The geomorphic origin and evolution of the Tierkloof Wetland, a peatland dominated by Prionium serratum in the Western Cape. She is a member of scientific organisations such as the Society of Wetland Scientists (SWS), the South African Wetland Society (SAWS), the Southern African Association of Geomorphologists (SAAG), and the International Association for Impact Assessment (IAIAsa). Debbie is registered with SACNASP in the field of Ecological Science (Reg Number: 119102).

Tertiary Education
- M.Sc. Environmental Science (Rhodes University):

Master of Science thesis entitled: The geomorphic origin, evolution and collapse of a peatland dominated by Prionium serratum: a case study of the Tierkloof Wetland, Western Cape.
- BA Hons. Environmental Science (Rhodes University):

Honours dissertation: The status and use of Aloe ferox. Mill in the Grahamstown commonage, South Africa.
Courses: Wetland Ecology, Environmental Water Quality /Toxicology, Biodiversity, Non-Timber Forest Products (NTFPs) and Rural Livelihoods, Environmental Impact Assessment (EIA), Statistics
- BA - Environmental Science and Geography (Rhodes University)

Work Experience:

- Ecological specialist (2022/03/01 – present)
- Sharples Environmental Services cc (2016/08/10 – 2022/03/01)

Position: Aquatic Ecologist and WULA Manager

- KSEMS Environmental Consulting (2015/08/10 - 2016/07/31)

Position: Wetland specialist

- AGES EC (Pty) Ltd (2014/10/01 – 2015/08/10)

Position: Aquatic Ecologist and WULA Manager

- Environmental Impact Management Services (2014/02/04-2014/02/07)

Position: Environmental consultant

- Rhodes University Alumni Relations (2010/04/01 – 2010/12/17)

## APPENDIX 3

# Draft Monitoring Plan

- **Contents**



## RESPONSIBLE PERSON

- **Appointment:**

  A SACNASP-registered scientist must be appointed to oversee and conduct monitoring activities requiring specialist input or analysis.

- **Monitoring Schedule:**
  - **Before Construction**: Conduct baseline monitoring.
  - **During Construction**: Perform monitoring monthly.
  - **Post-Construction**: Conduct monitoring annually, or as recommended by the scientist after the first operational phase monitoring report.

- **Duties:**
    - Conduct site inspections, collect water quality samples, and perform fixed-point photography.
    - Analyze the results and compile a brief report detailing compliance levels and recommendations.
    - Submit the report to the relevant authorities.

## MONITORING POINTS

- **Identification and Marking:**

Establish permanent and clearly mark (or GPS point) three monitoring points:

1. Upstream: To provide background conditions unaffected by the development.
2. At the Point of Treated Wastewater Discharge: To assess direct impacts of the discharge.
3. Downstream: To evaluate the cumulative effects of the development.

- **Documentation:**

  Use fixed-point photography to create a visual record at each monitoring point, supporting observational notes.

## MONITORING FREQUENCY

- Baseline Data: Collect data before any commencement on site.
- During Construction: Conduct monitoring monthly.
- Operational Phase: Conduct monitoring annually, or as advised by the scientist following initial reporting.

## VARIABLES TO MEASURE

**Water Quality**

Test for parameters such as:

- Total Suspended Solids (mg/l)
- Nitrate Nitrogen (mg/l as N)
- Nitrite Nitrogen (mg/l as N)
- Ammonia Nitrogen (mg/l as N)
- Ortho Phosphate (mg/l as P)
- E. coli (count per 100 ml)
- Ammonium (mg/l as N)
- Total Kjeldahl Nitrogen (mg/l as N) – not that important
- Total Phosphate (mg/l as P)
- Total Residual Chlorine (µg/L) – not that important
- Free chlorine (mg/l) – not that important
- EC
- pH

        - COD
        - and any specific pollutants like hydrocarbons or heavy metals.

    - Sample Collection: Use sterilized bottles for sample collection and ensure samples are analyzed in an accredited laboratory.
    - On-Site Testing: Utilize field kits for measuring pH, DO, and temperature.

**Flow Patterns**

- Observations: Note whether water is present, its level, and its movement (e.g., standing, slow, fast flow). Visual Observations: Regularly observing water levels and flow patterns at specific points along the watercourse can provide insights into any noticeable changes. You can use simple markers like stakes or painted rocks at key locations to track water levels over time.

**Erosion and Sedimentation**

- Visual Inspections: Check for signs of erosion, bank instability, and sediment accumulation.
- Control Structures: Inspect sediment control measures and stormwater outlets for functionality.

**Vegetation**

- Invasive Species: Identify any alien invasive plants and document any encroachment into buffer zones.
- Habitat Condition: Record signs of vegetation degradation or habitat change.

## REPORTING AND ADAPTIVE MANAGEMENT

- **Record-Keeping:**

Maintain a detailed logbook (e.g., Excel spreadsheet) of all monitoring activities, including:

- Weather conditions
- Observations
- Collected data

Photographic Records: Take regular photographs from fixed points to observe any changes in flow characteristics, water clarity, and the presence of sediment.

- **Reporting Schedule:**
    - During Construction: Submit quarterly reports.
    - Post-Construction: Submit annual reports.
- **Report Content:**
    - Analysis of trends
    - Photographs
    - Deviations from baseline conditions
    - Recommendations for corrective actions
- **Non-Compliance Response:**
    - Notify authorities immediately upon identifying non-compliance.
    - Consult with the SACNASP scientist to determine corrective measures.

- Implement actions to rectify issues and achieve compliance within one week.

## • ADAPTIVE MANAGEMENT

- **Additional Measures:**

If necessary, and only after consultation with the scientist/ authorities, implement additional controls, such as:

- Installing sediment traps
- Adjusting stormwater management structures
- Reinforcing erosion control mechanisms

- **Plan Review:**

Reassess the effectiveness of monitoring and mitigation measures and update the plan as needed, in consultation with aquatic specialists.

- **Stakeholder Communication:**

Engage with relevant stakeholders and authorities if significant impacts occur and collaborate on solutions.

# APPENDIX 4- DECLARATION OF SPECIALIST

I ……Debbie Fordham……, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

25/06/2025

Signature of the Specialist: Date:

Upstream Consulting

Name of company (if applicable):

I .....Debbie Fordham....., as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

30/03/2025

Signature of the Specialist: Date:

Upstream Consulting

Name of company (if applicable):

**ANNEXURE P:**

*Agricultural Potential Report*

# Appendix G7: Agricultural Assessment

**DECLARATION OF THE SPECIALIST**

**Note:** Duplicate this section where there is more than one specialist.

I ……Johann Lanz……, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

30 May 2025

Signature of the Specialist: Date:

SoilZA

Name of company (if applicable):

info@soilza.co.za
www.soilza.co.za
1A Wolfe St Wynberg
Cape Town, 7800
South Africa

# AGRICULTURAL AGRO-ECOSYSTEM SPECIALIST ASSESSMENT FOR REZONING AND SUBDIVISION OF PORTION 110 OF THE FARM GWAYANG NO 208 GEORGE, WESTERN CAPE PROVINCE

**Report by**
**Johann Lanz**

**2 April 2025**

**Table of Contents**

**EXECUTIVE SUMMARY**

The overall conclusion of this assessment is that the proposed development will result in some loss of irrigated pasture but will cause only a minor reduction in future agricultural production potential. This assessment disputes the very high sensitivity rating of the site by the screening tool because of the site's assessed agricultural production potential and current agricultural land use.

Despite the soil limitations (limited soil depth, limited drainage, low water and nutrient holding capacity), the site is suitable and used for viable irrigated pastures. The soils are not of sufficient capability to be used for crop production. They are only suitable for pastures. Fairly intensive inputs of drainage and ridging would be necessary to make them suitable for crop production. The agricultural production potential is uniform across the whole cultivated land on which the development is proposed.

An agricultural impact is a change to the future agricultural production potential of land. The single, direct agricultural impact of this development is the total loss of agricultural production potential on the development footprint due to the permanent exclusion of agriculture from the development.

The entire potential development footprint is considered to be on the threshold for needing to be conserved as agricultural production land because it is suitable as irrigated pastures but has limitations that make it unsuitable as viable cropland. The proposed development on this land will result in some loss of future agricultural production potential in terms of national food security. The overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed as being of low significance and acceptable. The factors that lessen the significance of the agricultural impact, making it low are:

1. that the proposed Western Bypass dissects the existing agricultural land and isolates the western part of it, where most of the development footprint is located.
2. that the area to the west of the bypass is set aside for 'Airport Support Services' and not agriculture in the Gwayang LSDF.
3. that the soils have limitations that make them unsuitable for crop production.
4. That only a fairly small area of land is excluded from agricultural use (5.3 ha).
5. Treated wastewater from the development offers potential to increase the availability and particularly the quality of irrigation water on the rest of the farm and could therefore unlock the development of potential avocado and macadamia nut production on the farm.

From an agricultural impact point of view, it is recommended that the proposed development be approved.

## 1 INTRODUCTION

Environmental and change of land use authorisation is being sought for rezoning and subdivision of Portion 110 of the farm Gwayang no 208 George, Western Cape Province (see location in Figure 1). In terms of the National Environmental Management Act (Act No 107 of 1998 - NEMA), an application for environmental authorisation requires an agricultural assessment. In this case, based on the high and very high agricultural sensitivity of the site on the screening tool (see Section 7), the level of agricultural assessment required by the protocol is an Agricultural Agro-Ecosystem Specialist Assessment.

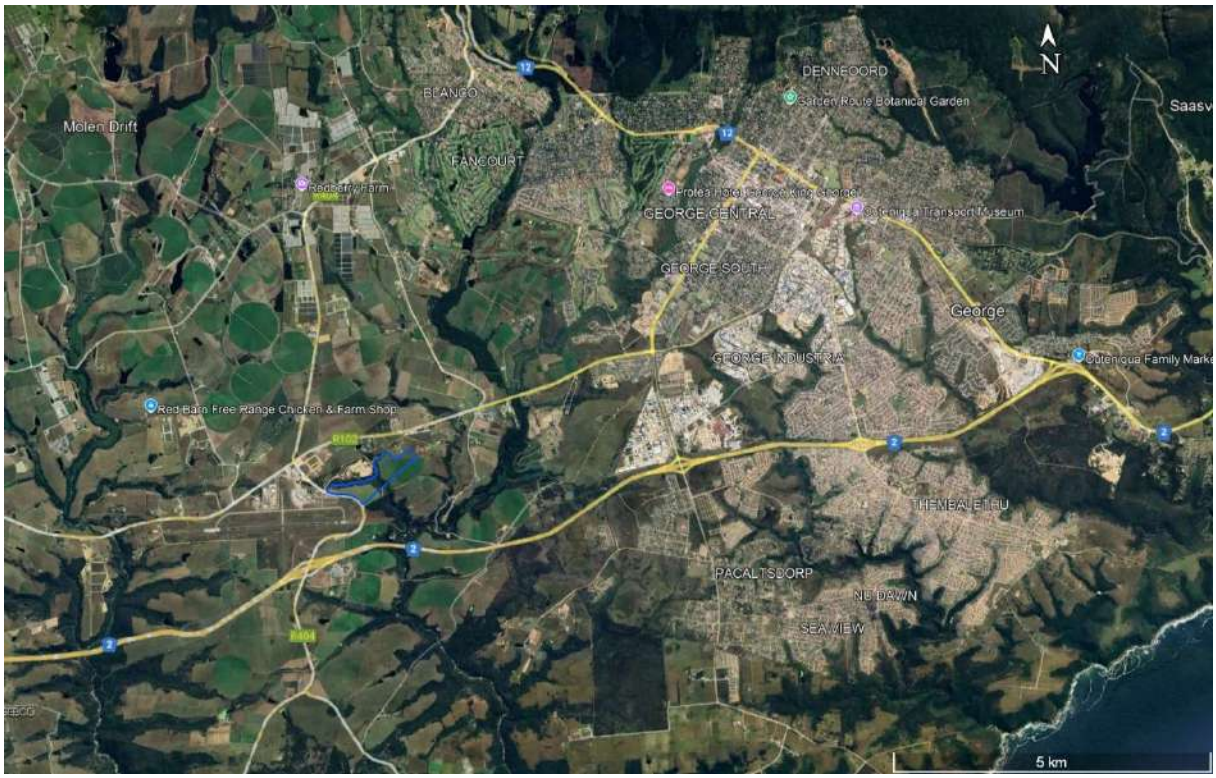


***Figure 1.*** *Locality map of the property boundary (blue outline), southwest of George.*

The purpose of an agricultural assessment is to answer the question:

> Will the proposed development cause a significant reduction in agricultural production potential, and most importantly, will it result in a loss of arable land?

Section 9 of this report unpacks this question, particularly with respect to what constitutes a significant reduction. To answer the above question, it is necessary to determine the existing agricultural production potential of the land that will be impacted, and specifically whether it is viable arable land or not. This is done in Section 8 of this report. Sections 8 and 9 of this report

directly address the above question and therefore contain the essence and most important part of the agricultural impact assessment.

## 2 PROJECT DESCRIPTION

The proposed project is the establishment of a utility zone near the George Airport. The footprint of the development is shown in Figure 3. The project will cause the permanent exclusion of any potential future agricultural production from the entire footprint of the development. Once agriculture is excluded from the site, there can be no further on-site agricultural impact. There is also no off-site agricultural impact. The design and layout of the development within the footprint is therefore of no relevance to agricultural impacts and it is unnecessary to consider it any further in this assessment. All that is of relevance is the loss of the total footprint to potential future agricultural production.

## 3 TERMS OF REFERENCE

The terms of reference for this study are to fulfill the requirements of the *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources*, gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

The terms of reference for an Agricultural Agro-Ecosystem Specialist Assessment, as stipulated in the protocol, are listed below, and the section number of this report which fulfils each stipulation is given after it in brackets.

1. The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professions (SACNASP). (**Appendix 3**)
2. The assessment must be undertaken on the preferred site and within the proposed development footprint. (**Figures 2 and 3**)
3. The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify:
    - the extent of the impact of the proposed development on the agricultural resources (**Section 9.1**);
    - whether or not the proposed development will have an unacceptable negative impact on the agricultural production capability of the site (**Section 12**), and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.
4. The status quo of the site must be described, including the following aspects which must be considered as a minimum in the baseline description of the agro-ecosystem:

- The soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope (**Section 8**);
- Where applicable, the vegetation composition, available water sources as well as agro-climatic information (**Section 8**);
- The current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units (**Section 8**);
- The current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure (**Section 8**);
- Existing impacts on the site, located on a map where relevant (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc **Section 8**).

5. Assessment of Impacts, including the following which must be considered as a minimum in the predicted impact of the proposed development on the agro-ecosystem:
   - Change in productivity for all agricultural activities based on the figures of the past 5 years, expressed as an annual figure and broken down into production units (**Section 9.1**);
   - Change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure (**Section 9.1**);
   - Any alternative development footprints within the preferred site which would be of "medium" or "low" sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification (**Section 9.3**).
6. The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be written up in an Agricultural Agro-Ecosystem Specialist Report that contains as a minimum the following information:
   - Details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vita (**Appendix 1);**
   - A signed statement of independence by the specialist (**Appendix 2**);
   - The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment (**Section 4**);
   - A description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant (**Section 4**);
   - A map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool (**Figure 2**);
   - An indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development **Section 9.1**);
   - an indication of possible long-term benefits that will be generated by the project in comparison to the benefits of the agricultural activities on the affected land (**Section**

**11.3**);

- Additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc. (**Section 11.4**);
- Information on the current agricultural activities being undertaken on adjacent land parcels (**Section 8**);
- an identification of any areas to be avoided, including any buffers (Section 9);
- a motivation must be provided if there were development footprints identified as per point 5.3 above that were identified as having a medium or low agricultural sensitivity and that were not considered appropriate (**Section 9.3**);
- Confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities (**Section 11.1**);
- A substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development (**Section 12**);
- Any conditions to which this statement is subjected (**no conditions**);
- Where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr) (**Section 10**);
- A description of the assumptions made and any uncertainties or gaps in knowledge or data (**Section 5**).

## 4 METHODOLOGY OF STUDY

The assessment was based on an on-site investigation of the soils and agricultural conditions conducted on 6 October 2024. It was also informed by existing climate, soil, and agricultural potential data for the site (see references). The aim of the on-site assessment was to assess and determine the cropping potential across the site. Soils were assessed based on the investigation of existing soil exposures in combination with indications of the surface conditions and topography and strategically positioned auger samples. Soils were classified according to the South African soil classification system (Soil Classification Working Group, 2018).

An assessment of soils and long-term agricultural potential is in no way affected by the season in which the assessment is made, and therefore the date on which this assessment was done has no bearing on its results. The level of agricultural assessment is considered entirely adequate for an understanding of on-site agricultural production potential for the purposes of this assessment.

## 5 ASSUMPTIONS, UNCERTAINTIES OR GAPS IN KNOWLEDGE OR DATA

There are no specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of this study.

## 6 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS

This section identifies all applicable agricultural legislation and permit requirements over and above what is required in terms of NEMA.

The project is likely to require agricultural approval (or at least comment from Department of Agriculture) as part of the required approval in terms of applicable municipal land use legislation, as well as in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970 - SALA), if it is on land currently zoned for agriculture.

## 7 BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

The purpose of this section is firstly to present the baseline information that controls the agricultural production potential of the site and then to assess that potential. Agricultural production potential, and particularly cropping potential, is one of three factors that determines the significance of an agricultural impact, together with size of footprint and duration of impact (see Section 9). Cropping potential also directly determines the true agricultural sensitivity of the land and therefore informs the site sensitivity verification.

All the important parameters that control the agricultural production potential of the site are given in Table 2. Soil data are given in Appendix 4. A map of the development site is given in Figure 3 and photographs of site conditions are shown in Figures 4 to 5.

The site is within a Protected Agricultural Area (PAA) (DALRRD, 2020). A PAA is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, or in a regional context, has made important contributions to the production of the various crops that are grown across South Africa. Within PAAs, the protection of viable, arable land is considered a priority for the protection of food security in South Africa.

**Table 2:** Parameters that control and/or describe the agricultural production potential of the site.

| | Parameter | Value |
|---|---|---|
| **Climate** | Köppen-Geiger climate description (Beck *et al*, 2018) | Temperate, no dry season, warm summer |
| | Mean Annual Rainfall (mm) (Schulze, 2009) | 675 |
| | Reference Crop Evaporation Annual Total (mm) (Schulze, 2009) | 945 |
| | Climate capability classification (Ranges from 3 to 8) (DAFF, 2017) | 6 (moderate-high) |
| **Terrain** | Terrain type | Hilly elevated coastal plain |
| | Terrain morphological unit | Mid slope |
| | Slope gradients (%) | 0 to 23 |
| | Altitude (m) | 200 |
| | Terrain capability classification (Ranges from 2 to 8) (DAFF, 2017) | 3 (low) to 6 (moderate-high) |
| **Soil** | Geology (DAFF, 2002) | Mainly gneissic granite and granodiorite, as well as phyllite, schist, grit, hornfels and quartzite of the Kaaimans Group, and quartzitic sandstone of the Table Mountain Group, Cape Supergroup. |
| | Land type (DAFF, 2002) | Db33 |
| | Description of the soils | Shallow, light textured, poorly drained duplex soils on underlying structured clay |
| | Dominant soil forms | Estcourt |
| | Soil capability classification (Ranges from 1 to 8) (DAFF, 2017) | 3 (low) to 4 (low-moderate) |
| | Soil limitations | Limited soil depth, limited drainage, low water and nutrient holding capacity |
| **Land use** | Agricultural land use surrounding the site | Planted Pastures |
| | Agricultural land use on the site | Planted Pastures |

| | Parameter | Value |
|---|---|---|
| General | Long-term grazing capacity (ha/LSU) (DAFF, 2018) | 72 |
| | Land capability classification (Ranges from 1 to 13) (DAFF, 2017) | 5 (low) to 7 (low-moderate) |
| | Within Protected Agricultural Area (DALRRD, 2020) | Yes, category B, irrigation |

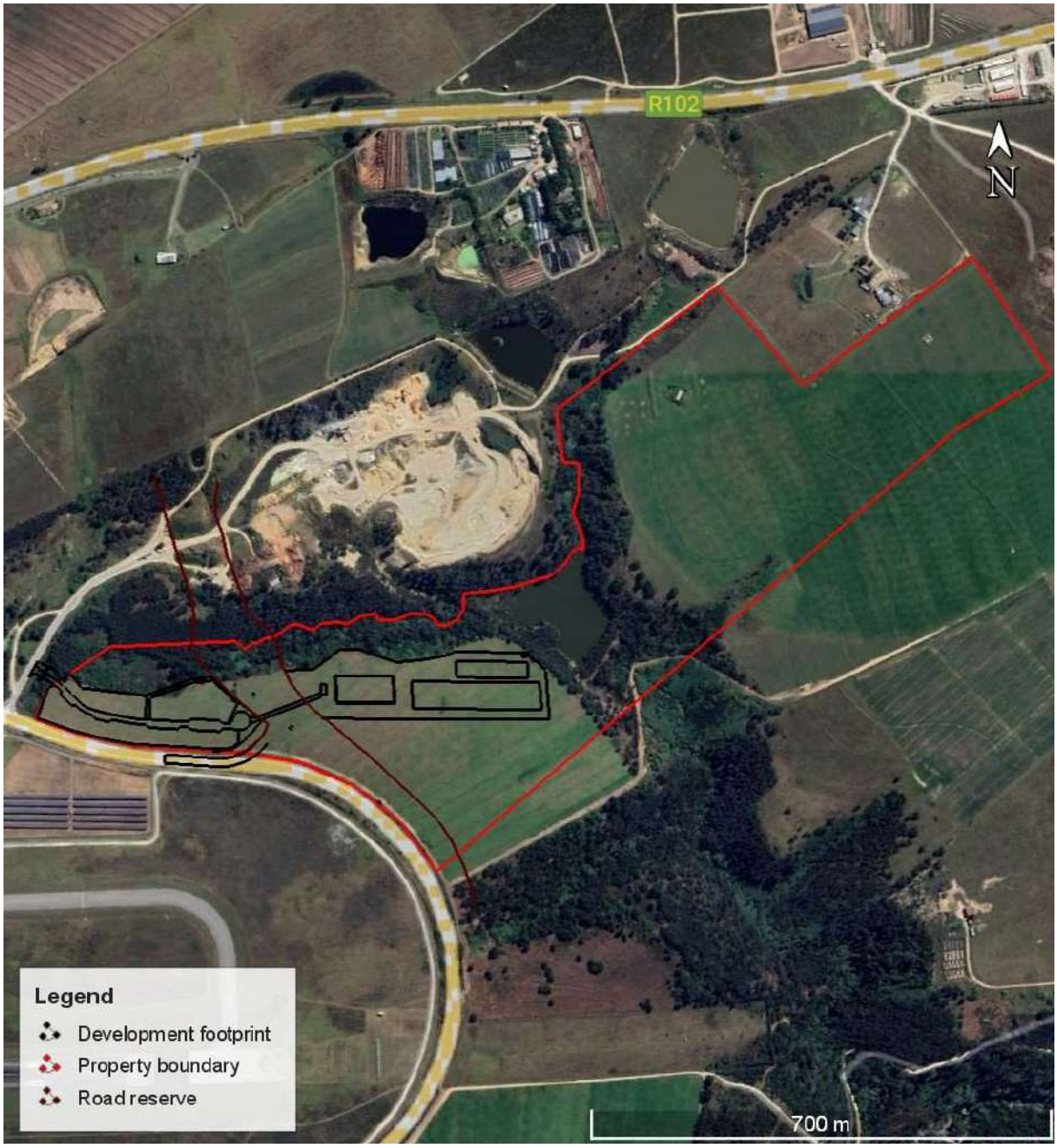


***Figure 3.*** *Satellite image map of the development. Most of the development footprint is the portion of the property to the west of the road reserve. Inclusion of the utility stand to its east is one of the alternatives.*

***Figure 4.*** *Typical site conditions looking west towards airport and showing excavated soil.*

***Figure 5.*** *Typical site conditions looking east.*

The agricultural protocol requires the current productivity of the land based on detailed production figures and it requires the current employment figures. However, because the land is used for

pastures and not crop production, yield details are not available and are not considered necessary for this assessment of agricultural impact. What is relevant is simply that the site is suitable for irrigated pastures and the loss of the development site is therefore a loss of future potential for irrigated pastures. Employment figures are also not considered necessary because the site represents a small proportion of the total farming enterprise that utilises the land and its loss is therefore highly unlikely to affect employment within that enterprise.

There are no existing impacts on the site that are relevant to this assessment of agricultural impact.

### 7.1 Assessment of the agricultural production potential

This assessment of the agricultural production potential of the site is based on an integration of the different parameters in Table 2 above and the on-site soil investigation.

Despite the soil limitations (limited soil depth, limited drainage, low water and nutrient holding capacity), the site is suitable and used for viable irrigated pastures. The soils are not of sufficient capability to be used for crop production. They are only suitable for pastures. Fairly intensive inputs of drainage and ridging would be necessary to make them suitable for crop production. The agricultural production potential is uniform across the whole cultivated land on which the development is proposed.

## 8 SITE SENSITIVITY VERIFICATION

A specialist agricultural assessment is required to include a verification of the agricultural sensitivity of the development site as per the sensitivity categories used by the web-based environmental screening tool of the Department of Forestry, Fisheries and the Environment (DFFE). The screening tool's classification of sensitivity is merely an initial indication of what the sensitivity of a piece of land might be, as indicated by the only data that is available. What the screening tool attempts to indicate is whether the land is suitable for crop production (high and very high sensitivity) or unsuitable for crop production (low and medium sensitivity). To do this, the screening tool uses three independent criteria, from three independent data sets, which are all indicators of suitability for crop production but are limited and were not designed for this purpose. The three criteria are:

1. Whether the land is classified as cropland or not on the field crop boundary data set (Crop Estimates Consortium, 2019). All classified cropland is, by definition, either high or very high sensitivity.
2. Its land capability rating as per the Department of Agriculture's updated and refined, country-wide land capability mapping (DAFF, 2017). Land capability is defined as the combination of soil, climate, and terrain suitability factors for supporting rain-fed agricultural production. The direct relationship between land capability rating, agricultural sensitivity,

and rain-fed cropping suitability is summarised by this author in Table 2.

3. Whether the land is classified as a protected agricultural area (PAA) or not (DALRRD, 2020). All classified PAAs are, by definition, either high or very high sensitivity.

The limitations for determining cropping suitability based on these data are as follows:

1. The field crop boundary data set used by the screening tool is very outdated
2. Land capability mapping is fairly coarse, modelled data which is not accurate at site scale.
3. PAAs are demarcated broadly, not at a fine scale, and there is therefore much variation of cropping suitability within a PAA. All land within these demarcated areas is not necessarily of sufficient agricultural potential to be suitable for crop production, due to finer scale terrain, soil, and other constraints.

These three inputs operate independently, and the screening tool's agricultural sensitivity is simply determined by whichever of these gives the highest sensitivity rating. The agricultural sensitivity of the site, as classified by the screening tool, is shown in Figure 6.

The true agricultural sensitivity of any land is equivalent to its actual suitability for crop production on the ground, rather than being determined by a parameter that serves as a proxy for crop suitability in a dataset, which is how the screening tool determines sensitivity. The land's suitability for cropping directly determines how important it is to conserve that land as agricultural production land. To determine suitability for crop production, and hence sensitivity, requires a site-specific assessment, as has been conducted in this assessment, rather than a reliance on data sets that have significant limitations.

**Table 2:** Relationship between land capability, agricultural sensitivity, and rain-fed cropping suitability.

<table>
<tr><th rowspan="2">Land capability value</th><th rowspan="2">Agricultural sensitivity</th><th colspan="2">Rain-fed cropping suitability</th></tr>
<tr><th>Summer rainfall areas</th><th>Winter rainfall areas</th></tr>
<tr><td>1 - 5</td><td>Low</td><td rowspan="3">Unsuitable</td><td rowspan="2">Unsuitable</td></tr>
<tr><td>6</td><td rowspan="2">Medium</td></tr>
<tr><td>7</td><td rowspan="3">Suitable</td></tr>
<tr><td>8 - 10</td><td>High</td><td rowspan="2">Suitable</td></tr>
<tr><td>11 - 15</td><td>Very High</td></tr>
</table>

**Note:** There is an error in the screening tool whereby a land capability of 8 is classified as medium sensitivity, but according to NEMA's agricultural protocol, should in fact be classified as high sensitivity. This assessment follows the agricultural protocol definition and classifies a value of 8 as high sensitivity.

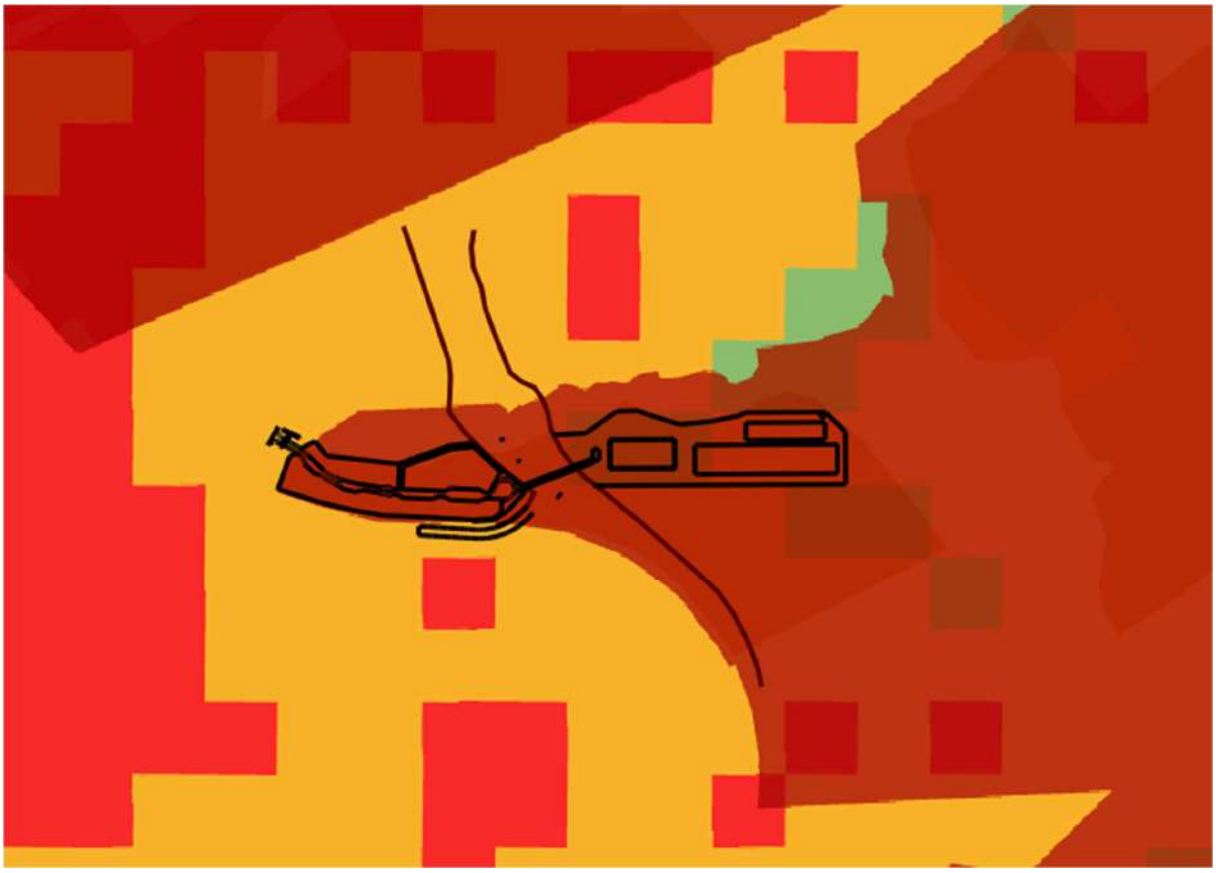

***Figure 6.*** *The assessed development overlaid on agricultural sensitivity, as classified by the screening tool (green = low; yellow = medium; red = high; dark red = very high).*

Despite the detail in this section above, the determinants of agricultural sensitivity are actually very straightforward and may be summed up as follows. If land is suitable for viable crop production - that is if it has the capability to deliver an above break-even crop yield on a sustainable basis - then it is of high or very high agricultural sensitivity. If it has limitations that prevent it from being able to deliver an above break-even crop yield on a sustainable basis, then it is of medium or low agricultural sensitivity.

The screening tool classifies the assessed site as being entirely of very high agricultural sensitivity. The very high sensitivity classification by the screening tool is due to the site's PAA status. The underlying high sensitivity is due to the land being classified as cropland. However, as shown in Section 7, the site is not suitable for viable crop production, but it is suitable for irrigated pastures and has irrigation infrastructure in place. The appropriate true sensitivity, as assessed on the ground, under these conditions (limited crop production potential but irrigated pastures) is high sensitivity. This assessment therefore disputes the very high sensitivity classification of the site by the screening tool and verifies the entire site as being of high agricultural sensitivity because of its assessed cropping potential and agricultural land use.

# 9 ASSESSMENT OF THE AGRICULTURAL IMPACT

## 9.1 Impact identification and assessment

An agricultural impact must by definition cause a change to the future agricultural production potential of land. If there is no change, there is no impact. The single, direct agricultural impact of this development is the total loss of agricultural production potential on the development footprint due to the permanent exclusion of agriculture from the development site.

The significance of any loss of agricultural production potential is a direct function of the following three factors:

1. the size of the footprint of land from which agriculture will be excluded (or the footprint that will have its potential decreased)
2. the baseline production potential (particularly cropping potential) of that land
3. the length of time for which agriculture will be excluded (or for which potential will be decreased).

The most significant loss of potential, for any development anywhere in the country, is on high yielding cropland, and the least significant possible, is on low carrying capacity grazing land. Cropping potential is highlighted in factor 2, above, because the threshold, above which it is a priority to conserve land for agricultural production, is determined by the scarcity of arable crop production land in South Africa (approximately only 13% of the country's surface area) and the relative abundance of the rest of agricultural land across the country that is only good enough to be used for grazing. If land can support viable and sustainable crop production, then it is considered to be above the threshold and is a priority for being conserved as agricultural production land. If land is unable to support viable and sustainable crop production, then it is considered to be below the threshold and of much lower priority for being conserved.

In this case, the entire potential development footprint is considered to be on the threshold for needing to be conserved as agricultural production land because it is suitable as irrigated pastures but has limitations that make it unsuitable as viable cropland. The proposed development on this land will result in some loss of future agricultural production potential in terms of national food security. The overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and acceptable. The factors that lessen the significance of the agricultural impact, making it low are:

1. that the proposed Western Bypass dissects the existing agricultural land and isolates the western part of it, where most of the development footprint is located.
2. that the area to the west of the bypass is set aside for 'Airport Support Services' and not

agriculture in the Gwayang LSDF.

3. that the soils have limitations that make them unsuitable for crop production.
4. That only a fairly small area of land is excluded from agricultural use (5.3 ha).
5. Treated wastewater from the development offers potential to increase the availability and particularly the quality of irrigation water on the rest of the farm and could therefore unlock the development of potential avocado and macadamia nut production on the farm.

The agricultural protocol requires an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development. The footprint is relatively small, and production will therefore be lost from only a maximum of approximately 5.3 hectares of pastures. Because the loss represents a small proportion of the total farming enterprise that utilises the land, it is not likely to have any effect on agricultural employment within that enterprise.

### 9.2 Cumulative impact assessment

Specialist assessments for environmental authorisation are required to include an assessment of cumulative impacts. The cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present, or reasonably foreseeable future activities that will affect the same environment. The potential cumulative agricultural impact of importance is a regional loss of future agricultural production potential.

Agricultural land throughout South Africa is under inevitable pressure from various non-agricultural land uses, including urban expansion. The cumulative impact of agricultural land loss is significant, and this development will contribute to that, although minimally. The cumulative agricultural impact of the proposed development is therefore assessed as being of medium significance.

### 9.3 Assessment of alternatives

Specialist assessments for environmental authorisation are required to include a comparative assessment of alternatives, including the no-go alternative. Various alternatives for water supply and treatment, services, and access roads have been proposed but do not have any agricultural significance. The only agricultural significance lies in the total size of the footprint of land that will be excluded from agricultural use and that is not significantly different for the different alternatives. All of the proposed alternatives are therefore considered equally acceptable in terms of agricultural impact. If any alternatives result in the increased availability of irrigation water to the farm, then those alternatives would be preferred.

The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. There are no agricultural impacts of the no-go alternative,

and it is therefore the preferred alternative if assessed purely from an agricultural impact perspective.

## 10 MITIGATION

No mitigation measures are required for the protection of agricultural production potential within the development because it will be permanently excluded from agricultural land use. Erosion to surrounding farmland does not pose a threat or require specific mitigation because a sophisticated, engineered system for managing water runoff will be inherent in the engineering of such a project.

## 11 ADDITIONAL ASPECTS REQUIRED IN AN AGRICULTURAL ASSESSMENT

### 11.1 Micro-siting

The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities. However, micro-siting will make no material difference to agricultural impacts and disturbance.

### 11.2 Confirmation of linear activity exclusion

If linear infrastructure has been given exclusion from complying with certain requirements of the agricultural protocol because of its linear nature, the protocol requires confirmation that the land impacted by that linear infrastructure can be returned to the current state within two years of completion of the construction phase. No such exclusion applies to this project.

### 11.3 Long term benefits versus agricultural benefits

It is outside of the scope of an agricultural assessment to consider the value of the potential benefits that the proposed development will provide to George.

### 11.4 Additional environmental impacts

There are no additional environmental impacts of the proposed development that are relevant to this agricultural assessment.

## 12 CONCLUSION

The overall conclusion of this assessment is that the proposed development will result in some loss of irrigated pasture but will cause only a minor reduction in future agricultural production potential. This assessment disputes the very high sensitivity rating of the site by the screening tool because of

the site's assessed agricultural production potential and current agricultural land use.

Despite the soil limitations (limited soil depth, limited drainage, low water and nutrient holding capacity), the site is suitable and used for viable irrigated pastures. The soils are not of sufficient capability to be used for crop production. They are only suitable for pastures. Fairly intensive inputs of drainage and ridging would be necessary to make them suitable for crop production. The agricultural production potential is uniform across the whole cultivated land on which the development is proposed.

An agricultural impact is a change to the future agricultural production potential of land. The single, direct agricultural impact of this development is the total loss of agricultural production potential on the development footprint due to the permanent exclusion of agriculture from the development.

The entire potential development footprint is considered to be on the threshold for needing to be conserved as agricultural production land because it is suitable as irrigated pastures but has limitations that make it unsuitable as viable cropland. The proposed development on this land will result in some loss of future agricultural production potential in terms of national food security. The overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed as being of low significance and acceptable. The factors that lessen the significance of the agricultural impact, making it low are:

1. that the proposed Western Bypass dissects the existing agricultural land and isolates the western part of it, where most of the development footprint is located.
2. that the area to the west of the bypass is set aside for 'Airport Support Services' and not agriculture in the Gwayang LSDF.
3. that the soils have limitations that make them unsuitable for crop production.
4. That only a fairly small area of land is excluded from agricultural use (5.3 ha).
5. Treated wastewater from the development offers potential to increase the availability and particularly the quality of irrigation water on the rest of the farm and could therefore unlock the development of potential avocado and macadamia nut production on the farm.

From an agricultural impact point of view, it is recommended that the proposed development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions.

## 13 REFERENCES


Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood. 2018. Present and future Köppen-Geiger climate classification maps at 1-km resolution, Nature Scientific Data. Available at: https://gis.elsenburg.com/apps/cfm/.

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Soil Classification Working Group. 2018. Soil Classification: A Natural and Anthropogenic System for South Africa. ARC-Institute for Soil, Climate and Water, Pretoria.

**APPENDIX 1: SPECIALIST CURRICULUM VITAE**

## Johann Lanz
## Curriculum Vitae

### Education

| | | |
|---|---|---|
| M.Sc. (Environmental Geochemistry) | University of Cape Town | 1996 - 1997 |
| B.Sc. Agriculture (Soil Science, Chemistry) | University of Stellenbosch | 1992 - 1995 |
| BA (English, Environmental & Geographical Science) | University of Cape Town | 1989 - 1991 |
| Matric Exemption | Wynberg Boy's High School | 1983 |

### Professional work experience

I have been registered as a Professional Natural Scientist (Pri.Sci.Nat.) in the field of soil science since 2012 (registration number 400268/12) and am a member of the Soil Science Society of South Africa.

**Soil & Agricultural Consulting** **Self employed** **2002 - present**

Within the past 5 years of running my soil and agricultural consulting business, I have completed more than 170 agricultural assessments (EIAs, SEAs, EMPRs) in all 9 provinces for renewable energy, mining, electrical grid infrastructure, urban, and agricultural developments. I was the appointed agricultural specialist for the nation-wide SEAs for wind and solar PV developments, electrical grid infrastructure, and gas pipelines. My regular clients include: Zutari; CSIR; SiVEST; SLR; WSP; Arcus; SRK; Environamics; Royal Haskoning DHV; ABO; Enertrag; WKN-Windcurrent; JG Afrika; Mainstream; Redcap; G7; Mulilo; and Tiptrans. Recent agricultural clients for soil resource evaluations and mapping include Cederberg Wines; Western Cape Department of Agriculture; Vogelfontein Citrus; De Grendel Estate; Zewenwacht Wine Estate; and Goedgedacht Olives.
In 2018 I completed a ground-breaking case study that measured the agricultural impact of existing wind farms in the Eastern Cape.

**Soil Science Consultant** **Agricultural Consultors International (Tinie du Preez)** **1998 - 2001**

Responsible for providing all aspects of a soil science technical consulting service directly to clients in the wine, fruit and environmental industries all over South Africa, and in Chile, South America.

**Contracting Soil Scientist** **De Beers Namaqualand Mines** **July 1997 - Jan 1998**

Completed a contract to advise soil rehabilitation and re-vegetation of mined areas.

### Publications

- Lanz, J. 2012. Soil health: sustaining Stellenbosch's roots. In: M Swilling, B Sebitosi & R Loots (eds). *Sustainable Stellenbosch: opening dialogues*. Stellenbosch: SunMedia.
- Lanz, J. 2010. Soil health indicators: physical and chemical. *South African Fruit Journal*, April / May 2010 issue.
- Lanz, J. 2009. Soil health constraints. *South African Fruit Journal*, August / September 2009 issue.
- Lanz, J. 2009. Soil carbon research. *AgriProbe*, Department of Agriculture.
- Lanz, J. 2005. Special Report: Soils and wine quality. *Wineland Magazine.*

I am a reviewing scientist for the *South African Journal of Plant and Soil*.

forestry, fisheries
& the environment
Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

**APPENDIX 2: SPECIALIST DECLARATION FORM AUGUST 2023**

Specialist Declaration form for assessments undertaken for application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

**REPORT TITLE: REZONING AND SUBDIVISION OF PORTION 110 OF THE FARM GWAYANG NO 208 GEORGE, WESTERN CAPE PROVINCE**

**Kindly note the following:**

1. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
2. This form is current as of August 2023. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.dffe.gov.za/documents/forms.
3. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
4. The specialist must be aware of and comply with '*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 the act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

**1. SPECIALIST INFORMATION**

| | |
|---|---|
| Title of Specialist Assessment | Agricultural Assessment |
| Specialist Company Name | SoilZA – sole proprietor |
| Specialist Name | Johann Lanz |
| Specialist Identity Number | 6607045174089 |
| Specialist Qualifications: | M.Sc. (Environmental Geochemistry) |
| Professional affiliation/registration: | Registered Professional Natural Scientist (Pr.Sci.Nat.) Reg. no. 400268/12<br>Member of the Soil Science Society of South Africa |
| Physical address: | 1a Wolfe Street, Wynberg, Cape Town, 7800 |
| Postal address: | 1a Wolfe Street, Wynberg, Cape Town, 7800 |
| Telephone | Not applicable |
| Cell phone | +27 82 927 9018 |
| E-mail | johann@soilza.co.za |

## 2. DECLARATION BY THE SPECIALIST

I, **Johann Lanz** declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. “the Protocols”) and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
  - any decision to be taken with respect to the application by the competent authority; and;
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.

Signature of the Specialist

SoilZA (sole proprietor)

Name of Company:

19 March 2025

Date

### 3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Johann Lanz**, swear under oath that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

**SoilZA – sole proprietor**

Name of Company

19 March 2025

Date

.....7071651-0

S NUNU

Signature of the Commissioner of Oaths

2025-03-19

Date

SUID-AFRIKAANSE POLISIEDIENS
HOUT BAY
19 MAR 2025
COMMUNITY SERVICE
SOUTH AFRICAN POLICE SERVICE

**APPENDIX 3: SACNASP REGISTRATION CERTIFICATE**

SACNASP

South African Council for Natural Scientific Professions

**herewith certifies that**

**Johan Lanz**

Registration Number: 400268/12

**is a registered scientist**

in terms of section 20(3) of the Natural Scientific Professions Act,
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Soil Science (Professional Natural Scientist)

Effective **15 August 2012** Expires **31 March**

**APPENDIX 4: SOIL DATA**

Soil data from investigated auger samples on site. Three auger samples across the site indicated very uniform soil conditions.

| Soil form | Depth (mm) | Clay % Horzn 1 | Clay % Horzn 2 | Clay % Horzn 3 | Depth limiting layer | Rating |
|---|---|---|---|---|---|---|
| Estcourt | 300 to 400 | 10 | 7 | 45 | Dense, structured clay | 3.5 |

**ANNEXURE Q:**

*Heritage Notice of Intent to Develop*

# Appendix G9: Background Information Document and Notice of Intent to Develop – submission to Heritage Western Cape

**DECLARATION OF THE SPECIALIST**

I, **Stéfan Ethan de Kock**, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

**1st November 2024**

Signature of the Specialist: Date:

**PERCEPTION PLANNING**

Name of company (if applicable):

**Ref: HWC 2410 3110**

# BACKGROUND INFORMATION DOCUMENT TO NOTICE OF INTENT TO DEVELOP (NID) IN TERMS OF SECTION 38(8) OF THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT 25 OF 1999)

## PROPOSED LIGHT INDUSTRIAL ZONE (AIRPORT SUPPORT ZONE) ON A PORTION OF THE REMAINDER OF THE FARM GWAYANG 208/110, GEORGE DISTRICT AND MUNICIPALITY

**ON BEHALF OF: PLATRUG TRUST**

**NOVEMBER 2024**



**STÉFAN DE KOCK & DR LITA WEBLEY**
PERCEPTION Planning
7 Imelda Court, 103 Meade Street, George

Cell: 082 568 4719
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**CONTENTS**



**ABBREVIATIONS**

1. DEADP –Department of Environmental Affairs & Development Planning (WCG)
2. DOI – Department of Infrastructure (WCG)
3. EA – Environmental Authorization
4. HIA – Heritage Impact Assessment
5. HWC – Heritage Western Cape
6. NGSI – National Geo-Spatial Information, Department of Rural Development and Land Reform, Mowbray
7. NHRA - National Heritage Resources Act, 1999 (Act 25 of 1999)
8. PHS – Provincial Heritage Site
9. SAHRIS – South African Heritage Resources Information System
10. VIA – Visual Impact Assessment
11. WCG – Western Cape Government

**COVER:** Collage of images of the study area, surrounds (Author, 2024)

  

## 1. INTRODUCTION

*PERCEPTION Planning* was appointed by Michael David Elston (SA ID 7911145073087), being the Proxy/ Representative of the Platrug Trust (IT 1608/97) (being the registered landowner) to submit to Heritage Western Cape (HWC) a Notice of Intent to Develop (NID) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act 25 of 1999) in relation to the proposal as outlined in this application. Copies of the Proxy/ Mandate, Power of Attorney, Title Deed and SG Diagram are attached as **Annexure 1**.

The cadastral land unit subject to this application is:

- Remainder of Portion 110 of the farm Gwayang 208, measuring 40,3536 ha, registered to Platrug Trust (IT 1608/97) and situated with George District and Municipality, Western Cape Province.

### 1.1 Previous applications

The following applications undertaken in terms of Section 38 of the NHRA are considered relevant to the subject study area. Copies of HWC's comments in respect of these applications are attached as part of **Annexure 2** hereto.

| HWC Ref | NHRA Section | Proposal/ Property description | Application status | Decision outcome/ date |
|---|---|---|---|---|
| HWC24051424SB0823 | 38 | Proposed Airport bulk water pipeline: Portions 44, 45, 53, 65, 68, 96, 102, 112, 113, 132, 131 & 139 of the farm Gwayang 208 | Ongoing | No further studies 10/09/2024 |
| HWC23031514SB0315 | 38 | Gwayang Mixed-use area: Erf 464/ RE, George & Erf 325/RE, Pacaltsdorp | Ongoing | No further studies 06/04/2023 |
| 21092709AM0930E | 38 | Proposed rezoning, subdivision Gwayang 208/139 | Ongoing | 22/10/2021 |
| 17102302WD1025E | 38 | Proposed service station: Gwayang 208/4 | Never implemented | 14/11/2017 |
| 120531ZS48M | 38 | Service Station, Hotel: Gwayang 208/ 78, 82, 84 | Never implemented | No further studies 31/05/2012 |
| 19110610AS0127E | 38 | Proposed Airport Access Roads: Gwayang 208/ RE, 4, 34, 37, 53, 60, 73, 74, 78, 83, 84, &110 | Ongoing | 10/02/2012 |

## 2. DESCRIPTION OF STUDY AREA

The subject property (± 40ha in extent) is situated ±7.2km southwest of the George historic town centre, ±6.2km south of the village of Blanco and directly east of the George Airport. The irregular-shaped property is furthermore set back southwards of the R102 (historic inland route between George and Great Brak River) and northwards of the N2 National Road (**Figure 1**).


**Figure 1:** Study area location within sub-regional context (GoogleEarth© 2024 as edited).

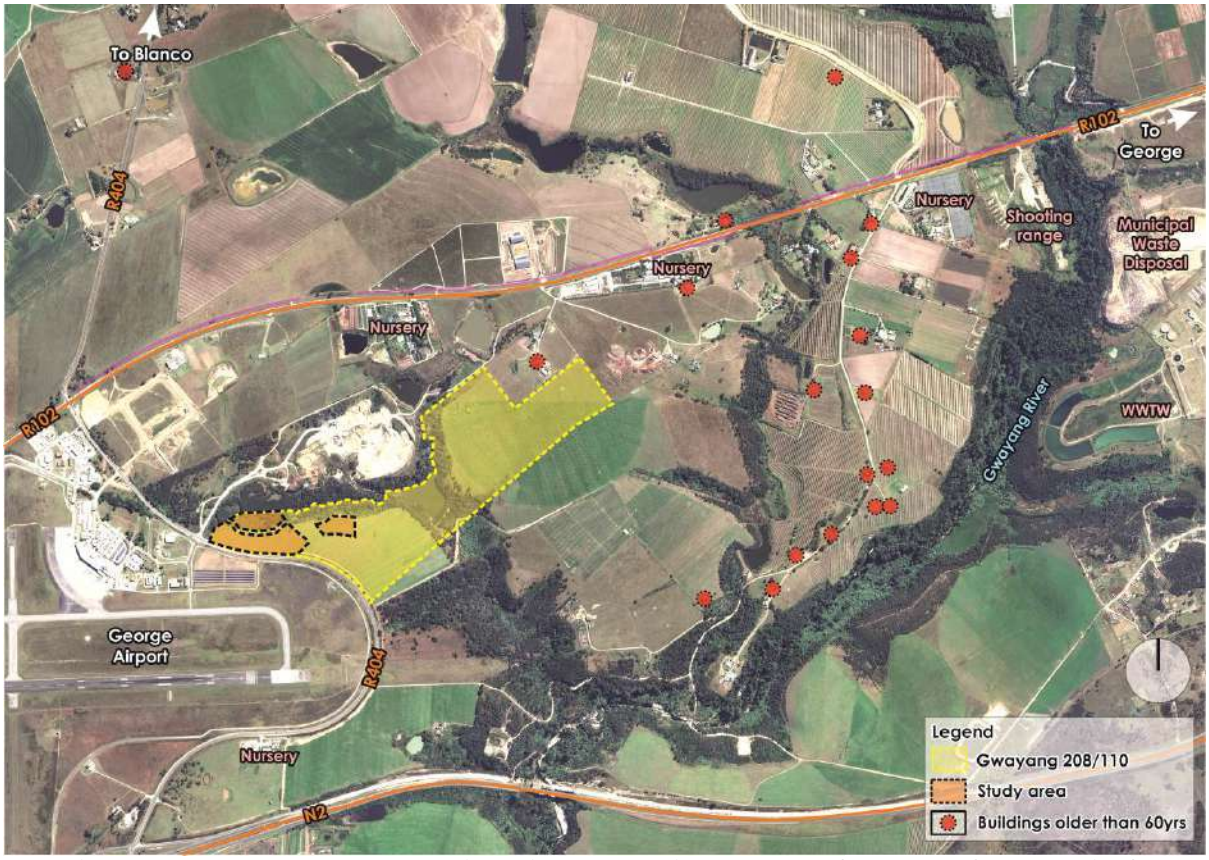


**Figure 2:** Property and study area shown in relation to surrounding rural context (GoogleEarth© 2024 as edited).

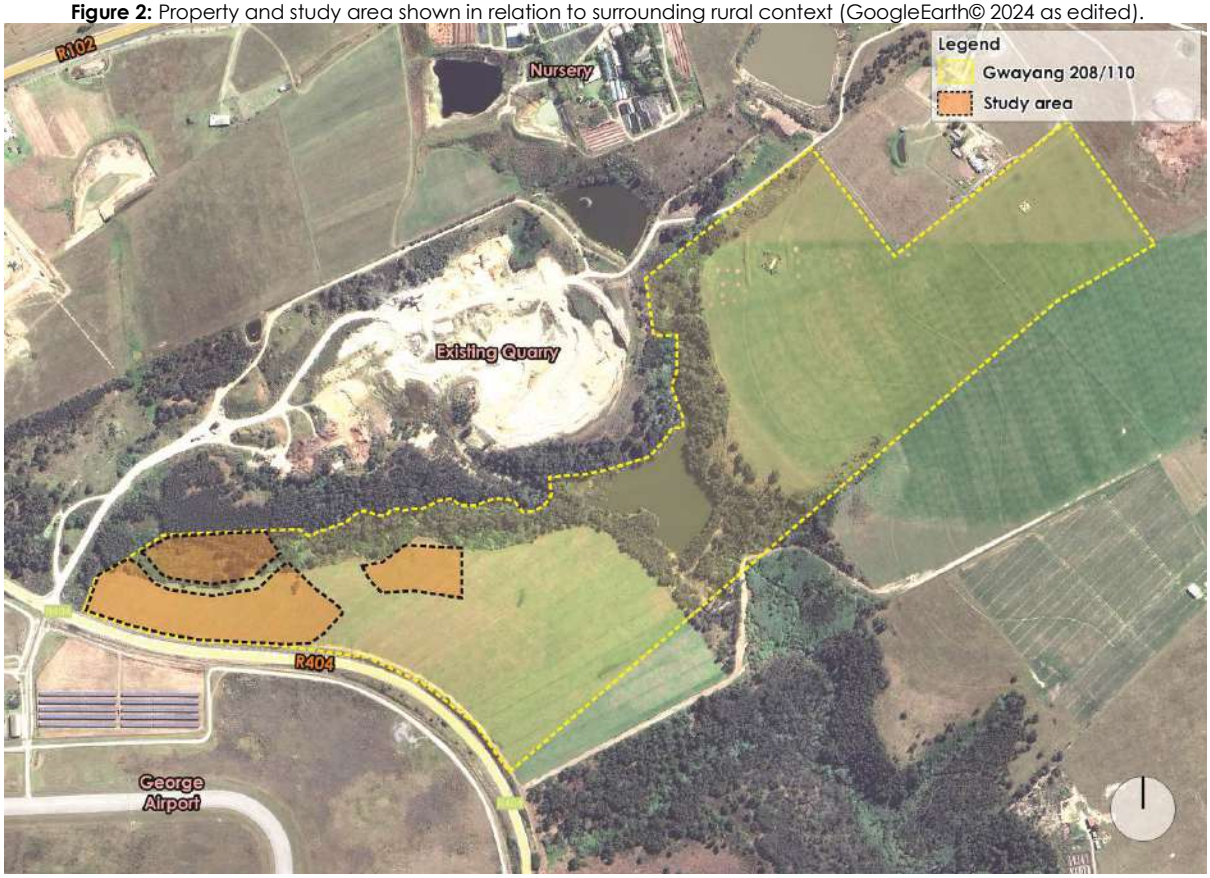


**Figure 3:** Closer aerial view highlighting boundaries of the property and proposed development site/ study area (GoogleEarth© 2024 as edited).

The proposed development site (±4 ha in extent) is located on the westernmost portion of the property, directly east of the R404 (also the common boundary shared with the George Airport) and just south of an

existing quarry. Recent aerial imagery shows the beginnings of construction works related to components of the approved George Airport Support Zone (including light industrial, warehousing and ancillary uses and facilities) presently underway Forming part of an undulating rural landscape, the study area has foremost been transformed through agriculture/ cultivation for an extended period. Though several historic structures occur on farms to the east, none were noted on the subject property or study area (**Figure 2**).

More recent semi-urban developments within the vicinity of the study area include, foremost, establishment of an Airport Support Zone on former agricultural lands directly northeast of the George Airport. Other non-agricultural uses include for example a chef training academy, various nurseries, restaurants as well as more intensive agricultural activities, the Outeniqua Research Farm (WCG) to the northeast and the George Municipality solid waste disposal and Water Treatment Works to the east. Several land use applications relating to the Airport Support Zone have recently been approved and are currently under construction as mentioned.

No buildings/ ruins occur on the study area and no historic gravesites/ burial grounds are known to occur on or within the direct proximity of the linear study area. Photographs of the study area and its direct environs are attached to this report as **Annexure 3.**

## 3. DEVELOPMENT DESCRIPTION

**Proposed Land Use:**

According to information made available by the client the proposed development is for the establishment of light industrial uses (primarily warehousing and storage) on ±4 ha of the subject property, as shown through an extract from the simplified site development plan (**Figure 4**), also attached as part of **Annexure 4**. The main component of the proposal would comprise of the following components:

- 3 x Light Industrial erven (±1,4 ha)
- 2 x Private Open Space erven (±9,235m²)
- 1 x Parking area (±4,190m²)
- 1 x site for Utility services (±5,905m²)

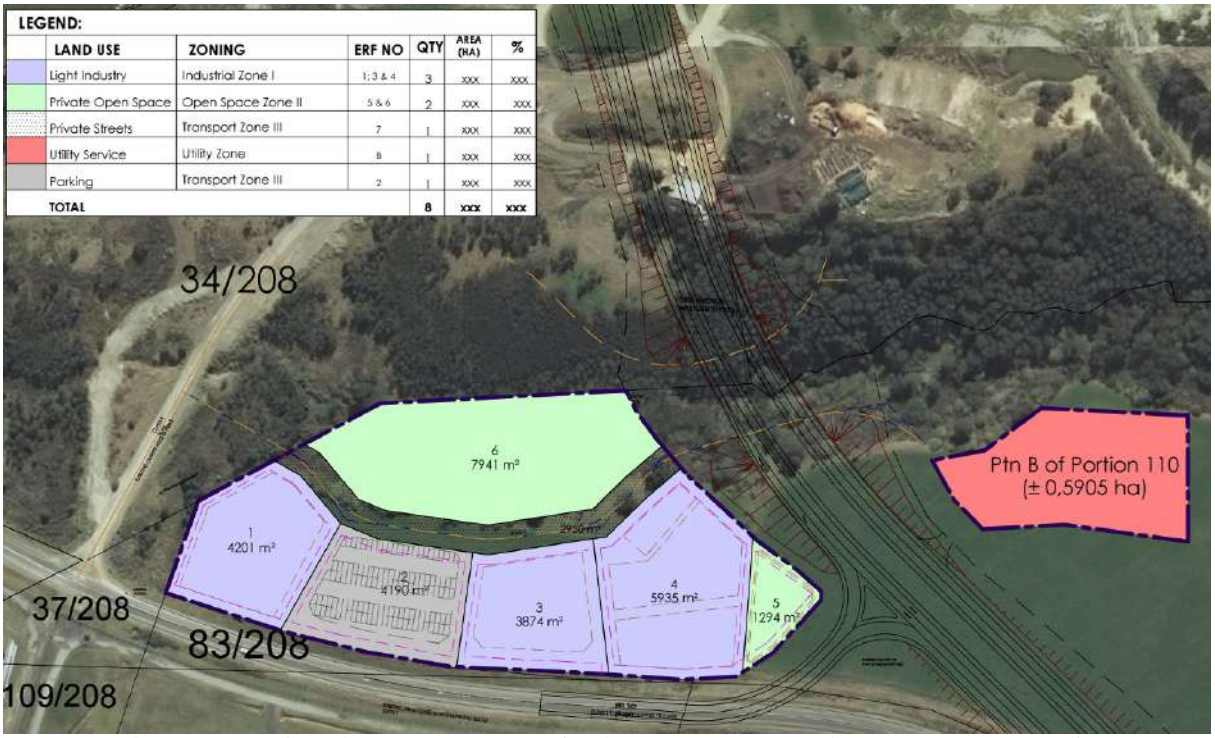


**Figure 4:** Extract from Site Development Plan (Marike Vreken Urban & Environmental Planners, 2024).

**Engineering Services:**

According to the engineering services report (Infrastructure Consulting Engineers, 2024), "the existing water and sanitation infrastructure is limited. The developers of the (adjoining) Business Park (presently under construction) concluded an agreement with (George Municipality) for the development of a privately owned and operated wastewater treatment works to be developed as part of the Business Park. The Business Park supplies 80% of the water demand from either harvested rainwater or re-use of treated wastewater. ACSA started with the planning process for the expansion of the George Airport. The objective is to increase the capacity of the Airport from 900 000 passengers per annum to two million. This expansion will put further pressure on the limited infrastructure.

Officials of ACSA indicated interest in finding joint solutions for the treatment of wastewater. The development of Portion 110 will make use of the municipal bulk system for water only. Wastewater will be treated on site for re-used for non-potable purposes. The water demand will furthermore be supplied for by harvested roof water and the recirculation of treated and disinfected wastewater. A limited portion of the water demand will be from George Municipality.

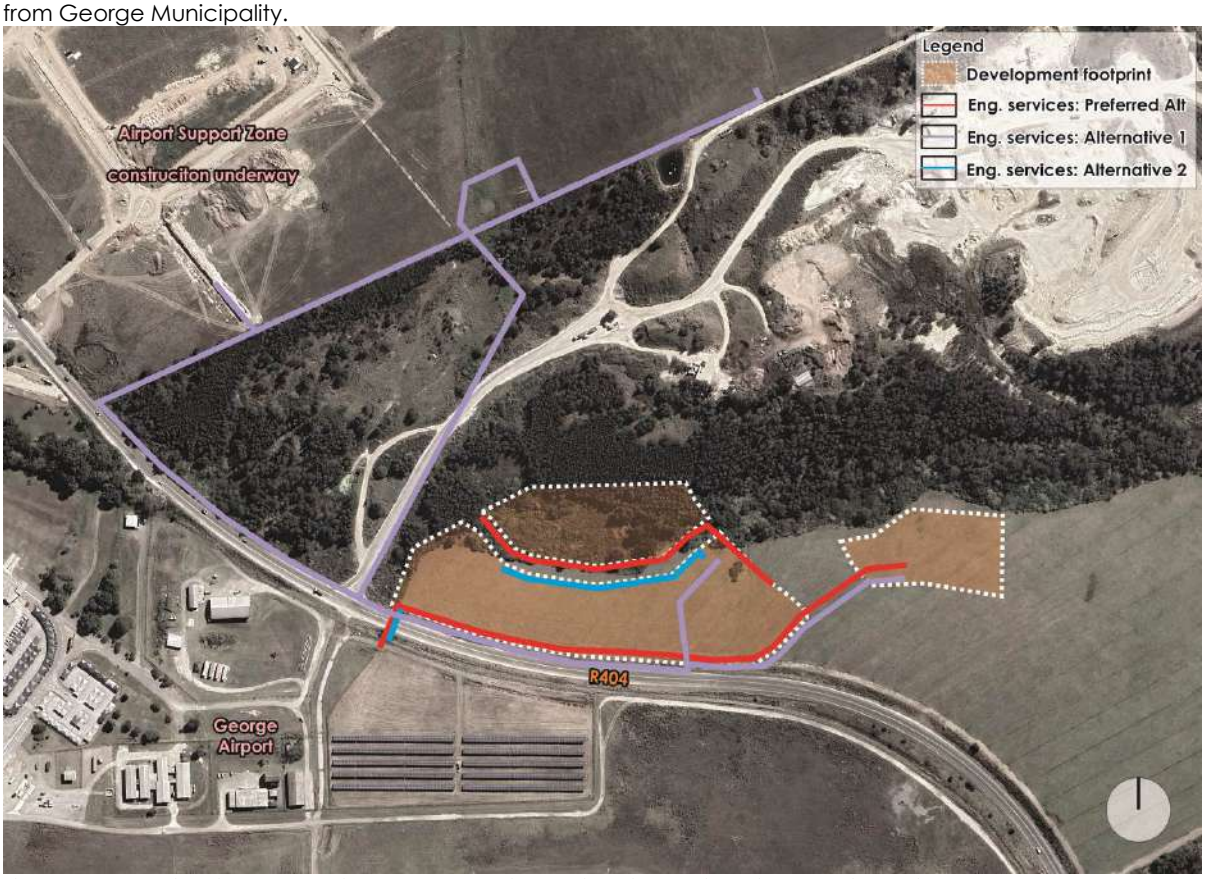


**Figure 5:** Composite diagram showing three alternative engineering service alignments in relation to proposed development site (Infrastructure Consulting Engineers, 2024 as edited).

As such, three alternative route alignments are currently under consideration for engineering services (i.e. access roads, municipal water supply, sewer line, treated wastewater and harvested rainwater and rainwater collection to a storage dam), as outlined in the detailed engineering drawings also attached to this report as part of Annexure 4. A simplified, composite diagram showing the approximate engineering service alignments are shown in **Figure 5**.

## 4. FOCUSSED HISTORIC BACKGROUND

Historical background research focussed on relevant primary sources obtained in the George Museum Archives as well as other primary and secondary sources.

### 4.1 Early establishment of George

The town of George was established on land registered as a loan farm named "Post Rivier" 1760, in favour of Koert Grobbelaar[1]. Jan Coetsee (Koert Grobbelaar's stepson) extended the lease until Coetsee's death in 1782[2]. In 1777 the Dutch East India Company (DEIC) had decided to establish a new Company Post to monitor the felling of indigenous woods. The DEIC annexed the farm Post Rivier in order to further establish the boundaries of the woodcutter's post. Although George was established as a town in 1811, the first freeholds were only granted in 1814 by which time the town grid had been laid out.

Formalisation of the first town layout (1812) appear to have been done by J H Voorman[3], most likely with some input from then landrost Van Kervel. The basic layout of the town bears resemblance to that of Uitenhage although with various improvements. The layout consisted of two parallel streets namely York Street (±60m wide but increasing to ±100m width at the top end) and a second, being the narrower Meade Street. These

[1] Cape Archives (CA)RLR 15/2 p. 511
[2] CA MOOC8/18.49a
[3] Cape Town Archives (CTA) CO 2576 1811, July 3rd. Letter from Landrost A van Kervel to Colonial Office requesting plan of Town layout compiled by Voorman to be returned as it was the only copy made.

two streets run into a cross street, being Courtenay Street in which the main public buildings dating back to the Colonial Period were situated.

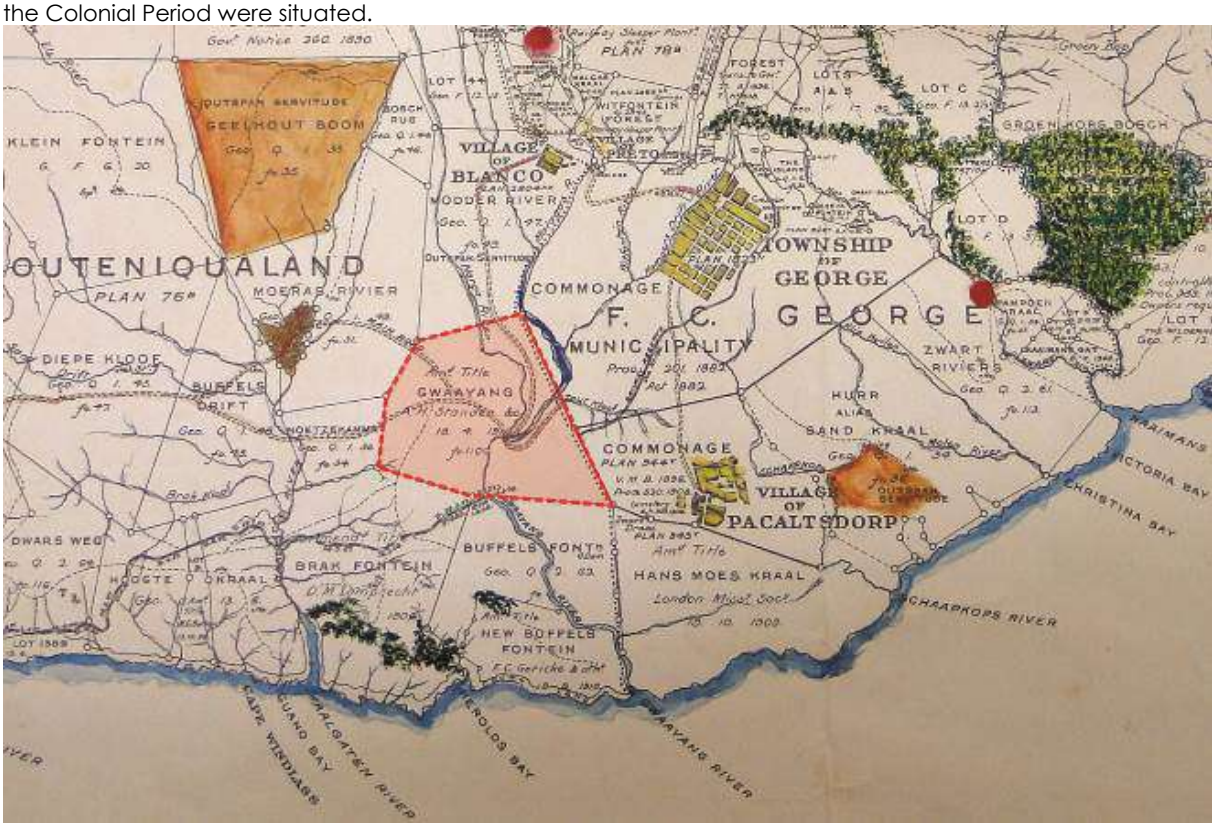


**Figure 6:** Location of early farm Gwayang, 1900 SG Mapping for the Outeniqualand (George Museum Archives).

## 4.2 Early farm Gwayang 208

From a colonial perspective the farm Gwayang 208 was first framed during 1910[4] and at the time, covered an area of 1,980 morgen 520 sq. roods (±1,774 ha) (**Figure 7**). To the northeast the farm was bound by both the Pacaltsdorp Commonage (now "Erf 325, Pacaltsdorp") and the George Commonage (now "Erf 464") as partly defined by the Gwayang River. The farm was granted to Adriaan H Stander "and fifteen others" during April 1911[5]. Figure 4 shows the proposed pipeline alignment within the context of the 1910 diagram, traversing early Lots C and D as well as the George Commonage (now Erf 464).

Basic historical background research did not identify or highlight any other significant heritage-related aspects related to the study area. It is unlikely that detailed archival research would provide further meaningful insight into former use and/or broader understanding of heritage-related themes of the area.

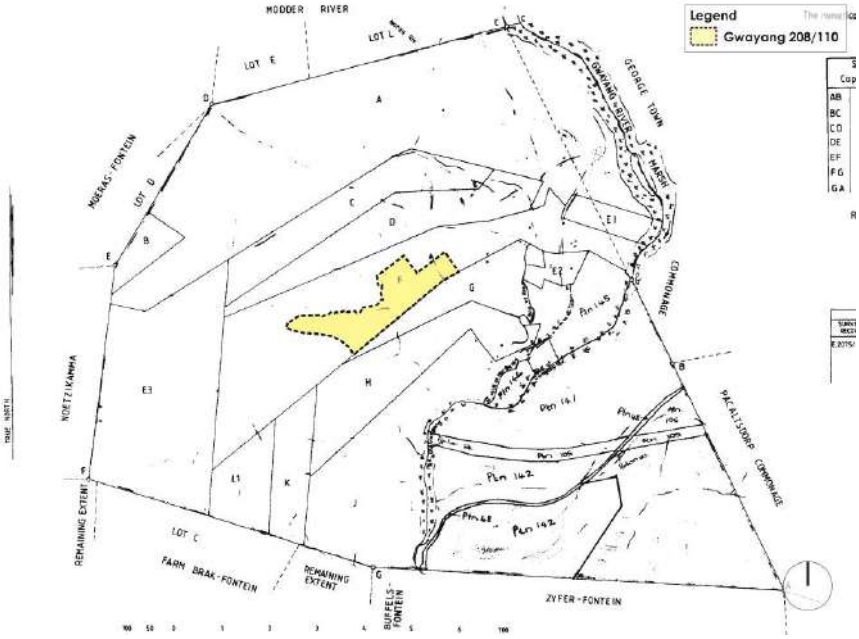


**Figure 7:** Location of the subject property in relation to early 1910 diagram for the farm Gwayang 208 (SGO as edited).

[4] S.G. Diagram A1474/1910
[5] SG Diagram 1156/1911

## 5. HERITAGE RESOURCES AND ISSUES

### 5.1 Cultural landscape context

Given the limited nature of available primary and/ or secondary archival sources pertinent to the study area, analysis of early (1957) aerial photography was found useful to inform our understanding from a cultural landscape context. From this analysis the following traditional (i.e. Pre-Modern) cultural landscape patterns emerge, as summarized below. **(Figure 8)**

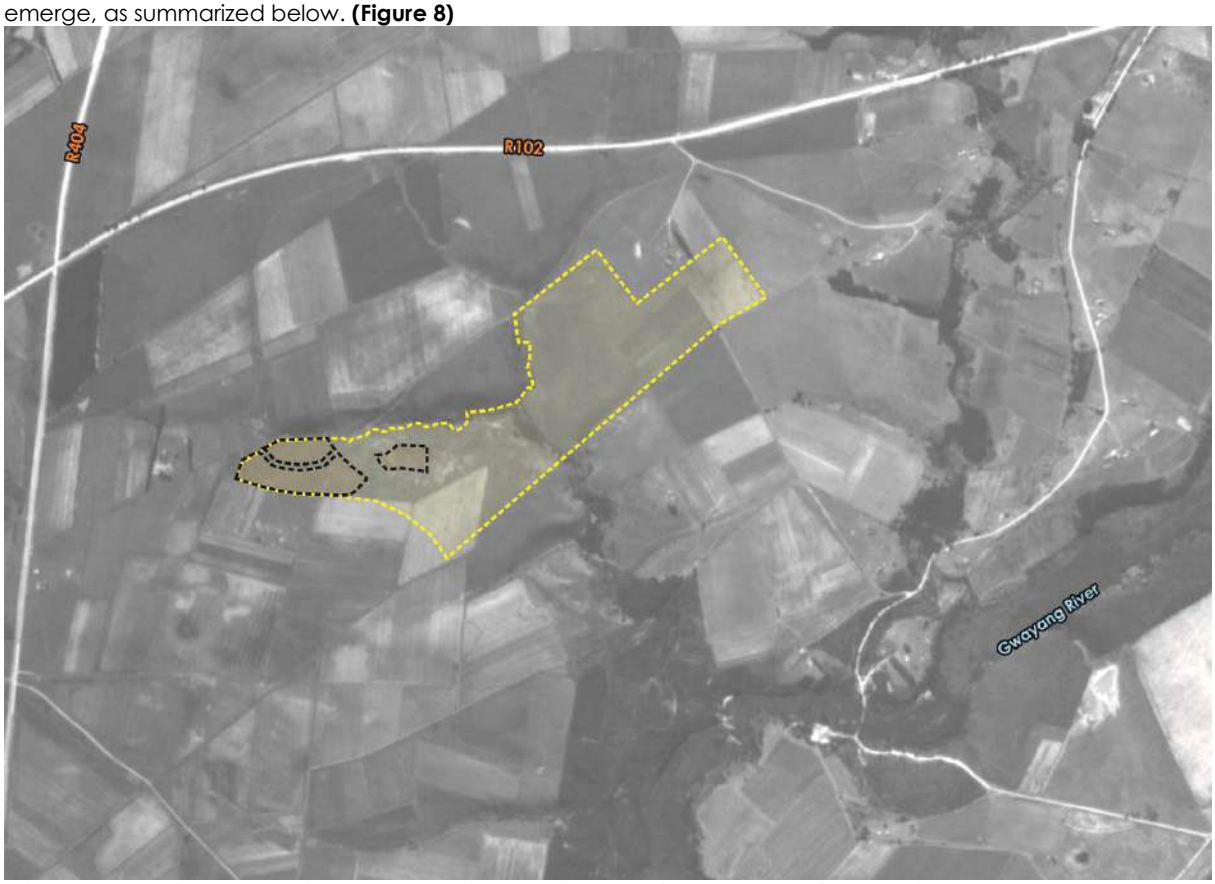


**Figure 8:** Extract from 1957 aerial imagery showing the alignment of the study area (NGSI, Aerial survey 403, Image 3269, as edited).

The imagery, which predates construction of the George Airport, shows the early alignment of the R102 (current "Airport Road"), formerly the old George – Great Brak River road. To the east (right hand of image), the Gwayang River and early alignment of the "Gwayang Road" remains largely unchanged in present day. Thirdly, the early alignment of the R404 connecting Blanco and the coastline/ Herold's Bay is noted on the left-hand side of the image.

Though several farmsteads are noted within this early landscape none are noted within the cadastral boundaries of the subject property and/or proposed study area. Save for river corridors, which are generally defined through denser vegetation, the subject study area and in fact much of the surrounding landscape had clearly already been transformed through extensive agriculture/ cultivation by this period (1957). Archival sources confirm that agriculture had been an important land use within this landscape since at least the 18th century.

### 5.2 Archaeology

**Pre-colonial archaeology**: The closest Provincial Heritage Site (Grade II) to the study area is Herold's Bay Cave, some 6.7km to the south-west. It was gazetted in 1979 because of its palaeontological significance, anthropogenic sediments, remains of a speleothem and remnants of a Last Interglacial Beach. Various archaeologists (Kaplan 2005; Dreyer 2006 & Nilssen 2009) have commented on the steep cliffs along the coast between Mossel Bay and George and numerous caves, some with significant MSA material, have been reported. The CTS Heritage Screener (2019) repeats the importance of the coastal strip, noting the stone tools found at the Blougat River mouth. However, these caves are difficult to reach, and Kaplan (2007) has commented that most significant sites occur within 300m of the high-water mark.

In general, archaeological studies which have been conducted in the interior around George, have reported scattered surface distributions of ESA artefacts as well as smaller numbers of MSA stone artefacts. No observations were made of LSA sites in the area. Kaplan (2007) commented that artefact density is very low

  

away from the coastal margin. No artefacts were observed at the George Country Club (Kaplan 2002), or at Buffelsfontein near Herold's Bay (Kaplan 2007).

Scatters of ESA and MSA artefacts were observed on the farm Hooge Kraal and the catchment of the Maalgate River (i.e. Lagoon Lifestyle Estate) (Kaplan 2005) and at Oubaai Golf estate and the 'Brink' (a residential development) near Herold's Bay. Artefacts were made on local quartzite, included side-struck flakes, prepared flakes, large chunks, flaked cobbles, hammerstones, a cleaver and at least two bifacial flaked handaxes. They occurred in disturbed and degraded areas. Nilssen (2009) too surveyed a portion of Hooge Kraal 238 (8km to the south-west) noting the impenetrable vegetation. He noted that the remains are dominated by ESA material located in and under ancient dune sands. These included handaxes, cleavers, cores, hammerstones, choppers, etc. The steeper slopes to the south were dominated by a range of Middle Stone Age (MSA) artefacts on quartzite and quartz.

Dreyer (2006) surveyed Ballots Bay on the Farm Sand Kraal 197, and he reported on a collection of ESA hand axes (from the illustration there are at least 8 handaxes) and a smaller assemblage of flaked tools which resemble MSA artefacts (from the illustrations these include broken blades and flakes) from the same source. The source of the raw material is likely the locally derived quartzite from the beach. A study in the Pacaltsdorp area by Webley (2022), has confirmed the presence of caves and rock shelters in the Skaapkop River, some with rock art.

**Historical Archaeology**: No historical archaeology has been undertaken in the area, but Orton & Hart (2011) did develop a conservation management plan for some late 18th/early 19th century ruined buildings at Tyolora, to the south-east of George.

**Graves:** During an archaeological survey around Blanco for a new substation and powerlines, (ACO Associates for Vidamemoria 2015) recorded two graveyards and more are likely to occur around small settlements.

**Comments on Potential Archaeological Impacts:**
It is unlikely that any significant artefact material will be identified along the study area. Scatters of ESA and/or MSA material are possible but are likely to be of low significance. Caves/rock shelters do occur in rock outcrops along the lower reaches of the Gwayang River, near the coast and it is possible that some may be found higher up the river valleys as well. However, these are not likely to be impacted. The study area is however ±7km north of the nearest coastline and the proposed pipeline will not impact any caves/ rock shelters.

Notwithstanding, if any human remains or significant archaeological materials are exposed during development activities, then the find should be protected from further disturbance and work in the immediate area should be halted and Heritage Western Cape must be notified immediately. These heritage resources are protected by Section 36(3)(a) and Section 35(4) of the NHRA (Act 25 of 1999) respectively and may not be damaged or disturbed in any way without a permit from the heritage authorities. Any work in mitigation, if deemed appropriate, should be commissioned, and completed before construction continues in the affected area and will be at the expense of the developer. The above recommendations should be included in the Environmental Management Program (EMPr) for the proposed residential development.

### 5.3 Palaeontology

According to SAHRIS Palaeontological sensitivity mapping, the entire study area forms part of an area highlighted as being of no palaeontological sensitivity (grey) where "no palaeontological studies are required".[6]

### 5.4 Conclusion

The proposed development would essentially form part of the approved George Airport Support Zone, significant components of which have already been approved and are under construction as evident during fieldwork as well as recent aerial imagery (Figures 1,2) included in this report. From the information provided, the layout of the proposed development site aligns with the overall roads master plan for the Airport Support Zone (see Figure 4). Various primary archival sources, including aerial imagery, confirms that the study area and surrounding landscape had been transformed through agriculture since as early as the 18th century.

Based on fieldwork, historic background research and the literature review undertaken as part of this assessment it is therefore our view that no heritage resources of cultural significance (i.e. built environment, cultural landscape, archaeology, or palaeontology) would be impacted through the proposed development, which includes the three alternative options pertaining to the alignment of engineering services as described 3 of this report.

[6] https://sahris.sahra.org.za/map/palaeo, accessed 8th February 2023

## 6. RECOMMENDATION

Having regard to the above assessment it is our view that the proposal would not impact on any heritage resource of cultural significance and that no further heritage-related studies would be warranted in this instance.

**PERCEPTION Planning**
7th November 2024

**STEFAN DE KOCK**
*Hons: TRP(SA) EIA Mgmt (IRL) Pr Pln PHP*

**REFERENCES and ACKNOWLEDGEMENTS**


1. Cape Town Archives
2. De Kock, S. 2021. Integrated Heritage Impact Assessment: Proposed development of boutique hotel on Erven 19324, 19325 & 19326 (Pinnacle Point), Mossel Bay Municipality. Unpublished report for Dumakanda Residence Trust.
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# APPLICATION FORM

## NOTIFICATION FOR INTENT TO DEVELOP (NID)

## ~~Section 38(1) and~~ Section 38(8)

**Completion of this form is required by Heritage Western Cape for the initiation of all impact assessment processes under Section 38 (1) & (8) of the National Heritage Resources Act (NHRA).**

**As per Section 38(1)(e) of the NHRA, submission of the NID must be initiated at the earliest stage of development. Should the development trigger any other legislation, practitioners may submit the NID without formal submission to other statutory bodies in order to comply with the NHRA.**

**This form is to be read in conjunction with the HWC Notification of Intent to Develop, Heritage Impact Assessment, (Pre-Application), Basic Assessment Reports, Scoping Reports and Environmental Impact Assessments.**

**All sections of the form must be completed in order to deem the application to be complete.**

**Making an incorrect statement or providing incorrect information may result in all or part of the application having to be reconsidered by HWC in the future, or submission of a new application.**

**HERITAGE WESTERN CAPE REFERENCE NO., AS PROVIDED DURING SCRUTINY:** **HWC 2410 3110**

## SECTION A

**APPLICATION MADE IN TERMS OF:**

- [ ] Section 38(1) of the NHRA (This development will not require a NEMA application)
- [√] Section 38(8) of the NHRA (This development requires an application with another authority)
- [ ] Amendment of approved Site Development Plan (SDP) for endorsement. Endorsements are only reviewed upon submission of an assessment by the heritage practitioner confirming heritage design indicators as approved are not compromised by the revision
- [ ] Advice in terms of Section 38(1)

**APPLICABILITY OF OTHER LEGISLATION:**

Specify the authorized department that makes the final decision in terms of NEMA (National Environmental Act.), i.e. Department of Mineral Resources, Department of Environmental Affairs and Development Planning Western Cape, Department of Forestry, Fisheries and Environment etc.: **DEADP**

Reference number of authority / government department: **6/3/3/6/7/1/D2/45/0265/24**

Present phase at which the process with that authority stands: **Application underway**

## PREVIOUS HWC APPLICATIONS APPLICABLE TO THE SITE AND OR DEVELOPMENT

Provide details of any previous applications submitted to HWC on the site.

| HWC Reference No. | NHRA Section | Summary of Proposal | Application Status (Approved, Not Approved, Pending) | Permit / Record of Decision Date |
|---|---|---|---|---|
| HWC24051424SB0823 | 38 | Proposed Airport bulk water pipeline: Portions 44, 45, 53, 65, 68, 96, 102, 112, 113, 132, 131 & 139 of the farm Gwayang 208 | Ongoing | No further studies 10/09/2024 |
| HWC23031514SB0315 | 38 | Gwayang Mixed-use area: Erf 464/ RE, George & Erf 325/RE, Pacaltsdorp | Ongoing | No further studies 06/04/2023 |
| 120531ZS48M | 38 | Service Station, Hotel: Gwayang 208/ 78, 82, 84 | Never implemented | No further studies 31/05/2012 |
| 19110610AS0127E | 38 | Proposed Airport Access Roads: Gwayang 208/ RE, 4, 34, 37, 53, 60, 73, 74, 78, 83, 84, &110 | Ongoing | 10/02/2012 |
| 21092709AM0930E | 38 | Proposed rezoning, subdivision Gwayang 208/139 | Ongoing | 22/10/2021 |
| 17102302WD1025E | 38 | Proposed service station: Gwayang 208/4 | Never implemented | 14/11/2017 |

**Above HWC comments attached as part of Annexure 2**

## SECTION B

### DETAILS OF SITE, PROPERTY OR PLACE

Physical address or Location (e.g., of the R44): **Along R404 (Road connecting Blanco, George Airport, N2).**

Erf or Farm Name and No. (including the name of the site): **Farm Gwayang 208/110, George**

Coordinates for logical center point (WGS84): **34˚ 00' 03.26" S; 22˚ 23' 20.00" E (centroid)**

Town: **George** District / Municipality: **George District and Municipality**

Property Extent: **40,3536ha** Current land Use: **Agriculture**

Current zoning: **Agriculture Zone I**

Predominant land uses of surrounding properties: **George Airport, Agriculture, Nurseries, Tourism-related uses, Airport Support Zone (under construction)**

## SECTION C

### APPLICANT / AUTHORISED AGENT – Details of person to receive Record of Decision

Name: **Stéfan de Kock**

Company: **Perception Planning (duly appointed agent plse see Power of Attorney attached)**

Address and postal code: **PO Box 9995, George, 6530**

Cellular phone number: **082 568 4719**

E-mail: **perceptionplanning@gmail.com**

Signature: _____ Date: **8th November 2024**

**REGISTERED OWNER OF PROPERTY**

Name: **Michael David Elston (Developer) on behalf of the Platrug Trust (IT 1608/97), being the Registered landowner**

Identity number of applicant: **(SA ID 791114 5073 087)**

Address and postal code: **N/A**

Cellular phone number: **N/A**

E-mail: **N/A**

**PLEASE SEE POWER OF ATTORNEY, MANDATE ATTACHED HERETO.**

Declaration: I, _____ am fully aware of this application and accept its contents and declare that I intend to undertake the actions as proposed in this application.

Signature: _____ Date: _____

## SECTION D

**DETAIL OF PROPOSED DEVELOPMENT**

Provide a full description of the nature and extent of the proposed development.

**Proposed light industrial use (primarily warehousing and storage). Kindly refer to Background Information Document for comprehensive description.**

**DEVELOPMENT DETAILS –** Indicate which sections of the NHRA, or other legislation which requires a NID

| **PLEASE TICK THE APPROPRIATE BOX** | |
|---|---|
| √ | **Section 38(1)(a)** Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length. |
| | **Section 38(1)(b)** Construction of a bridge or similar structure exceeding 50m in length. |
| | **Section 38(1)(c)** Any development or activity that will change the character of a site: |
| √ | **(i)** exceeding 5 000m² in extent. |
| | **(ii)** involving three or more existing erven or subdivisions thereof. |
| | **(iii)** involving three or more erven or divisions thereof which have been consolidated within the past five years. |

| | |
|---|---|
| | *If (i), (ii) and/or (iii) are marked above, describe how the development will change the character of the site<br>_____<br>_____<br>_____ |
| √ | **Section 38(1)(d)** Rezoning of a site exceeding 10 000m² in extent. |
| | **Other triggers e.g., in terms of other legislation (NEMA, etc.)** – Describe the details:<br>**Proposal triggers a NEMA process, which is presently underway**<br>_____ |

**ESTIMATED CONSTRUCTION COST AND/ OR VALUE OF DEVELOPMENT UPON COMPLETION: R** _____

## SECTION E

**PROVIDE A SHORT HISTORY OF THE SITE, PROPERTY OR PLACE –** Include sources where applicable

**Kindly refer to Background Information Document for comprehensive description.**

**ANTICIPATED IMPACTS ON HERITAGE RESOURCES**

Section 3 of the NHRA sets out the following categories of heritage resources as forming part of the national estate. Please indicate the known presence of any of these by checking the box alongside and then providing a description of each occurrence, including nature, location, size, type

Failure to provide sufficient detail or to anticipate the likely presence of heritage resources on the site may lead to a request for more detailed specialist information.

**IDENTIFICATION OF ALL HERITAGE RESOURCES ON THE SITE, PROPERTY OR PLACE AND ITS ENVIRONMENTS**

Please indicate where applicable:

| | |
|---|---|
| | **Places, buildings, structures, and equipment of cultural significance:**<br>Description of Heritage Resource: **None**<br>Descriptions of Heritage Impact: **No impact** |
| | **Places to which oral traditions are attached or which are associated with living heritage:**<br>Description of Heritage Resource: **None known**<br>Descriptions of Heritage Impact: **None** |
| | **Places to which oral traditions are attached or which are associated with living heritage**: |

| | |
|---|---|
| | Description of Heritage Resource: **None known**<br><br>Descriptions of Heritage Impact: **None** |
| | **Historical settlements and townscapes:**<br><br>Description of Heritage Resource: **None**<br><br>Descriptions of Heritage Impact: **None** |
| | **Landscapes and natural features of cultural significance:**<br><br>Description of Heritage Resource: **None**<br><br>Descriptions of Heritage Impact: **None** |
| | **Geological resources of scientific or cultural significance:**<br><br>Description of Heritage Resource: **None known**<br><br>Descriptions of Heritage Impact: **None** |
| | **Archaeological resources –** Incl. archaeological sites and material, rock art, battlefields, and wrecks etc.:<br><br>Description of Heritage Resource: **None known**<br><br>Descriptions of Heritage Impact: **None** |
| | **Palaeontological resources –** i.e., fossils, geological formations etc.:<br><br>Description of Heritage Resource: **None**<br><br>Descriptions of Heritage Impact: **None** |
| | **Graves and burial grounds –** e.g.: ancestral graves, graves of victims of conflict, historical graves, cemeteries etc.:<br>Description of Heritage Resource: **None known**<br><br>Descriptions of Heritage Impact: **None** |
| | **Sites of significance relating to the history of slavery in South Africa:**<br><br>Description of Heritage Resource: **None known**<br><br>Descriptions of Heritage Impact: **None** |
| | **Other heritage resources:**<br><br>Description of Heritage Resource: **None known**<br><br>Descriptions of Heritage Impact: **None** |

**PROVIDE A SUMMARY OF THE ANTICIPATED IMPACTS ON HERITAGE RESOURCES**

**Kindly refer to Background Information Document for comprehensive description**

## SECTION F

**RECOMMENDATION**

In your opinion, do you believe that a Heritage Impact Assessment (HIA) is required?

☐ **Yes** ☑ **No**

**Specialist studies to be provided as part of the HIA:**

| | |
|---|---|
| | Architectural (i.e., fabric analysis, historical analysis, material analysis etc.) |
| | Archaeological Impact Assessment |
| | Paleontological Impact Assessment |
| | Townscape Assessment |
| | Cultural Assessment |
| | Social Historical Study |
| | Visual Impact Assessment |
| | Other: |

**Recommendations made by:** **Stéfan de Kock**

**Capacity:** **Heritage Practitioner**

**PLEASE NOTE**

Any further studies which HWC requires should be submitted in the form of a single, consolidated report with a single set of recommendations. Specialist studies must be incorporated in full, either as chapters of the report, or as annexures thereto.

Please refer to the Guidelines for Heritage Impact Assessments required in terms of Section 38 of the National Heritage Resources Act (25 of 1999).

Applications are considered to be public documents and are open to public scrutiny. Should you wish for your application to be kept confidential, please motivate your request on a separate sheet attached to your application form.

For applications that are granted confidentiality, this confidentiality will be limited to one year (12 months).

applications that are granted confidentiality, this confidentiality will be limited to one year (12 months).

**Our Ref**: HM/ EDEN / GEORGE / FARM 208/110
**Case No**: HWC24103110SB1108
**Enquiries**: Stephanie Barnardt
**E-mail**: Stephanie.Barnardt@westerncape.gov.za
**Tel**: 021 829 3315

ILifa leMveli leNtshona Koloni
Erfenis Wes-Kaap
Heritage Western Cape

**Applicants/Consultant details: Stefan de Kock**
perceptionplanning@gmail.com

**RESPONSE TO NOTIFICATION OF INTENT TO DEVELOP: FINAL**
**In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) and the Western Cape Provincial Gazette 6061, Notice 298 of 2003**

**NOTIFICATION OF INTENT TO DEVELOP: PROPOSED LIGHT INDUSTRIAL ZONE ON A PORTION OF THE REMAINDER OF THE FARM GWAYANG 208/110, GEORGE, SUBMITTED IN TERMS OF SECTION 38(1) OF THE NATIONAL HERITAGE RESOURCES ACT (ACT 25 OF 1999)**

The matter above has reference.

Heritage Western Cape is in receipt of the above matter received. This matter was discussed at the Heritage Officers meeting held on 18 November 2024.

You are hereby notified that, since there is no reason to believe that the proposed light industrial zone on a portion of the remainder of the farm Gwayang 208/110, George, will impact on heritage resources, no further action under Section 38 of the National Heritage Resources Act (Act 25 of 1999) is required. HWC chance finds to be implements.

However, should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities above, all works must be stopped immediately, and Heritage Western Cape must be notified without delay.

This letter does not exonerate the applicant from obtaining any necessary approval from any other applicable statutory authority.

HWC reserves the right to request additional information as required.

Should you have any further queries, please contact the official above and quote the case number.

.....
Waseefa Dhansay
**Assistant Director: Professional Services**

Heritage Western Cape
Erfenis Wes-Kaap
ILifa leMveli leNtshona Koloni

28 November 24

**ANNEXURE R:**

*Heritage Western Cape Approval*

**Our Ref:** HM/ EDEN / GEORGE / FARM 208/110
**Case No:** HWC24103110SB1108
**Enquiries:** Stephanie Barnardt
**E-mail:** Stephanie.Barnardt@westerncape.gov.za
**Tel:** 021 829 3315

**Applicants/Consultant details: Stefan de Kock**
perceptionplanning@gmail.com

**ILifa leMveli** leNtshona Koloni
**Erfenis** Wes-Kaap
**Heritage** Western Cape

**RESPONSE TO NOTIFICATION OF INTENT TO DEVELOP: FINAL**
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.....
Waseefa Dhansay
**Assistant Director: Professional Services**

Heritage Western Cape
Erfenis Wes-Kaap
ILifa leMveli leNtshona Koloni

28 November 24

**ANNEXURE S:**

*Visual Impact Statement*

# PROPOSED LIGHT INDUSTRIAL DEVELOPMENT

# DRAFT

on **Portion 110** of the farm Gwayang no 208, division George, George, Western Cape, South Africa

High-level

## VISUAL IMPACT ASSESSMENT

8 OCTOBER 2024

REV 1

Prepared for:

Mr Michael Elston

Prepared by:

NEWURBAN
Architects and Urban Designers

t: +27(0)86 036 0000
t: +27(0)12 460 3226/7/8

5 Guild House 239 Bronkhorst Street,
Nieuw Muckleneuk. Pretoria, South Africa

# Table of Contents

## 1. INTRODUCTION

**NewUrban Architects and Urban designers** were appointed by Michael Elston to do a high-level Visual Impact Assessment (VIA) as a requirement for the Environmental Impact Assessment (EIA). This VIA is done according to the Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Edition 1) as compiled by the Provincial Government the Western Cape Department of Environmental Affairs and Development Planning dated June 2004.

The project falls within in the George Municipality and the property under discussion is located opposite to the George Airport, on **portion 110 of farm 208**. The urban design vision prepared NEWURBAN Architects & Urban Designers was done for the full Airport support zone. The VIA is site specific and is compiled taking into consideration a **Category 4 development** which entails a possible high visual impact according to the Guideline for Involving Visual and Aesthetic Specialists in EIA Processes.

The outcome of the visual impact of the Category 4 development relates to the type of environment and is assessed in the study.

## 2. SCOPE OF PROJECT

The high-level VIA should form an integral part of the EIA and Township Application. Comments and objections that were received through the EIA process should also be addressed if it relates to be Visual impact. No direct comments regarding the Visual Impact were submitted during the EIA process.

The scope of work included in this Visual Impact Assessment:

- Criteria used in the assessment of the affected area
- Description of the proposed project and receiving environment.
- Determine of the Area affected by the development.
- Propose possible Mitigating Measures
- Viewpoints of 3D model

The overall objective of the Visual Impact Assessment (VIA) is to assess the significance of the visual impact that will be caused by the proposed development.

The VIA should be read in conjunction with:

- Proposed EIA (Basic Assessment process will be followed)
- Gwayang Local Spatial Development Framework (2015)
- Portion 139 of the farm Gwayang no 208, division George, George municipality application for subdivision & rezoning.
- VIA of Portion 4 of the farm Gwayang no 208
- VIA of Portion 130,131 & 132 of the farm Gwayang no 208 (In process)
- VIA of Portion 139 of the farm Gwayang no 208

Delimitation of scope of work.

- Monitoring programmes and urban design guidelines
- Impact of potential night lighting

## 3. METHODOLOGY & APPROACH

This VIA is done according to the Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Edition 1) as compiled by the Provincial Government the Western Cape department of environmental affairs and development planning. The following sequence was employed in this Visual Assessment Report:

The desktop survey made use of various aerial photographs. These were used to identify landforms and landscape patterns, as well as to determine the view shed of the area. The view shed for the development is based on the maximum height of 2 storeys and based on an 18m hight impact as per the Urban Design Guidelines set out for portion 139 . *(GEORGE AEROTROPOLIS - URBAN DESIGN GUIDELINES DRAFT-REV4 – see annexures)*

In order to model the decreasing visual impact of the development, concentric diameter zones with distance of 1km to 5km from the proposed site were superimposed on the view shed to determine the level of visual exposure. The closest zone to the proposed development indicates the area of most significant impact, and the zone 2 - 5km indicates the area of least impact.

A photographic survey of the site and surrounding areas was conducted which determine the visibility of the proposed development.

Potential visual impacts were identified using standard criteria such as geographic view shed and viewing distance, as well as qualitative criteria such as importance to surrounding land users and compatibility with the existing landscape.

Possible mitigation measures were identified.

## 4. ASSESSMENT CRITERIA

The below assessment criteria will be used to assess the relevant viewpoints relating to the proposed developments. The assessment criteria are used to identify the overall visual impact the development will have on the existing environment.

**VIEWPOINTS AND VIEW CORRIDORS**

Viewpoints have been selected based on prominent viewing positions in the area. The selected viewpoints and view corridors are used as a basis for determining potential visual ability and visual impacts of the proposed development activities. 8 viewpoints were identified based on sensitivity and visual impact of the area.

**VISUAL EXPOSURE**

Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance. The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if the proposed development activities and associated infrastructure were not visible, no visual impact would occur. Visual exposure is determined by the view shed or the view catchment being the area within which the proposed development will be visible.

**VISUAL SENSITIVITY**

Visual sensitivity can be determined by several factors together such as prominent topographic or other scenic features, including:

- High points, ridges and spurs (visible from a greater distance and determines the horizon effects);
- Steep slopes (tends to be more prominent and visible from a distance);

**LANDSCAPE INTEGRITY**

Landscape integrity is represented by the following visual qualities, which enhance the visual and aesthetic experience of the area:

- Intactness of the natural and cultural landscape;
- Lack of visual intrusions or incompatible structures;
- Presence of a 'sense of place'.

**VISUAL ABSORPTION CAPACITY (VAC)**

The ability of elements of the landscape to "absorb" or mitigate the visibility of an element in the landscape. Visual absorption capacity is based on factors such as vegetation height (the greater the height of vegetation, the higher the absorption capacity), structures (the larger and higher the intervening structures, the higher the absorption capacity) and topographical variation (rolling topography presents opportunities to hide elements in the landscape and therefore increases the absorption capacity).

## 5. DESCRIPTION OF THE AFFECTED AREA

This section of the report provides a description of the current status of the environment. This provides a baseline context for assessment of the proposed development.

**SITE LOCATION & DESCRIPTION**

The location of the site (Portion 110 of The Farm Gwayang no 208 AIRPORT SUPPORT ZONE) is opposite the George Airport with the R404 running to the east of the site. The airport is situated to the south west with a quarry to the south east of the proposed development. Access to the site from George is either via the N2 or the R102 connecting via the R404. The GPS co-ordinates for the centre of the proposed development are **34°00'03.1"S 22°23'14.4"E**

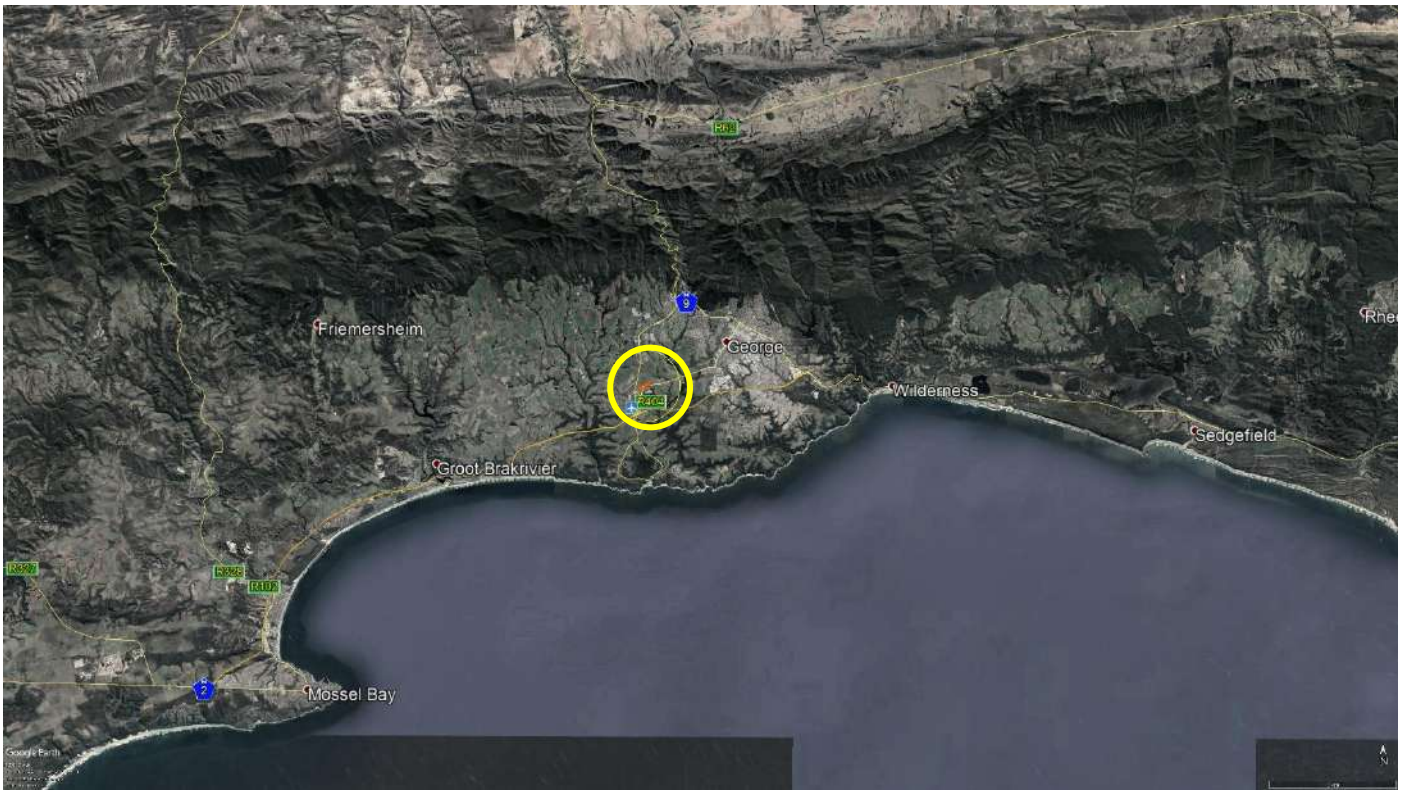



*Figure 1:Macro Locality Plan*

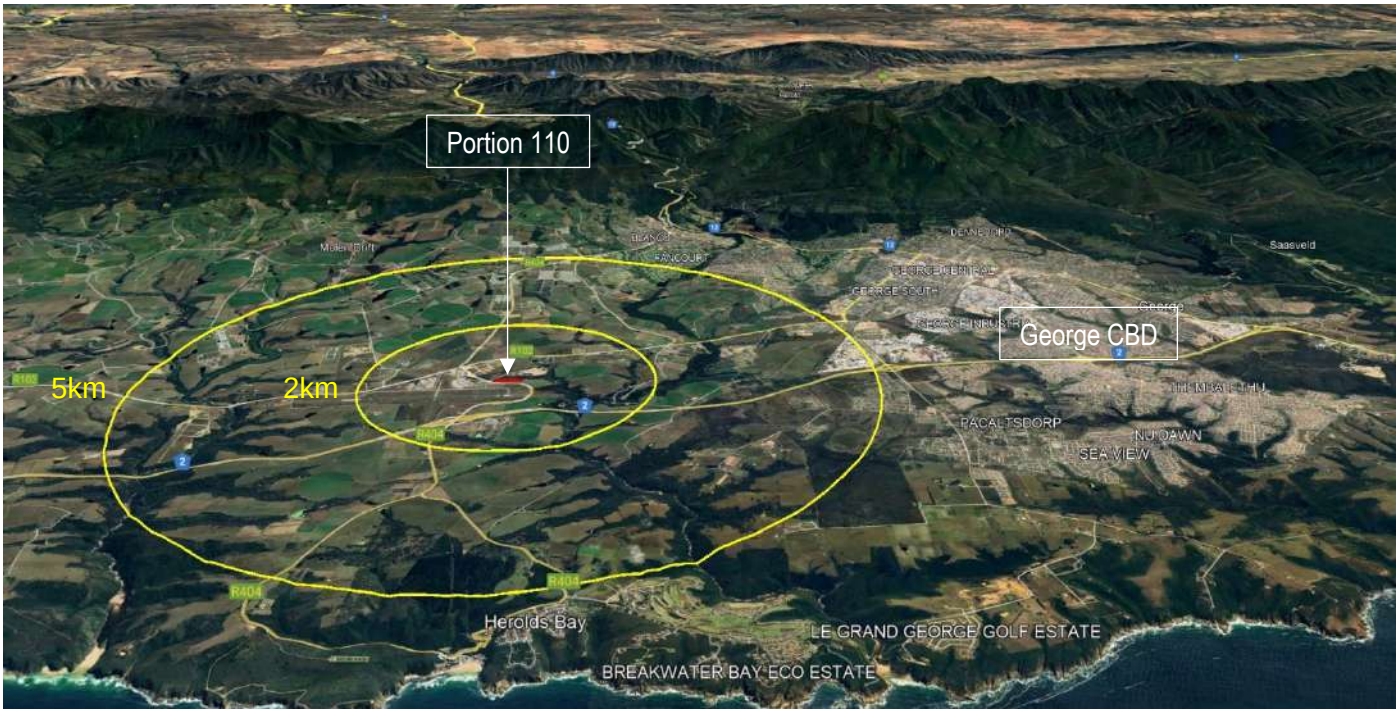



*Figure 2:Mirco Locality Plan of Portion 110 The Farm Gwayang no 208*


*Figure 3: Aerial image of Portion 110 of Farm the Farm Gwayang no 208*

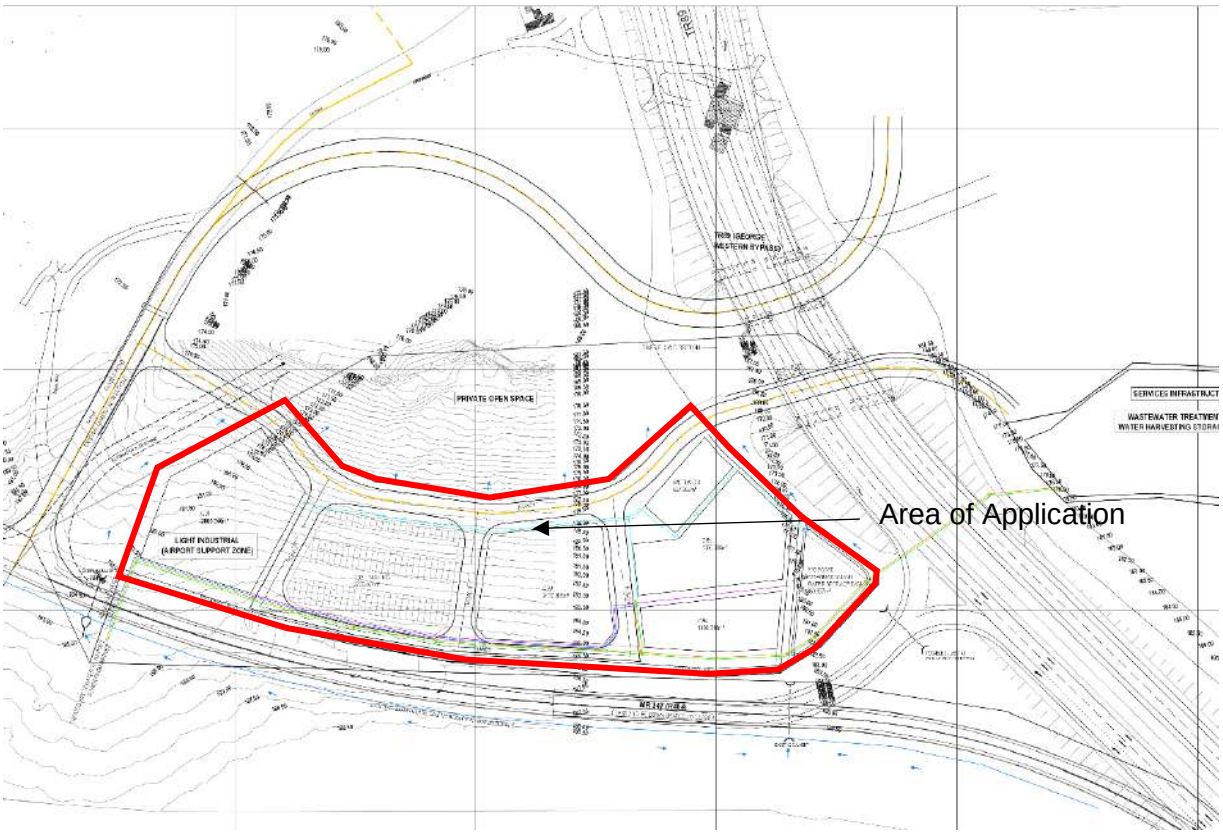



*Figure 4: Proposed Cadastral layout of Portion 110 The Farm Gwayang no 208*

**SURROUNDING AREA**

The airport is the most prominent structure in the immediate area occupying a large portion of the land. The existing quarry is visible or exposed from the R102 driving from east to west as the road is higher than the valley (see below). From other approaches the quarry is out of sight due to the high density of trees around surrounding it as well as the approach being lower than the quarry. The outlying areas beyond the 1km radius from the proposed site are primarily farmlands.


*View travelling west along R404 traveling towards the airport. The airport tower can be seen in the distance to the left and the solar farm next to it.*


*View of the proposed site from the R404 traveling form the east (Towards George Airport).*


*View from the R404. Looking toward the George airport. No existing structure on the portion 110 site is visible.*


*View just before the R102 & R404 intersection. The airport tower and car rental buildings are visible in the landscape.*

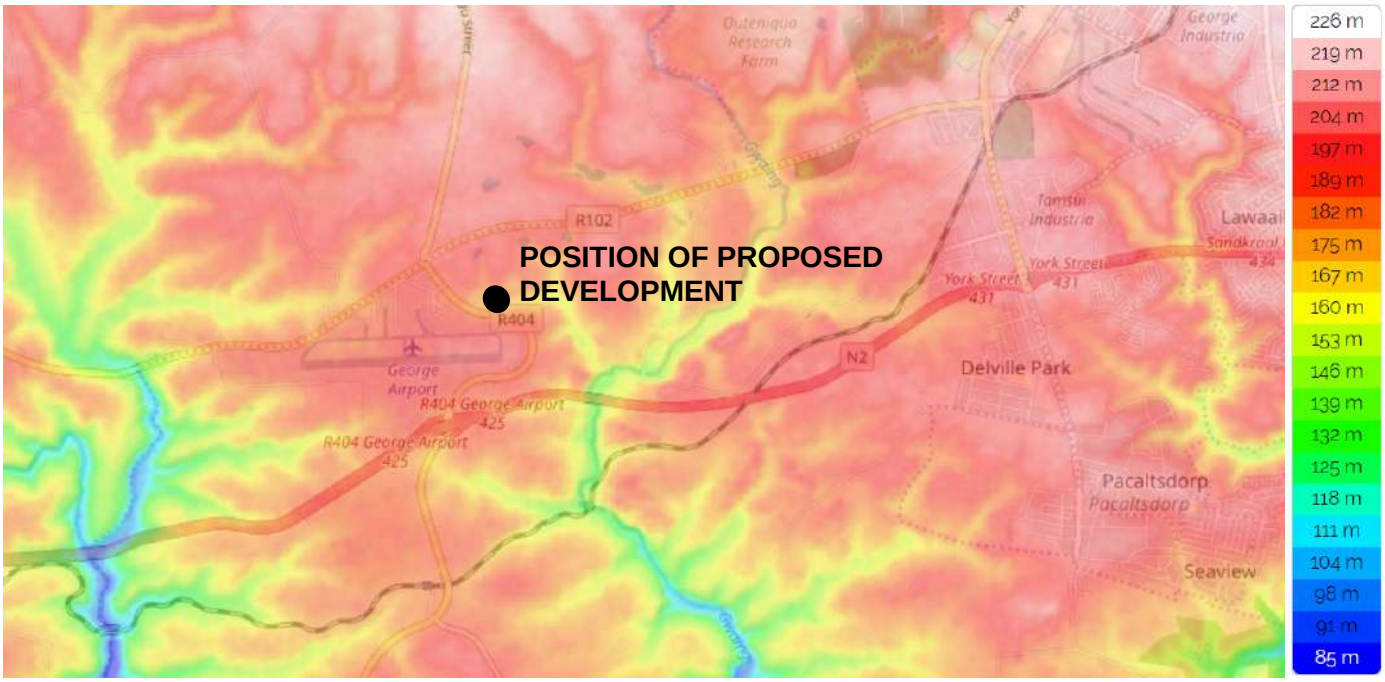
*View from the R404 of the quarry north of the site looking east towards the quarry.*


*View of Ptn 110 from the R404 directly next to it. Topography can be seen sloping down from rod edge.*

**TOPOGRAPHY**

An overview of the topography of the area noting the proposed site is in a similar level to the airport with low lying valleys to the south and south east of the site. The topography to the north increases in height above sea level while to the south drop in height toward the ocean. This plays a specific role in the view sheds and visibility of the proposed development.

According to Marike Vreken Urban and Environmental Planners, a 5m Contour Plan and Slope (Degree) Plan indicates that the topography is very flat and slope of 0-5 degree covers the proposed development area.




**LAND COVER**

Land cover varies in the immediate area. The airport contributes to a large area of disturbed land cover with the quarry also contributing to the disturbed natural landscape. Farmlands are the consistent land cover north of the R102 and again south of the N2.


For the purpose of this assessment, land cover is categorised into classes that represent natural habitat and land use categories that contribute to habitat degradation. Areas that are characterised by high levels of transformation and habitat degradation are generally accepted as being suitable for development purposes as it is unlikely that the development will further affect the biodiversity attributes of sensitivities. Conversely, areas that are characterised by extensive untransformed and pristine habitat are generally not regarded suitable options for development purposes. There are currently no CBAs identified on the site in terms of the Garden Route BSP. However, the drainage area is part of an ESA.

The area comprises extensive transformed habitat that resulted from agriculture, airport development and landing strip and the nearby quarry. The landcover on the area of the proposed development is Improved Grassland, the property is currently used for grazing purposes. The Crop Census (2013) illustrate that property consist of planted pastures (Lucerne). (Vreken.M, August 2018)

**SENSE OF PLACE**

The airport occupies a large land portion south of the proposed site and forms part of the cultural landscape. The airport has a control tower that forms a landmark and is highly visible when approaching form any direction on the R404 and R102.

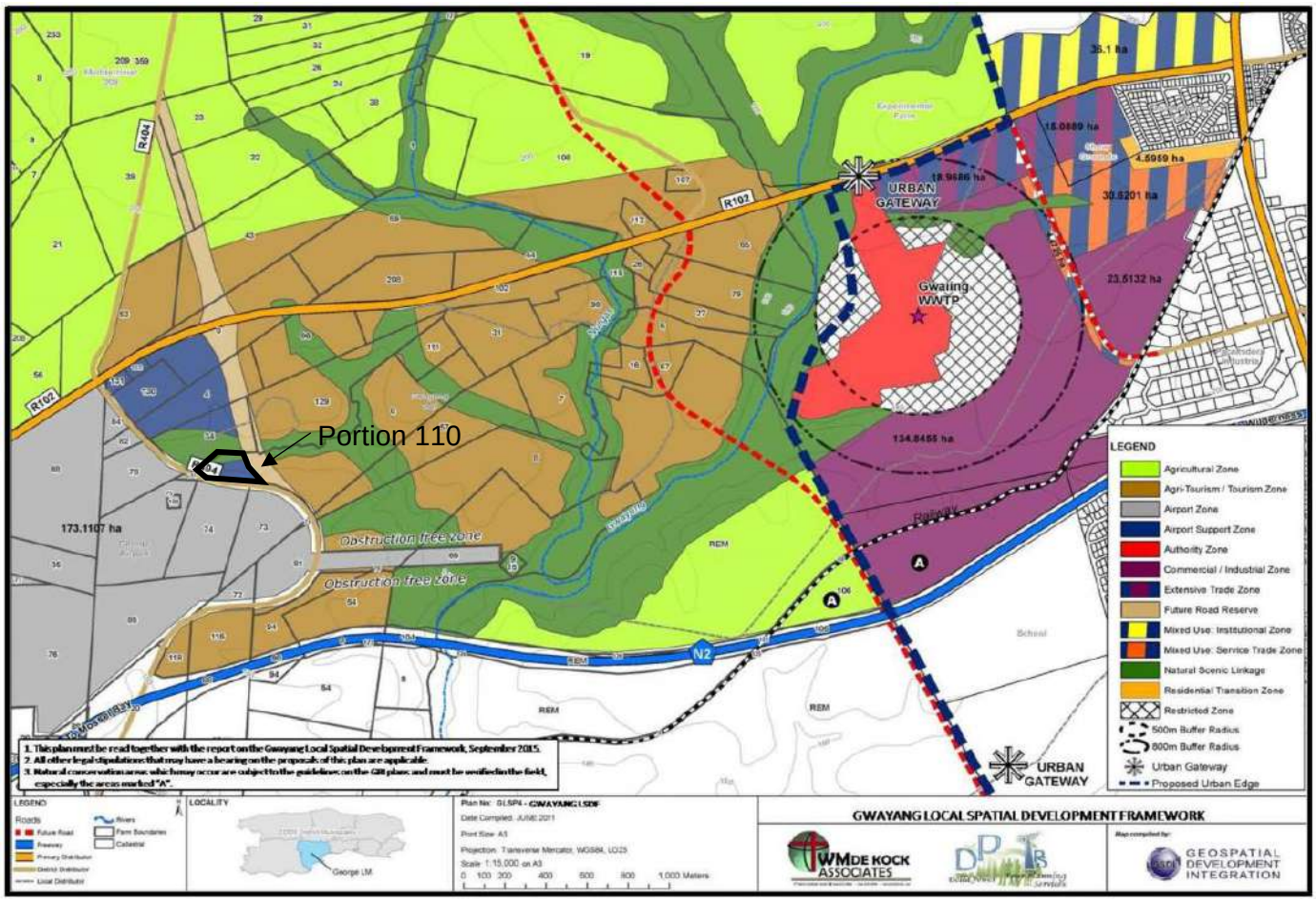
Farmland and disturbed landscape

**PROPOSED DEVELOPMENT**

The proposed site and development are positioned to the east of the existing airport and will form an extension of the existing airport. With the R102 to the north, R404 to the west, existing quarry & natural scenic linkage to the south and a proposed future road to the west of the site, the development is contained within these infrastructure and natural elements.

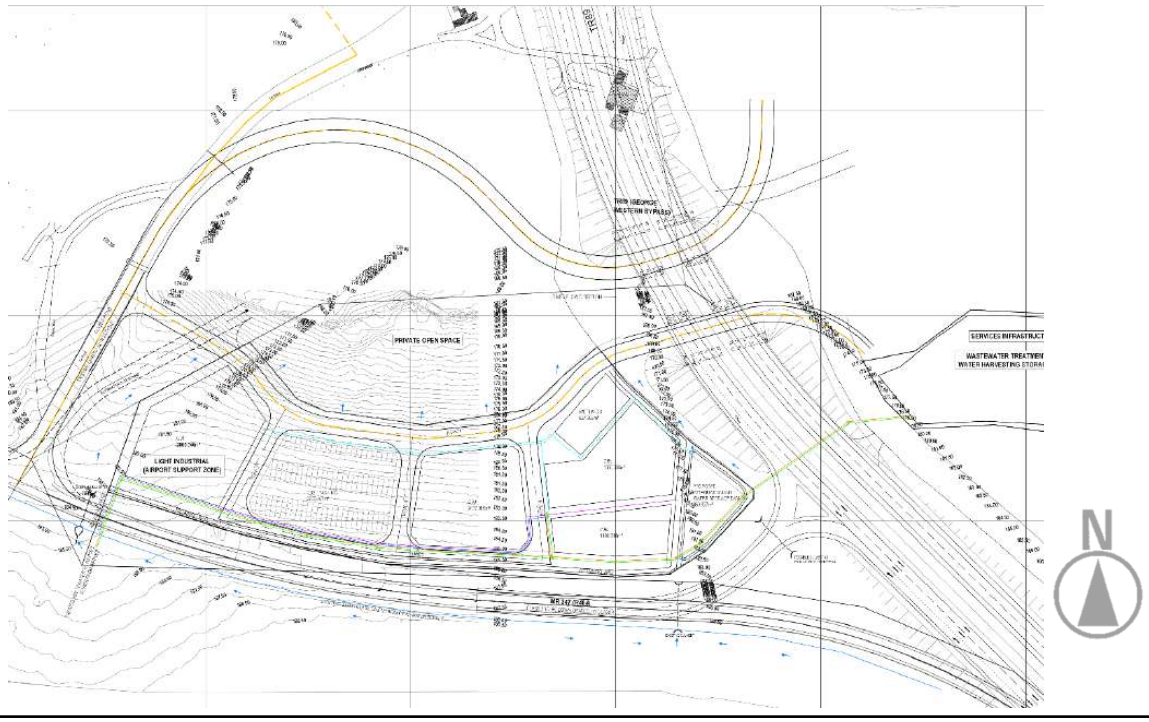
The proposed development envelopes as done by NewUrban Architects and Urban Designers considers restrictions of **2 storeys for light industrial and office use, both with 18m height restriction for this specific portion of 110. (See heigh map below)**

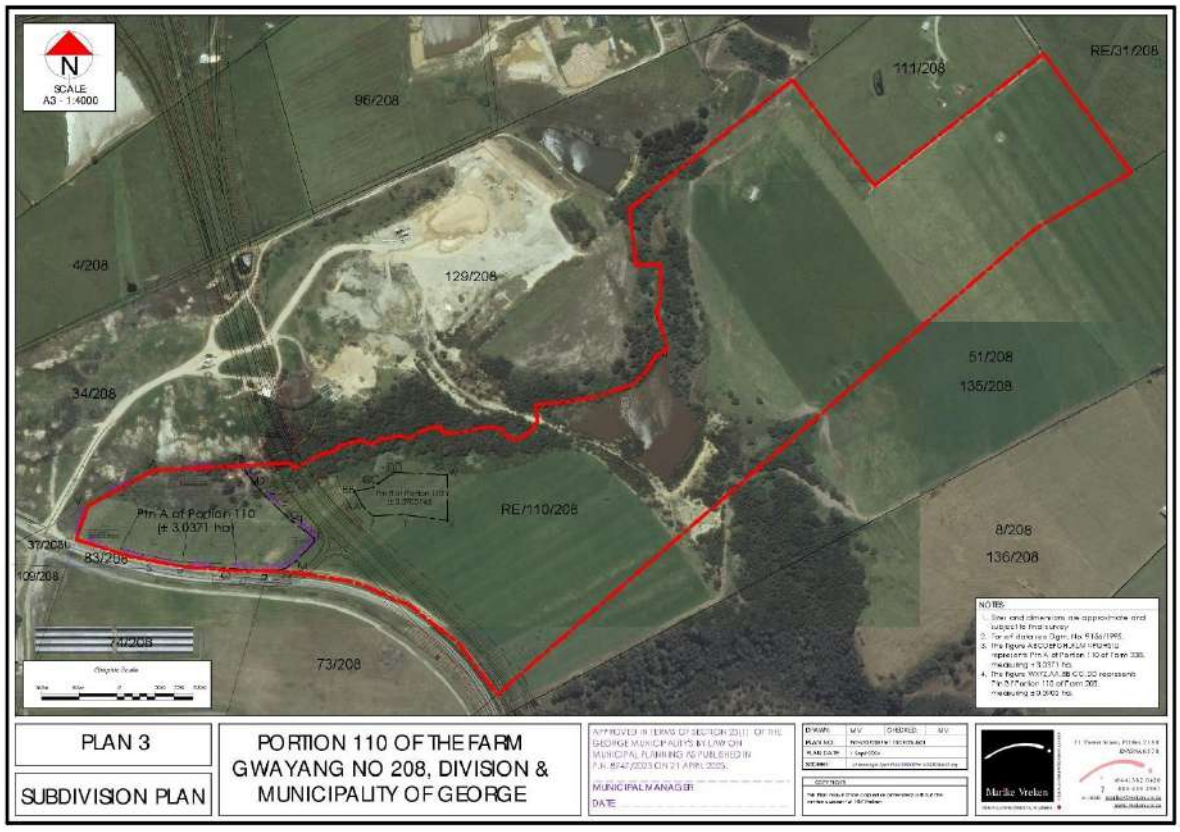
The proposed site falls within the airport support zone in the spatial development framework as seen below.



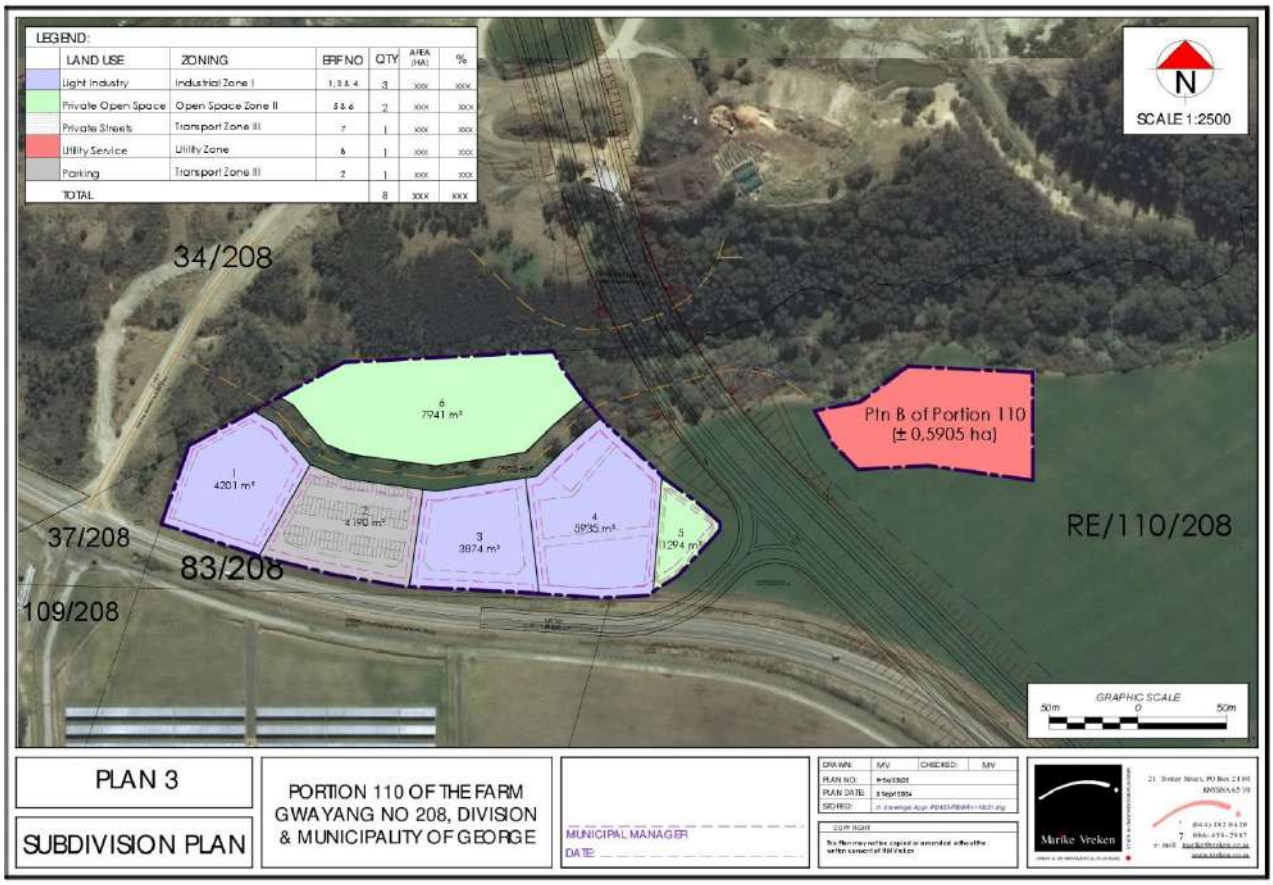
The below image shows the proposed development highlighted within the landscape.

*Cadastral layout of Entire Portion 110 of The Farm Gwayang no 208*

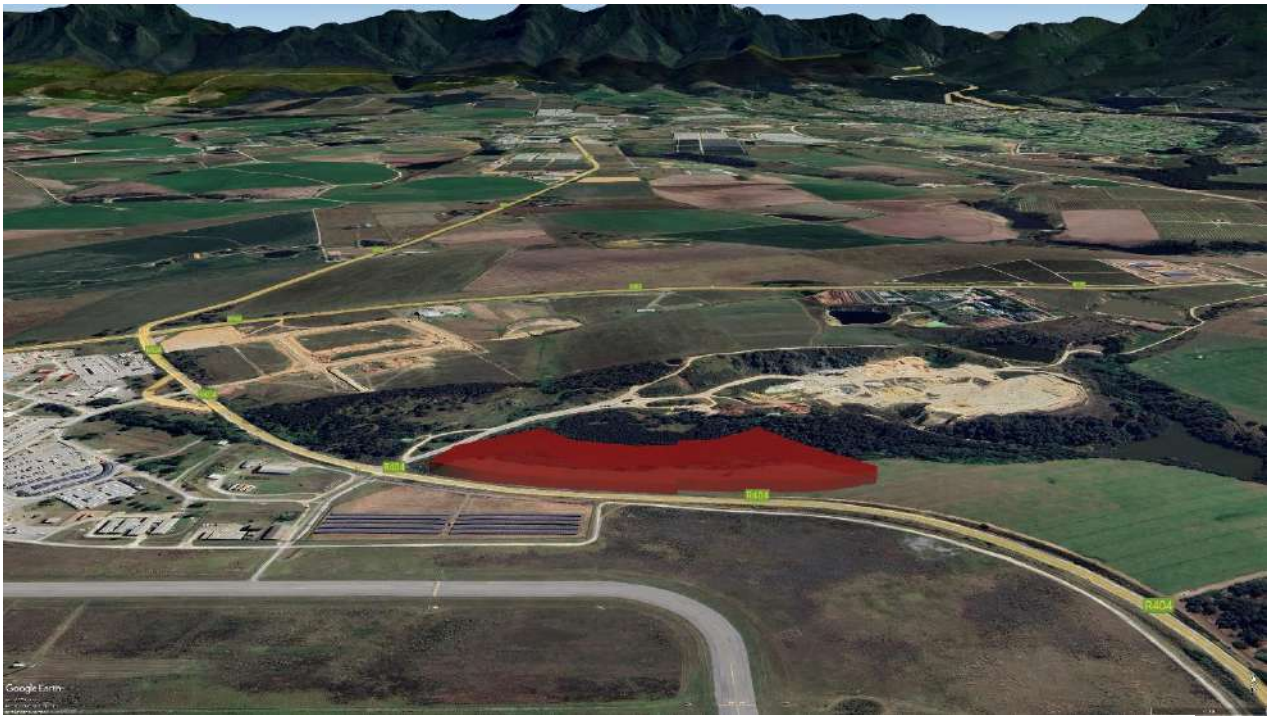



*Proposed SUBDIVISION PLAN for Light Industrial Development on Portion 110 of Farm 208. Final layout as per approved Site Development plan. (Prepared by Marike Vreken)*




*Town planning submission plan of The Farm Gwayang no 208 indicating the entire development. Final layout as per approved Site Development plan. (Prepared by Marike Vreken)*




*3D View of 18m high ZONE on Portion 110 of Farm 208. Final layout as per approved Site Development plan.*


*3D View of 18m high Development on Portion 110 of Farm 208. Final layout as per approved Site Development plan.*

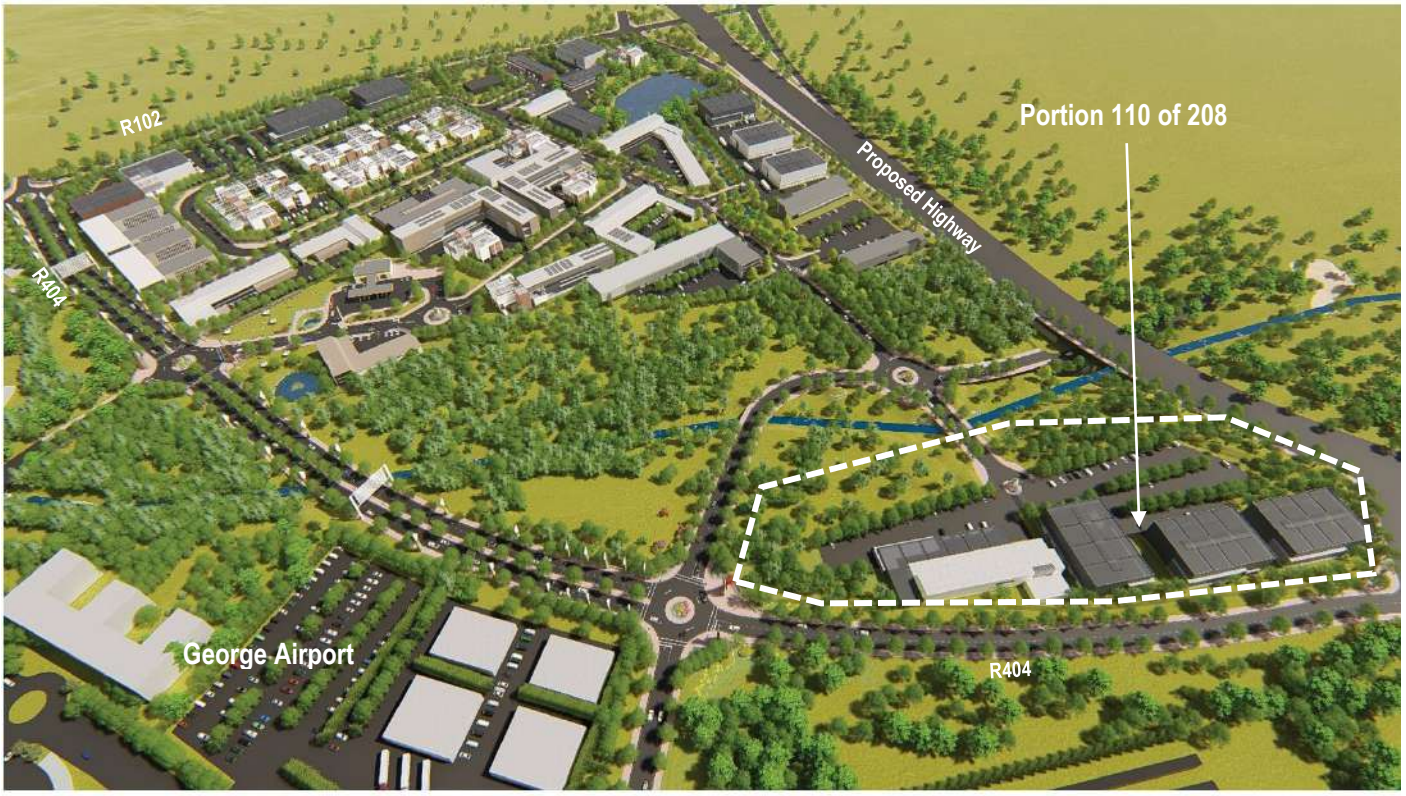

*3D View of 18m high Development on Portion 110 of Farm 208. Final layout as per approved Site Development plan.*

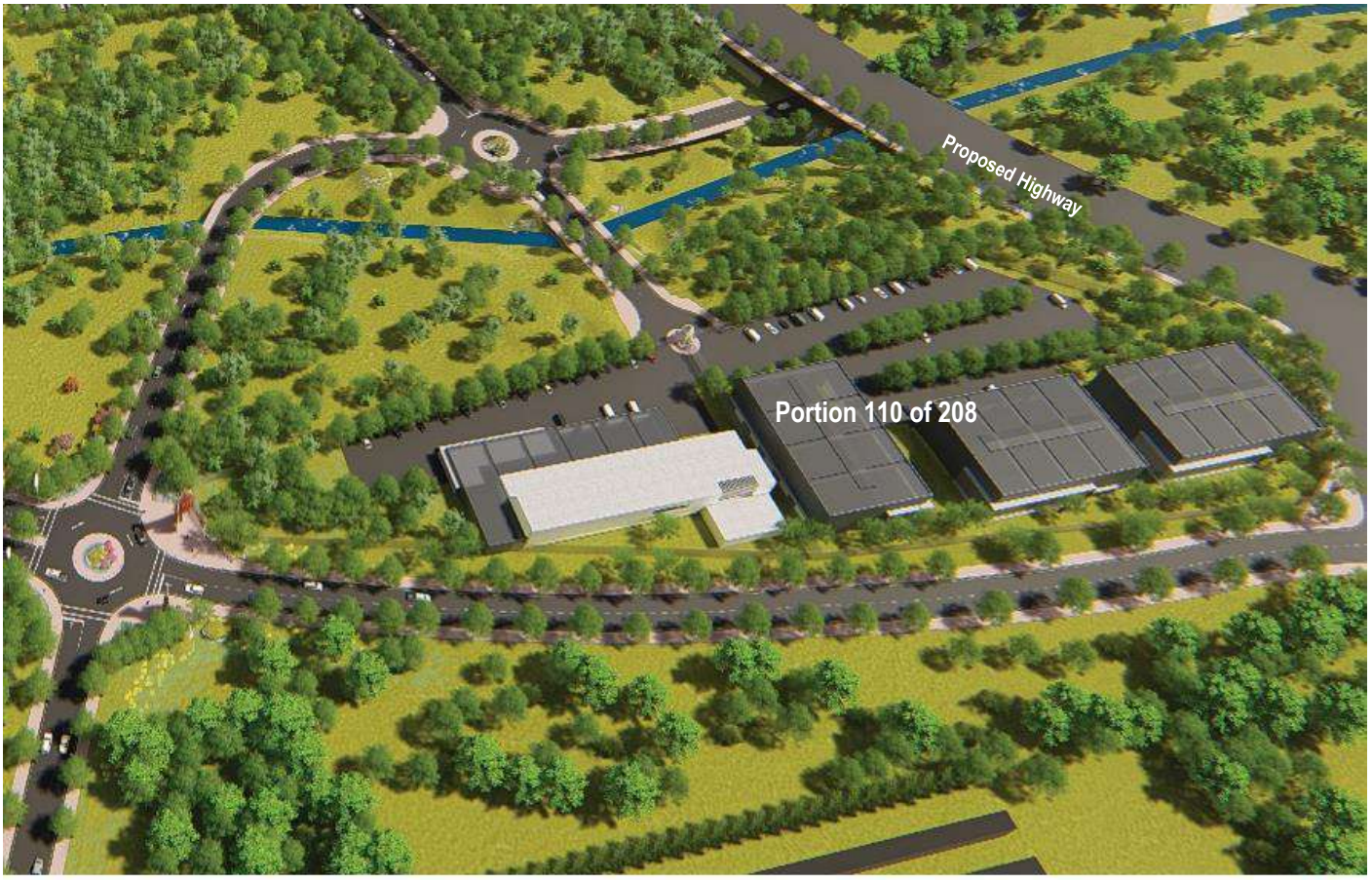
*3D Views of 18m high massing on Portion 110 of Farm 208. Final layout as per approved Site Development plan.*

The below image indicates the vision of the proposed entrance to the development across from the existing airport entrance as per previously submitted VIA for Portion 4 of The Farm Gwayang no 208

The below image indicates the vision of the proposed gateway and traffic circle at the existing airport entrance as per previously submitted VIA for Portion 4 of The Farm Gwayang no 208.

The below images show the proposed total development vision of the airport support zone, Portion 110 is circled. As per previously submitted VIA for Portion 4 of The Farm Gwayang no 208



## 6. VIEW SHED & VISIBILITY STUDY

**EXPOSURE ZONES**

The exposure zones of the zones have been defined below and take into consideration distance only. Exposure zones form part of the visual exposure assessment below.

- <1 km (high)
- 1 - 2 km (moderate - high)
- 2 - 5 km (low - negligible). (Excluded form high-level assessment)

Viewpoints within the zones have been identified along primary approaches to the site and are identified in the assessment.

**VIEW SHED VISIBILITY**

The proposed site is considered as a baseline for the assessment. The viewsheds and visibility are taken at levels relative to the specific site and highlighted within the different exposure zones. Areas highlighted in yellow below are either at the same level as the site or higher in elevation. The viewshed does not take into consideration manipulated landscapes, existing building and trees. The elements will be considering as part of the VAC and Visual Exposure assessments.

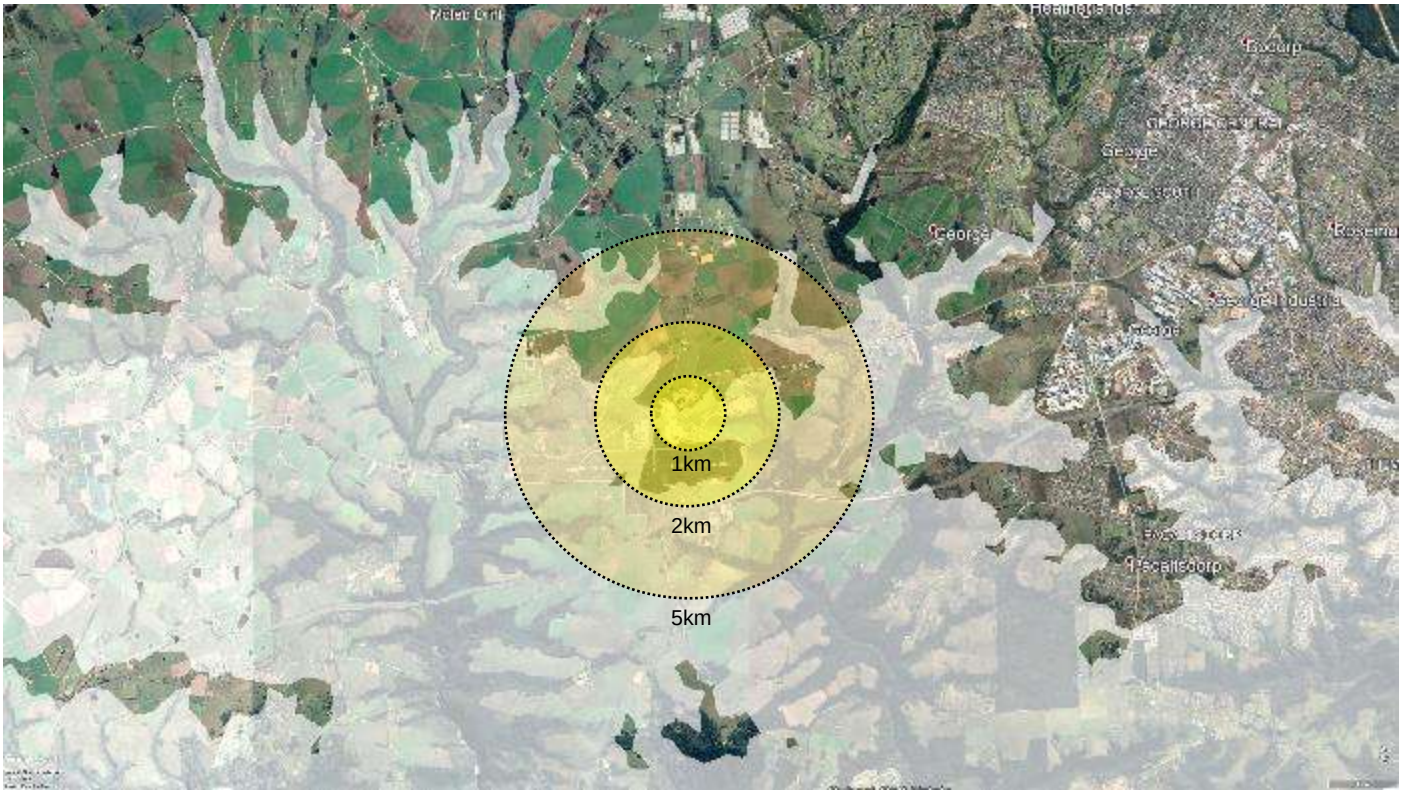



Figure: Base line assessment.

The viewshed visibility for the theoretical impact of the proposed development is based on an **8m,18m & 22m high structure** below. The development would be visible from a larger area within the immediate surroundings compared to an undeveloped site, not taking into account trees, existing structures or buildings or any other artificial landform such as berms, dams etc. The largest area of influence is north of the site due to the rising topography.

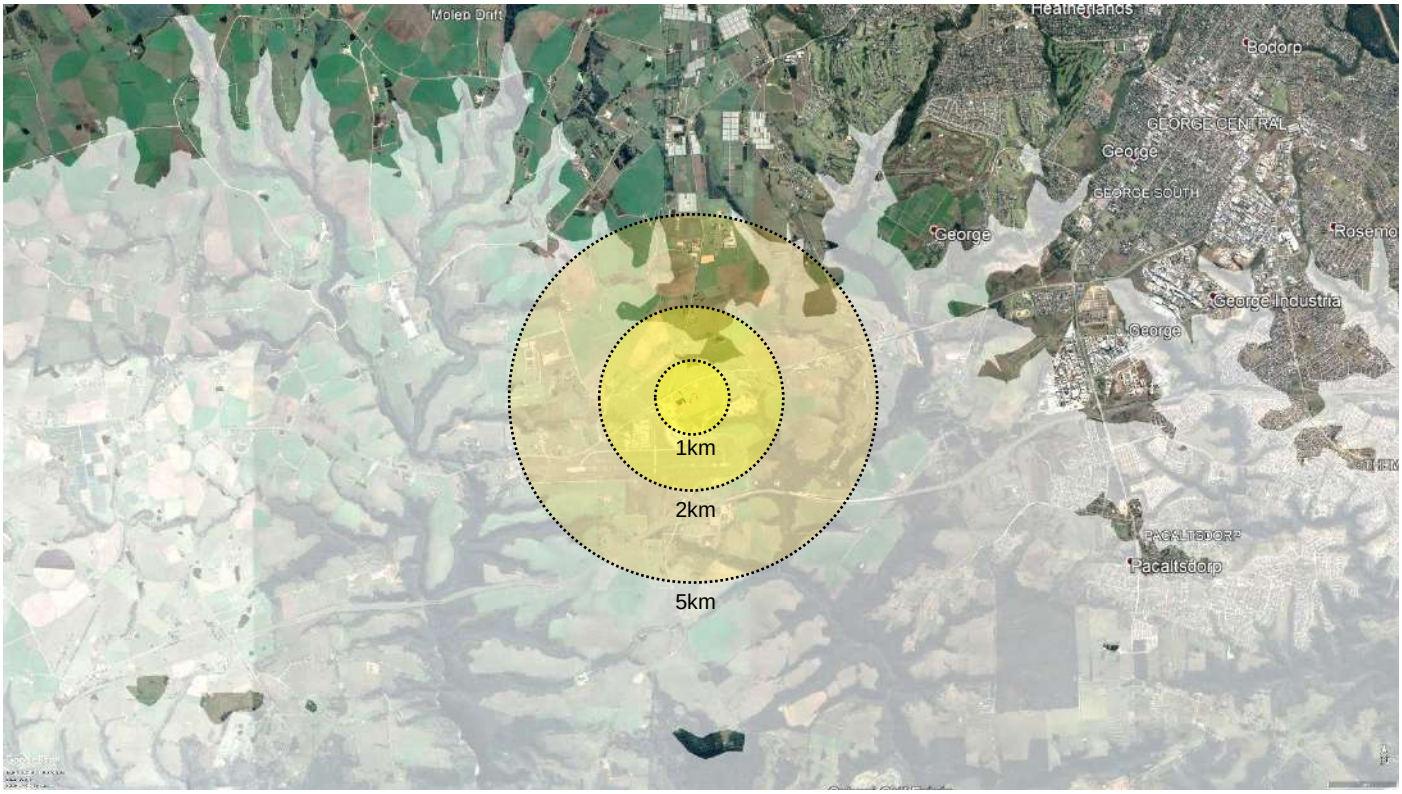



Figure: Assessment at 8m height.

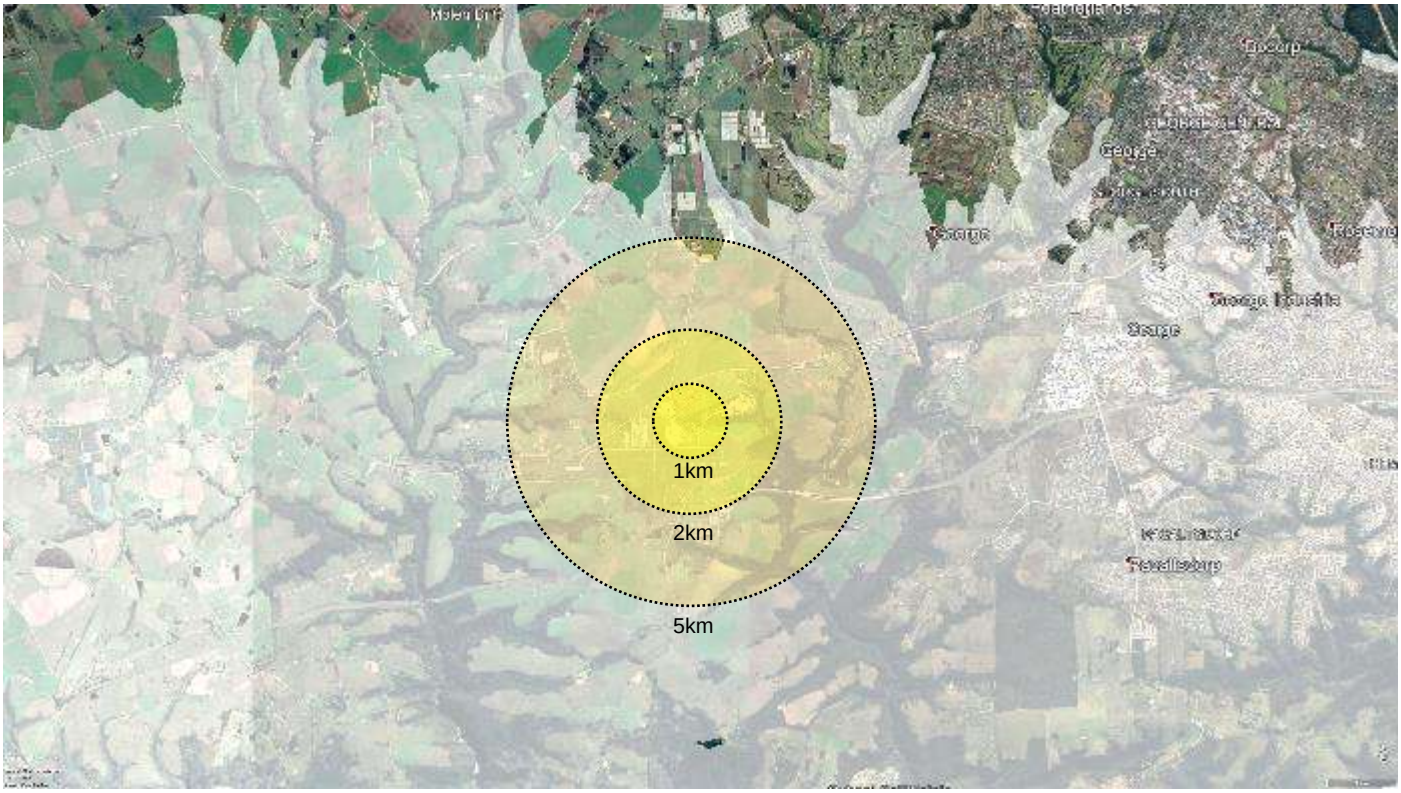



Figure: Assessment at 18m Height

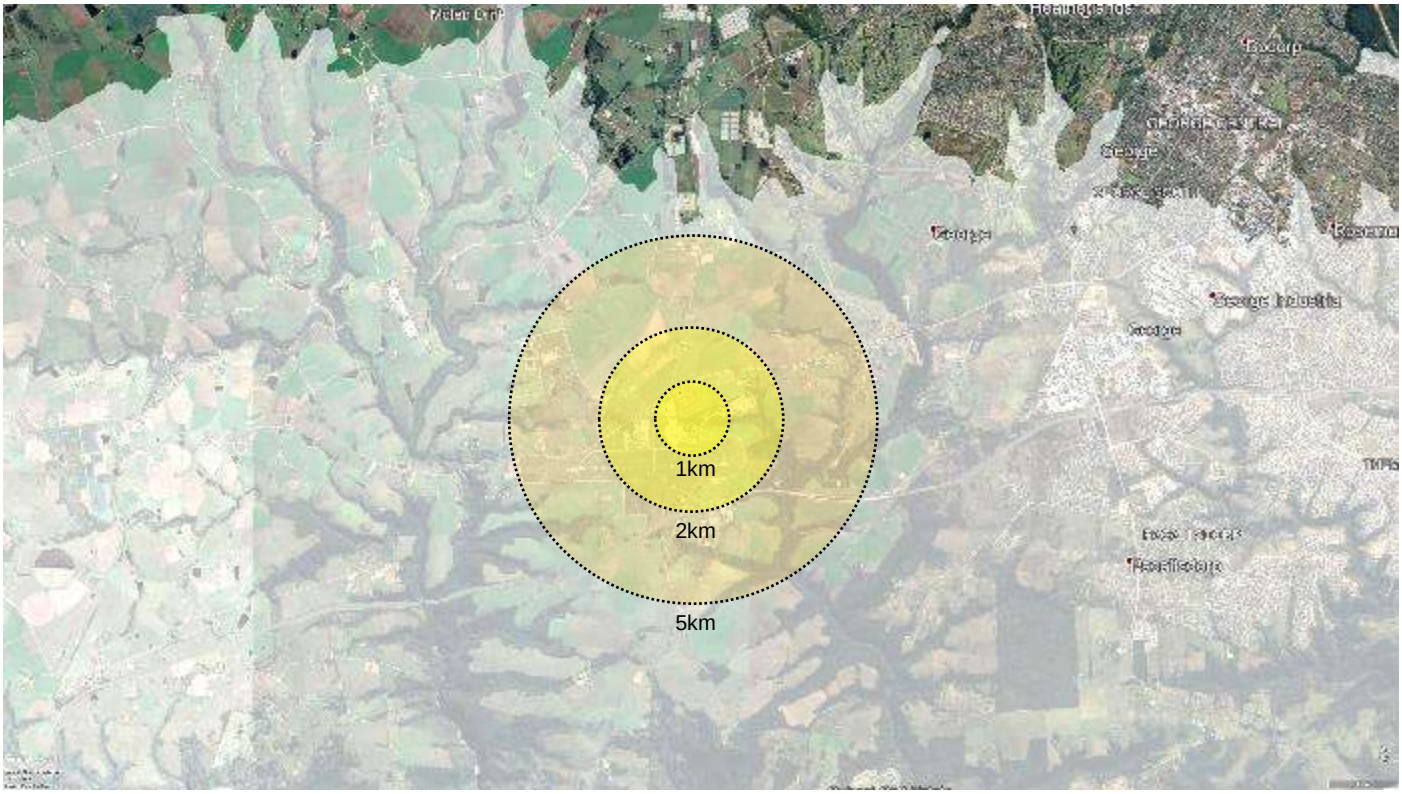



Figure: Assessment at 22m Height

# 7. VISUAL IMPACT ASSESSMENT

It is expected that the development will be a **Category 4 development** which entails a possible high visual impact according to the Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Edition 1) in the immediate surroundings.
Category 4 developments are expressed as; medium density residential development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure.
The development forms an extension of the existing airport within the airport support zone and should not be taken in isolation as a standalone development as described in the guideline.

**VISUAL EXPOSURE**

The level of visual exposure takes into consideration the distance at which the development is viewed from, visibility items of the viewsheds and any existing obstructions such as trees or existing development.

- High exposure – fully exposed
- Moderate exposure – partially exposed
- Low exposure – little to no exposure

**VISUAL SENSITIVITY**

The visibility of sites is determined by a combination of topography, landform, vegetation cover, settlement pattern and special features and existing development.

- High visual sensitivity – highly visible and potential sensitive areas in the landscape
- Moderate visual sensitivity – moderately visible in the landscape
- Low visual sensitivity – minimal visible in the landscape

**LANDSCAPE INTEGRITY**

Landscape integrity is represented by the following visual qualities, which enhance the visual and aesthetic experience of the area:

- High landscape integrity – Intact natural and cultural landscape with no visual intrusions or incompatible structures.
- Moderate landscape integrity – Intact natural or cultural landscape with minimal visual intrusions or incompatible structures.
- Low landscape integrity – Disturbed natural and cultural landscape with visual intrusions or incompatible structures.

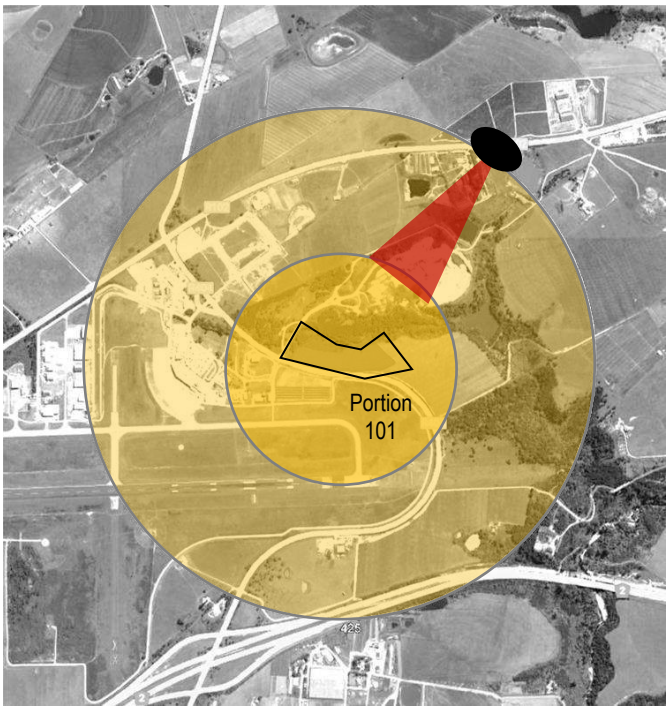
**VISUAL ABSORPTION CAPACITY**

The ability of elements of the landscape to “absorb” or mitigate the visibility of an element in the landscape.

- High VAC – effective screening by topography and vegetation and existing structures.
- Moderate VAC - partial screening by topography and vegetation and existing structures.
- Low VAC - little or no screening by topography or vegetation and existing structures.

**VIEWPOINTS**

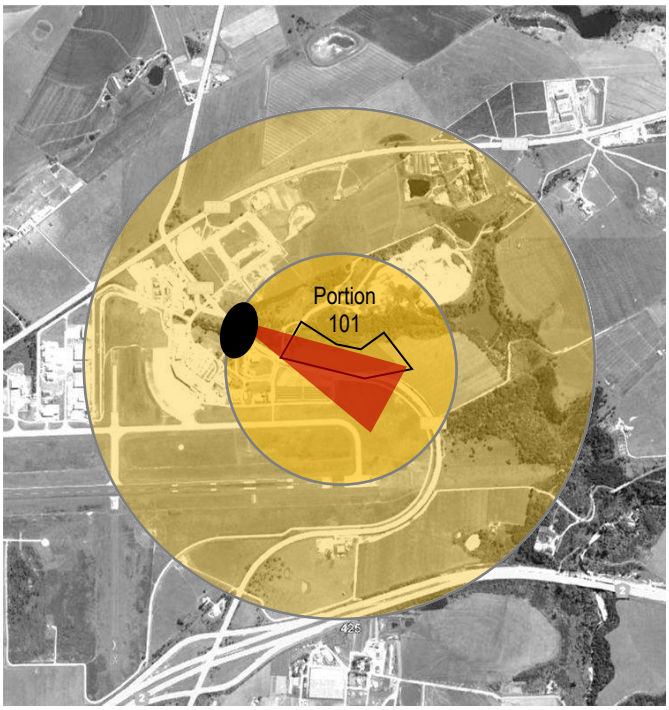
**Viewpoint 1A**



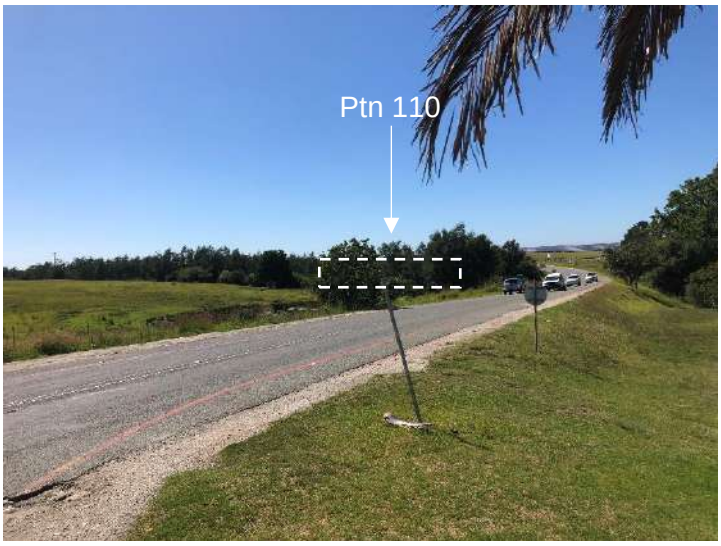

**Viewpoint 1A is taking along the R102 at 1000m approaching the site from the north.**


| VISUAL EXPOSURE | VISUAL SENSITIVITY | LANDSCAPE INTEGRITY | VISUAL ABSORPTION CAPACITY |
|---|---|---|---|
| **LOW** | **LOW** | **LOW** | **HIGH** |
| The site is not visible at this point due to the elevation and distance. | Minimally visible in the landscape | The natural landscape is not considered intact. | effective screening by topography and vegetation. |

**Viewpoint 2A**

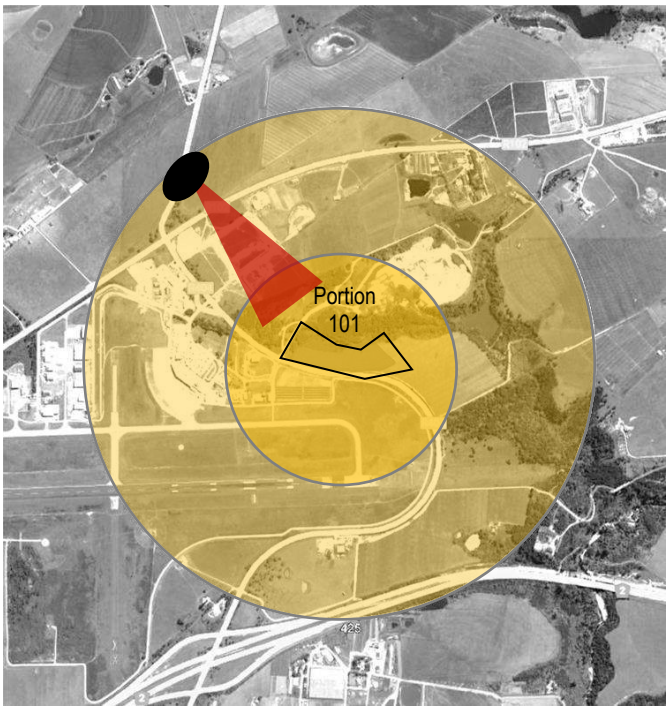



**Viewpoint 2A is taking along the R404 at 500m approaching from the west.**




| VISUAL EXPOSURE | VISUAL SENSITIVITY | LANDSCAPE INTEGRITY | VISUAL ABSORPTION CAPACITY |
|---|---|---|---|
| **LOW** | **LOW** | **MODERATE** | **HIGH** |
| little to no exposure of the site. Screening by existing vegetation. | minimal visible in the landscape. | The natural landscape is not considered intact. | Effective screening by topography and vegetation and existing structures. |

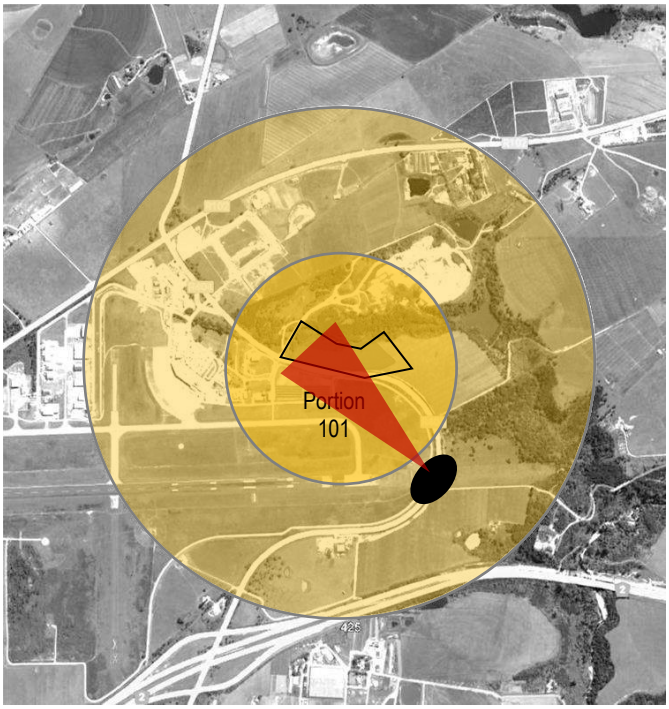
**Viewpoint 2B**




**Viewpoint 2B is taking along the R102 at 1000m approaching from the east.**


| VISUAL EXPOSURE | VISUAL SENSITIVITY | LANDSCAPE INTEGRITY | VISUAL ABSORPTION CAPACITY |
|---|---|---|---|
| **LOW** | **LOW** | **LOW** | **HIGH** |
| The site is not visible at this point due to the elevation and distance. | Not visible in the landscape | The natural landscape is not considered intact. | effective screening by topography and vegetation. |

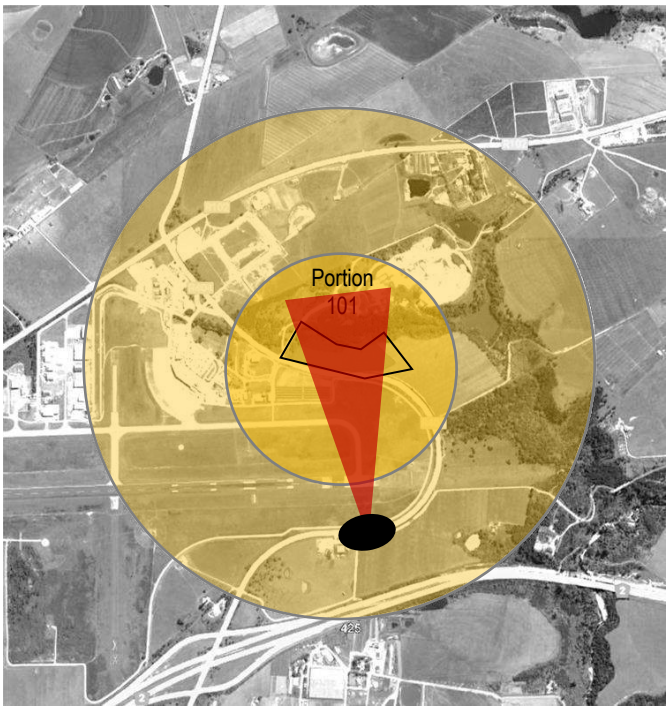
**Viewpoint 3A**




**Viewpoint 3A is taking along the R404 at 500m approaching from the south.**

| VISUAL EXPOSURE | VISUAL SENSITIVITY | LANDSCAPE INTEGRITY | VISUAL ABSORPTION CAPACITY |
|---|---|---|---|
| **HIGH** | **MODERATE** | **LOW** | **MODERATE** |
| Fully exposed but due to the contours the site is lower than the road and thus assists in screening. | moderately visible in the landscape | Disturbed natural and cultural landscape with visual intrusions or incompatible structures. Site is already used for agriculture. | Partial screening by topography and, no vegetation and existing structures. |

**Viewpoint 3B**




**Viewpoint 3B is taking along the R404 at 750m approaching from the south.**

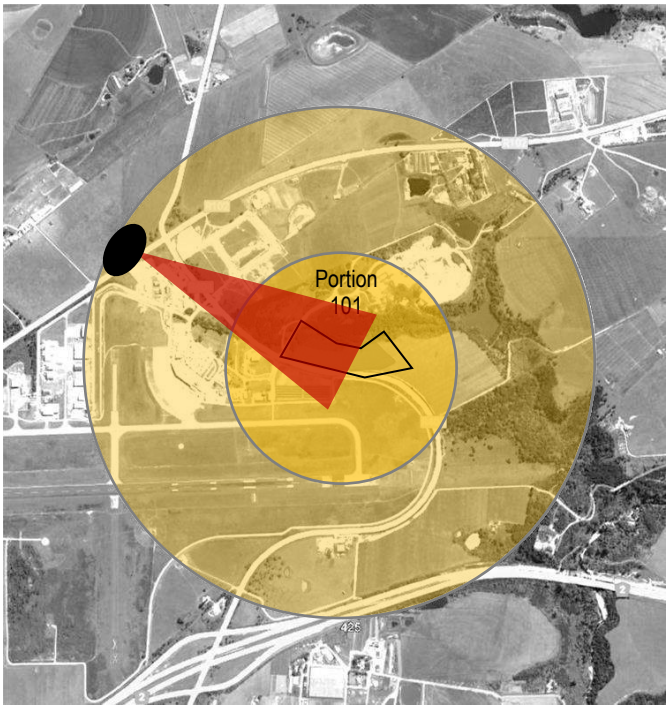

| VISUAL EXPOSURE | VISUAL SENSITIVITY | LANDSCAPE INTEGRITY | VISUAL ABSORPTION CAPACITY |
|---|---|---|---|
| **LOW** | **LOW** | **LOW** | **HIGH** |
| Exposure of the site is low due to the proximity of the viewpoint, with degraded areas prominent with the landing strip in view. | Not visible in the landscape | Disturbed natural and cultural landscape with visual intrusions or incompatible structures. | Effective screening by topography and vegetation and existing structures. |

**Viewpoint 4A**


**Viewpoint 4A is taking along the R102 at 1000m approaching the site from the west along the N2 Highway.**

| VISUAL EXPOSURE | VISUAL SENSITIVITY | LANDSCAPE INTEGRITY | VISUAL ABSORPTION CAPACITY |
|---|---|---|---|
| **LOW** | **LOW** | **LOW** | **HIGH** |
| Exposure of the site is low to non-existent due to the proximity of the viewpoint, with degraded areas prominent. | Not visible in the landscape | Disturbed natural and cultural landscape with visual intrusions or incompatible structures. Airport radar tower visible in the distance. | Effective screening by topography and vegetation and existing structures. |

**Viewpoint 4B**




**Viewpoint 4B is taking along the R102 at 1000m approaching the site from the west**

| VISUAL EXPOSURE | VISUAL SENSITIVITY | LANDSCAPE INTEGRITY | VISUAL ABSORPTION CAPACITY |
|---|---|---|---|
| **LOW** | **LOW** | **LOW** | **HIGH** |
| Exposure of the site is low and non-existent due to the proximity of the viewpoint, with topography obstructing the site line. | Not visible in the landscape, not within sensitive area. | Disturbed natural and cultural landscape with visual intrusions or incompatible structures. | Effective screening by topography and vegetation and existing structures. |

The visual exposure from viewpoints within 500m from the site are relatively low. It is however predominantly the case when viewing the site from the south when passing via the R404 passing directly beside it. Overall, the visual exposure is moderate to low due to the capacity of the environment to absorb the visual impact of the development.

Visual sensitivity and landscape integrity are consistently moderate to low due to the surrounding environment being disrupted by the airport which can be seen from most of the viewpoints as well as the quarry being visible from the eastern approach on the R102 and southern approach on the R404.

Due to the underlying topography, existing trees and development, the environment has a moderately high capacity to absorb the visual impact of the development.

Based on the assessment of the viewpoints, taking into consideration the assessment criteria it is clear that the environment as defined by Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Edition 1) in the table below, is **an area or route of low scenic, cultural, historical significance and is disturbed**. Therefore, based on a category 4 development, a **moderate visual impact** can be expected. Degraded/wasteland areas such as the quarry may reduce the impact further.

Table below refers to the categorisation of issues to be address in the assessment. The mitigating measures are based on the moderate visual impact.

| Type of environment | Type of development (see Box 3) Low to high intensity | | | | |
|---|---|---|---|---|---|
| | Category 1 development | Category 2 development | Category 3 development | Category 4 development | Category 5 development |
| Protected/wild areas of international, national, or regional significance | Moderate visual impact expected | High visual impact expected | High visual impact expected | Very high visual impact expected | Very high visual impact expected |
| Areas or routes of high scenic, cultural, historical significance | Minimal visual impact expected | Moderate visual impact expected | High visual impact expected | High visual impact expected | Very high visual impact expected |
| Areas or routes of medium scenic, cultural or historical significance | Little or no visual impact expected | Minimal visual impact expected | Moderate visual impact expected | High visual impact expected | High visual impact expected |
| Areas or routes of low scenic, cultural, historical significance / disturbed | Little or no visual impact expected. Possible benefits | Little or no visual impact expected | Minimal visual impact expected | Moderate visual impact expected | High visual impact expected |
| Disturbed or degraded sites / run-down urban areas / wasteland | Little or no visual impact expected. Possible benefits | Little or no visual impact expected. Possible benefits | Little or no visual impact expected | Minimal visual impact expected | Moderate visual impact expected |

# 8. MITIGATING MEASURES

Mitigating measures have the potential to manage and reduce the impact of the development on the surrounding environment. Due to the moderate outcome of the impact the mitigation measures are more prevalent for close distance mitigation. The types of mitigation measures that should be considered are:

**MATERIALITY**

Material selection should be considered as part of any design in order to ensure the proposed buildings/structures are in harmony with the surrounds as far as possible. **Natural materials** can be used to identify with the local landscape. **Signage needs to be done with care** on the R404 road.

**COLOUR**

Colour selection should be **sensitive to the environment and cultural landscape**. Preferably **dark green, dark grey and dark brown walls** but roof can be white for sustainability purposes. The development should also **avoid the use of reflective surfaces** in the design.

**BULK & BUILDING FORM**

The **scale, bulk and building form** can be used to articulate the buildings in order to mitigate or reduce the impact of the specific industrial typology.

**HEIGHT & SCALE**

The height and scale of the buildings should be minimised where possible, this will reduce the overall impact of the development from the surrounding environment. **The 18m height** should be mitigated by use of setbacks and screens to reduce the scale of the buildings. Larger buildings should be placed central to the development and step down towards the street edge. **Lowering the building platforms** thus creating a retaining structure on the road edge will also assist in lower the visual impact on the R404.

**SCREENING**

Screening through the **planting of indigenous trees** should be a priority. Addition of screens where landscape elements are not possible should be used to screen off any unsightly areas. The placement of these screens will be most effective along the boundary and or roadside. Screening has a strong potential to reduce the impact of the development on the surrounding areas.

**URBAN DESIGN GUIDLINES**

Mitigating measures should be included in the Urban Design Guidelines and should be described in more detail.

# 9. CONCLUSION

The proposed development forms an **extension of this existing airport**. Due to the extent of the existing Airport, the impact of this development within the landscape is much less of an impact than the Airport. The current site Ptn110 forms a portion of the total proposed **Airport Support Zone as defined in the SDF and LSDF.**

Although the development will have a **moderate to low impact** on the immediate area, it is however not considered degradation of the exiting landscape, but an extension of the current airport existing developed area. The airport support zone is contained by the existing and proposed roads as well as the natural topography which will avoid urban sprawl. This will limit the total feasible development area of the support zone.

As the **Airport is a major gateway** for the ever-growing tourism industry in the Garden Route, the celebration of the Gateway is an opportunity that can enhance the sense of the place and create a memorable experience.

In order to soften the possible visual impacts, certain **mitigation principles have been proposed.** In addition to this, **architectural guidelines** for the development could be done in terms of; building form, proportion, scale, architectural elements and finishes. This will ensure the impact is managed and consistent throughout the development.

**ANNEXURE T:**

*Socio-Economic Impact Assessment*

# Appendix G8: Socio-Economic Impact Assessment

**DECLARATION OF THE SPECIALIST**

**Note:** Duplicate this section where there is more than one specialist.

I ... Anton de Wit ....., as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

**04 November 2024**

Signature of the Specialist: Date:

NA

Name of company (if applicable):

# PROPOSED LIGHT INDUSTRIAL DEVELOPMENT: PORTION 110 OF THE FARM GWAYANG (NO 208), GEORGE, WESTERN CAPE PROVINCE

***SOCIO-ECONOMIC IMPACT ASSESSMENT***

**Prepared by:**

**Dr AH de Wit**

**NOVEMBER 2024**

## EXECUTIVE SUMMARY

The purpose of this Socio-Economic Impact Assessment (SEIA) is to identify and assess the socio-economic impacts associated with the proposed Light Industrial Development on Portion 110 of the Farm Gwayang (NO 208) in George, Western Cape Province.

The proposed Light Industrial Development is likely to exert its socio-economic influence at the local level, *i.e.* the George municipal area. This area has witnessed a depressed economic outlook in recent times. Stagnant employment growth is a significant local challenge. This does not bode well for the plight of the town's poor and unemployed inhabitants. Following the negative economic impact of the Covid-19 pandemic, unemployment has shown a sharp increase here. Despite some post-Covid-19 economic recovery in George, jobs continue to be shed in the local economy.

However, George has access to several strategic resources that count in its favour from the viewpoint of Local Economic Development. This includes well-developed commercial, financial and social infrastructure; quality conference facilities, businesses and retail services; extraordinary bio-physical and marine resources; a growing regional tourism sector; and major transport systems, including the N2 National Road, and the George Airport with its emerging development node.

To identify and assess the socio-economic impact of the proposed Light Industrial Development, the research results were filtered through a range of possible socio-economic change processes and SEIA categories. The following categories and socio-economic impacts were subsequently identified:

**Socio-economic impacts:**

- The construction phase of the proposed Light Industrial Development will see the creation of temporary (short-term) employment opportunities. This will culminate in positive (direct / indirect / cumulative) impacts in the form of increased economic activity, poverty alleviation and favourable socio-economic implications (such as improved access to and consumption of goods and services, greater freedom of choice, better quality of life, and so on) for the affected individuals and their dependants.

- The construction phase of the proposed Light Industrial Development will also have a positive (direct / indirect / cumulative) impact on the Gross Domestic Product (GDP) of the George Municipality. Local GDP is important because it reflects the capability of a municipality to create, sustain and develop its own economy, something with far-reaching socio-economic consequences.

- An increased demand for local goods and services during the construction phase will in addition have a positive (direct / indirect / cumulative) impact on the local economy, with various socio-economic benefits, such as employment creation and poverty reduction, as a result.

- The operational phase impact of the proposed Light Industrial Development is cumulative in nature. It involves a direct investment in Local Economic Development in George in general, and around the George Airport in particular. Here it would be strategically and geographically well situated to provide enabling and supporting services to a future industrial node around the George Airport and in the proximity to the N2 National Road.

**Empowerment impacts:**

- The construction phase of the proposed Light Industrial Development could see the development and transfer of skills taking place in order to meet the necessary labour requirements. This will have a socio-economic (direct / indirect / cumulative) importance that extends well beyond the period of the proposed development's construction phase. Relevant individuals will be able to sell their newly acquired skills within and beyond the boundaries of the local economy long after the completion of the construction phase.

**Public health and safety impacts:**

- The proposed Light Industrial Development is likely to generate an increased amount of traffic as far as the daily movement of its workforce and other construction related traffic is concerned. This could culminate in (indirect / cumulative) health and safety impacts through the potential increase in motor vehicle and pedestrian related accidents. Relevant mitigation in this case however would decrease the impact significance.

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## LIST OF ABBREVIATIONS

EIA Environmental Impact Assessment

IDP Integrated Development Plan

GDP Gross Domestic Product

SEIA Socio-economic Impact Assessment

# 1. INTRODUCTION

The following two subsections set the stage for the Socio-Economic Impact Assessment (SEIA) of the proposed Light Industrial Development on Portion 110 of the Farm Gwayang (NO 208) in George, Western Cape Province. Information on the location and basic characteristics of the proposed development are first presented, followed by the scope of the SEIA.

## 1.1 Project location and description

Figure 1 shows the location of the site of the proposed Light Industrial Development in a broader local context. Figure 2 shows this location relative to the George Airport and includes a site map of the proposed activity. The Light Industrial Development classification in this case includes freight and logistics, warehousing, services, and light manufacturing activities. A water treatment and water harvesting facility is proposed for Portion B of Portion 110 (Figure 2). The following footprints apply:

- Light Industrial – 8378m$^2$ across three sites (Figure 2)
- Parking – 2706m$^2$
- Services – 1488m$^2$
- Water treatment and water harvesting – 5897m$^2$

The proposed development forms part of the emerging George Airport Support / Business Zone, which includes several other development proposals. It is therefore important to note that the socio-economic impact of the proposed Light Industrial Development on Portion 110 can and should be assessed in a cumulative context. Taking this into account, other development proposals in the George Airport Support / Business Zone include the following:

a) Light Industrial Development on Portion 139 of the Farm Gwayang (NO 208), with a 32381m$^2$ footprint, and a 6.7 W solar plant.

b) Light Industrial Development on Portions 130, 131, and 132 of the Farm Gwayang (NO 208), with a 26942m$^2$ footprint.[1]

c) Light Industrial Development on Portion 4 of the Farm Gwayang (NO 208), with a 23006m$^2$ footprint.[2]

d) A Service Station Development on a portion of Portion 4 of the Farm Gwayang (No 208), along the R404 route at the intersection that provides access to the George Airport. This proposal includes the following:

- A service station with four dispenser islands for light vehicles and one dispenser island for heavy vehicles.
- A convenience store.
- A take-away food facility with limited seating.
- Restrooms (ablution facilities).
- An information centre.

[1] This footprint is an estimate based on the assumption that about 41% of Portions 130, 131, and 132 will be used for the construction of Light Industrial structures.

[2] This footprint is an estimate based on the assumption that about 41% of Portion 4 will be used for the construction of Light Industrial structures

## 1.2 SEIA scope

This SEIA includes the following key components that are generally agreed upon for the study, assessment, and reporting of social impacts (See Barbour, 2007; Vanclay *et al*., 2015 and Vanclay & Esteves, 2024):

- A baseline account of the affected socio-economic environment, involving qualitative and quantitative descriptive elements, to comprehend and contextualise relevant issues and impacts.

- The identification and assessment of the (direct / indirect / cumulative) socio-economic impacts of the proposed Light Industrial Development in its construction and operational phases.[3]

- Recommendations regarding the mitigation of the identified social impacts (where applicable).

The study approach of the SEIA appears in **Addendum A** at the end of this report. This includes the methodological foundation that informed the SEIA and the research process that was followed to identify potential socio-economic impacts.

[3] *"Direct socio-economic impacts occur at the same time and in the same space as the proposed development. Indirect socio-economic impacts can occur later in time, or at a different place, from the causal activity, or as a result of a complex pathway"* (Barbour, 2007:39, Box 5). Several types of cumulative socio-economic impacts can occur. Additive cumulative impacts, *i.e.* the simple sum of all the effects, is applicable to this SEIA.

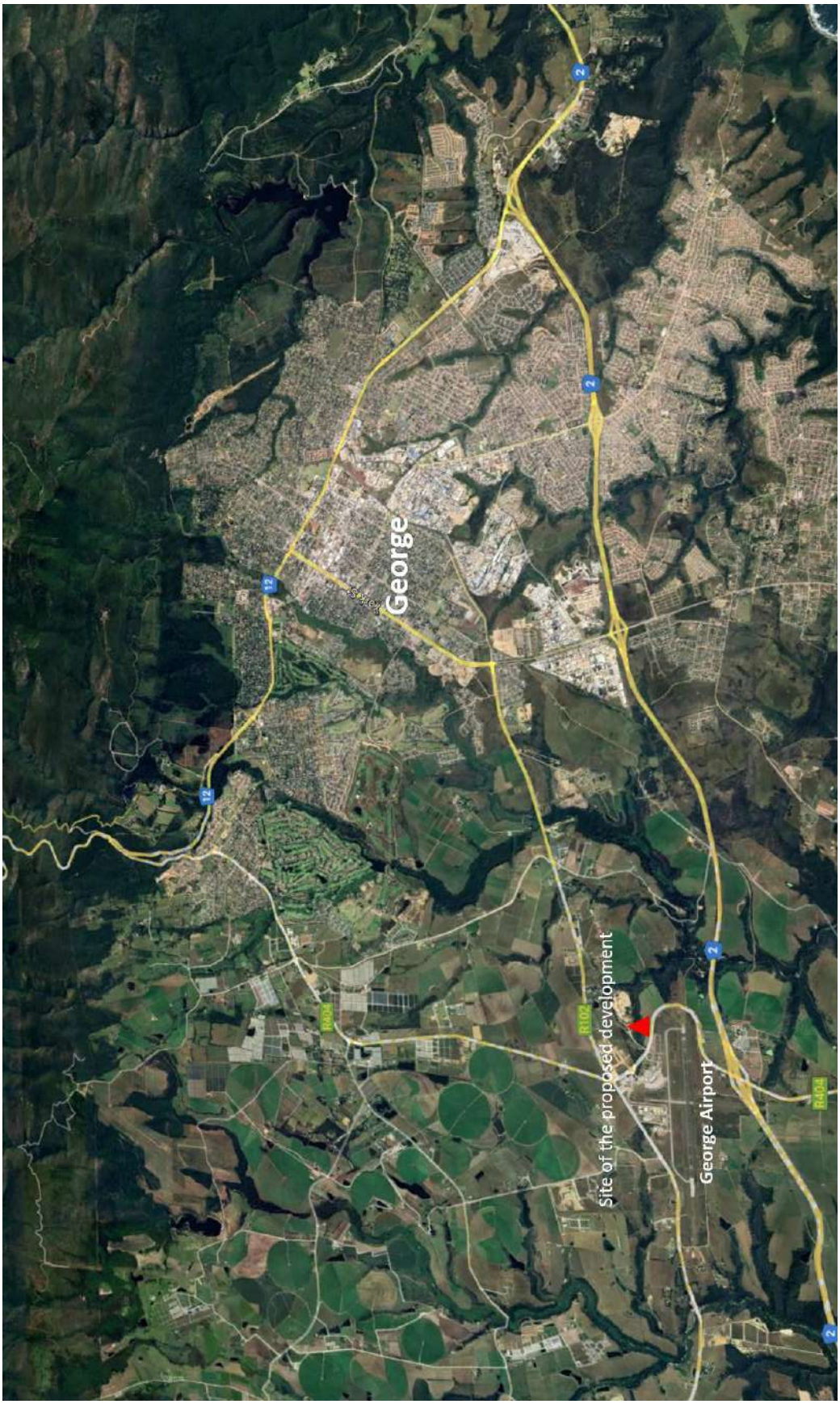


**Figure 1: The location of the proposed development in a broader local context**


**Figure 2: The location of the proposed development relative to the George Airport**

## 2. DESCRIPTION OF THE AFFECTED SOCIAL ENVIRONMENT

The proposed Light Industrial Development is likely to exert much of its socio-economic impact at the local level, *i.e.* within the boundaries of the George Municipality.

George is a so-called 'secondary city' in the Eden District Municipality of South Africa's Western Cape Province. It is located towards the western extreme of what is popularly known as the country's Garden Route. Following are some of the key contemporary attributes of George that are particularly relevant to this SEIA (See George Municipality, 2012; Western Cape Government, 2015; George Municipality, 2016/17; George Municipality, 2021/22; George Municipality, 2022/27):

- The economy of George confirms the town's status as a secondary city. Financial services and real estate generally account for the most significant slice of the town's economy (26%), followed by wholesale and retail trade, catering and accommodation (18%), and then manufacturing (14%).

- Much of the local economic growth in 2016/17 happened in sectors such as construction (8%); commercial services (4%); and government, community, social and personal services (4%). Manufacturing reflected a meagre 1.5%. Since this time, growth in the local economy has slowed to 0.7% (2019). It is only the finance, insurance, real estate, and business services that maintain their previous growth levels. The stagnant state of the municipal economy up to 2020 is largely the result of the COVID-19 related restrictions and economic recession, as well as loadshedding.

- From 2021, the municipal economy showed some recovery from the COVID-19 related economic restrictions. This was largely driven by growth in the wholesale and retail trade, catering and accommodation (7.1%); the finance, insurance, real estate and business services (5.1%); as well as manufacturing (7.9%) sectors. Agriculture, fishing and forestry grew the fastest at about 8.0%. The mining and quarrying (-13.7%); construction (-2.6%); and government (-2.2%) sectors however reflected continued economic decline.

- The position of the economy of George within the larger Eden District Municipality is not encouraging and it is plagued by stunted economic growth (From 3.5% in about 2016 to 0.7% in 2019) that is slower than other similar municipalities. Employment growth over the last half a decade is basically zero, in fact, the net change in this case is negative. This highlights the fact that the sustainability and carrying capacity of the local economy are significant socio-economic limiting factors.

- The total population of George is about 224 015 people, arranged in roughly 57 000 households.[4] Of the number of households in this town, almost 14 500 exist in abject poverty. The unemployment rate for George is approximately 27% (it has doubled since 2016, largely due to the Covid-19 pandemic), which, together with the problem of poverty and associated socio-economic deprivations, appear geographically concentrated in a few municipal wards. A particularly concerning factor in this case is that, despite signs of economic recovery, the local economy continues to shed jobs.

[4] There are slight variations in these figures across different reports.

Given the attributes above, Local Economic Development in George is an important, if not urgent socio-economic priority. The town fortunately has access to several strategic resources that count in its favour from the perspective of Local Economic Development. This includes the following:

- Well-developed commercial, financial and social infrastructure.
- Quality conference facilities, businesses and retail services.
- Extraordinary bio-physical and marine resources.
- A growing regional tourism sector and major transport systems, including the N2 National Road and the George Airport.
- Potentially positive role of the George Airport in Local Economic Development.

## 3. SOCIAL IMPACT ASSESSMENT

Section 3.1 contains an outline of the relevant socio-economic impact categories that are associated with the proposed Light Industrial Development. This is followed by the presentation and assessment of the identified socio-economic impacts that may occur during the construction phase of this development (Section 3.2) as well its operational phase (Section 3.3).

### 3.1 Socio-economic impact categories associated with the proposed development

After the conclusion of the research process (See Addendum A), the results were filtered through the range of possible socio-economic change processes and SEIA categories. The following three socio-economic impact categories (and actual impacts) surfaced throughout the course of the research process.

**Socio-economic impact categories and impacts:**

- **Economic impacts:** A project such as the proposed Light Industrial Development usually contributes to increased economic activity within a region and generates employment opportunities and other economic impacts due to knock-on effects. Impacts include:

    - Creation of employment opportunities during the construction phase (direct / indirect / cumulative impacts)
    - Contribution to the GDP of the George Municipality during the construction phase (direct / indirect / cumulative impacts)
    - Increased demand for local goods and services during the construction phase (direct / indirect / cumulative impacts)
    - Contribution to Local Economic Development during the operational phase (direct / indirect / cumulative impacts)

- **Empowerment impacts:** The developer will have to engage in an economic empowerment process to supply the proposed Light Industrial Development with the necessary local labour. The impact includes:

    - Skills development and transfer during construction phase (indirect / cumulative impacts)

- **Public health and safety impacts:** The construction of the proposed Light Industrial Development will involve the movement of relevant heavy vehicular traffic and the daily transport of workers. The impact revolves around:

    - Public health and safety impacts during the construction phase due to increased construction related vehicular traffic (indirect / cumulative impacts)

## 3.2 SOCIO-ECONOMIC IMPACTS DURING THE CONSTRUCTION PHASE

### 3.2.1 Economic impacts

*Economic impacts result from employment creation, changes in business activity, livelihoods, economic attributes, etc.*

**A) Employment creation – impact identification and assessment**

**Impact identification:**

The investment that would be required by the construction phase of the proposed Light Industrial Development is estimated at slightly more than R64.37m.[5] It is therefore a sizeable construction project. For that reason, a noteworthy outcome of this development, throughout its construction phase, will be the creation of 106 direct employment opportunities, most presumably in the semi-skilled category.[6] The unemployment situation in the George Municipality has drastically deteriorated over the last few years. Moreover, unemployment here is geographically concentrated in the town's historically disadvantaged wards. This reality therefore amplifies the

[5] This value was estimated by using the latest factor for the construction of Industrial Warehouses, including office and related facilities, as well as parking (See AECOM, 2024). This value includes the R4m cost estimate of the proposed water treatment facility (Waste Water Hub, n.d.; Fehr Graham, 2022; SAMCO, n.d.).

[6] Direct employment refers to employment that is directly related to the construction phase and would, amongst others, include artisans such as shop fitters, bricklayers, plumbers, electricians, *etc*.

The number of direct employment opportunities (106) was estimated using the total construction cost of the proposed development (R64.37m) and the *Average Sectoral Employment Multipliers* of the Industrial Development Corporation (IDC, 2020). The applicable multipliers for *Construction* were specifically applied in this case.

adverse welfare related consequences of unemployment at a more local scale. Seven years ago, the problem of unemployment was flagged as an important development related 'weakness' in such areas (George Municipality, 2016/17). Considering the relatively low unemployment rate then (11% as opposed to 27%% in recent times), this 'weakness' got considerably worse. When looked at in this context, job creation is an important impact of the proposed development.

The creation of direct employment opportunities is not the only job-related advantage of the construction phase of the proposed Light Industrial Development. Several indirect and induced employment opportunities would naturally follow the latter. Whereas a direct job is something that is directly related to the construction of a project for example, indirect jobs are created due to the provision of goods and services by suppliers and distributers to the on-site construction activities. Induced jobs lastly result from the spending and consumption by direct and indirect workers (IFC, 2013). Using the same methodology as above (See Footnote 6), the number of indirect and induced employment opportunities that will be created by the proposed development's construction phase and activities is estimated at 114.

The creation of employment opportunities (direct, indirect and induced jobs) is likely to have a considerable socio-economic impact in the form of increased economic activity, poverty alleviation and favourable socio-economic implications (such as improved access to and consumption of goods and services, greater freedom of choice, better quality of life, and so on) for the affected individuals and their dependants. Using household size estimates (George Municipality, 2022/27), the latter translates into a total of slightly more than 370 people for the direct job category alone. In a town where unemployment is no doubt a challenge in some quarters, where employment seekers contribute to a steady population increase, and where employment growth in recent years is negative, employment creation is a significant direct and indirect impact. As far as the cumulative effect is concerned, the importance of the impact is obviously much more significant

considering existing levels of unemployment.

The cumulative impact of the proposed Light Industrial Development as far as employment creation is concerned, was determined by estimating the combined construction cost of the other development proposals in the larger George Airport Support / Business Zone (See Section 1.1). This was estimated at R635.4m. Using the methodology mentioned in Footnote 6, the number of direct employment opportunities that will be created is estimated at 1051, while indirect and induced jobs amount to 243 and 863 respectively.

**Impact assessment and significance rating:**

| Impact type: | Existing impact | Project impact (direct / indirect) | | Cumulative impact |
|---|---|---|---|---|
| | | Unmitigated | Mitigated | |
| **Intensity:** | Major | Major | NA | Extreme |
| **Duration:** | Long term | Short term | NA | Short term |
| **Extent:** | Local | Local | NA | Local |
| **Consequence:** | High | Medium | NA | Medium |
| **Probability:** | Certain | Certain | NA | Certain |
| **Frequency:** | Always | Always | NA | Always |
| **Impact status:** | Negative | Positive | NA | Positive |
| **Impact significance:** | Negative high | Positive medium | NA | Positive high |

**Assessment risks:**

| | |
|---|---|
| Likelihood of mitigation measures being implemented successfully: | NA |
| Degree to which impacts can be avoided, managed, or mitigated: | NA |
| Degree to which impacts can be reversed: | NA |
| Degree to which impacts could cause irreplaceable loss of resources: | NA |
| Stakeholder interest: | Positive high |
| Assessment confidence: | High |
| Degree to which assessment supports decision-making: | Adequate for decision-making |
| Gaps and limitations: | NA |
| Recommendations: | NA |

Contribution to the Gross Domestic Product (GDP) of the George Municipality – impact identification and assessment

**Impact identification:**

GDP provides a measure of the total economic and sectoral activity within a particular area (municipalities, regions, *etc*.). Expressed as the Rand (market) value of all final goods and services that are produced and sold within a given period, GDP is a well-known measure of a municipality's economic activity. It can therefore be used to reflect the capability of a municipality to create, sustain and develop its own economy. Contributions to the GDP of any particular place therefore carry an obvious importance, something that is particularly associated with construction projects (Nhlapo, 2013). Although the actual contribution of the proposed Light Industrial Development to the local GDP may appear relatively small in real terms (albeit positive),[7] it forms part of a larger cumulative impact and will happen at a time when the local municipality has been struggling for several years already to come close to its projected GDP growth rate (Western Cape Government, 2015). The economy of the George Municipality has only managed to grow at a rate of 1.9% between 2014 and 2018 (Western Cape Government, 2020), while the Covid19 pandemic has obliterated the economic growth rates of South Africa's secondary cities since then. In addition to all of this, the ongoing challenge of energy (in)security in the country is equally limiting in its effect on the GDP and economic health of all urban places, including George. Adding the capital cost of the proposed Light Industrial Development and the other related proposals noted in Section 1.1 to the GDP of the George Municipality, is therefore a significant cumulative impact.

[7] The economy of George in 2020 was valued at R20.6bn (George Municipality, 2022/27).

**Impact assessment and significance rating:**

| Impact type: | Existing impact | Project impact (direct / indirect) | | Cumulative impacts |
|---|---|---|---|---|
| | | Unmitigated | Mitigated | |
| **Intensity:** | Major | Major | NA | Major |
| **Duration:** | Long term | Short term | NA | Short term |
| **Extent:** | Local | Local | NA | Local |
| **Consequence:** | High | Medium | NA | Medium |
| **Probability:** | Certain | Certain | NA | Certain |
| **Frequency:** | Always | Always | NA | Always |
| **Impact status:** | Negative | Positive | NA | Positive |
| **Impact significance:** | Negative high | Positive medium | NA | Positive medium |

**Assessment risks:**

| | |
|---|---|
| Likelihood of mitigation measures being implemented successfully: | NA |
| Degree to which impacts can be avoided, managed, or mitigated: | NA |
| Degree to which impacts can be reversed: | NA |
| Degree to which impacts could cause irreplaceable loss of resources: | NA |
| Stakeholder interest: | Positive high |
| Assessment confidence: | High |
| Degree to which assessment supports decision-making: | Adequate for decision-making |
| Gaps and limitations: | NA |
| Recommendations: | NA |

## B) Increased demand for local goods and services – impact identification and assessment

Higher levels of local economic activity normally follow the increased demand for goods and services (and the supply thereof) and this in turn is likely to culminate into various socio-economic benefits, such as employment creation and poverty reduction. The extent of this impact is of course a factor of the size and health of the local economy in question and the subsequent ability of local service providers to meet such demands. It follows that the more limited this ability, the

more leakage will take place from the local economy as developers would be compelled to source relevant goods and services elsewhere (DBIS, 2008). Although some leakage will inevitably occur, the impact remains significant in the context of the positive effect that the demand for goods and services will have on the local economy.

**Impact assessment and significance rating:**

| Impact type: | Existing impact | Project impact (direct / indirect) | | Cumulative impacts |
|---|---|---|---|---|
| | | Unmitigated | Mitigated | |
| **Intensity:** | Major | Major | NA | Major |
| **Duration:** | Long term | Short term | NA | Short term |
| **Extent:** | Local | Local | NA | Local |
| **Consequence:** | High | Medium | NA | Medium |
| **Probability:** | Certain | Certain | NA | Certain |
| **Frequency:** | Always | Always | NA | Always |
| **Impact status:** | Negative | Positive | NA | Positive |
| **Impact significance:** | Negative high | Positive medium | NA | Positive medium |

**Assessment risks:**

| | |
|---|---|
| Likelihood of mitigation measures being implemented successfully: | NA |
| Degree to which impacts can be avoided, managed, or mitigated: | NA |
| Degree to which impacts can be reversed: | NA |
| Degree to which impacts could cause irreplaceable loss of resources: | NA |
| Stakeholder interest: | Positive high |
| Assessment confidence: | High |
| Degree to which assessment supports decision-making: | Adequate for decision-making |
| Gaps and limitations: | NA |
| Recommendations: | NA |

### 3.2.2 Empowerment impacts

*Empowerment impacts result from the social or economic empowerment of vulnerable and other groups.*

**C) Skills development and transfer – impact identification and assessment**

**Impact identification:**

The commitment by developers to recruit local labour, as far as possible, to benefit local communities in general and the unemployed in particular, is almost standard practice in South Africa when construction projects are proposed. The proposed Light Industrial Development is of course no different and several employment opportunities will subsequently be created within the semi-skilled category. This is likely to have a considerable socio-economic impact in the form of poverty alleviation and favourable socio-economic implications (improved access to and consumption of goods and services, greater freedom of choice, better quality of life and so on) for the affected individuals and their dependants (Section 3.2.1 A).

One limiting factor that is expected to restrict the prioritisation of local labour during the construction phase of the proposed Light Industrial Development, is the educational attainment of the prospective labour force, particularly in the case of semi-skilled workers. The twin problems of illiteracy and low levels of post-school education and/or training are clear obstacles in this case. Thus, to supply the construction phase of the proposed development with the necessary local labour, the developer will most likely have to engage in a process of skills development and transfer.

In a town burdened by poverty and problematic unemployment rates and where many of the unemployed may be unemployable without some form of intervention, skills development and transfer are likely to have a substantial socio-economic impact. The benefits would essentially revolve around the improved socio-economic mobility of people and should extend well beyond the construction phase of the proposed development. Relevant individuals would for example be able to sell their newly acquired skills within and beyond the boundaries of the local economy long after the completion of the construction phase.

**Impact assessment and significance rating:**

| Impact type: | Existing impact | Project impact (direct / indirect) | | Cumulative impacts |
|---|---|---|---|---|
| | | Unmitigated | Mitigated | |
| **Intensity:** | Major | Major | NA | Major |
| **Duration:** | Long term | Short term | NA | Short term |
| **Extent:** | Local | Local | NA | Local |
| **Consequence:** | High | Medium | NA | Medium |
| **Probability:** | Certain | Certain | NA | Certain |
| **Frequency:** | Always | Always | NA | Always |
| **Impact status:** | Negative | Positive | NA | Positive |
| **Impact significance:** | Negative high | Positive medium | NA | Positive medium |

**Assessment risks:**

| | |
|---|---|
| Likelihood of mitigation measures being implemented successfully: | NA |
| Degree to which impacts can be avoided, managed, or mitigated: | NA |
| Degree to which impacts can be reversed: | NA |
| Degree to which impacts could cause irreplaceable loss of resources: | NA |
| Stakeholder interest: | Positive high |
| Assessment confidence: | High |
| Degree to which assessment supports decision-making: | Adequate for decision-making |
| Gaps and limitations: | NA |
| Recommendations: | NA |

### 3.2.3 Public health and safety impacts

*Public health and safety impacts result from changes in community health and safety parameters.*

**D) Public health and safety impacts due to increased construction related vehicular traffic – impact identification and assessment**

**Impact identification:**

The proposed Light Industrial Development is likely to generate an increased amount of traffic as far as the daily movement of its workforce is concerned. The transport of workers will of course supplement the other construction related vehicular traffic that is expected to coincide with the proposed Light Industrial Development's construction phase.

It can be expected that much of the total traffic volume that will be produced by the proposed Light Industrial Development at this stage will share the existing R404 and R102 roads with regular road users. Although these roads appear to have the capacity to absorb the added traffic, the addition of construction related vehicles can nevertheless potentially affect existing mobility patterns. This could culminate in health and safety impacts through the potential increase in motor vehicle and pedestrian related accidents.

Cumulatively, the proposed development combined with relevant others is not likely to change the significance of this impact. Industrial Zone developments are usually not concentrated in time, while impact mitigation in this case is possible.

**Impact assessment and significance rating:**

| Impact type: | Existing impact | Indirect project impact | | Cumulative impact |
|---|---|---|---|---|
| | | Unmitigated | Mitigated | |
| **Intensity:** | Minor | Moderate | Minor | Minor |
| **Duration:** | Long term | Short term | Short term | Short term |
| **Extent:** | Local | Local | Local | Local |
| **Consequence:** | Low | Low | Low | Low |
| **Probability:** | Certain | Certain | Possible | Possible |
| **Frequency:** | Sporadic | Occasional | Sporadic | Sporadic |
| **Impact status:** | Negative | Negative | Negative | Negative |
| **Impact significance:** | Negative very low | Negative low | Negative very low | Negative very low |

**Assessment risks:**

| | |
|---|---|
| Likelihood of mitigation measures being implemented successfully: | Possible |
| Degree to which impacts can be avoided, managed, or mitigated: | Can be mitigated |
| Degree to which impacts can be reversed: | Can be partially reversed |
| Degree to which impacts could cause irreplaceable loss of resources: | Highly unlikely |
| Stakeholder interest: | Positive high |
| Assessment confidence: | High |
| Degree to which assessment supports decision-making: | Adequate for decision-making |
| Gaps and limitations: | NA |
| Recommendations: | See recommended mitigation |

- **Recommended mitigation**

  - Establish an information-sharing link with the Community Safety Directory of the George Municipality.

  - Comply with relevant health and safety regulations, and applicable legislation, including the Occupational Health and Safety Act (85/1993): 2014 Construction Regulations and the 1996 National Road Traffic Act.

## 3.3 SOCIO-ECONOMIC IMPACTS DURING THE OPERATIONAL PHASE

### 3.3.1 Socio-economic impacts

*Socio-economic impacts result from employment creation, changes in business activity, livelihoods, economic attributes, etc.*

**A) Contribution to Local Economic Development – impact identification and assessment**

**Impact identification:**

Light Industrial Development, by virtue of its design, physical nature, and purpose, is generally not known to have noteworthy direct and indirect operational phase socio-economic impacts. The operational phase impact of the proposed Light Industrial Development is therefore cumulative in nature due to its collective contribution to the George Airport development node, and ultimately, Local Economic Development.

In reaction to the current need for Local Economic Development in George, the following conclusion comes from a Specialist Planning Report on the strategic value of George Airport as a development node:

> *"There is a strong need for the economic development around the George Airport to establish a new sub-regional industrial node in proximity to the N2 and airport, targeted at Southern Cape manufacturing, freight and logistics, and service industries"* (Marike Vreken, 2017:35).

The Gwayang Local Spatial Development Framework furthermore emphasises that:

> *"Land around the airport needs to be retained for commercial purposes with its key functions being freight and logistics, which will create additional employment and economic benefits"* (George Municipality, 2015:47).

In line with the above two statements, the previous Integrated Development Plan (IDP) of the George Municipality has the following as one of its Spatial Development Objectives:

> *"Strengthening the Economic Vitality by enhancing the Regional and Local Space Economy, Strategic Developments to diversify and strengthen the Economy, Consolidating and reinforcing nodes of economic activity, and Infrastructure Services Provision"* (George Municipality, 2021/22:104).

This objective is echoed by the current IDP, which labels the Airport development node an important opportunity to advance Local Economic Development and the creation of job opportunities (George Municipality, 2022/27).

The proposed Light Industrial Development, in combination with other development proposals in the larger George Airport Support / Business Zone (See Section 1.1), would subsequently be strategically and geographically well located to provide an essential supporting / enabling service in the context of an economic development node around the George Airport. In short, the Light Industrial Development and other relevant development proposals are likely to have the following twofold cumulative impact:

- Much needed direct investment in Local Economic Development in George; and

- The provision of key services for the incubation of Local Economic Development activities around the George Airport and in the proximity to the N2 National Road.

**Impact assessment and significance rating:**

| Impact type: | Existing impact | Indirect project impact | | Cumulative impact |
|---|---|---|---|---|
| | | Unmitigated | Mitigated | |
| **Intensity:** | Major | Moderate | NA | Major |
| **Duration:** | Long term | Long term | NA | Long term |
| **Extent:** | Local | Local | NA | Local |
| **Consequence:** | High | Medium | NA | Medium |
| **Probability:** | Certain | Certain | NA | Certain |
| **Frequency:** | Always | Always | NA | Always |
| **Impact status:** | Negative | Positive | NA | Positive |
| **Impact significance:** | Negative high | Positive medium | NA | Positive high |

**Assessment risks:**

| | |
|---|---|
| Likelihood of mitigation measures being implemented successfully: | NA |
| Degree to which impacts can be avoided, managed, or mitigated: | NA |
| Degree to which impacts can be reversed: | NA |
| Degree to which impacts could cause irreplaceable loss of resources: | NA |
| Stakeholder interest: | Positive high |
| Assessment confidence: | High |
| Degree to which assessment supports decision-making: | Adequate for decision-making |
| Gaps and limitations: | NA |
| Recommendations: | NA |

***– FIN –***

## *Addendum A: STUDY APPROACH*

### SEIA methodology

SEIA generally includes *"the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by these interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment"* (IAIA, 2003:2). In South Africa, the SEIA process is among others directed by DEAT (2006) and subsequent Socio-economic Impact Assessment Guidelines (Barbour, 2007; DPME, 2015).

### Socio-economic processes and impacts

The above IAIA definition highlights two critical issues, namely socio-economic process and socio-economic consequence (impact), which are tied together in a cause-and-effect relationship. The influential distinction between socio-economic process and socio-economic consequence in the context of SEIA, similar to the difference between biophysical change and biophysical impact in the context of EIA, comes from the model developed by Slootweg *et al.* (2001). Strongly advocated by the International Handbook of Social Impact Assessment (Slootweg *et al*., 2003), this model is subscribed to by the present study. It underlies the importance of segregating socio-economic process from socio-economic impact and ultimately supports the understanding of the processes that can result in socio-economic impacts (Aucamp, 2009).

With reference to the effects of proposed development projects, Slootweg's *et al*. (2003) model suggests pathways or socio-economic change processes which may culminate in socio-economic impacts. Accordingly, development interventions can result in intended or unintended (socio-economic change) processes. Such processes are discreet and observable and may alter the characteristics of a society. They also take place regardless of particular societal contexts (population groups, nations, religions, *etc.*). Under certain conditions (community attributes or the nature and extent of mitigation measures for example), socio-economic change processes may ultimately result in socio-economic impacts.

### Socio-economic change processes

Several socio-economic change processes can be recognised as the fundamental drivers of socio-economic impacts. These include the following according to Van Schooten *et al*. (2003) and supplemented by the author of the current report (See also Vanclay *et al*., 2015):

- Demographic processes that relate to the movement of people and/or the demographic composition of human populations.

- Human health and safety processes that affect the physical, mental and material well-being of people.

- Economic processes that affect the economic activity and socio-economic status of people and/or the way they make a living (livelihoods).

- Geographic processes that affect land-use and associated patterns.

- Institutional processes that affect the organisations that are responsible for urban, provincial or national governance as well as the supply, regulation and maintenance of the goods and services on which people depend.

- Empowerment processes that affect the ability of people to influence decision-making and the circumstances that impact on their daily lives and well-being.

- Socio-cultural processes that affect the social culture of a society, referring to aspects of the way people live together and / or how this manifests in geographical space.

- Socio-spatial processes that affect the way in which people relate to their residential environments (place utility or sense of place).

- Intrusion processes that relate to imposed environmental disturbance in the form of pollution.

The above list of socio-economic change processes is obviously not complete due to the complex nature of human society and invariably as a result of the multitude of ways in which it may respond to change (Vanclay, n.d.).

**Identifying socio-economic impacts**

The identification of socio-economic change processes during SEIA is naturally followed by the identification of socio-economic impacts. Following the above-mentioned distinction between socio-economic process and socio-economic impact, a socio-economic impact, according to The Interorganizational Committee on Guidelines and Principles for Social Impact Assessment (2003:231), can be defined as:

> *"Consequences to human populations of any public or private actions – that alter the ways in which people live, work, play, relate to one another, organize to meet their needs, and generally cope as members of society. The term also includes cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize their cognition of themselves and their society."*

Socio-economic impacts are also something that may be physically experienced (objective impacts in other words that can be quantified, such as changes in people's health and safety) or emotionally perceived by people (subjective impacts in other words that manifest in the *'minds'* of people, such as emotional stress, reduced quality of life, or an altered sense of place). Such experiences and perceptions can be either positive or negative.

Faced with the obvious complexity subsumed in the identification of social impacts in multifaceted human societies, a framework of SEIA categories is often referred to by practitioners for guidance. The following comprehensive set of SEIA categories is adapted by the present study from Burdge (2004) and act as essential parameters for the structured identification and presentation of social impacts:

- Population related impacts, resulting from changes in population attributes, the (induced) migration of people, the inflow of a temporary / permanent labour force, *etc.*

- Economic impacts, resulting from employment creation, changes in business activity, livelihoods, economic attributes, *etc.*

- Empowerment impacts, resulting from the social or economic empowerment of vulnerable and other groups.

- Individual and family level impacts, resulting from changes in human movement patterns and social networks, the relocation of individuals and families, *etc.*

- Public health and safety impacts, resulting from changes in community health and safety parameters.

- Impacts related to community resources, resulting from impacts on cultural sites and social and/or physical infrastructure, *etc.*

- Impacts related to community arrangements, resulting from impacts on interest groups.

- Institutional impacts (related to government and other institutions), resulting from infrastructural demand and supply issues, changes in institutional image, land-use change, gentrification, policy related demands and changes, processes that affect urban, provincial or national governance *etc.*

- Intrusion impacts, resulting from air pollution, noise pollution, light pollution, visual pollution and malodour pollution.

- Socio-cultural impacts, resulting from social disintegration; the creation and/or maintenance of social differentiation, segregation or social inequality, etc.

- Socio-spatial impacts, resulting from changes in people's place utility or their sense of place.

It is important to note the social impact variables that resort under the different socio-economic change processes may naturally overlap, while the actual socio-economic impacts associated with different impact variables may also coincide. For example, socio-economic impacts that result from employment creation may overlap with empowerment impacts that result from the social or economic empowerment of vulnerable and other groups.

**SEIA research process**

The recognition of socio-economic change process categories and relevant impact categories, and the subsequent identification and assessment of the socio-economic impacts that may result from the proposed Light Industrial Development in George, were largely the product of a technical research approach.

With reference to the technical approach, the SEIA practitioner is an observer of socio-economic phenomena and identifies and assess impacts by means of objective research, published literature and information, simulations, and personal experience. In a participatory approach on the other hand, the SEIA practitioner relies on the knowledge and experience of individuals that are affected by proposed changes as the foundation from which socio-economic impacts are projected (Sogunro, 2001; Becker *et al*, 2004; DPME, 2015).

To identify and assess the socio-economic impacts of the proposed Light Industrial Development in George, research results were filtered through a range of possible socio-economic change processes and impact categories. The impacts were then identified and assessed. Rating criteria of the actual assessment process, the qualitative way in which impacts are rated and presented in a tabular form in other words, are listed below (See the first column of the table below):

- Impact intensity
- Impact duration
- Impact extent
- Impact consequence
- Impact probability
- Impact frequency
- Impact status
- Impact significance

The above criteria are first applied to the so-called 'existing impact' which refers to the current and relevant status of the affected socio-economic environment. Both DEAT (2006) and DPME (2015) emphasise the importance of a proper understanding of the current socio-economic environment, because this presents the baseline for predictions in the SEIA process.

**Impact assessment template with impact rating criteria**

| Impact rating criteria: | Existing impact | Policy / programme plan / project impact | |
|---|---|---|---|
| | | Unmitigated | Mitigated |
| Intensity: | | | |
| Duration: | | | |
| Extent: | | | |
| Consequence: | | | |
| Probability: | | | |
| Frequency: | | | |
| Impact status: | | | |
| Impact significance: | | | |

The technical definitions of the above-mentioned list of criteria, as well as the sequence (steps) of the impact assessment process, appear in the tables below.

| ***Step 1:*** | ***Identify and Describe the Nature of the Impact*** | |
|---|---|---|
| **Existing Impacts** | Current level of socio-economic depravation / degradation / predicament associated with the affected socio-economic environment. | |
| **Project Impacts** | Impacts of the proposed project and associated activities and infrastructure (also known as incremental impacts). | |
| **Impact Status** | Negative | Impacts with a potential negative / adverse effect |
| | Neutral | Neutral, no impact |
| | Positive | Impacts with a potential positive / beneficial effect |

| ***Step 2:*** | ***Identify and Discuss Mitigation / Impact Management Measures*** |
|---|---|
| **Mitigation Measures (Impact Management)** | Measures designed to avoid, reduce or remedy potential adverse impacts.<br>Measures designed to compensate for residual adverse impacts.<br>Measures designed to expand and augment the effect of potential positive impacts (enhancement measures). |

| ***Step 3:*** | | ***Rating of Impact Consequence and Significance*** |
|---|---|---|
| **Unmitigated** | | Impact rating assuming the proposed mitigation measures are not in place. |
| **Mitigated** | | Impact rating assuming the proposed mitigation measures are in place. |
| **Intensity** *(Negative Impacts)* | Eliminated | The impact was considered and assessed but found to be not applicable to the affected socio-economic environment. |
| | Minor | Slight change, disturbance or nuisance. Targets, limits and thresholds of concern never exceeded. Impacts are rapidly and easily reversible. Require no or only minor interventions if these impacts occur. No complaints expected when the impact takes place. |
| | Moderate | Moderate change, disturbance or discomfort. Large enough to have a real effect. Targets, limits and thresholds of concern may occasionally be exceeded. Impacts are reversible but may require some effort, cost and time. Sporadic complaints can be expected when the impact takes place. |
| | Major | Substantial change, disturbance or degradation. Real and prominent effects. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Regular complaints can be expected when the impact takes place. |
| | Extreme | Extreme change, disturbance or degradation. A serious disruption to the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope. Potentially catastrophic. |
| **Intensity** *(Positive Impacts)* | Eliminated | The impact was considered and assessed but found to be not applicable to the affected socio-economic environment. |
| | Minor | Slight change or improvement. Minor benefits. |
| | Moderate | Moderate change or improvement. Real but not substantial benefits. |
| | Major | Prominent change or improvement. Real and substantial benefits. General community support. |
| | Extreme | Considerable large-scale change or improvement compared to current conditions. Widespread benefit. Favourable publicity and/or widespread support expected. |
| **Extent** Spatial (geographical) scale of the impact | Site | Impact limited to within the boundaries of the project site. Not notable impact on receptors beyond the site boundary. |
| | Local | Impact notable in the immediate area (< 5 km) around the project site. Individual sensitive receptors may be affected. Does not affect an entire neighbourhood, habitat or community. Does not affect large numbers of people in nearby townships. |
| | Regional | Widespread impact within province / district or catchment. Large area or large numbers of sensitive receptors affected. May affect an entire community, neighbourhood or habitat. May affect large numbers of people in nearby residential areas. |
| | (Inter) national | National and or international (transboundary) impacts. |
| **Duration** Risk or impact period. The total length of time (i.e. number of months or years) that the impact or | Short-term | Less than 5 years. Impact may occur for the first few years of the project, during construction, or for up to five years. Once the impact source has been removed, the effects are reversible within a one-year period. |
| | Medium-term | > 5 to 10 years. Impact may occur for up to ten years. Once the impact source has been removed, the effects are reversible within a three-year period. |
| | Long-term | > 10 years, and for < 10 years after decommissioning or rehabilitation. May occur throughout the operational life of the project but will cease after operations ceases either because of natural processes or human intervention / remediation. |

| ***Step 3:*** | | ***Rating of Impact Consequence and Significance*** |
|---|---|---|
| **Unmitigated** | | Impact rating assuming the proposed mitigation measures are not in place. |
| **Mitigated** | | Impact rating assuming the proposed mitigation measures are in place. |
| **Intensity** *(Negative Impacts)* | Eliminated | The impact was considered and assessed but found to be not applicable to the affected socio-economic environment. |
| | Minor | Slight change, disturbance or nuisance. Targets, limits and thresholds of concern never exceeded. Impacts are rapidly and easily reversible. Require no or only minor interventions if these impacts occur. No complaints expected when the impact takes place. |
| | Moderate | Moderate change, disturbance or discomfort. Large enough to have a real effect. Targets, limits and thresholds of concern may occasionally be exceeded. Impacts are reversible but may require some effort, cost and time. Sporadic complaints can be expected when the impact takes place. |
| | Major | Substantial change, disturbance or degradation. Real and prominent effects. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Regular complaints can be expected when the impact takes place. |
| | Extreme | Extreme change, disturbance or degradation. A serious disruption to the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope. Potentially catastrophic. |
| | Permanent | Permanent. Irreversible (residual impacts will remain for more than 10 years after the impact source has been removed. |
| **Consequence** | | Consequence = Intensity + Duration + Extent<br>The outcome or result of an impact / risk being realised. |

| | | |
|---|---|---|
| **Probability** | Likelihood that the impact will occur. | |
| | Eliminated | The impact was considered and assessed but found to be not applicable to the project site or affected socio-economic environment. |
| | Highly Unlikely | Conceivable but will only happen in exceptional circumstances (<20% chance of happening). |
| | Possible | Plausible. Could happen and has occurred here or elsewhere (20 to 50% chance of happening). |
| | Highly Likely | Probable (>50 to 80 % chance of happening). |
| | (Near) Certain | Definite or expected. The impact cannot be prevented. (>80 % chance of happening). |
| **Frequency** | How often (number of occurrences) the impact would manifest over the impact duration period. | |
| | Sporadic | < 5% of the time. Once off occurrence. Effects only present for a short period of time, no residual effects. |
| | Occasional | 5 to 30% of the time. Occurring from time to time without specific periodicity or pattern. Effects are reversed quickly and easily. |
| | Regular | > 30 to < 80% of the time. |
| | (Near) Always | > 80 to 100% of the time. |
| **Significance** | Significance = Consequence x (Probability + Frequency) | |
| | Negative Very High | Widespread negative effect. Negative impact that is of the highest order.<br>Potential fatal flaw. Unacceptable impact / loss of a resource will occur. |
| | Negative High | Substantial negative impact. |
| | Negative Moderate | Negative impact that is real but not substantial. |
| | Negative Low | Low to negligible negative impact with little real effect. |
| | Positive Low | Low to insignificant positive impact. |
| | Positive Moderate | Positive impact that is real but not substantial. |
| | Positive High | Substantial positive impact. |
| | Positive Very High | Widespread/substantial beneficial effect. |

| ***Impact Rating Matrix*** | | | | | | |
|---|---|---|---|---|---|---|
| **CONSEQUENCE** (Intensity + Duration + Extent) | ***INTENSITY:*** | ***DURATION:*** | ***EXTENT:*** | | | |
| | | | *Site* | *Local* | *Regional* | *(Inter)national* |
| | *Extreme* | *Permanent* | **High** | **Very High** | **Very High** | **Very High** |
| | | *Long-term* | **High** | **High** | **Very High** | **Very High** |
| | | *Medium-term* | **High** | **High** | **High** | **Very High** |
| | | *Short-term* | **Medium** | **High** | **High** | **High** |
| | *Major* | *Permanent* | **High** | **High** | **Very High** | **Very High** |
| | | *Long-term* | **High** | **High** | **High** | **Very High** |
| | | *Medium-term* | **Medium** | **High** | **High** | **High** |
| | | *Short-term* | **Medium** | **Medium** | **High** | **High** |
| | *Moderate* | *Permanent* | **Medium** | **Medium** | **High** | **High** |
| | | *Long-term* | **Medium** | **Medium** | **Medium** | **High** |
| | | *Medium-term* | Low | **Medium** | **Medium** | **Medium** |
| | | *Short-term* | Low | Low | **Medium** | **Medium** |
| | *Minor* | *Permanent* | Low | Low | **Medium** | **Medium** |
| | | *Long-term* | Low | Low | **Medium** | **Medium** |
| | | *Medium-term* | Low | Low | Low | Low |
| | | *Short-term* | Low | Low | Low | Low |
| | *Eliminated* | *Permanent* | None | | | |
| | | *Long-term* | | | | |
| | | *Medium-term* | | | | |
| | | *Short-term* | | | | |

| **SIGNIFICANCE** (Consequence x (Probability + Frequency)) | ***PROBABILITY:*** | ***FREQUENCY:*** | ***CONSEQUENCE:*** | | | | |
|---|---|---|---|---|---|---|---|
| | | | *None* | *Low* | *Medium* | *High* | *Very High* |
| | *(Near) Certain* | *Regular / Always* | None | Low | **Medium** | **High** | **Very High** |
| | | *Occasional* | None | Low | **Medium** | **High** | **Very High** |
| | | *Sporadic* | None | Very Low | Low | **Medium** | **High** |
| | *Highly Likely* | *Regular / Always* | None | Low | **Medium** | **High** | **Very High** |
| | | *Occasional* | None | Very Low | Low | **Medium** | **High** |
| | | *Sporadic* | None | Very Low | Very Low | Low | **Medium** |
| | *Possible* | *Regular / Always* | None | Very Low | Low | **Medium** | **High** |
| | | *Occasional* | None | Very Low | Very Low | Low | **Medium** |
| | | *Sporadic* | None | Very Low | Very Low | Very Low | Low |
| | *Highly Unlikely* | *Regular / Always* | None | Very Low | Low | **Medium** | **High** |
| | | *Occasional* | None | Very Low | Very Low | Low | **Medium** |
| | | *Sporadic* | None | Very Low | Very Low | Very Low | Low |
| | *Eliminated* | *N/A* | None | None | None | None | None |

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