



Indwe

Environmental Consulting

PROJECT TITLE	PROPOSED DEVELOPMENT AND OPERATION OF MEMORIAL PARK AND PRIVATE CEMETERY ON PTN 50 FARM 821, BCMM, EASTERN CAPE
REPORT TYPE	DRAFT BASIC ASSESSMENT REPORT DEDEAT REF: EC/7/A/LN1, LN3/M/25-30
VERSION	REV 0
DATE	13 FEBRUARY 2026
PREPARED FOR	CAPEVEST INVESTMENTS (PTY) LTD



COPYWRITE AND DISCLAIMER

This document contains proprietary information of Indwe Environmental Consulting CC and is protected by copyright in favour of Indwe Environmental Consulting CC and may not be reproduced, or used without the written consent by Indwe Environmental Consulting CC, which has been obtained beforehand. This document is prepared exclusively for the client / DEDEAT and is subject to all confidentiality, copyright and trade secrets, rules, intellectual property law and practices of South Africa.

Regardless of the care taken to ensure the accuracy of this report, environmental assessment studies are limited in scope, time and budget. Discussions, recommendations and conclusions are to some extent made on reasonable and informed assumptions built on bona fide information sources, as well as deductive reasoning. Environmental impact studies deal with dynamic natural systems and therefore additional information may come to light at a later stage during the impact assessment phase. The authors and its contributors do not accept responsibility for conclusions made in good faith based on internal databases or on the information provided. Although the authors and its contributors exercised due care and diligence in rendering services and preparing documents, they accept no liability, and the client, by receiving this document, indemnifies the authors against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, directly or indirectly by the authors and by the use of this document. This report should therefore be viewed and acted upon with these limitations in mind.

Indwe



Environmental Consulting

QUALITY AND REVISION RECORD

	CAPACITY	NAME	SIGNATURE	DATE
EAP AND REVIEWER	Registered EAP (EAPASA Reg No. 2019/1530)	Megan Hugo		09 February 2026
EAP AND AUTHOR	Registered EAP (EAPASA Reg No. 2019/743)	Nicola Monks		06 February 2026
ADDITIONAL TECHNICAL INPUT	CapeVest Investments Director	Moshe Sohaba		

**PROPOSED DEVELOPMENT AND OPERATION OF MEMORIAL PARK AND
PRIVATE CEMETERY ON PTN 50 OF FARM 821, BCMM, EASTERN CAPE- DEDEAT
REF: EC/7/A/LN1, LN3/M/25-30**

**DRAFT BASIC ASSESSMENT REPORT
CONTENTS**

Part	Description	
BASIC ASSESSMENT REPORT		2
APPENDIX A: SITE PLANS		3
APPENDIX B: SITE PHOTOGRAPHS		4
APPENDIX C: FACILITY ILLUSTRATIONS		5
APPENDIX D: SPECIALIST REPORTS		6
	APPENDIX D1 – A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA)	7
	APPENDIX D2 – PALAEONTOLOGICAL IMPACT ASSESSMENT	8
	APPENDIX D3 – AQUATIC BIODIVERSITY IMPACT ASSESSMENT	9
	APPENDIX D4 – TERRESTRIAL BIODIVERSITY ASSESSMENT	10
	APPENDIX D5 – GEOHYDROLOGICAL AND GEOTECHNICAL ASSESSMENT	11
APPENDIX E: COMMENTS AND RESPONSE REPORT		12
APPENDIX F: ENVIRONMENTAL MANAGEMENT PLAN		13
APPENDIX G: OTHER		14
	APPENDIX G1 – PUBLIC PARTICIPATION PROCESS	15
	APPENDIX G2 – PROOF OF BID DISTRIBUTION VIA EMAIL	16
	APPENDIX G3– BACKGROUND INFORMATION DOCUMENT (BID)	17
	APPENDIX G4– I&AP CORRESPONDENCE	18
	APPENDIX G5– I&AP REGISTER	19
	APPENDIX G6– IMPACT SIGNIFICANCE METHODOLOGY	20
	APPENDIX G7 – IMPACT ASSESSMENT	21
	APPENDIX G8– SCREENING TOOL DELIVERABLES	22
	APPENDIX G9– EAP CV AND QUALIFICATIONS	23



Province of the
EASTERN CAPE
ECONOMIC DEVELOPMENT,
ENVIRONMENTAL AFFAIRS & TOURISM

BASIC ASSESSMENT REPORT

(For official use only)

File Reference Number:

NEAS Number:

Date Received:

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2014 as amended, promulgated in terms of the National Environmental Management Act, 1998(Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2014 as amended and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.
2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
3. Where applicable **tick** the boxes that are applicable or **black out** the boxes that are not applicable in the report.
4. An incomplete report may be returned to the applicant for revision.
5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
6. This report must be handed in at offices of the relevant competent authority as determined by each authority **unless indicated otherwise by the Department.**
7. No faxed or e-mailed reports will be accepted **unless indicated otherwise by the Department.**
8. The report must be compiled by an independent environmental assessment practitioner (EAP). The EAP must satisfy conditions 11 below.

9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request during any stage of the application process.
10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.
- 11.1 The Environmental Assessment Practitioner (EAP) must be registered in terms of S24H Regulations with the Registration Authority EAPASA as from 8 August 2022.
- 11.2. S24H (14) states that "only a person registered as an Environmental Assessment practitioner may perform tasks in connection with an application for an environmental authorisation contemplated in
 - (a) Chapter 5 of the Act read with the Environmental impact Assessment Regulations.
 - (b) Section 24G of the Act
 - (c) Chapter 5 of the National Environmental Management Waste Act 2008 (Act No 59 of 2008) read with the Environmental Impact Assessment Regulations
- 11.3. Tasks in regulation 14 may only be conducted by an EAP that is registered
- 11.4. Regulations 20 of S24H indicates the offences and penalties as indicated below:

"20. Offences and penalties

 - (1) A person is guilty of an offence if that person-*
 - (a) contravenes regulation 14 of the Regulations; or*
 - (b) pretends to be a registered environmental assessment practitioner or registered candidate environmental assessment practitioner.*
 - (2) A person convicted of an offence in terms of subregulation (1) is liable to the penalties contemplated in section 49B(3) of the Act."*

Section 49B(3) of the Act states:

"A person convicted of an offence in terms of section 49A(1)(h), (l), (m), (n), (o) or (p) is liable to a fine or to imprisonment for a period not exceeding one year, or to both a fine and such imprisonment."

CONTENTS

EAP'S BACKGROUND AND DECLARATION.....	4
SECTION A: ACTIVITY INFORMATION	5
1. ACTIVITY DESCRIPTION	5
2. FEASIBLE AND REASONABLE ALTERNATIVES	7
3. ACTIVITY POSITION	10
4. PHYSICAL SIZE OF THE ACTIVITY	10
5. SITE ACCESS.....	11
6. SITE OR ROUTE PLAN	12
7. SITE PHOTOGRAPHS	13
8. FACILITY ILLUSTRATION.....	13
9. ACTIVITY MOTIVATION.....	13
9(A) SOCIO-ECONOMIC VALUE OF THE ACTIVITY	13
9(B) NEED AND DESIRABILITY OF THE ACTIVITY	14
10. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES	15
11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT	16
11(A) SOLID WASTE MANAGEMENT	16
11(B) LIQUID EFFLUENT	17
11(C) EMISSIONS INTO THE ATMOSPHERE	18
11(D) GENERATION OF NOISE.....	18
12. WATER USE	18
13. ENERGY EFFICIENCY.....	19
SECTION B: SITE/AREA/PROPERTY DESCRIPTION	20
1. GRADIENT OF THE SITE	21
2. LOCATION IN LANDSCAPE	22
3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE	22
4. GROUNDCOVER	26
5. LAND USE CHARACTER OF SURROUNDING AREA	40
6. CULTURAL/HISTORICAL FEATURES	42
SECTION C: PUBLIC PARTICIPATION	43
1. ADVERTISEMENT.....	43
2. CONTENT OF ADVERTISEMENTS AND NOTICES	44
3. PLACEMENT OF ADVERTISEMENTS AND NOTICES	44
4. DETERMINATION OF APPROPRIATE MEASURES	44
5. COMMENTS AND RESPONSE REPORT	45
6. AUTHORITY PARTICIPATION.....	45
7. CONSULTATION WITH OTHER STAKEHOLDERS	46
SECTION D: IMPACT ASSESSMENT	47

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES.....	47
2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES	51
3. CLIMATE CHANGE ASSESSMENT	56
4. ENVIRONMENTAL IMPACT STATEMENT	58
SECTION E. RECOMMENDATIONS OF PRACTITIONER.....	60
SECTION F: APPENDICES	62

FIGURE TITLE LIST

Figure 1: Aerial location of the proposed site PTN 50 of Farm 821 and neighbouring farms.....	6
Figure 2: Topographic map of the proposed site PTN 50 of Farm 821	7
Figure 3: Design layout for the Preferred Alternative.....	8
Figure 4: Design layout plan for the Least Preferred alternative	9
Figure 5: Entrance off of W road (see red arrow).	12
Figure 6: Elevation profile for the cross section east to west for the proposed private cemetery on Farm 50/821	21
Figure 7: Redrawn detail of the Council for Geosciences “Kingwilliamstown” map sheet (3226), showing the geology around the study area. Pale Green/Blue represents strata of the Balfour Formation (Pub); Plum colour represents dolerite intrusions and Pale Pink represents the proposed development area. Note that the field survey indicated that the dolerite intrusion extends further into the proposed developmental area.	23
Figure 8: Geology of the area covered by the proposed development.....	24
Figure 9: Underlain soils of the area of the proposed development.	25
Figure 10: Vegetation Type According to Mucina & Rutherford 2018)	28
Figure 11: The site overlaid with the ECBCP(2019) terrestrial CBA data.....	32
Figure 12: The site overlaid with the ECBCP (2019) freshwater CBA data.....	33
Figure 13: locality of proposed project site indicated in red, in relation to the mainstem of the Qnira River illustrated in green	34
Figure 14: Watercourses that fall within the 500m Buffer of the site. Indicated in green.....	35
Figure 15: Sensitivity map with associated buffer zones demarcated and delineated	38
Figure 16: Estuary flood risk in relation to the site as extracted from the DFFE Coastal Vulnerability Viewer.	57
Figure 17: Coastal short term erosion in relation to the site as extracted from the DFFE Coastal Vulnerability Viewer	57

TABLE TITLE LIST

Table 1: Applicable Water Use License Section 21 items that require authorisation as a result of the proposed activity	19
Table 2: PES, ES, EI and EIS for the surface aquatic features on site from a desktop level	34
Table 3: Summary table of PES, EI, ES and EIS for the surface water features on site	36
Table 4: Summary table of ecosystem services for the surface water features on site.....	37
Table 5: Summary of nearby borehole vs onsite spring underground water sampling results	39
Table 6: List of potential impacts for S1: Preferred alternative for memorial park and private cemetery on ptn 50 of farm 821, BCMM	51
Table 7: Pre and Post Impact Significance of Preferred alternative and Least Preferred alternative	58
Table 8: Impact Significance of NO-GO Alternative.....	59

EAP'S BACKGROUND AND DECLARATION

Nicola joined Indwe Environmental Consulting as a Junior Environmental Consultant in March 2019 following the completion of her Master of Science Degree in Geography (Environmental Wetland Management) from Nelson Mandela University. Nicola became a member of the Golden Key International Honour Society in 2015 and was awarded the Nelson Mandela University Honours and Masters Postgraduate Research Scholarship as well as the Masters National Research Foundation Scholarship. During Nicola's studies at Nelson Mandela University, Nicola worked part time for a well known construction company formulating and completing Environmental Management Plans, Waste Management Plans, environmental work instructions, Health, Safety and Environment Risk Assessments and the like. Nicola has completed various courses in water quality management and GIS mapping and analysis. **Nicola is a Registered Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA) (Reg. No 2019/743).** EAPASA is the single Registration Authority for EAPs in South Africa. Nicola is also registered as a Candidate Natural Scientist with the South African Council for Natural Scientific Professions (Cand. Sci. Nat 121556) and an active paid up member of the International Association of Impact Assessment (IAIA) South Africa. Nicola has strong GIS skills and is responsible and/ or assists in GIS mapping and analysis, technical report writing, public participation and project management. **Nicola held position of main author for this Environmental Impact Assessment.**

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

A copy of the EAP's Curriculum Vitae and professional registration is included in Appendix G9.

As the lead Environmental Assessment Practitioner on this project assessment, I Nicola Monks can confirm the following:

- 1) To the best of my knowledge, all information authored by Indwe Environmental Consulting presented in this report is factually correct. We have relied on reports and information sourced from external parties. In this regard we assume that all external information is a true reflection and is factually correct.
- 2) I can confirm that all information of relevance received in the form of comments and inputs from stakeholders and interested and affected parties has been included; and
- 3) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties of relevance has been included.

For Indwe Environmental Consulting:



Nicola Monks
Registered EAP: EAPASA (Reg no. 2019/743)

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section?

NO ✓

If YES, please complete form XX for each specialist thus appointed:

Any specialist reports must be contained in Appendix D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail

The proposed project includes the construction of a cemetery near the Ducats area of East London and is located approximately 10.7 km north of the East London CBD and is about 4 km from the Merrifield School turn off onto the N6 from East London Beacon Bay. The study site is located at co-ordinates 32°55'8.77"S; 27°54'31.55"E and has access off of the N6. On the eastern side of the N6 where the site is located the predominant land use surrounding the site is that of agriculture.

The site in question is approximately 10.2 Ha in extent, and has evidence of old farm contours indicative of historical agricultural activities. In addition, the site has been intersected by two powerline servitudes, has an informal soccer field on site as of 2022 site investigation which has now overgrown from observations in 2025, and has evidence of prevalent dumping activities. Obvious environmental features within the site include a greenbelt within the site which indicates a watercourse and an old borrow pit-turned-dam. The greenbelt and old borrow pit/ dam will be excluded from the total area of which the remaining development footprint is expected to be roughly 7.76 Ha. There exists two alternatives for this particular project which is discussed in Section 2 below.

In terms of services, the following applies to both alternative:

Water

A borehole will be drilled to supply water. There is no need for potable treated water. Supply is available if needed from the adjacent Ducats Settlement. The water supply authority for the area is the Buffalo City Metropolitan Municipality (BCMM) and water infrastructure is in place to allow for the development to proceed.

Sewerage and sanitation

There is currently no sanitation infrastructure provided on the subject site. This would be remedied by the construction of either a septic tank system (least-preferred) or a conservancy tank (preferred).

Access

As the site currently stands there is a single access point on the property at the Northern Boundary from Road W (MN10118) which is an unpaved provincial road and is categorised as a Class 5 Provincial Minor Road. This provincial minor road known as Road W connects to the N6 to the west of the site. The location of the sites access road will not be changed however it will be upgraded and formalized in line with the development proposal needs. No change to current access and road network is proposed in terms of routing.

Electricity

The demand for this development will be low and an application will be made via Eskom/BCMM when the phase 1 needs to commence. Per the current status quo there is electricity available on the property. An electrical load report will be completed before formal application is made to Eskom/ BCMM to indicate the electrical supply required. This electrical load report is still to be compiled.

Town Planning

The applicant has submitted a formal application in terms of the Spatial Planning and Land Use Management Act of 2013, together with the BCMM Zoning Scheme of 2007. The application consists of a Permanent Departure to allow for the establishment of a Private Cemetery and Memorial Park, with a building line relaxation of 6m on all sides.

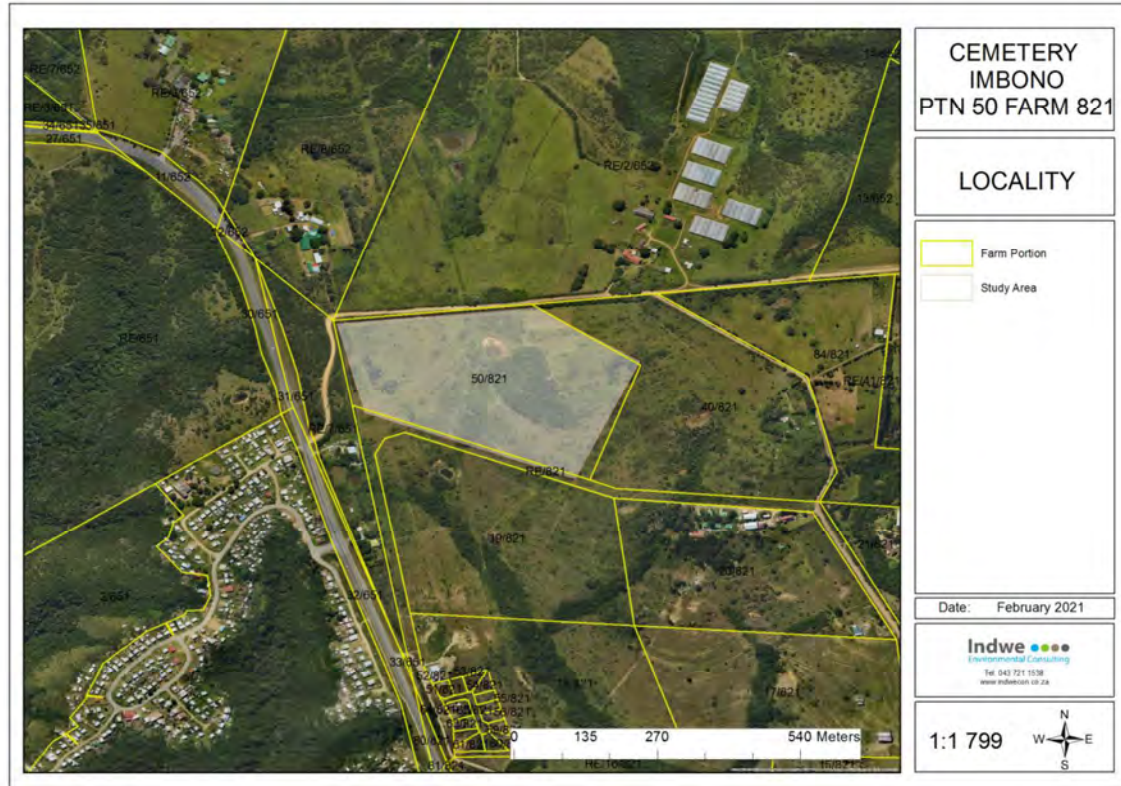
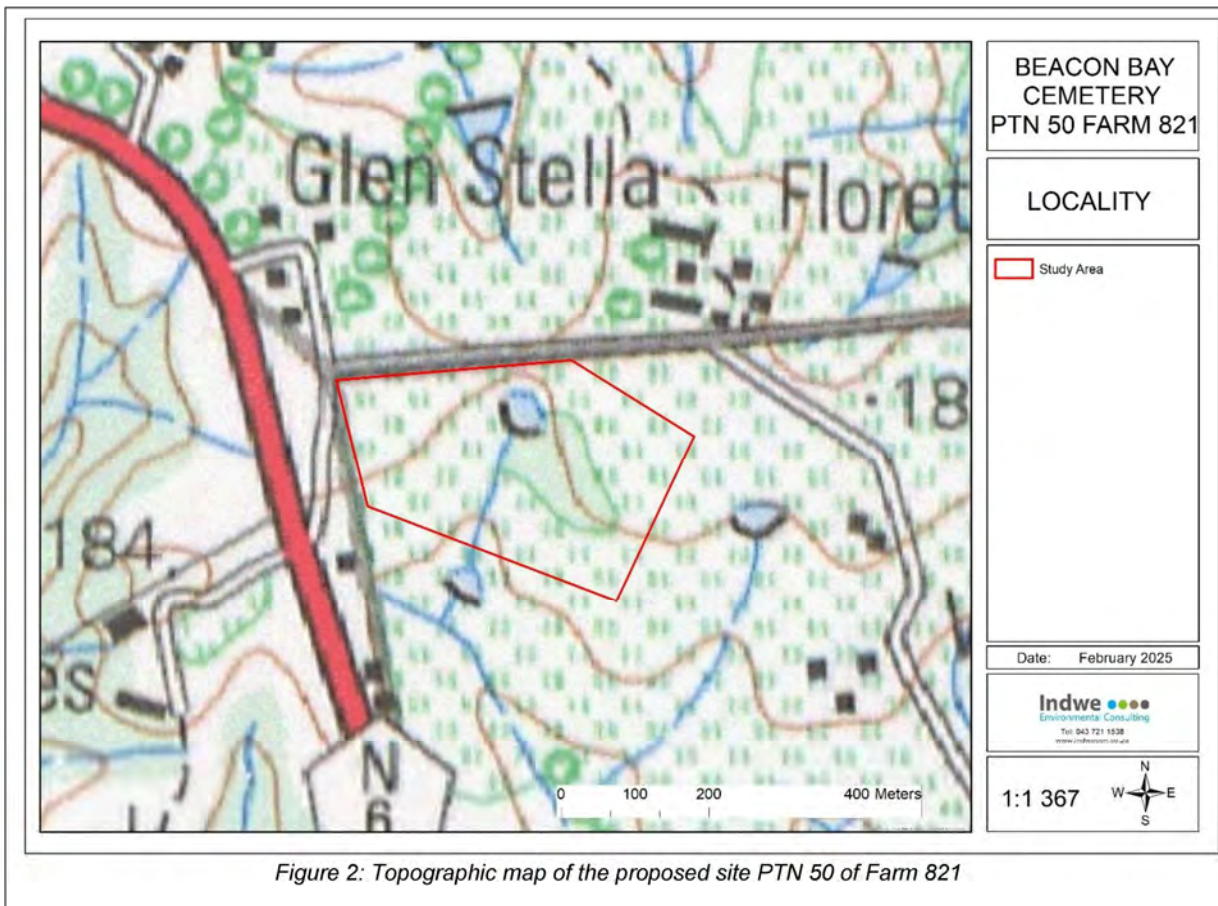


Figure 1: Aerial location of the proposed site PTN 50 of Farm 821 and neighbouring farms



2. FEASIBLE AND REASONABLE ALTERNATIVES

“alternatives”, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

- (a) the property on which or location where it is proposed to undertake the activity;
- (b) the type of activity to be undertaken;
- (c) **the design or layout of the activity;**
- (d) the technology to be used in the activity;
- (e) the operational aspects of the activity; and
- (f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.

Paragraphs 3 – 13 below should be completed for each alternative.

The proposed project has both a preferred and a least preferred alternative based on design. The preferred alternative, seen in figure 3 below, has its private cemetery component focused towards the eastern extent of the site and the memorial park component focused towards the western extent of the site which will make provisions for memorial plaques. In total the development will have five buildings on the site, consisting of a chapel, reception area, admin office, workshop and security house at the entrance. In terms of parking, the preferred alternative makes provision for 40 parking bays in total.

The least preferred alternative has a design layout where the cemetery components are situated both on the eastern and western side of the site. Due to the western side of the site being quite rocky in reality this layout, seen in figure 4, serves as the least preferred alternative. Further to this the layout plan includes a mausoleum, gathering hall, admin building, a workshop and chapel. The crematorium noted on the least preferred alternative has since been removed from the design proposal and is no longer included as part of the least preferred proposed project development plan. In terms of parking, the least preferred alternative makes provision for 65 parking bays in total.



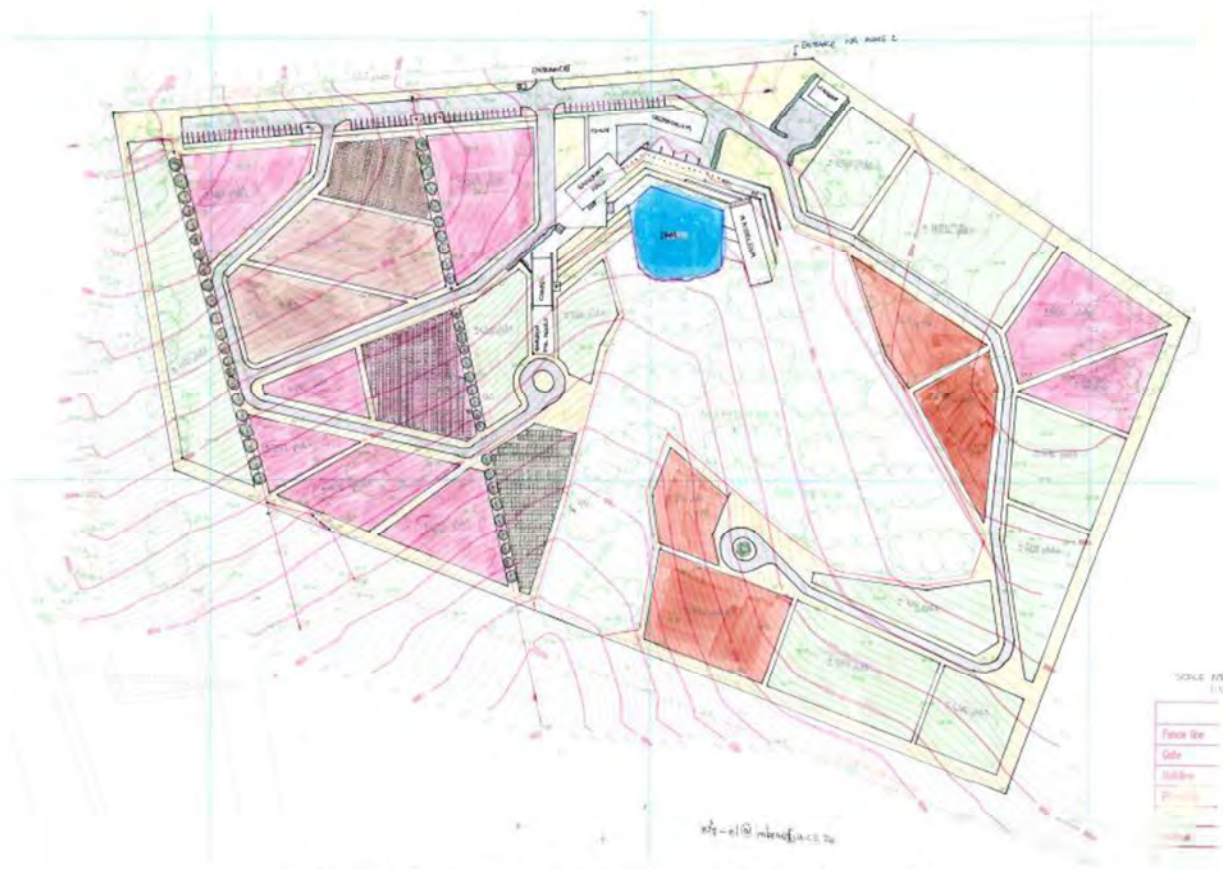


Figure 4: Design layout plan for the Least Preferred alternative

3. ACTIVITY POSITION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in degrees and decimal minutes. The minutes should have at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

List alternative sites if applicable.

Alternative:	Latitude (S):	Longitude (E):
Alternative S1 ¹ (preferred or only site alternative)	32°	55'8.77"S
Alternative S2 (if any)	32°	27°
Alternative S3 (if any)	0	0

In the case of linear activities:

Alternative:	Latitude (S):	Longitude (E):
Alternative S1 (preferred or only route alternative)		
• Starting point of the activity	0	0
• Middle point of the activity	0	0
• End point of the activity	0	0
Alternative S2 (if any)		
• Starting point of the activity	0	0
• Middle point of the activity	0	0
• End point of the activity	0	0
Alternative S3 (if any)		
• Starting point of the activity	0	0
• Middle point of the activity	0	0
• End point of the activity	0	0

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	Size of the activity:
Alternative A1 ² (preferred activity alternative)	10 510 m ²
Alternative A2 (if any)	10 510 m ²

¹ "Alternative S.." refer to site alternatives.

² "Alternative A.." refer to activity, process, technology or other alternatives.

Alternative A3 (if any)

or, for linear activities:

Alternative:

Alternative A1 (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

m²

Length of the activity:

m

m

m

Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:

Alternative A1 (preferred activity alternative)

Alternative A2 (if any)

Alternative A3 (if any)

Size of the site/servitude:

m²

m²

m²

5. SITE ACCESS

Does ready access to the site exist?

If NO, what is the distance over which a new access road will be built

YES	NO
m	

Describe the type of access road planned:

As the site currently stands, there is a single informal access point on the property at the Northern Boundary from Road W (MN10118), which is an unpaved provincial road and is categorised as a Class 5 Provincial Minor Road. This provincial minor road known as Road W connects to the N6 to the west of the site. The location of the sites access road will not be changed according to the town planning report, however it will be upgraded and formalized in line with the development proposal needs. No change to current access and road network is proposed in terms of routing.



Figure 5: Entrance off of W road (see red arrow).

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

6. SITE OR ROUTE PLAN

A detailed site or route plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document.

The site or route plans must indicate the following:

- 6.1 the scale of the plan which must be at least a scale of 1:500;
- 6.2 the property boundaries and numbers of all the properties within 50 metres of the site;
- 6.3 the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- 6.4 the exact position of each element of the application as well as any other structures on the site;

- 6.5 the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, storm water infrastructure and telecommunication infrastructure;
- 6.6 all trees and shrubs taller than 1.8 metres;
- 6.7 walls and fencing including details of the height and construction material;
- 6.8 servitudes indicating the purpose of the servitude;
- 6.9 sensitive environmental elements within 100 metres of the site or sites including (but not limited thereto):
 - rivers;
 - the 1:100 year flood line (where available or where it is required by DWA);
 - ridges;
 - cultural and historical features;
 - areas with indigenous vegetation (even if it is degraded or invested with alien species);
- 6.9 for gentle slopes the 1 metre contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- 6.10 the positions from where photographs of the site were taken.

See Appendix A

7. SITE PHOTOGRAPHS

Colour photographs from the centre of the site must be taken in at least the eight major compass directions with a description of each photograph. Photographs must be attached under Appendix B to this form. It must be supplemented with additional photographs of relevant features on the site, if applicable.

See Appendix B

8. FACILITY ILLUSTRATION

A detailed illustration of the activity must be provided at a scale of 1:200 as Appendix C for activities that include structures. The illustrations must be to scale and must represent a realistic image of the planned activity. The illustration must give a representative view of the activity.

See Appendix C for both alternatives

9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?

R75 000 000

What is the expected yearly income that will be generated by or as a result of the activity?	R8 000 000
Will the activity contribute to service infrastructure?	No
Is the activity a public amenity?	No
How many new employment opportunities will be created in the development phase of the activity?	80
What is the expected value of the employment opportunities during the development phase?	R15 000 000
What percentage of this will accrue to previously disadvantaged individuals?	95%
How many permanent new employment opportunities will be created during the operational phase of the activity?	18
What is the expected current value of the employment opportunities during the first 10 years?	R20 000 000
What percentage of this will accrue to previously disadvantaged individuals?	100%

The above estimates apply to both Alternatives

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

Buffalo City Metropolitan Municipality is in need of additional cemetery space based on the population growth and large number of persons based in outlying areas relying on BCMM cemeteries. The mortality rate in Buffalo city has reached unprecedented levels. This has put serious pressure on Buffalo City's existing Cemetery facilities. Buffalo City is rapidly running out of grave sites and is under tremendous strain to develop new sites. Suitable land within 12 km of residential areas is a challenge to get and this poses a problem with regards to accessibility of cemeteries. There are approximately 279 cemeteries in the entire Buffalo City Metropolitan Municipal area. Of these 279 cemeteries 29 are formal with the remaining falling under the informal category. These burial sites are situated within the rural areas and are either located on unsuitable or undeveloped land. The twenty nine formal cemeteries were properly established and meet legal standards.

Furthermore, the identified distribution of formal cemeteries within the BCMM area and City of East London notes that the existing cemeteries are located within the older parts of East London. Therefore distribution is not equal within the City of East London where younger areas of Beacon Bay and Gonubie are not well represented. In addition, the BCMM formal cemeteries it is general practice to expand cemeteries into neighbouring vacant lots. However, this is not possible for BCMM as the existing formal cemeteries are located within residential areas with little surrounding open space. By-laws have allowed measures to be put in place to allow two burials per grave however this has done little to stem the overwhelming need for burials within the East London Region. Thus, the proposals main benefit to the local population of BCMM is the relieving of pressure from the public sectors provision of cemeteries and burial sites.

The provision of cemetery space is a major issue in the metropolitan area, as is the increasing prevalence of informal cemeteries which are established without consideration of the environment. It is thus beneficial for provisions of private memorials and private cemeteries, considering the challenges municipal cemeteries face and the current informal cemetery developments as a possible result of them. In addition, private facilities will ensure their facilities meet standards for clients as the facilities do require profits to operate etc. It is likely the

provision is highly anticipated for the broader community of East London particularly for Beacon Bay and Gonubie areas who currently have no nearby access to interment options.

In terms of the two alternatives the Preferred alternative is more desirable as the least preferred alternative proposes provision of more graves on the site however these graves are unlikely to meet the minimum recommended depth of 1.8m and will require expensive operative costs to excavate to that depth due to the rocky conditions experienced on the western side of the site. The preferred alternative has graves positioned only on most desirable and suitable eastern extent of the site and has planned the memorial park operation on the western extent of the site which is a nice presentation of the interment options available at the proposed facility. It should be noted that there is an additional private facility planned in the area located about 1.5 km away via straight line distance. Thus cumulative impacts of the cemeteries need to be taken into consideration, however it must also be noted that the proposed Memorial Park and Private Cemetery on PTN 50 of Farm 821 has had extensive consultation with the team of specialists and robust buffers have been placed in addition to other measures for efficient mitigation of the projects impacts. There have been no identified fatal flaws from an environmental perspective and it is not uncommon for cemeteries to be located near one another.

Indicate any benefits that the activity will have for society in general:

The establishment of the private cemetery will provide the public with the ability to place their lost loved ones in a well maintained place of respect. At the moment cemeteries within the East London and the immediate area do exist however they are fast running out of capacity and are poorly maintained by the municipality where looting and vandalism occurs. In addition, these cemeteries are cause for safety concerns as they are freely accessible to those who may wish ill intentions on the visitors.

Thus, the private cemetery provides peace of mind to those who wish to lay their loved ones to rest in a safe and secure facility with active security personnel available on site 24/7. In addition, the facility caters for all needs for bereavement as it provides a space for ceremony as well to cater for funeral processions, thus traveling is not required from chapel to graveyard. Lastly, the development provides not only space for burial but also space for those who opt for memorial keeping.

Indicate any benefits that the activity will have for the local communities where the activity will be located:

- Employment opportunities during the construction and operational phase
- Skills development during construction
- Economic upliftment
- Possible investment opportunities
- Improved facility for interment services
- Use of land that at current is a cause of concern both environmentally and from a safety perspective

10. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
National Environmental Management Act (NEMA) No. 107 Of 1998	DFFE	1998
The Constitution of South Africa Act, 1998 (Act No. 108 of 1996)	South African Government	1996
Environmental Impact Assessment Regulations of 2014, as amended	DFFE & DEDEAT	2017
<i>EIA Regulations promulgated under the NEMA GN No. 327; 324, 325, and 326 for listed activities that may impact on the environment.</i>		

National Environmental Management Biodiversity Act (10 of 2004)	DFFE & DEDEAT	2004
Conservation of Agricultural Resources Act (43 of 1983)	Department of Rural Development and Agrarian Reform (DRDAR)	1983
National Heritage Resources Act (25 of 1999)	South African Heritage Resources Agency (SAHRA)	1999
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 National Environmental Management Act, 1998, When Applying For Environmental Authorisation GN. R. 320; GG. No 43110	DFFE & DEDEAT	2020
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 National Environmental Management Act, 1998, When Applying For Environmental Authorisation GN. R. 1150; GG. No 43855	DFFE & DEDEAT	2020
National Environmental Management Act (NEMA) No. 107 Of 1998	DFFE	1998
National Water Act (NWA) (Act 36 of 1998)	Department of Water and Sanitation (DWS)	1998

11. WASTE, EFFLUENT, EMISSION AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?

YES✓

If yes, what estimated quantity will be produced per month?

At least 10m³

How will the construction solid waste be disposed of (describe)?

It is likely that Construction solid waste will be transported to the nearest registered landfill site and disposed of accordingly. No burning or burying of solid waste will occur on site.

Where will the construction solid waste be disposed of (describe)?

The nearest municipal landfill site. The Construction EMP includes specifications concerning the disposal of construction and demolished waste. The Contractor will be responsible for the disposal of construction waste.

Will the activity produce solid waste during its operational phase?

YES✓

If yes, what estimated quantity will be produced per month?

~5m³

How will the solid waste be disposed of (describe)?

General solid waste will be gathered in a central area and will likely be collected by municipal services on a weakly basis both during construction and operation or alternatively taken to the nearest transfer station for disposal into the municipal waste stream.

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

It will feed into the municipal waste stream.

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?

NO✓

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?

NO✓

If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?

NO✓

If yes, what estimated quantity will be produced per month?

m³

Will the activity produce any effluent that will be treated and/or disposed of on site?

NO✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?

NO✓

If yes, provide the particulars of the facility:

Facility name:

Contact person:

Postal address:

Postal code:

Telephone:

E-mail:

Cell:

Fax:

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

None.

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?

YES✓

If yes, is it controlled by any legislation of any sphere of government?

NO✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the emissions in terms of type and concentration:

During the construction phase, emissions into the atmosphere will be limited to the construction dust and these will be low in both quantity and severity. Sources of emissions include those produced by heavy vehicles and machinery involved in site preparation and construction of buildings, parking areas including road maintenance. These activities are anticipated to occur only over a short period.

During the operational phase, the proposed development is not expected to release any significant emissions into the atmosphere and will be related to the excavation of gravesites which will be small in extent and sporadic in terms of time.

Normal decomposition emission from burial which does not require an Air Emission license

11(d) Generation of noise

Will the activity generate noise?

YES✓

If yes, is it controlled by any legislation of any sphere of government?

NO✓

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

If no, describe the noise in terms of type and level:

Noise will be short term, intermittent and limited to the construction phase. During operation the noise levels will be typical of operating a cemetery with low impact noise levels. The adjacent N6 roadway is likely to create higher noise volumes in comparison.

12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)

	groundwater✓			
--	--------------	--	--	--

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate

the volume that will be extracted per month:

Unsure at this stage

Does the activity require a water use permit from the Department of Water Affairs?

YES✓

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

In terms of the National Water Act (Act 36 of 1998) an application for a Water Use Licence will be submitted to DWS for the following water uses: Section 21 (a), (c) & (i)

Table 1: Applicable Water Use License Section 21 items that require authorisation as a result of the proposed activity

DWS Section 21 triggers			Related activity
Section 21	(a)	Taking water from a water resource.	Abstracting water from a river or borehole for the following purposes: -domestic use -irrigation -watering of livestock -industrial -mining - water bottling, etc
Section 21	(c)	Impeding or diverting the flow of water in a watercourse.	Construction of structures/facilities within surface water resources, e.g. weirs, bridges, pipelines, etc.
Section 21	(i)	Altering the bed, banks, courses or characteristics of a watercourse.	Construction of structures/facilities within surface water resources, e.g. weirs, bridges, pipelines, etc. Introduction of unnatural characteristic to the resource.

13. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

The developments energy use will feed from the municipal energy grid. However, the usage of solar where possible and energy saving lighting is recommended in order to reduce electricity usage and to encourage green energy usage.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

The use of alternative renewable energy sources such as solar panels could be installed on roof tops and the use of energy saving lighting can be installed.

SECTION B: SITE/AREA/PROPERTY DESCRIPTION

Important notes:

1. For linear activities (pipelines, etc) as well as activities that cover very large sites, it may be necessary to complete this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area, which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g.
A):

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section?

	NO✓
--	-----

If YES, please complete form XX for each specialist thus appointed:

All specialist reports must be contained in Appendix D.

Indwe Environmental Consulting has identified that the following important Specialist Assessments which will be required in order to assess the important environmental factors on the site and how these environmental factors will be impacted by the proposed memorial park and cemetery:

In terms of additional "specialist" input, the following "specialist" assessments were commissioned:

1. Phase 1 Archaeological Impact Assessment (AIA)
2. Palaeontological Impact Assessment
3. Aquatic and Wetland Assessment
4. Terrestrial Biodiversity Assessment
5. Geohydrological Impact Assessment

According to the National Web Based Screening Tool, the following sensitivities applicable to the project and the site were identified:

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

All remaining sensitivities not covered by the specialist studies mentioned above will be dealt with and motivated in Appendix G8- Screening Tool Deliverables.

1. GRADIENT OF THE SITE

The estimated gradient is approximately 6v:100h on the western side of the site with the eastern side being approximately 9v:100h, sloping towards the watercourse within the centre of the site . Where the middle of the site held the lowest elevation at 170m Above Sea Level and indicated the non-perennial watercourses. The average slope is at 7.9% or 1:13 slope ratio. This is applicable to both alternatives as they fall on the same property.



Indicate the general gradient of the site.

Alternative S1:

	1:15 1:10✓	–			
--	---------------	---	--	--	--

Alternative S2 (if any):

--	--	--	--	--

Alternative S3 (if any):

--	--	--	--	--

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:

- 2.1 Ridgeline
- 2.2 Plateau
- 2.3 Side slope of hill/mountain✓
- 2.4 Closed valley
- 2.5 Open valley
- 2.6 Plain
- 2.7 Undulating plain / low hills✓
- 2.8 Dune
- 2.9 Seafront

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

The site is underlain by the geology of the Beaufort Group and Adelaide subgroup which are high in palaeontological significance (see figure 7). These geologies are continental siliclastic sediments, pedocretes (calcretes) within the late Permian-Early Triassic about 266-250 Ma. According to Almond et al. 2009, these geologies have diverse terrestrial and freshwater tetrapods of *Tapinocephalus* to *Cynognathus* Biozones (amphibians, true reptiles, synapsids- especially therapsids), palaeoniscoids fish, freshwater bivalves, trace fossils (including tetrapod trackways), sparse vascular plants (*Glossopteris* Flora, including petrified wood).

According to the Palaeontological Impact Assessment Report, the study area is underlain by Upper Permian strata of the Balfour Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup). These are intruded by dolerite dykes and sills emplaced during the Jurassic period. The flood plains of the Beaufort Group provide an internationally important record of life during the early diversification of land vertebrates. During its deposition giant amphibians coexisted with diapsid reptiles (the ancestors of dinosaurs, birds and most modern reptiles), anapsids and synapsids, the dominant group of the time which included the diverse therapsids (including the ancestors of mammals). Rocks of the Beaufort Group provide the world's most complete record of the important transition from early reptiles to mammals.

During the site visit and survey conducted on the 5 February 2022. The only outcrops of bedrock encountered comprised of dolerite which extended further into the study area than predicted in the Geological map below (Figure 7). Dolerite was experienced in the small dam as well as underlying the woodland, both of which will not be altered according to the design layout of the proposed project. These dolerite rocks are intrusive in nature, having cooled from molten igneous rock and contain no fossils. Balfour formation strata, altered and hardened due to proximity to the dolerite intrusion, were observed in the road bed adjacent to the study area. The area situated over Balfour formation which is world renowned for its abundant and diverse record of terrestrial

vertebrates. Much of the area however is matled by a layer of recent alluvium, which obscures the underlying strata and has in the past been ploughed along contour for agricultural purposes. Areas that will be disturbed by the development appear to have a thick covering of alluvium soiul that has previously been ploughed for agriculture. It is likely that due to the even and low laying gradient of the site, particularly at the top where most disturbance will occur, that the soil is underlain by degraded leached mudstones. Therefore the study found that as a result of the above there is very low likelihood that any significant palaeontological material will be disturbed during development of the site. However should petrified bones be encountered at any time ECPHRA or a professional palaeontologist should immediately be contacted.

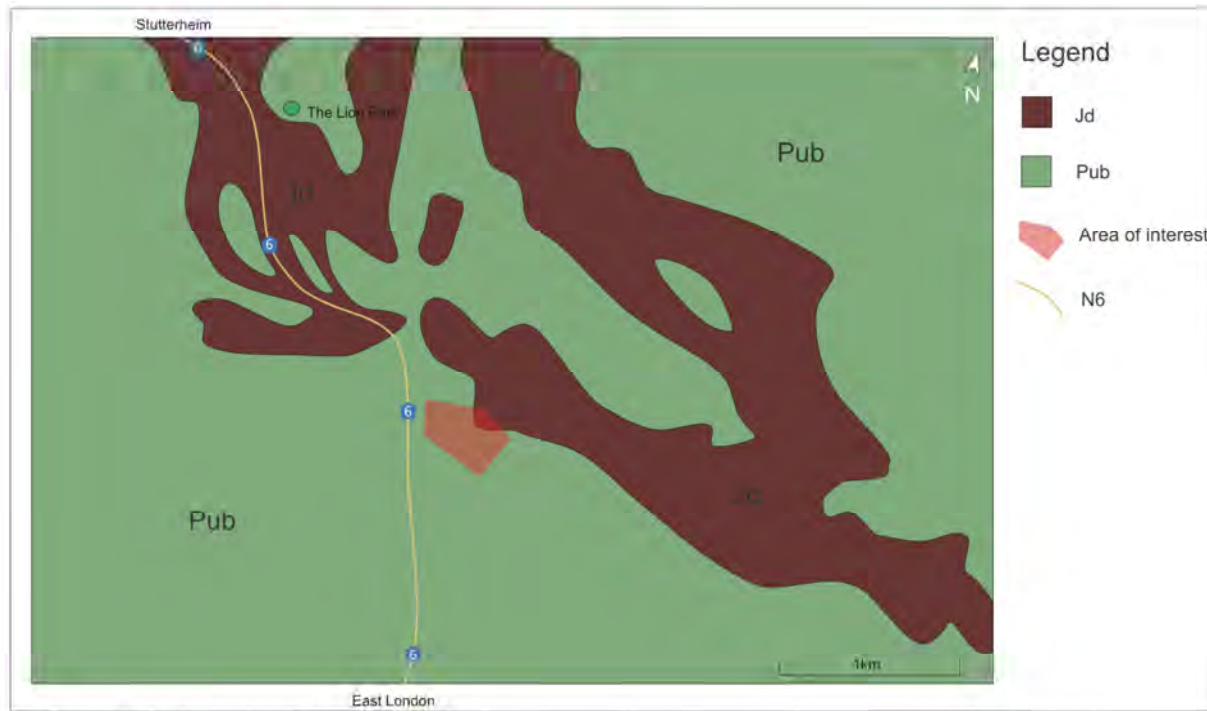


Figure 7: Redrawn detail of the Council for Geosciences “Kingwilliamstown” map sheet (3226), showing the geology around the study area. Pale Green/Blue represents strata of the Balfour Formation (Pub); Plum colour represents dolerite intrusions and Pale Pink represents the proposed development area. Note that the field survey indicated that the dolerite intrusion extends further into the proposed developmental area.

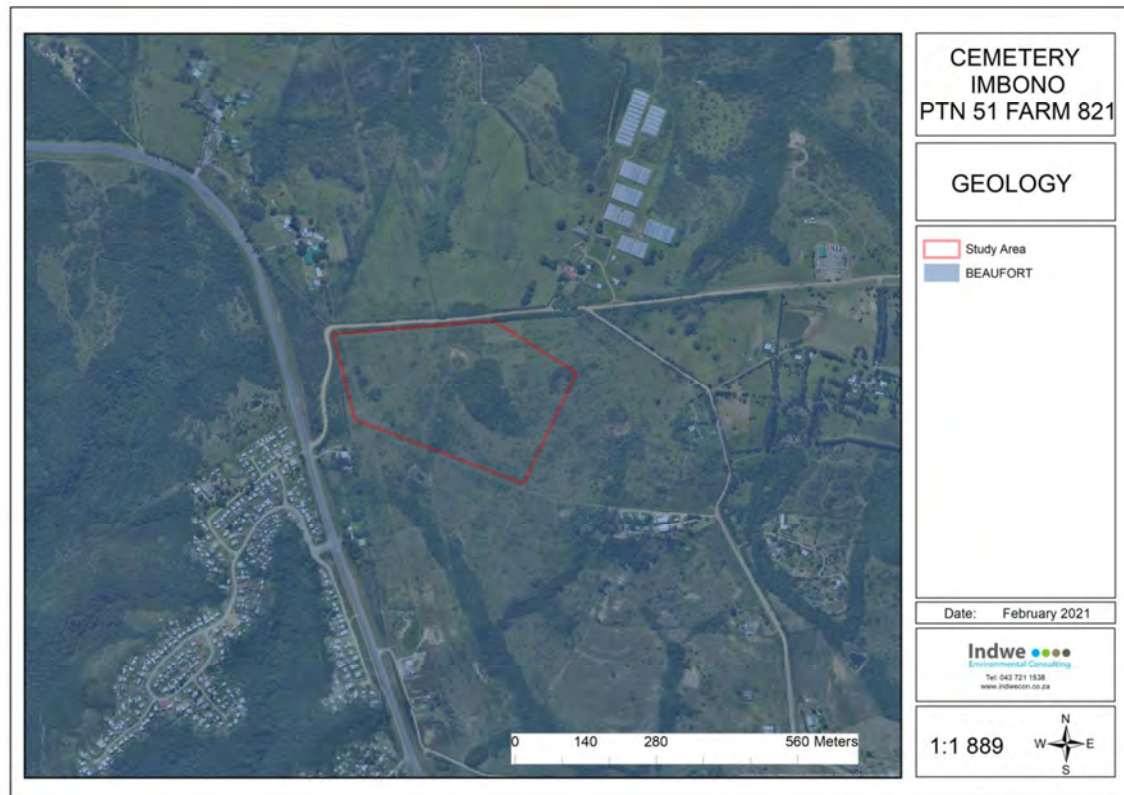


Figure 8: Geology of the area covered by the proposed development

The soils of the site, see figure 9, fall within the soil code of LP1. These soils are characterised by minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils. Lime is also rare or completely absent in the landscape. In terms of classes the soils within the area have no dominance to soils horizons.

Any other unstable soil or geological feature

NO✓

An area sensitive to erosion

NO✓

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUND COVER

Indicate the types of groundcover present on the site:

- 4.1 Natural veld — good condition^E
- 4.2 Natural veld – scattered aliens^E✓
- 4.3 Natural veld with heavy alien infestation^E
- 4.4 Veld dominated by alien species^E
- 4.5 Gardens
- 4.6 Sport field
- 4.7 Cultivated land✓
- 4.8 Paved surface
- 4.9 Building or other structure
- 4.10 Bare soil

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld with scattered aliens^E✓

Cultivated land✓

If any of the boxes marked with an “^E” is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

ENVIRONMENTAL THEMES

The National web-based Environmental 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. The National Environmental Screening Tool indicates the following, which has relevance to this section:

Animal Species Theme: High

Result: Aves- *Stephanoaetus coronatus*, *Prostalia granulate*, *Cercopithecus albogularis labiatus*, *Chrysospalax trevelyani*, sensitive species 8

Archaeological and cultural heritage theme: Low

Paleontology theme: Very High

Result: *Features with a very high sensitivity*

Plant Species Theme: Low

Terrestrial Biodiversity Theme: Very High

Result: *Ecological Support Area 1 and 2*

Aquatic Sensitivity Theme: Very High

Result: Strategic Water Source Area-Amathole

VEGETATION

A single vegetation unit (Figure 10) is primarily affected by the proposed project (National VegMap, 2018). The site is located entirely within South Eastern Coastal Thornveld (Categorised as "Least Concern").

The characteristics of the vegetation unit are as follows:

South Eastern Coastal Thornveld is located within the Eastern Cape Province along the southeastern Seaboard of the Eastern Cape, from the Gamtoos River to the Kei River. This vegetation unit occupies the gently to moderately undulating landscapes and dissected hilltop slopes close to the coast at about 15-20km of the coast.

The vegetation is characterised by short grassland with scattered bush clumps (dominated by small trees and woody shrubs). There also exists emergent *Euphorbia triangularis* and solitary *Vachellia karoo* trees also occur. However, dominant species for the vegetation type for the short grassland constitute includes *Cynodon dactylon*, *Digitaria spp.*, *Eragrostis spp.* and *Themeda triandra*.

The conservation target for the vegetation unit is currently sitting at 19%. Some 39.24% has been transformed mainly for cultivation and by dense concentrations of rural settlements. Other threats include plantations, bush encroachment, urban sprawl, altered fire regime and erosion low to medium.



Figure 10: Vegetation Type According to Mucina & Rutherford (2018)

According to the Terrestrial Biodiversity Assessment the site is located within the sparsely populated peri-urban area on the transition between an urban area to the south and rural agricultural areas to the north. Thus development of the site is unlikely to significantly affect the conservation of the vegetation unit. Therefore the conservation value at a regional level for the site is low. Additionally several South African and Eastern Cape endemic species are recorded from the vegetation unit, some have localised distributions and others are widespread. However no endemic species or species having limited distribution ranges were recorded from within the site, which confirmed to have undergone periodic disturbances of an agricultural nature such as ploughing and tunnels.

According to the, Sub –tropical ecosystem planning (STEP), one designated vegetation STEP unit is experienced by the site. The site is located within the Berlin Savanna Thicket (Currently not Vulnerable, STEP, 2006) or Buffels Thicket Mosaic with Savanna. Buffels thicket (currently not Vulnerable, STEP, 2006) is known from the surrounding area, predominantly associated with major watercourses and drainage systems and elements are likely present. The site is also situated within a designated Gqunube-Amatole inland corridor, one of several mega corridors designated in STEP along with a coastal corridor indicates connectivity between the coast and inland areas associated with three key river valleys, which align with STEP vegetation delineation.

According to the terrestrial assessment, the project area is characterised by gently undulating hills and slopes with a short savannah grassland or rather thornveld with scattered trees on the gentler slopes and hilltops and a denser thicket in fire protected areas which include dolerite outcrops and along watercourses. The thornveld vegetation where present is largely secondary, since it is likely it was favoured historically by agriculture, including crops and pastures as well as being cleared for grazing. Within the site both the secondary savannah (Thornveld) vegetation and denser thicket is present. Thornveld is entirely secondary, based on site observations and historical aerial photographs. Agricultural contouring is still visible on the landscape even after approximately 15 years of regeneration.

The thornveld which are all old lands consisting of 7.5 Ha, are comprised of a grassland with a well represented forb component and scattered trees. Thornveld grasses include *Digitaria natalensis*, *Cynodon dactylon*, *Dactyloctenium australe*, *Brachiaria serrata*, *Cymbopogon marginatus*, *Ehrharta calycina*, *Ehrharta erecta*, *Eragrostis capensis*, *Eragrostis curvula*, *Eragrostis plana*, *Setaria sphacelata*, *Sporobolus africanus*, *Themeda triandra*, *Tristachya leucothrix* and *Heteropogon contortus*. Herbs and shrubs within the thornveld include *Chamaecrista mimosoides*, *Cheilanthes hirta*, *Chrysocoma ciliata*, *Monsonia emarginata* and *Pelargonium alchemilloides*, with trees predominantly being *Vachellia karroo* but also with *Diospyros villosa*, *Canthium spinosum*, *Carissa bispinosa* (PNCO species), *Coddia rudis*, *Grewia occidentalis* and *Gymnosporia buxifolia* common. The thornveld present on site is prone to frequent fire which can prevent it from attaining a denser thicket form. However some trees appear to be resistant to fire after a certain size is reached.

With specific reference to the thicket area comprised of a large clump within the central locality of the site, a band running centrally through the site surrounding a drainage line and a small patch on the eastern boundary. This thicket vegetation is about 2Ha of the site and is associated with rockier substrate with scattered patches of dolerite boulders. These areas are not only fire protected but also probably not suited to cultivation, hence it has been retained. A narrow band of thicket is also present along the western and northern fenceline boundary of about 0,5Ha which is likely mostly secondary in nature and harbour some few larger trees likely to be remnants of the area not cleared for agriculture. The thicket along the watercourse drainage line is somewhat disturbed, having moderate alien invasion, predominantly ruderal weeds with occasional wattle tree or tree clump. The main thicket clump is also comprised of a mix of older large trees, but with notable young growth aswell which indicate that it has densified in recent times and thus was disturbed in the past. A list of species present within this area can be noted within the Terrestrial biodiversity assessment, it must be observed however that the central area of thicket and the drainage line thicket area are to be retained within the design of the cemetery but do harbour two PNCO species specifically the *Dietes iridioides* and *Strelitzia reginae*. Subsequently per Figure 11 the central thicket along the drainage line and the thicket clump and area around the wetland on the eastern corner have noted to be moderate in sensitivity and the dam and wetland are designated high sensitivity areas.

Project : Beacon Bay Memorial Park Layout - Vegetation Sensitivity



Figure 11: Site vegetation layout and sensitivity map from a terrestrial perspective

FAUNA

Due to the site being of both of high and medium sensitivity which largely relates to modeled habitat suitability of the National Web Based Screening Tool, a verification report was devised to describe the faunal aspects of the site.

According to the National Web Based Screening Tool, *Camphetera notate* (Knysna Woodpecker) is characterised as a near threatened species. The numbers in decline, although the rate is unknown, is thought to be subject to a contributed to habitat loss occurring with its Eastern Cape Stronghold. It usually occurs long the coastal plains of Western Cape and Eastern Cape Provinces in forest and well developed thicket areas however it has been recorded as far inland as Queenstown, Somerset East and near Graaff-Reinet. The species is sedentary throughout its range and according to SANBI there is no evidence of seasonal movements. The species is recorded from 16 Important Bird Areas. According to the Terrestrial Biodiversity Assessment, the proposed activity is unlikely to have any impact on any designated Important Bird Area. Important Bird areas are sites of international significance for the conservation of the worlds birds and other biodiversity. In addition, it may be considered that the African Crowned Eagle and Knysna Woodpecker may be an occasional visitor of the thicket on site and the surrounding thornveld but it is deemed unlikely to be significantly affected by the development as the thicket area is to be retained and not disconnected from the surrounding landscape.

According to the National Web Based Screening Tool the *Chrysospalax trevelyani* (Giant Golden Mole) is listed as endangered and has only been recorded in 17 locations within the Eastern Cape and has very specific habitat requirements with a total occupancy extent of 272 km², is severely fragmented. Their habitat occurs in the Transkei Coastal Scarp forests and Amathole Mistbelt Forests.

Prostalia granulata (Bladder Grasshopper) is listed as Endangered and is found along the east along the East Coast of South Africa, where its distribution is estimated based on only three fairly widely spaced location with an estimated area of occurrence of 20 km² and is quite seriously fragmented. The subpopulations are very small and isolated with probably no exchange between them. The species is very rarely encountered in the field and has not been collected for 38 years, despite the geographic area where the species is recorded to occur being fairly well surveyed.

In terms of other fauna, the habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if migration measures are adhered to. Thus the site is unlikely to provide significant faunal habitat. No large or medium sized mammals are likely to be found on site other than occasional visits from the surrounding area or moving through the site. *Stephanoaetus coronatus* and Sensitive Species 5 was found to be not likely to be present on site except as a transient visitor. Some species may be present on site during construction or operation of the cemetery, but they are mobile species that would move away from the disturbance and with intact habitat available in the immediate surroundings they would be unlikely to be negatively impacted. The same bears true for small mammals. As with all construction there exists a latent risk of mortality due to vehicular activity but the risk to species of conservation concern is low. The Giant Golden Mole may be present, however there was no evident of significant mole activity on the site during the site visit. If present however it was deemed to be unlikely that the species would be significantly affected by the proposed activity.

The remaining species of invertebrates, amphibians and reptiles are seen to be of low significance in terms of risk from impact related construction activities, however no species of conservational concern was believed to be present within the study area. The Bladder grasshopper may be present within the proposed site however it is unlikely to pose any significant risk, similar habitat is quite widespread with the vegetation on site earmarked for development consisting of secondary vegetation.

BIODIVERSITY

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

A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007) was undertaken of which the Eastern Cape Biodiversity and Conservation Plan (2019) was derived. According to the Biodiversity Assessment and the ECBCP 2007, the site overlaps a designated CBA 2 area, in terms of land use the ECBCP classifies the site and the immediate surrounding area at the time as natural. It was noted however that this has changed in the surrounding area somewhat in more recent times due to urbanisation. The surrounding areas are generally natural, extensive with minimal fragmentation of ecological processes to the north and west of the site, but significantly fragmented to the south and east, since the site is situated more or less on the boundary between an urban and rural area.

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

The Department of Economic Development, Environmental Affairs and Tourism issued a Provincial Notice on 19 October 2020 (PN. No. 173 of 2020) in the Provincial Gazette (No. 4460) citing "Notice of Intention to Publish and Gazette the Final Eastern Cape Biodiversity Conservation Plan (2019) for Implementation; in terms of The National Environmental Management Act".

It further noted that “Listing Notice 3 (12) refers to Critical Biodiversity Areas of a Bioregional Plan. The ECBCP 2019 is not a Bioregional Plan, but a systematic biodiversity plan, and does therefore not constitute a listed area in terms of this activity.”

According to the ECBCP 2019 and Biodiversity Assessment the proposed project intersects with an ESA 2 area. As a result the proposed activity is not in line with the recommended management recommendations, however, ecological function and ecosystem services will not be significantly affected by the proposed activity in light of the extensive intact vegetation surrounding the site as well as the proposed activity being within areas that were previously transformed, while retaining the untransformed areas. No Freshwater CBAs or ESAs are affected by the project.



Figure 12: The site overlaid with the ECBCP(2019) terrestrial CBA data

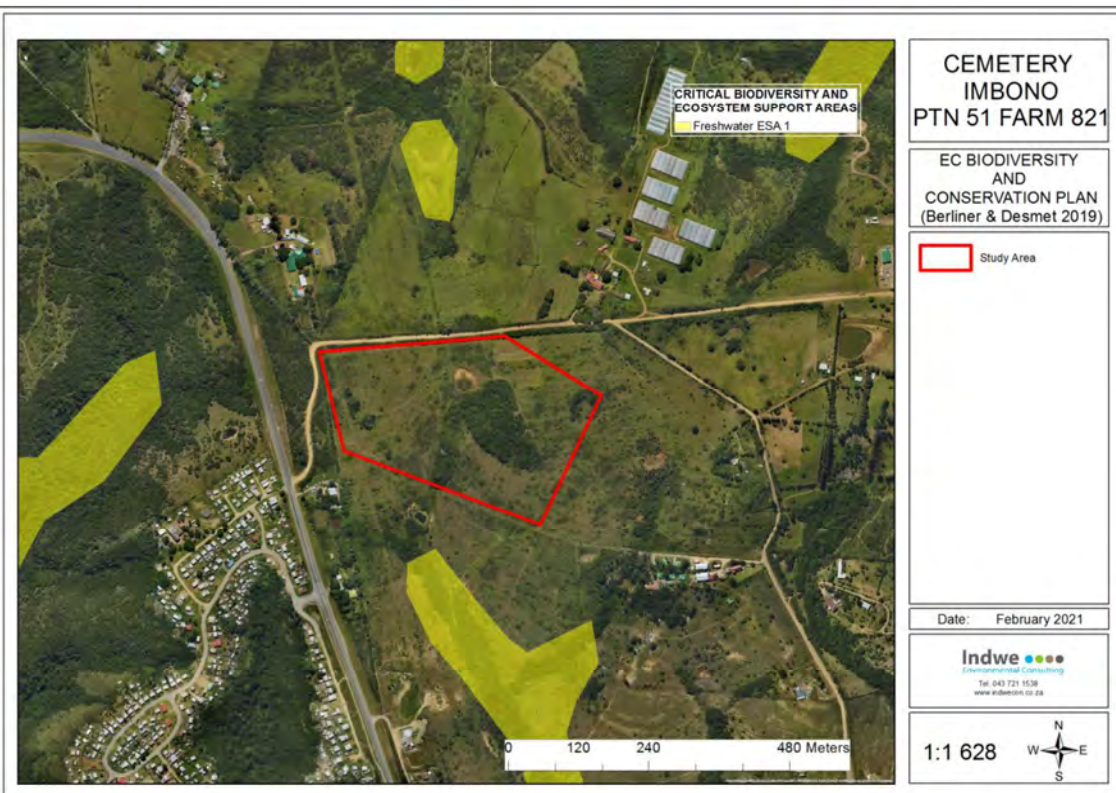


Figure 13: The site overlaid with the ECBCP (2019) freshwater CBA data

In terms of critical habitats that affect biodiversity on the site the following are present on site:

- Rocky Outcrops- present in the form of dolerite boulders, however they are not in areas intended for the proposed construction of the cemetery.
- Wetland habitat- Wetland like habitats in the form of dams which will be retained.
- Forest- South Eastern Coastal Thornveld (Berlin Savanna Thicket) is successional vegetation that is known to become forest or forest- like in patches in areas where conditions permit i.e. fire protected. However, present emergent trees lack overlapping crowns and thus cannot be classified as forest.

Present Ecological State

- The thornveld vegetation on the site is secondary vegetation that has colonised historical cultivated lands.
- Remnant solid thicket is present, although it has likely been disturbed historically, due to larger trees and younger growth evident.
- Alien invasion is presently low with occasional shrubs, herbs and the occasional tree, including bugweed, lantana and wattle.

**however it must be noted that this state occurred after a veld fire event. On the initial site visit the area was observed to be rife with aliens on the degraded areas of the site where historical agricultural activities took place, of particular notice was the dense lantana stands.*

SURFACE WATER AND ASSOCIATED WATER FEATURES

According to the aquatic specialist assessment surface water features that were observed and verified on site were the presence of an artificial wetland in the form of a farm dam, a depressional wetland and a non-perennial watercourse and associated riparian area. The site falls within the quaternary catchment of R30F of the water management area 5 the Mzimvubu to Tsitsikamma. The site is situated at the head or upper most portion of a non-perennial watercourse that drains into a confluence of the Qinira River some 5km downstream (Figure 14).

Drainage directions for the site is south-east and south-west towards the drainage line. The non-perennial is fed from runoff and seepage from a small dam situated centrally in the site. This dam is assessed as a natural wetland which has been historically excavated for water supply and thus appears as an artificial wetland on the NBA 2018 Wetland map. The natural wetland is situated in the easternmost corner of the site and is described as a spring according to the Geohydrological report by AGES(2022).

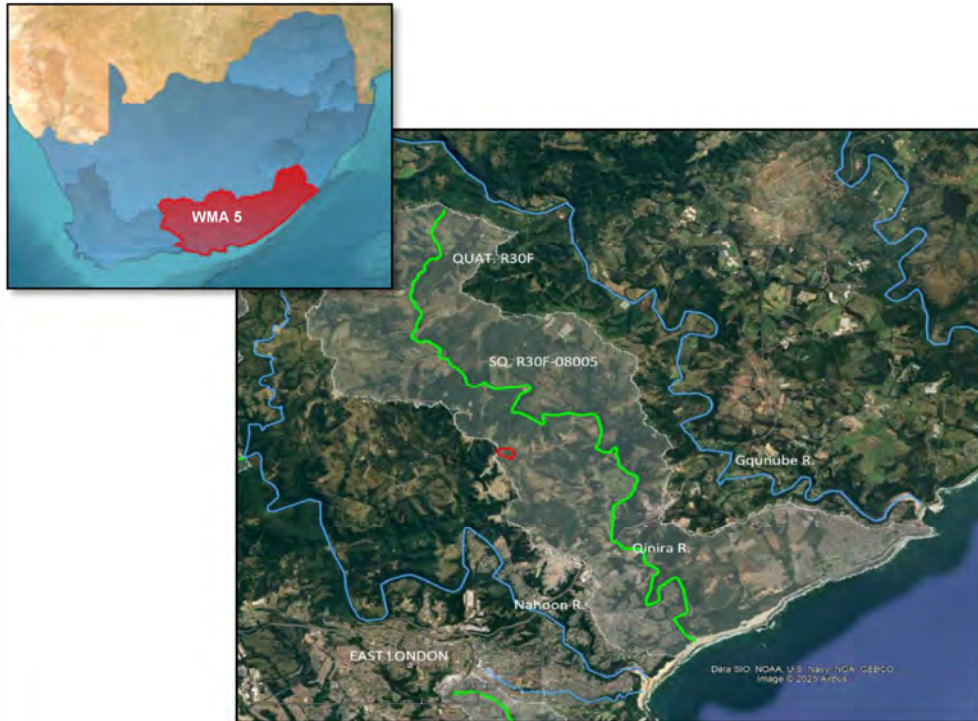


Figure 14: locality of proposed project site indicated in red, in relation to the mainstem of the Qinqira River illustrated in green

According to the National Web Based Screening Tool, the site and surrounding area falls part of the 2021 Amathole Strategic Water Source Area (SWSA): surface water and this is considered a very high Aquatic Biodiversity Sensitivity. SWSA are those that supply substantial downstream economies and urban centres. These water source are vital to the national economy. SWSA area vital to the national economy and are those that supply substantial downstream economies and urban centres, thus they are vital to the national economy. Furthermore, these areas can be described as naturally occurring water factories which support growth and development that are often far away. All surface water SWSAs are located in high rainfall areas where baseflow is at least 1125mm per annum. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. No Freshwater Ecosystem Support Area and no aquatic Critical Biodiversity Area was intersected by the site. No NFEPA systems are classified within the site. The PES and Ecological importance and Sensitivity for the Qinqira sub-quaternary R30F-08005 is a Class D PES- largely modified, with a moderate Ecological importance and a moderate Ecological sensitivity at desktop level.

Table 2: PES, ES, EI and EIS for the surface aquatic features on site from a desktop level

Surface Water Resource	PES	EI	ES	EIS
Depressional wetland (DW)	B	Moderate	Moderate	Moderate

Artificial wetland (dam; AW)	D	Moderate	Moderate	Moderate
Non-perennial watercourse (NW)	B/C	Moderate	Moderate	Moderate
Downstream watercourses (DSW) (non-perennial and dams)	D	Moderate	Moderate	Moderate

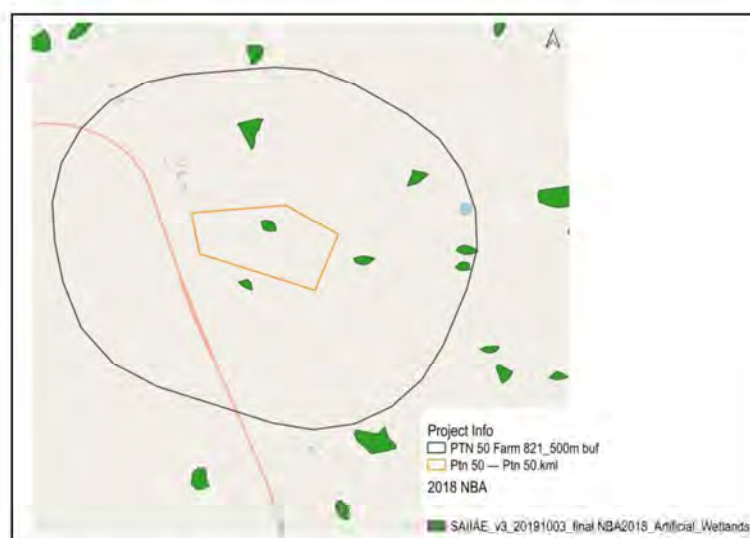


Figure 15: Watercourses that fall within the 500m Buffer of the site. Indicated in green

According to data accessed from National Biodiversity Assessment 2018 and the NFEPA project, only artificial systems i.e.. Agricultural dams were mapped to fall within the 500m buffer of the site.

According to the aquatic assessment report (2022), the depressional wetland that falls on the easternmost portion of the site located at 32°55'8.66"S and 27°54'39.68"E, is roughly circular in shape and is about 25 – 30m in diameter. This feature, although identified as artificial in desktop mapping, is a confirmed natural feature. The area was inundated during the time of the field assessment and it is likely that some level of inundation is also permanent in the system. The center being dominated by obligate species of *Cyperus polystachyos*, *Cyperus textilis*, *Cyperus longus*, *Centella asiatica* and *Commelina erecta*. The raised outer rim of dolerite rock is the transitional point to terrestrial environment. The PES for the wetland was assessed to be 73% natural and thus a Category B and largely natural wetland with few modifications. Presence of intolerant species and species richness back up the health category. In terms of Ecosystem services, the depressional wetland harboured most valued services with a particular service of Habitat Provision (see Table 2). A buffer of 20m is proposed to minimise risk to the hydrological characteristics of the wetland and to protect its immediate catchment and associated vegetation. It is proposed that any form of development or excavation, including roads, be excluded from the buffer zone.

The non-perennial watercourse is largely inaccessible from the riparian area and grassland within the site, however it drains in a south westerly direction with a channel of about 1 to 2 m wide in different areas and incised at about a 1-3 meter depth. The in-channel woody debris and leaf drop presents a major instream habitat utilized by macro invertebrates and other river fauna during period of surface water. At the time of site assessment there was only residual water present suggesting little recent surface flow. The only species which can be considered riparian is *Syzygium cordatum*, which is uncommon, but can also be simply associated with areas of increased

moisture, such as seepage areas. The dam doesn't show clear signs of overtopping and it is likely that the watercourse receives upstream water from hillslope seepage. The riparian areas woody species aligned along the channel include *Erythrina afra*, *Vachellia karoo*, *Gymnosporia buxifolia*, *Cussonia spicata*, *Harpephyllum afrum*, *Diospyros villosa*, *Canthium spinosum*, *Carissa bispinosa*, *Coddia rudis*, *Grewia occidentalis*, *Hippobromus pauciflorus*, *Olea europaea subsp. africana*, *Pterocelastrus tricuspidatus*, *Scutia myrtina*, *Searsia lucida*, *Euclea natalensis* and *Sideroxylon inerme*, while understorey species include *Dietes grandiflora*, *Setaria megaphylla*, *Crocasmia aurea*, *Strelitzia reginae* and *Scadoxus punicea*. Alien plant species, notably *Lantana camara* and *Solanum mauritanum* were mostly limited to the sunnier fringes. The specialist assigned a PES score of B/C and a EIS score of Moderate to the non-perennial system. In terms of ecosystem services the non-perennial delivers water supply downstream, attenuates floods, regulates streamflow, traps sediments etc (table 4). Due to the watercourse receiving most of its water from hillslop and lateral seepage, other than direct rainfall, protection of the lateral slopes of the are important and thus a buffer of 20m is proposed, within which all forms of development or excavation should be excluded.

The artificial wetland/dam has existed since 1938 where the area was extensively cultivated and and was highly likely a seepage wetland before it was excavated for storage for irrigation or other uses. While the dam does not support an aquatic vegetation component, it does support a number of wetland obligate emergent species (notably *Typha capensis*, *Ischaemum fasciculatum*, *Centella asiatica*, *Commelina erecta*, *Cyperus polystachyos*, *C. dives*, *Juncus effusus* and *Persicaria decipiens*) that suggest perenniality. Fringe vegetation comprised dense woody terrestrial vegetation (besides cleared access areas), notably *Vachellia karoo*, *Erythrina caffra*, *Brachylaena elliptica* and *Cussonia spicata*, with a clear band of alien woody species, mostly *Solanum mauritanus*, *Lantana camara* and *Melia azedarach*. In terms of ecosystem services, the system delivers most service with the exception of water supply or flow regulation services (Table 4). A buffer of 15m has been proposed for the artificial system. This distance includes sufficient surrounding woody vegetation and a portion of the dam's immediate catchment area to promote infiltration or slow laminate flow during rainfall events to prevent nearby erosion of the slopes or sediment delivery to the dam.

Table 3: Summary table of PES, EI, ES and EIS for the surface water features on site

Surface Water Resource	PES	EI	ES	EIS
Depressional wetland (DW)	B	Moderate	Moderate	Moderate
Artificial wetland (dam; AW)	D	Moderate	Moderate	Moderate
Non-perennial watercourse (NW)	B/C	Moderate	Moderate	Moderate
Downstream watercourses (DSW) (non-perennial and dams)	D	Moderate	Moderate	Moderate

Table 4: Summary table of ecosystem services for the surface water features on site

	Depressional Wetland	Non-Perennial Watercourse	Artificial Wetland (dam; non-natural ecosystem services)
Water supply to downstream environment		X	
Flood attenuation	X	X	
Streamflow regulation		X	
Groundwater recharge	X		
Sediment trapping	X	X	X
Phosphate assimilation	X		X
Nitrate assimilation	X		X
Toxicant assimilation	X		X
Erosion control	X		X
Carbon storage	X		X
Habitat Provision (plants, birds, amphibians, invertebrates, etc)	XX	X	X
Provision of recreational (sitting) value	X	X	X

Of note is the Aquatic specialist identified the indigenous thicket remnant as important to buffer in order to project its functional protection of the hillslope from eroding into the drainage channel and this a buffer of 3m is applied to the northern part of the thicket and a 5m is applied to the southern part of the thicket in which no excavations or any other development may take place but soft landscaping is allowable. This buffer is also noted to be kept clear of any alien vegetation. As a result of the findings, No-Go areas were recommended by the specialists to accompany the remnant thicket vegetation around the watercourse on site, the dam/artificial wetland in the center of the site and the thicket pocket situated centrally within the site and the artificial wetland in the north-eastern corner was also recommended to fall under a No-Go area and appropriately buffered and subsequently retained.

Sensitivity Mapping

In terms of sensitivity, the depressional wetland, its associated 20m buffer and drainage non-perennial watercourse are considered high sensitivity areas with no construction and operations allowable in these areas. The drainage non-perennial watercourse 20m buffer area is considered a moderate sensitivity area along with the artificial wetland turned dam and its associated 15m buffer area and the thicket remnant on site. These Moderately sensitive areas are to have not vehicular access with soft landscaping such as pathways, sitting areas etc to be done manually. Low sensitivity areas such as the thicket remnant buffer zones should be kept clear of graves and vehicles are advised to be kept out of the area. These areas are considered accessible during operation but should be managed for alien vegetation.

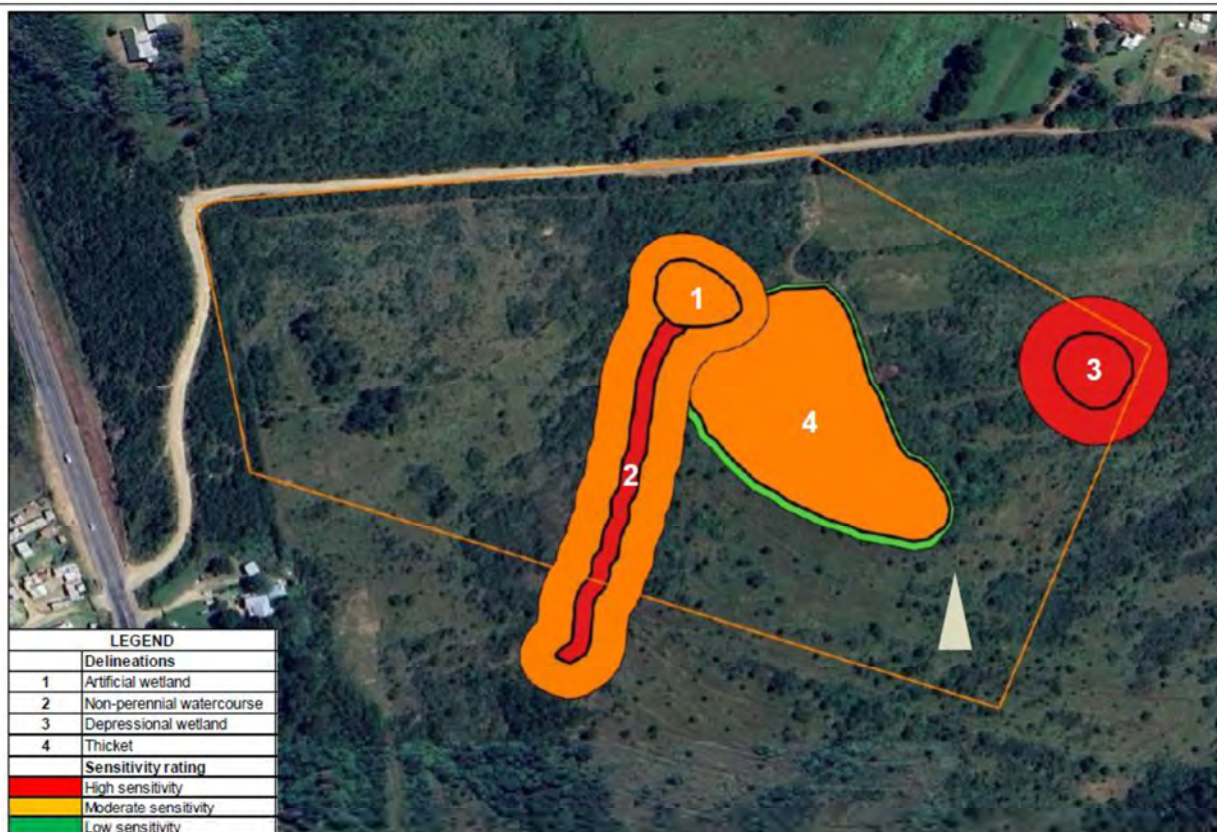


Figure 16: Sensitivity map with associated buffer zones demarcated and delineated

In addition to the above buffers to be implemented and NO-GO areas prescribed the Aquatic Specialist noted that the Groundwater and Surface water connection is not well understood particularly as assessments were conducted in different climatic phenomena i.e. drought vs La Nina periods and has recommended that the Static water level be determined for the site prior to construction to ensure the groundwater levels are better determined and if any further alteration in the design may be necessary. Additionally, a comprehensive stormwater management plan is to be developed and requested to be reviewed by the specialist to ensure sound aquatic integrity is retained and stormwater risk is mitigated particularly concerning the gravesites.

GEOHYDROLOGY

The site's hydrogeology, according to the 1:500 000 map, notes the project area to be underlain by predominantly argillaceous rock which include shale, carbonaceous shale, claystone, mudstone, and siltstone. Groundwater occurrences are expected to be intergranular and in fractured zones, with successful borehole yields between 0.1 and 0.5 Liters per second in general. The groundwater potential is thus considered to be low to moderate, considering the topographical and geological setting of the site.

The general groundwater flow is expected to be in a southerly to south-westerly direction on site, making Mr. Haris the closest affected downstream groundwater user. Based on the site geological factors the domestic use is deemed to be far enough from the project area.

Only one test pit had slight seepage out of 10 test pits which was associated with a shallow aquifer originating from stormwater runoff from W road and possibly the spring in the uppermost area of the site designated majority for infrastructure. The remainder of the test pits extended past the depth of grave depth of 1.8m where the cemetery component is proposed. During a hydrcensus conducted, 9 boreholes, 1 spring (on site) and 14 soil

dams were identified from the surrounding area within 500m radius of the site. The groundwater has been recognised as a prominent water source with static groundwater levels measured between 27.44 and 29.82 mbgl.

Samples of groundwater taken from surrounding borehole resources and onsite spring noted the following (Note prior to development):

Table 5: Summary of nearby borehole vs onsite spring underground water sampling results

Testing source	Operational risk				Acute health risk	Chronic Health Risk	
	Standard Plate Count (limit 1000 per 1ml)	Total Coliforms (limit 10 per 100ml)	Turbidity (limit 1 NTU)	Aluminum (300 ug/l)	E.coli (limit 0 per 100ml)	Iron Conc. (Limit 2000 ug/l)	Total organic carbon (limit 10 mg/l)
Private borehole	2001	20	Below	Below	Below	Below	Below
Onsite Spring	2001	2080	66	15623	1220	8676	34

The cemetery portion of the development will be concentrated to the eastern side of the site, however the entire project area is expected to be underlain by siltstone bedrock, which will form the main basal buffer zone or vadose zone. According to the *Protocol to manage the potential of groundwater contamination from on site sanitation edition 2, dated March 2003, by the Department of Water Affairs and Forestry* (now Department of Water and Sanitation), the unsaturated zone can be classified as bedded shales and has an expected slow rate of flow of 0.1m per day. This low permeability would inhibit the decomposition process but is a great positive towards groundwater pollution. Furthermore, the basal buffer zone is expected to be in excess of 10m where the minimum standard for cemeteries is 2.5m. Vertical flow is expected in flatter or higher elevation areas with slow infiltration rates through the vadose zone up to a static water level that is expected to be > 10 to 15 mbgl.

The permeability of in-situ materials, it was found to result in the permissible permeability guideline range. The site is expected to have a static groundwater level of more than 10mbgl with surrounding static water levels all exceeding 25mbgl. In relation to distance from domestic water supply, the guideline is at least 150m from a domestic watercourse, depending on numerous geological conditions. The groundwater flow onsite is in a southerly to south-westerly direction on site with the closest affected downstream user being 200m away with the geological factors on the site deeming the domestic use of enough distance away from the site area and having static groundwater levels in excess of 25mbgl. A monitoring borehole is recommended to be drilled upstream and downstream of the project site to monitor groundwater pollution closely with samples taken on a bi-annual basis. However, the assessment concluded that the groundwater pollution potential is considered low to moderate with suitable mitigatory and precautionary measures being implemented.

Surface water guideline notes the site must be well drained and have an efficient surface run-off control system implemented to prevent ingress of water into graves. According to the Geohydrological Assessment the site is well drained with overland flow directed towards the onsite dam and drainage line. Nevertheless, there is a requirement to implement a well-planned stormwater management plan as part of the technical document to the Department of Water and Sanitation of which is currently being actioned. In addition, considerable buffers are being implemented between the grave sites, the watercourse on site and that of the spring/ wetland area.

Groundwater quality monitoring is recommended for both upstream and downstream for shallow and deep aquifer monitoring. To serve as groundwater level monitoring as well as groundwater quality monitoring boreholes throughout the lifespan of the site.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

- 5.1 Natural area ✓
- 5.2 Low density residential
- 5.3 Medium density residential
- 5.4 High density residential
- 5.5 Informal residential ✓
- 5.6 Retail commercial & warehousing
- 5.7 Light industrial
- 5.8 Medium industrial ^{AN}
- 5.9 Heavy industrial ^{AN}
- 5.10 Power station
- 5.11 Office/consulting room
- 5.12 Military or police base/station/compound
- 5.13 Spoil heap or slimes dam ^A
- 5.14 Quarry, sand or borrow pit ✓
- 5.15 Dam or reservoir ✓
- 5.16 Hospital/medical centre
- 5.17 School
- 5.18 Tertiary education facility
- 5.19 Church
- 5.20 Old age home
- 5.21 Sewage treatment plant ^A
- 5.22 Train station or shunting yard ^N
- 5.23 Railway line ^N
- 5.24 Major road (4 lanes or more) ^N
- 5.25 Airport ^N
- 5.26 Harbour
- 5.27 Sport facilities
- 5.28 Golf course
- 5.29 Polo fields
- 5.30 Filling station ^H
- 5.31 Landfill or waste treatment site
- 5.32 Plantation
- 5.33 Agriculture ✓
- 5.34 River, stream or wetland ✓
- 5.35 Nature conservation area
- 5.36 Mountain, koppie or ridge
- 5.37 Museum
- 5.38 Historical building
- 5.39 Protected Area
- 5.40 Graveyard
- 5.41 Archaeological site
- 5.42 Other land uses (describe)

If any of the boxes marked with an "N" are ticked, how will this impact / be impacted upon by the proposed activity.

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity.

If YES, specify and explain:

If YES, specify:

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.

If YES, specify and explain:

If YES, specify:

6. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including

YES✓

Archaeological or palaeontological sites, on or close (within 20m) to the site?

No

If YES, explain:

A phase 1 Heritage Impact Assessment was conducted for the site where a single weathered Middle Stone Age stone artefact (MP_SA1) that was observed on the slope in the western half of the proposed development adjacent to the green belt. No other archaeological and cultural heritage resources were identified within the proposed development area. It was noted that the area has been heavily disturbed by previous agricultural activities and thus changes of finding of archaeological material is unlikely to occur in situ.

Glass bottles dating back to 1980s and 1990s were also identified within the southern extent of the green belt area which are to be retained.



In terms of the National Heritage Resources Act (Act 25 of 1999) a Notification of Intention to Develop (NID) form was submitted to both the South African Heritage Resources Information system (SAHRIS Ref No: 25142) and the Eastern Cape Provincial Recourses Authority. Final Comment has been received, and the project has been given approval from ECPHRA.

If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist:

The area in general was considered to have a low archaeological heritage significance, and it was noted that it was unlikely that any in situ archaeological sites would be uncovered within the top 50cm from the ground surface. Only one Middle Stone Age stone artefact was discovered on site and can be seen below.



Will any building or structure older than 60 years be affected in any way?

NO✓

Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?

NO✓

If yes, please submit or, make sure that the applicant or a specialist submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

- (a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application;
- (b) giving written notice to—
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority;

- (c) placing an advertisement in—
 - (i) one local newspaper; or
 - (ii) any official *Gazette* that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;
- (d) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and
- (e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
 - (i) illiteracy;
 - (ii) disability; or
 - (iii) any other disadvantage.

See Appendix G for a copy of the newspaper advert and notices

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

- (a) indicate the details of the application which is subjected to public participation; and
- (b) state—
 - (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
 - (ii) whether basic assessment or scoping procedures are being applied to the application, in the case of an application for environmental authorisation;
 - (iii) the nature and location of the activity to which the application relates;
 - (iv) where further information on the application or activity can be obtained; and
 - (iv) the manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers

associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Appendix E.

See Appendix E

6. AUTHORITY PARTICIPATION

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least 30 (thirty) calendar days before the submission of the application.

List of authorities informed:

- | |
|---|
| <ol style="list-style-type: none">1. Buffalo City Metropolitan Municipality2. Department of Economic Development, Environmental Affairs and Tourism- Amathole Region3. Eastern Cape Provincial Heritage Resources Authority4. SANRAL5. The South Africa Civil Aviation Authority6. Department of Water and Sanitation7. The Department of Defence |
|---|

List of authorities from whom comments have been received:

- | |
|--|
| <ol style="list-style-type: none">1. Department of Economic Development, Environmental Affairs and Tourism- Amathole Region2. Eastern Cape Provincial Heritage Resources Agency |
|--|

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority.

Any stakeholder that has a direct interest in the site or property, such as servitude holders and service providers, should be informed of the application at least 30 (thirty) calendar days before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders?

YES ✓

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

Ward 15 Councillor was engaged as an identified I&AP for the project. When sent the Notification letter and BID for the proposed project, he requested a meeting. Indwe notified the applicant in order for to set up a meeting that was convenient for both parties. The applicant had a telephonic conversation with the councillor and requested via email a teams or zoom meeting however the councillor failed to reply hereafter. It is assumed that the councillor is satisfied with the engagement, however being a registered I&AP he will remain updated with regards to the project progress and the notification of the Public Review Phase.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2014 as amended, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

Issue's raised outside of the initial public participation period

1. Pre-application phase:

A Pre-Application meeting was held with DEDEAT on the 15 August 2025 where the project and its screening tool findings were discussed. DEDEAT issued no objections with the findings towards the specialist studies and EIA regulations listing notice triggers which in this case is only LN 1 Activity 23 and 27, as well as LN 3 Activity 14.

2. Comment from ECHPRA

An NID form was submitted to the department, with supporting documents and specialist assessments. The department noted they are happy with the information provided, but requested that a Chance Find Protocol be submitted to the department before construction commences and ECPHRA must be informed when the project is set to commence construction. In addition they requested a Final Feedback Report on the development on the completion of construction.

Issue's raised within the initial public participation period

It must be noted that two rounds of Initial Public Participation were run for the project, one in December 2021 and after further applicant feasibility investigations another in March 2025

3. During the Public Participation run of 2021- No issues were raised within the initial public participation period. Mr Harris an adjacent landowner requested a layout plan and provided information on a parcel of land. We enquired as to the ownership in order to inform the owners of the EIA.

4. During the Public Participation run of 2025- Multiple comments were submitted by the surrounding community of the area of Holm Hill not necessarily adjacent landowners. Here it became apparent that two proposals for a Memorial Park and Private Cemetery were planned for the same area of Holm Hill and there was some confusion between this application of PTN 50 Farm 821 and the other proposal for PTN 14 of Farm 821. Nevertheless the comments raised were submitted collectively by many Interested and Affected Parties and were as follows:

- a. **Community Objection 1: Negative Impact on Property Values:** Cemeteries are widely known to reduce nearby property values due to emotional discomfort, stigma, and buyer reluctance. Properties close to cemeteries take longer to sell and attract fewer potential buyers, who worry about the long-term impact on resale value, visual impact, and the area's atmosphere.

This is especially true in rural, lifestyle-driven communities like ours where peace, natural surroundings, and open space are central to the area's appeal. The presence of a large cemetery would fundamentally change the character of the surroundings, making it less desirable to prospective buyers seeking a farm or nature-based lifestyle.

Additionally, with the rezoning of B2 to resort, and multiple churches and businesses looking at expanding to Holm Hill, the type of business needs to fit into the culture and ambience desired on the hill.

b. Community Objection 2: Road Infrastructure and Traffic Concerns:

This development will introduce irregular yet significant traffic surges from funerals, memorial services, and visitor vehicles. Our rural roads are already in poor condition and not designed for this increased load.

Such added pressure will accelerate road deterioration, raise maintenance costs (likely falling on the community or municipality), and pose safety risks. This increased traffic will also disrupt daily farm operations and negatively impact the quiet, self-sufficient nature of the area.

c. Community Objection 3: Environmental Risks – Groundwater and Surface water Contamination:

The site is close to rivers and water sources essential to surrounding self-sufficient farms.

Cemeteries present well-documented risks of leachate contaminating groundwater and surface water over time.

With many residents' dependent on boreholes, rainwater, and rivers, this development could threaten essential water supplies, food production, and human health. Long-term contamination would have devastating consequences for the local environment and economy.

d. Community Objection 4: Community well-being, morale and Rural character:

Our community is rooted in peaceful, self-sufficient rural living. A large cemetery fundamentally changes that - both physically and emotionally. Cemeteries often create psychological discomfort, altering how residents experience the area they call home. For a community built around farming and nature, this development threatens the very identity and spirit of the area.

e. Community Objection 5: Grave Robbery (Joshua Coetzee)

Theft related issues such as tombstone theft etc.

For further comments submitted please see Appendix E and G4 for further details

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report):

Response (any) to issues raised outside of the initial public participation period

1. Pre-application phase:

DEDEAT noted that the information provided in the pre-application phase was satisfactory, however the department noted that they do not support the idea of septic tanks being used as

a preferred sanitation system. As a result septic tanks were made a least preferred alternative with a conservancy tank system serving as the preferred alternative. They also noted as a reminder to please make submissions both electronically and hard copy.

2. Response to ECHPRA

All requested information was provided for promptly and uploaded onto the SAHRIS website. All recommendations and conditions are well noted and to form part of the EIA. SAHRIS REF No. 25142

Response (any) to issue's raised within the initial public participation period

It must be noted that two rounds of Initial Public Participation were run for the project, one in December 2021 and after further applicant feasibility investigations another in March 2025

3. During the Public Participation run of 2021- No issues were raised within the initial public participation period
4. During the Public Participation run of 2025- As a result of community submitting comments collectively, a single response letter was addressed to all who submitted their concerns to Indwe Environmental Consulting who resided within the area of Holm Holl. Some of the responses area as below:
 - a. **Objection 1 response:** The property proposed for the development of the Memorial Park and Private Cemetery is located in the peri-urban area of BCMM. Peri-urbanization by definition is the transitional zone between urban landscape and rural landscape characteristics that often merge and are found on the outskirts of a prominent urban settlement i.e. East London. The proposed development is located adjacent to growing urbanization elements such as the Ducats settlement and businesses alongside the N6. It is unlikely the property value will be significantly impacted by the proposed development as the Settlement of Ducats comprised of unsightly shack areas is a strong element already in existence nearly directly adjacent to the development in addition to the N6. Regarding the development, there is a strong existing vegetation screen along W road and the site, with no current plan to remove such vegetation with the exception of at the entrance/ access point to the development. The development is privately owned and will be privately operated and managed, thus the development will likely be well landscaped and manicured to ensure the satisfaction of its clients. Thus it is unlikely to create a significant visual impact. The cemetery is not located in the centre of the area of Holm Hill but rather on the furthest western boundary of the area.
 - b. **Objection 2 response:**

A Traffic Impact Assessment (TIA) was conducted dated April 2024 for the proposed development. Regarding capacity along access roads, the MN10118 (W road) was found to be described as a minor road which provides access between the proposed development and the N6 to the west. According to the TIA, on site observations found there is sufficient spare capacity that exists along the road network to cater for the medium to long term future anticipated traffic growth, including future trips in relation to the proposed development. In addition, it was noted that the speeds on the road were relatively low due to the existing condition of the gravel road. As a provincial road, the responsibility of road maintenance of MN10118 (W Road) falls under the Eastern Cape Department of Transport.
 - c. **Objection 3 response:**

A Geohydrological Assessment was conducted for the site dated July 2022. The Assessment found that groundwater occurrences are expected to be intergranular and in fractured zones with borehole yields between 0.1 and 0.5 litres per second in general.

Only one test pit had slight seepage out of 10 test pits which was associated with a shallow aquifer originating from stormwater runoff from W road and possibly the spring in the uppermost area of the site designated majority for infrastructure. The remainder of the test pits extended past the depth of grave depth of 1.8m where the cemetery component is proposed. During a hydrosensus conducted, 9 boreholes, 1 spring (on site) and 14 soil dams were identified from the surrounding area within 500m radius of the site. The groundwater has been recognised as a prominent water source with static groundwater levels measured between 27.44 and 29.82 mbgl.

Samples of groundwater taken from surrounding borehole resources and onsite spring noted the following (Note prior to development):

Testing source	Operational risk				Acute health risk	Chronic Health Risk	
	Standard Plate Count (limit 1000 per 1ml)	Total Coliforms (limit 10 per 100ml)	Turbidity (limit 1 NTU)	Aluminium (300 ug/l)	E.coli (limit 0 per 100ml)	Iron Conc. (Limit 2000 ug/l)	Total organic carbon (limit 10 mg/l)
Private borehole	2001	20	Below	Below	Below	Below	Below
Onsite Spring	2001	2080	66	15623	1220	8676	34

The cemetery portion of the development will be concentrated to the eastern side of the site, however the entire project area is expected to be underlain by siltstone bedrock, which will form the main basal buffer zone or vadose zone. According to the *Protocol to manage the potential of groundwater contamination from on site sanitation edition 2, dated March 2003, by the Department of Water Affairs and Forestry* (now Department of Water and Sanitation), the unsaturated zone can be classified as bedded shales and has an expected slow rate of flow of 0.1m per day. This low permeability would inhibit the decomposition process but is a great positive towards groundwater pollution. Furthermore, the basal buffer zone is expected to be in excess of 10m where the minimum standard for cemeteries is 2.5m. Vertical flow is expected in flatter or higher elevation areas with slow infiltration rates through the vadose zone up to a static water level that is expected to be > 10 to 15 mbgl.

d. Objection 4 response:

The proposed development is positioned opposite the existing informal settlement of Ducats which has significantly led to the transformation of the general area of the site. The proposed site is situated in the peri-urban area of BCMM and on a plot with existing access, opposite semi-serviced Ducats settlement and several small businesses located alongside the N6. While the proposed Memorial Park and Private Cemetery does change the land use from agriculture on PTN 50 Farm 821 (Town Planning application submitted), it is expected the proposed development will not have a significant impact on the sense of place as the development is not significantly urbanising (built up areas) the site and will likely have a well landscaped and manicured grounds due to being privately owned and operated, it is thus their mandate to ensure customer satisfaction. The main reason for the nature of the development is to provide a much needed option for dignified burial and alternative interment options for the citizens of BCMM due to the unfortunate circumstance of existing

Municipal operated cemeteries falling into disrepair based on lack of resources of which the privately owned and operated proposed memorial park and cemetery will not experience.

e. Objection 5 response:

It is unlikely theft, and grave robbery will occur as the private cemetery will be fitted with 2.6m ClearVu perimeter fencing with an additional electric fence layer. The development will be gated and have 24 hour physical security services present and the installation of CCTV system. Thus, the presence on the development is high, in addition to access being controlled, it is therefore very unlikely theft will occur considering the considerable time needed to undertake the unlawful activity.

**Please refer to Appendix G4 for full response on objection items
See Appendix E and G4 for further details**

2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MANAGEMENT OF IDENTIFIED IMPACTS AND PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

Alternative (preferred alternative)

Direct impacts:

Due to impacts being a combination of Direct, Indirect and Cumulative Please see table 5 below

Indirect impacts:

Due to impacts being a combination of Direct, Indirect and Cumulative Please see table 6 below

Cumulative impacts:

Due to impacts being a combination of Direct, Indirect and Cumulative Please see table 6 below

Table 6: List of potential impacts for S1: Preferred alternative for memorial park and private cemetery on PTN 50 of farm 821, BCMM

Alternative A1 (preferred alternative)

Potential Impacts that are likely to occur in PLANNING & DESIGN PHASE

The "Planning & Design Phase" of the project has been completed and is in place for implementation.

Potential Impacts that are likely to occur in CONSTRUCTION PHASE

Palaeontological (direct): the site contains outcrops of intrusive dolerite rock which has cooled from molten igneous rock and this contains no fossils, these are preserved within the Greenbelt area of the site. Additionally, in areas designated for development have a thick covering of alluvium soil that has been previously used for agriculture. It is likely that these soils are underlain by extremely degraded leached mudstones. Very low likelihood exists for significant palaeontological material on site to be disturbed.

Heritage Impact (direct): The area is considered to have low archaeological and cultural heritage significance. Only a single isolated occurrence of a Middle Stone Age stone artefact was discovered on site which has not been graded. Stone artifacts usually occur between the surface and 50 to 80 cm below the ground surface. Thus it is possible to uncover artifacts during the proposed development and future excavations for the individual graves, however it is unlikely due to past historical agricultural activities taken place on site.

There also carries a possibility of human remains being discovered during excavation activities.

Alien Vegetation (Direct and Indirect): Several exotic invasive and other weed species were noted within the site, although present in low numbers. A few large Black wattle trees are present, as well as Lantana and other ruderal weed species. A species list can be found in Table 8 of the Biodiversity Assessment Report. It is likely these species may be exacerbated by the construction disturbance and it is also likely that some species currently not within the site will proliferate/ get introduced from adjacent areas.

Disturbed areas of the site are of particular concern during construction activities as alien vegetation are opportunistic in nature and will establish in any exposed soil. This is of particular concern as it can hinder natural vegetation from establishing.

Permanent or temporary loss of indigenous vegetation cover (Direct): Site clearing pre-construction will result within the blanket clearing of vegetation within the affected footprint.

Loss of Flora Species of concern (Direct): During site preparation otherwise known as pre-construction activities, there may be a risk for species of conservation concern which are potentially present within the affected area which could be destroyed during site preparation.

Loss of Faunal Species of Concern (Direct and Indirect): Due to construction activities associated with bushclearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

Erosion and sedimentation (Direct): Some areas are susceptible to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity. Loss of topsoil due to erosive processes will be detrimental to the site's rehabilitation, particularly during the operational phase of the project. Runoff over cleared surfaces during rainfall events, resulting in erosion of exposed surfaces and sedimentation of water resources.

Faunal habitat (Direct): Construction will result in the loss of the habitat and micro habitat for faunal species however there is ample habitat in the surrounding areas for species to move into.

Loss of Ecological Processes (Indirect): Some disturbances to ecological process including faunal processes.

Removal of aquatic/riparian vegetation (direct): Removal and loss of indigenous vegetation, exposure of soil surfaces, potential for degradation of riparian zones and aquatic habitat of all surface waters.

Watercourse water quality (Direct, Indirect and Cumulative): Pollution of surface and groundwater as a direct or indirect result of cement-mixing or washoff of cement water.

Stormwater (Direct and Indirect): Sediment laden runoff is of concern particularly draining into the river and aquatic systems in close proximity to the site. There exists a downstream dam of the site which is of risk to sedimentation if stormwater is not managed effectively.

Solid Waste Generation (Direct): Solid waste generation during construction activities i.e. builders rubble, cement, etc. may proliferate into the environment and downstream watercourses.

Dust Generation (Direct): Dust may be generated from vegetation clearing, exposure of soils and top soil stockpiles as a result of construction activities.
Noise generation (Direct): The site will generate noise while construction takes place which will disrupt neighbouring farms and business owners.
Employment Opportunities (Direct): The proposed project will create temporary employment during the construction phase.
Climate Change (Direct and Indirect): The removal of vegetation as a result of site clearance removes the ability of this vegetation to sequester carbon into their leaves, stems and root systems. However during the operation of the cemetery and memorial park the landscaping component over the graves sites will most likely be grasses. Grasses sequester carbon into the soil and thus are much more efficient carbon sinks
Climate change- increased flooding (Indirect): Increased Flooding events are the most hazardous risk for cemeteries as has been noted in cemeteries abroad. However the placement of the site is on a gentle slope at the top of the catchment of the drainage line and not at the bottom of a valley thus this area is unlikely to be exposed to flood water. In addition in terms of erosion and coastal flooding, according to the DFFE Coastal Vulnerability Viewer, the site is not at any risk.
Potential Impacts that are likely to occur in OPERATIONAL PHASE
Water quality and pollution (Direct and Indirect): Contamination of surface waters on site or downstream (largely farm dams) as a result of excavations and burials. According to Dippenaar et al (2018) the sources of potential contamination typically include (i) the actual decomposition of the corpse and the associated microbial contamination, (ii) the metals and organic compounds mobilised from the ornamental coffins and embalming processes, and (iii) nutrients from the landscaping. Surface waters on site and downstream are threatened if groundwater contamination occurs, and in other instances (e.g. when the hydrology of the site is influenced by the presence of multiple excavations, as discussed by Dippenaar et al. 2018). With climate change predictions indicating higher rainfall, the effects should not be underestimated. See Specialist Report Appendix 7: Impacts of Cemeteries on Water Resources. NOTE: the potential for Groundwater contamination is dealt with in the Geohydrology Report (AGES 2022)
Water logging of graves (Direct, Indirect and Cumulative): Waterlogging of graves, potential contamination of surface water. This may occur as a result of excavation of graves in areas where there may be seasonal inundation (or perched groundwater) that has not yet been identified by studies.
Alteration of hydrology (Direct and Indirect): Alteration of surface hydrology due to increased hardened surfaces on the site and a related increase in stormwater runoff (rather than infiltration to groundwater, which would occur on the undeveloped site). Increased runoff of this nature will also lead to erosion of land surface and contamination and sedimentation of surface waters.
Pollution of underground water resources (Indirect and Cumulative): There is risk of pollution of groundwater from leachate of gravesites. In addition to decomposition process, chemicals within the coffins or embalming process can leach within the soils and groundwater of the site. This is the greatest concern for the operation of the private cemetery.
Depletion of underground water resources (Direct): Overutilisation of the borehole for water resources for the operation of the cemetery may cause the depletion of the local underground aquifer that is depended on by surrounding farmers or users in the area. In addition, the recharge of springs and other watercourses in the vicinity may be affected and thus change their hydrological regime and affect aquatic system function.
Permanent or temporary loss of indigenous vegetation cover (Direct): Site clearing pre-construction will result within the blanket clearing of vegetation within the affected footprint.
Loss of Flora Species of concern (Direct): During site preparation otherwise known as pre-construction activities, there may be a risk for species of conservation concern which are potentially present within the affected area which could be destroyed during site preparation.
Loss of Faunal Species of Concern (Direct and Indirect): Due to construction activities associated with bushclearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.
Faunal habitat (Direct): Construction will result in the loss of the habitat and micro habitat for faunal species however there is ample habitat in the surrounding areas for species to move into.

Loss of Ecological Processes (Indirect): Some disturbances to ecological process including faunal processes.
Employment opportunities (Direct): The operation of the cemetery will provide jobs to the local community and city of East London but the impact will be low as the cemetery is small in scale.
Alien Vegetation (Direct and Indirect): Inappropriate maintenance activities during the operational phase would also promote the invasion or dominance of alien plant species at the site. An increase in alien vegetation will have negative biodiversity impacts displacing indigenous species and disrupting the ecology of the area. However due to the target market of private clients, it is likely the landscaping of the cemetery will be well maintained and proliferation of the site will be low.
Solid Waste Generation (Direct): During the operation phase, general solid waste will be generated by the development. Should the Buffalo City Municipality not service the area for waste collection, the management of the cemetery will transport waste to their nearest transfer station.
Stormwater management (Direct): An appropriately functioning stormwater management system will need to be in place for the development. This system should be monitored closely for any failure or need for maintenance, it is of the utmost importance that stormwaters are channelled away from gravesites and into the dam at the head of the drainage non-perennial watercourse. Over and above this should the stormwater management system fail for any reason, erosion must be monitored and addressed timeously.
Traffic (Direct): The proposed project will bring in an increased amount of traffic during operation, however this will be well within the load capability of the W Road and intermittent in extent.
Landscaping (direct): It is recommended that minimal irrigation for landscaping takes place. AGES (2022) state that 'Graves will likely cause zones of preferential infiltration if somewhat depressed, or will likely increase erosion or obstruct runoff if mounded. Optimal landscaping practices with minimal irrigation at low intensity will ensure that grass can grow without extensive mobilisation of possible contaminants.' Regarding planting on the site, it is recommended that only waterwise indigenous grasses and plants be considered, and that landscaping is done by a qualified local landscaper with good experience of the use of Eastern Cape indigenous plants in landscaping or rehabilitation.
Climate Change (Direct): Due to the provision of adequate maintenance in terms of cemetery operation, it is likely the citizens of East London will opt into traditional burial options, where concerns of unkempt municipal cemeteries have deterred citizens to consider cremation as the only other alternative for respectful interment. Cremation has a significantly higher Carbon Emission footprint to burial.
Climate Change-Burial (Indirect): The decomposition of organic matter releases methane among other gasses as part of the natural decomposition process. This gaseous release is only subject to once the decomposition phase is complete. This impact is however far reduced in comparison to cremation which releases 6 times that of traditional burial. It must be noted that although natural gaseous release through the process of decomposition, the levels do not fall within the ambient of an Atmospheric Emission License
Cumulative impact of Leachate (Indirect and Cumulative): Indwe Environmental Consulting has been made aware that a private cemetery development proposed for PTN 14 farm 821 has been submitted by a different applicant which falls in the same general area of Holm hill as this application for PTN 50 Farm 821. There is thus a risk of cumulative impact particularly regarding leachate between the two cemeteries into the same tributary and possibly the same groundwater resources, however it must be noted that the Private cemetery proposed on PTN 50 Farm 821 has had considerable consultation with

specialists to ensure its feasibility and generous buffers and strict mitigations have been applied to the sensitive watercourse features on site. In addition, the site is located on the edge of the area of Holm hill and with short distance access from the N6. It is also uncertain if the proposal for PTN 14 of Farm 821 and PTN 50 Farm 821 will achieve all the necessary additional permits and authorisations to implement the cemeteries respectively.

Potential Impacts that are likely to occur in DECOMMISSIONING AND CLOSURE PHASE

No discernible impacts are envisaged as it is unlikely that any aspect of the project will be decommissioned or closed at this point in time.

Alternative A2 (least preferred alternative)

Potential Impacts that are likely to occur PLANNING & DESIGN PHASE

The "Planning & Design Phase" of the project has been completed and is in place for implementation.

Potential Impacts that are likely to occur in CONSTRUCTION PHASE

All impacts noted in the above impact table for the preferred alternative are much the same and relevant towards the Least Preferred alternative.

Potential Impacts that are likely to occur in OPERATIONAL PHASE

All Impacts noted in the above impact table for the preferred alternative are much the same and relevant towards the Least Preferred alternative.

Potential Impacts that are likely to occur in DECOMMISSIONING AND CLOSURE PHASE

No discernible impacts are envisaged as it is unlikely that any aspect of the project will be decommissioned or closed at this point in time.

No-go alternative (compulsory)

Potential Impacts that are due to No-go Alternative

Employment opportunities (indirect): If the no-go alternative is opted for, the potential for employment opportunities although small, are not created.

Economic Development (Indirect): If the no-go alternative is opted for the economic development possible as a result of this unique development type, which is a first for the local area of East London, will be lost.

Loss of potential interment provision (Direct and Indirect): East London is in dire need for cemetery space and alternative options for interment. Land is scarce for cemetery provision and the number of illegal cemeteries are increasing as a result of this scarcity. In addition, there is a joint desire for well maintained cemeteries as the current cemeteries that exist in BCMM are in a serious state of disrepair due to lack of funding. The resulting disrespect experienced by families of different cultures has an emotional impact on society.

Increased overall security risk (indirect): At present the site is open to vagrants to settle and use the area, this is a great risk to illegal settlement formation which will have an even greater risk on the surrounding area. The Ducats settlement being directly across the N6 makes this a serious risk.

Increased dumping activities and fire hazard for the area (Indirect): Due to the site being open and freely accessible, illegal dumping has occurred on site and continues to occur on the site. If this site is left as is under the no-go alternative, it is likely the site will continue to be used as an illegal dumping sight and due to the site being visible from the N6 this will likely be a concerning visual impact on a larger community. In addition, it is unlikely this dumping will be resolved and thus proliferation into the downstream watercourse and into the larger agricultural area is a concern. Lastly, this area has been subjected to many veldfires, as there are no natural boundaries beside the road side boundary, the probability for these fires to jump onto neighbouring farms is

high which increased with the worsening alien invasive infestation currently occurring on the farm.
Disuse of desirable land (Direct and Indirect): At current, this well-positioned site is vacant and freely accessible, resulting in undesirable uses of the land which do not contribute to society's betterment but do pose a risk to negatively impact the surrounding communities.
Alien invasive species (Indirect and Cumulative): IF the no-go alternative is utilized for the site, the current dense investment of alien plant species is likely to proliferate further, impacting the drainage line and other sensitive watercourses on site and will eventually proliferate into the adjacent farm, valuable farmland, which could be detrimental to land management practices as alien invasive eradication can be expensive. In addition, as previously mentioned, the fire risk is of concern as veld fire intensity is often factored by the present and extent of alien invasive plant species.
Climate Change: Loss of Cemetery space provision to the northeastern suburbs of east London (Direct): Current formal cemeteries are located in the old portions of East London which is quite a distance from areas of Beacon Bay and Gonubie located closest to the proposed development. Thus there is discouragement of these residents from utilizing these cemeteries and turning to alternative interment options such as cremation.

3. CLIMATE CHANGE ASSESSMENT

Climate change issues must be considered as part of the EIA process. EAP must determine:

- a) The potential impact of climate change on society and the economy, whether the impact is negative or positive, considering that society needs to be at the centre of the proposed development;
- b) The potential alternatives of the proposed development, alternatives that will have less impact on climate change (environment and generation of waste included), the society and economy;

No alternatives are presented with relation to the proposed development in terms of site and layout. The No-Go alternative is otherwise applicable which has an associated climate change impact. See appendix G7.

- c) whether, and to what extent, the proposed development will result in the release of greenhouse gas (GHG) emissions;
- d) whether the proposed development is necessary to achieve long term decarbonisation goals;

By providing much needed alternative to municipal cemeteries, the cemetery may likely encourage citizens to utilize the traditional burial methods of interment compared to the current increasing trend of cremation, see appendix G7. However, the cemetery and memorial park, although does not provide crematory services, does provide a place for those who would utilize the memorial park for memorial walls and the like.

- e) the impact of the development on social, economic, natural and built environment that are crucial for climate change, adaptation and resilience;
- f) the projected impact of climate change on proposed development; and surrounding environment, and implications for the development.
- g) Explanation of how the impacts is likely to be exacerbated or minimised as result of climate change and what measures are likely to be implemented to accommodate and manage (adapt to) the anticipated worst scenario where applicable

According to the DFFE Coastal Vulnerability viewer, the site is not at risk in terms of either coastal flooding or erosion (Figure 17 and 18). The site is positioned at the top of a watershed area thus, risk from flooding is low. However, increased rainfall events render stormwater management to be rather significant. Thus the stormwater management plan which notes waters will be directed away from burial sites is necessary to ensure excessive overland wash does not occur.



Figure 17: Estuary flood risk in relation to the site as extracted from the DFFE Coastal Vulnerability Viewer.



Figure 18: Coastal short term erosion in relation to the site as extracted from the DFFE Coastal Vulnerability Viewer

h) whether, and to what extent, the impacts identified in (a) -(g) can be mitigated.
See appendix G7

4. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Alternative A (preferred and least preferred alternative)

Table 7: Pre and Post Impact Significance of Preferred alternative and Least Preferred alternative

	IMPACT SIGNIFICANCE											
	PRE-MITIGATION						POST MITIGATION					
	INSIGNIFICANT	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH	INSIGNIFICANT	VERY LOW	LOW	MEDIUM	HIGH	VERY HIGH
Planning & Design Phase	-	-	-	-	-	-	-	-	-	-	-	-
Construction Phase	-	3(-ve)	5(-ve) 1(+ve)	8(-ve)	1(+ve)	-	2	7(-ve)	7(-ve) 1(+ve)	-	-	-
Operational Phase	-	1(-ve)	5(-ve) 1(+ve)	7(-ve) 1(+ve)	2(-ve)	1(+ve)	1	3(-ve)	9(-ve) 1(+ve)	2(-ve) 1(+ve)	-	1(+ve)
Decommissioning Phase	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	-	4 (-ve)	10 (-ve) 2(+ve)	15 (-ve) 1(+ve)	1 (+ve) 2(-ve)	1(+ve)	3	10 (-ve)	16(-ve) 2(+ve)	2(-ve) 1(+ve)	-)	1(+ve)

High Significant Impacts

Based on the information contained in (Table 7) it is evident that one positive high sensitivity exists for Climate change which remains such due to no mitigation applicable.

In the operational phase there exists two high negative impact with regard to climate change and burial due to the release of methane gas which is reduced to a Medium impact rating due to mitigation of grasses being a carbon sink and retaining of intact thicket vegetation. The other is the water quality and pollution relating to decomposition, metals and organic compounds released from ornamental coffins and reduced a medium impact due to implementation of the prescribed buffers and monitoring plans. Of note is a Very High positive impact rating towards climate change as the cemetery provides alternatives to cremation which has a significantly higher carbon footprint and emission.

Medium Significant Impacts

There are several Medium significant impacts before mitigation and those are for construction Permanent or temporary loss of indigenous vegetation cover, Loss of Flora Species of concern, Loss of Faunal Species of concern, Alien Invasive Species, Faunal habitat, Loss of Ecological Processes, Water course

Quality, loss of riparian and artificial wetland habitat, which are all negative impacts and get reduced to Low impact significance upon mitigation.

During operational phase, there exists 7 Medium negative impacts, involving the cumulative impacts of leachate, Permanent/ temporary loss of indigenous vegetation, loss of faunal SCC, Loss of floral SCC, Faunal habitat, loss of ecological processes and solid waste generation of which all reduce to low significance after mitigation. There are one positive medium impacts relating to Employment opportunities.

Low Significance Impacts

The remaining impacts have a low or very low impact significant prior to mitigation and get reduced to very low or insignificant with the exception of those that are positive.

No-go alternative (compulsory)

Table 8: Impact Significance of NO-GO Alternative

	IMPACT SIGNIFICANCE									
	PRE-MITIGATION					POST MITIGATION				
	INSIGNIFICANT	VERY LOW	LOW	MEDIUM	HIGH	INSIGNIFICANT	VERY LOW	LOW	MEDIUM	HIGH
No-Go Alternative	-	-	2(-ve)	5 (-ve)	1 (-ve)	-	-	2(-ve)	5 (-ve)	1 (-ve)
TOTAL	-	-	2(-ve)	5 (-ve)	1 (-ve)	-	-	2(-ve)	5 (-ve)	1 (-ve)

High Significant Impacts

Based on the information contained in (Table 8) it is evident that there exists one negative high impact relating to Climate Change: Loss of Cemetery space provision to the northeastern suburbs of East London. No mitigation exists for this and thus remain high negative impacts. This impact comes about as a result of the proposed developments preferred alternative not achieving environmental authorisation and thus increase in cremations as the more preferred option of interment is cremation for many citizens or illegal burials that are not within regulated cemeteries.

Medium Significant Impacts

Five negative medium impacts exist which involve Employment Opportunities, loss of potential interment provision, Increased overall security risk, Disuse of desirable land and Increase in alien vegetation. These impacts will unfortunately remain as is since it is unlikely for the land owner to take further action on the site and there is no mitigation measures for the status quo of the site.

Low Significant Impacts

Two low negative impacts exist for the development if no environmental authorisation is granted for the preferred alternative, these are loss of economic development and increased dumping activities and fire hazard for the area. No mitigation is possible for these impact if the proposed development does not go ahead.

SECTION E. RECOMMENDATIONS OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?

YES✓

Is an EMPr attached?

YES✓

The EMPr must be attached as Appendix F.

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

n/a

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

Based on the information provided it is the opinion of Indwe Environmental Consulting that no significant fatal flaws have been identified for the Proposed Construction of Memorial Park and Private Cemetery on PTN 50 of Farm 821, BCMM, East London, Amathole Region and that the information contained within this report is sufficient enough to allow DEDEAT to make an informed decision.

Indwe Environmental Consulting therefore recommends that Environmental Authorisation be granted for the proposed project based on the following recommendations.

- Strict adherence to the relevant mitigation measures described above and in Appendix G7 and compliance with the attached EMP (Appendix F) is adhered to throughout all phases of the proposed project in order to reduce the risk or significance of impacts to an acceptable level after mitigation measures are adhered to.
- The validity period of the environmental authorisation should be for five years in which time construction should commence.
- Adopt the 20m buffer for the non-perennial river falling within the site.
- Adopt the 15m buffer for the water storage dam (AW1) falling within the northern central portion of the site where possible.
- Consider adoption of the 20m No-go buffer around depression wetland.
- All necessary authorisations in the form of an EA, GA/WUL and/or other must be obtained prior to construction should they be required.
- The requested stormwater management plan be reviewed by the aquatic specialist and the sites specific static ground level be determined prior to development. This will also be required for the WUL technical documents.
- The layout alternative 1 is the preferred layout from an aquatic and wetland perspective including a burial perspective.
- The conservancy tank is the preferred sewerage system for the development.
- An ECO should be appointed for the duration of the construction period to monitor the compliance with conditions of the authorisation/permits.
- It is recommended that the terrestrial moderate and high sensitivity areas are not developed but retained in their natural state as open space.
- It is recommended by the Geohydrologist that groundwater monitoring boreholes must be conducted both upstream and downstream of the development.

- The implementation of the management actions relating to flora and fauna as well as post construction rehabilitation will minimise biodiversity impacts.

SECTION F: APPENDICES

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

Appendix C: Facility illustration(s)

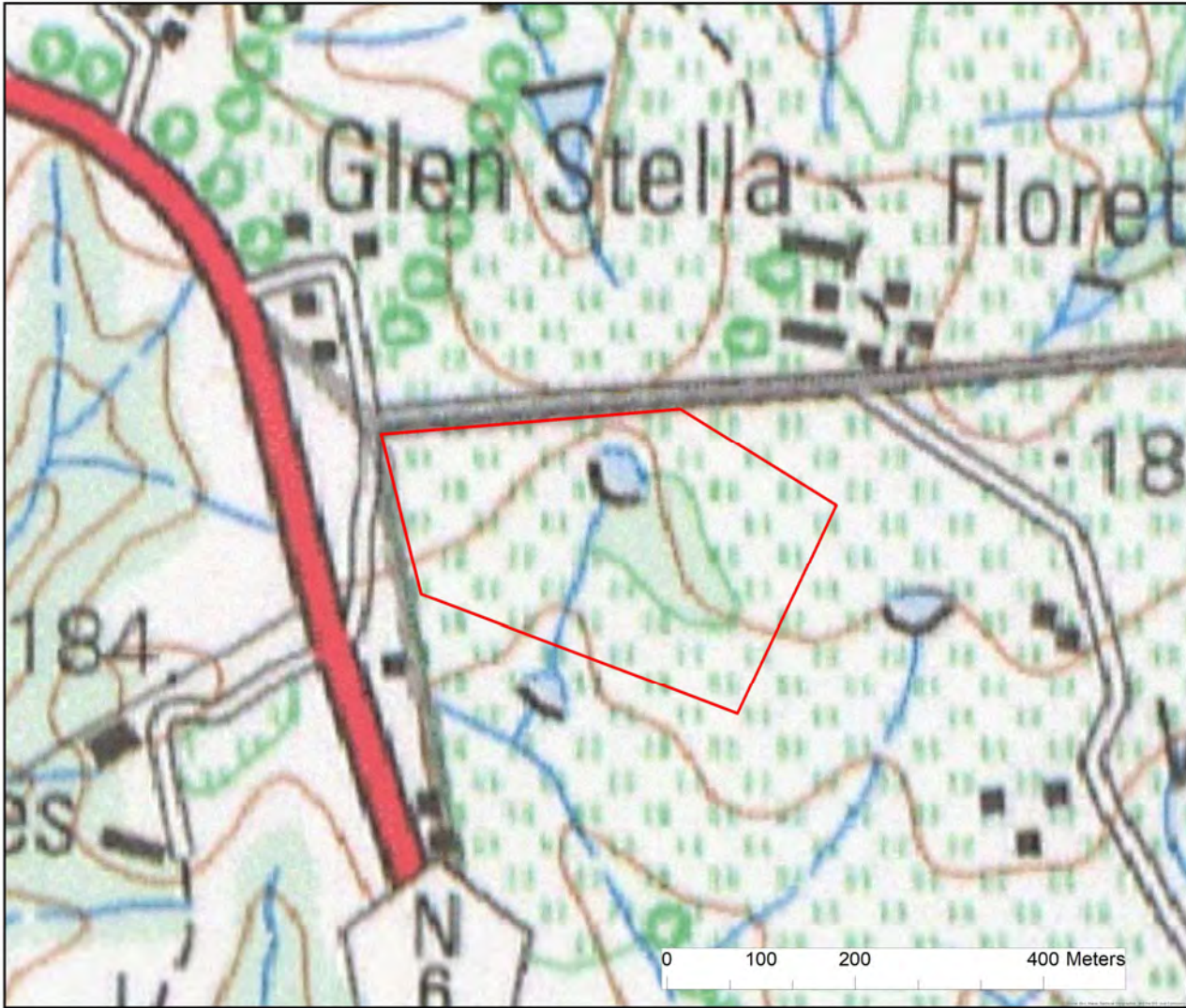
Appendix D: Specialist reports

Appendix E: Comments and responses report

Appendix F: Environmental Management Programme (EMPr)

Appendix G: Other information

APPENDIX A: SITE PLANS



BEACON BAY
CEMETERY
PTN 50 FARM 821

LOCALITY

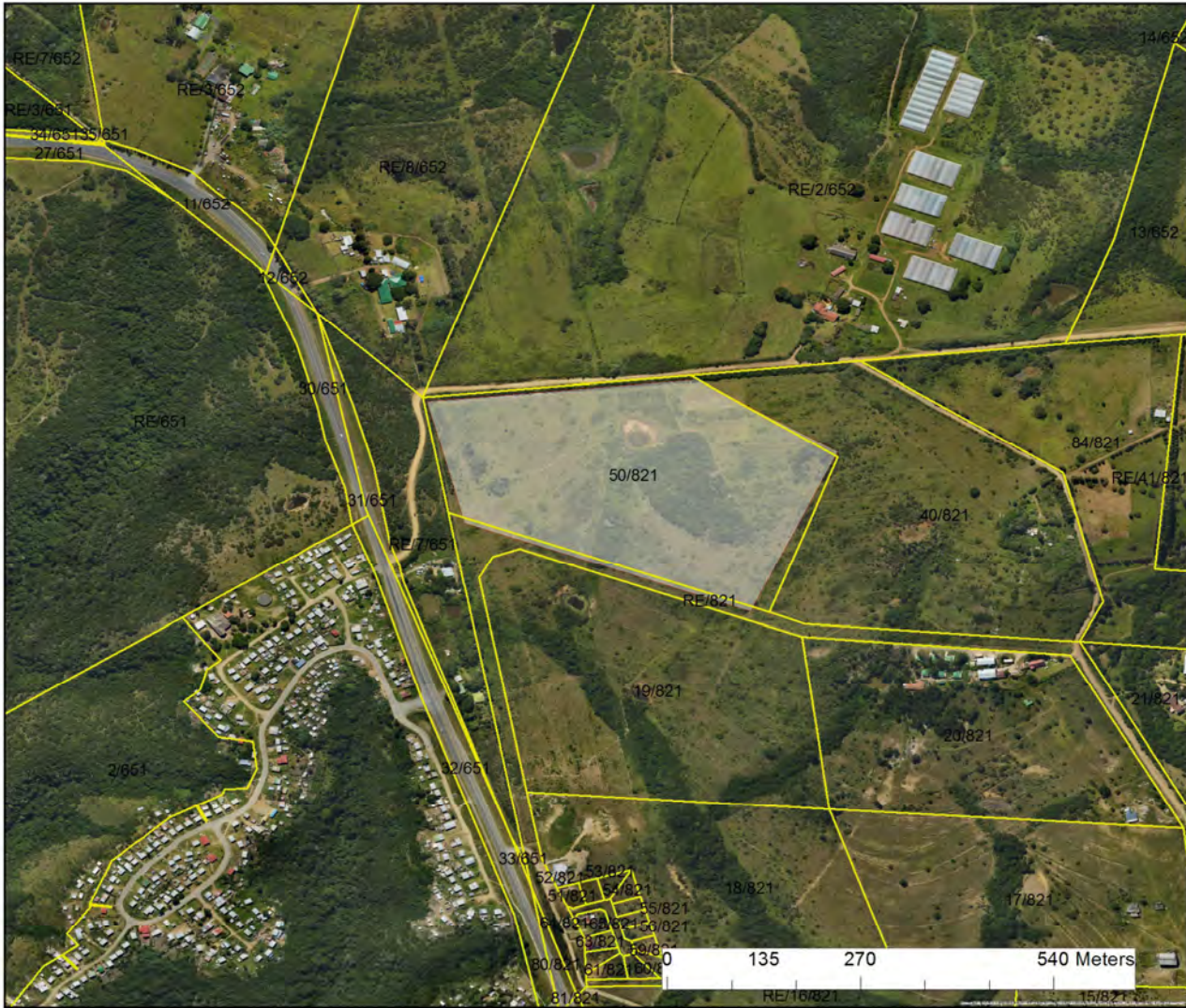
 Study Area

Date: February 2025

Indwe ●●●●
Environmental Consulting
Tel: 043 721 1538
www.indwecon.co.za

1:1 367





CEMETERY
IMBONO
PTN 50 FARM 821

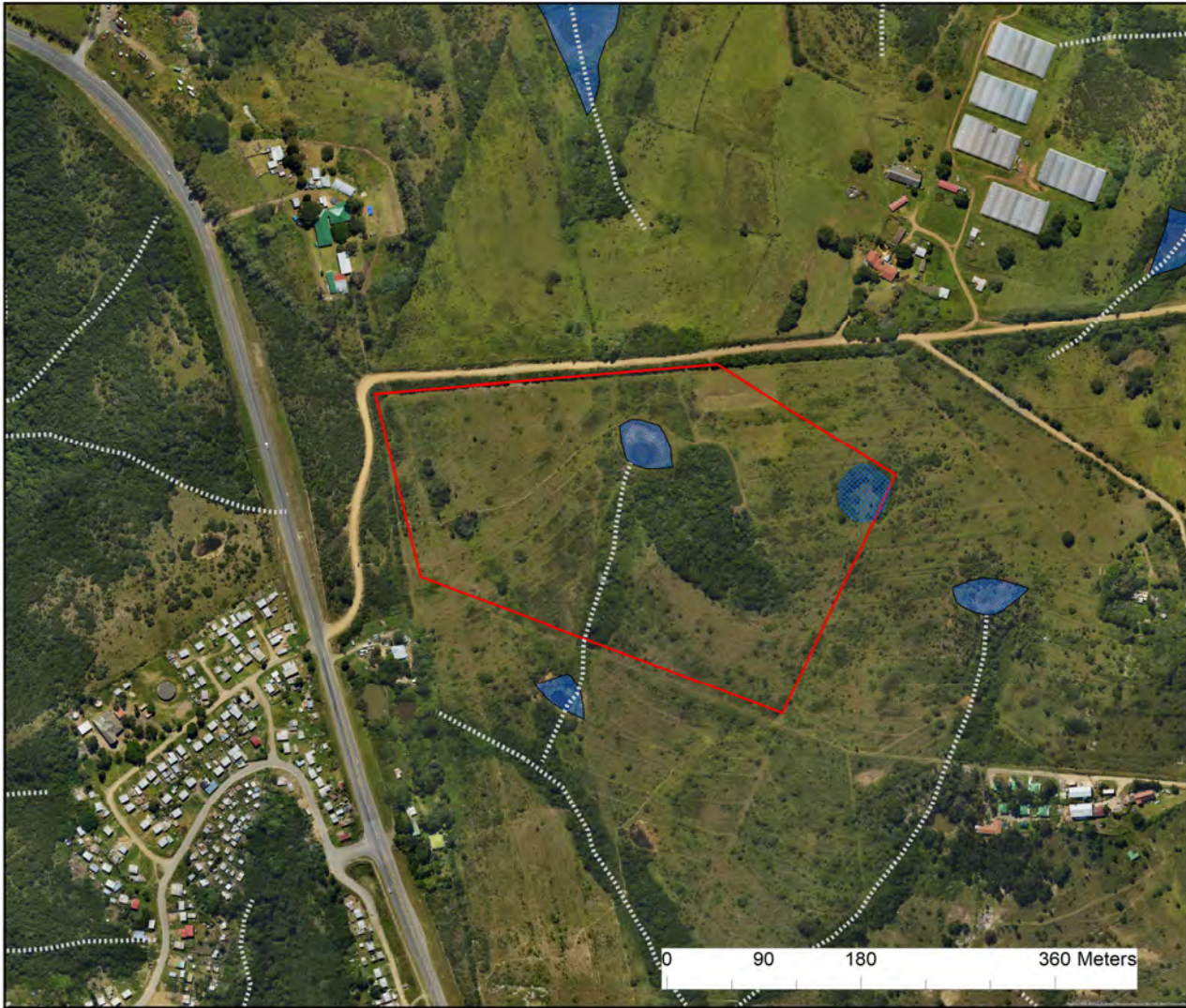
LOCALITY



Date: February 2021

Indwe Environmental Consulting
Tel: 043 721 1538
www.indwecon.co.za

1:1 799



BEACON BAY
CEMETERY
PTN 50 FARM 821

SURFACE WATER

Study Area
 Dam
 Perennial Spring
 Non-perennial watercourse

Date: February 2025

Indwe
Environmental Consulting
Tel: 043 721 1538
www.indwecon.co.za

1:1 194



VEGETATION TYPE
South Eastern Coastal Thornveld

BEACON BAY CEMETERY PTN 50 FARM 821

VEGETATION TYPE
(National Biodiversity
Assessment VegMap 2018)

 Study Area

Date: February 2025

Indwe 
Environmental Consulting
Tel: 043 721 1538
www.indwecon.co.za

1:600





CRITICAL BIODIVERSITY AND
ECOLOGICAL SUPPORT AREA

- Terrestrial ESA 2
- Terrestrial ESA 1

BEACON BAY CEMETERY PTN 50 FARM 821

EC BIODIVERSITY
AND
CONSERVATION PLAN
(Berliner et al. 2019)

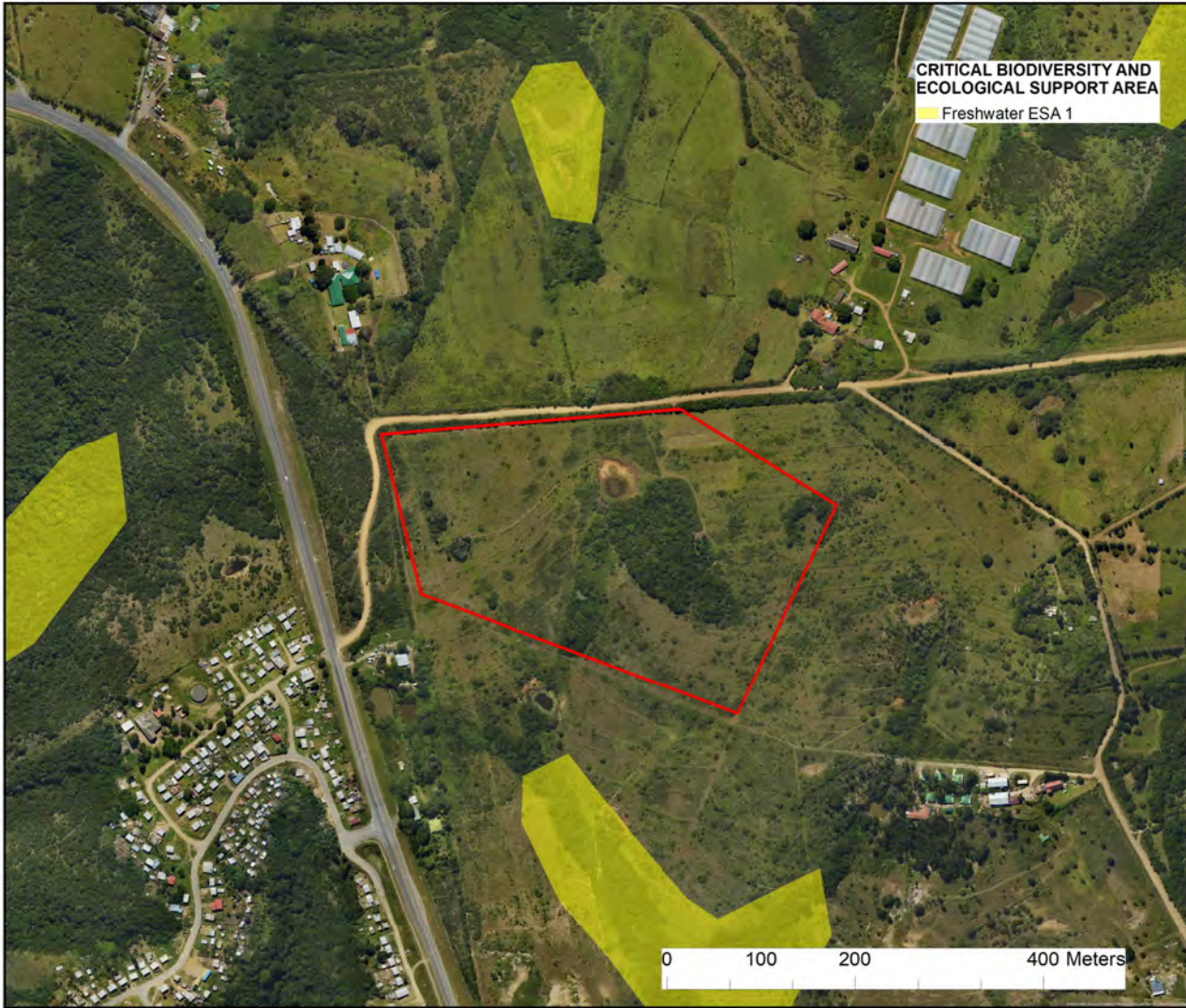
 Study Area

Date: February 2025

Indwe ●●●●●
Environmental Consulting
Tel: 043 721 1538
www.indwecon.co.za

1:1 367





CRITICAL BIODIVERSITY AND
ECOLOGICAL SUPPORT AREA
Freshwater ESA 1

BEACON BAY CEMETERY PTN 50 FARM 821

EC BIODIVERSITY
AND
CONSERVATION PLAN
(Berliner et al. 2019)

 Study Area

Date: February 2025

Indwe 
Environmental Consulting
Tel: 043 721 1538
www.indwecon.co.za

1:1 367



APPENDIX B: SITE PHOTOGRAPHS

APPENDIX B: PHOTOGRAPHS



Figure 1: Northern look at the existing access to the site, Ptn 50 Farm 821, off W Road.



Figure 2: looking east towards old land and makeshift abandoned informal soccer field.



Figure 3: Southern view of the electrical servitude on site looking down the servitude.



Figure 4: South western view of the servitude intersecting the site along with the non-perennial watercourse on site (indicated via red arrow).



Figure 5: Southwestern view of the thicket area on site set to be retained.



Figure 6: Southern look at the area associated with the dam/borrow pit feature onsite



Figure 7: Close up image of the small dam/borrow pit on site



Figure 8: Western view of a large lantana stand and dumping occurring on site.



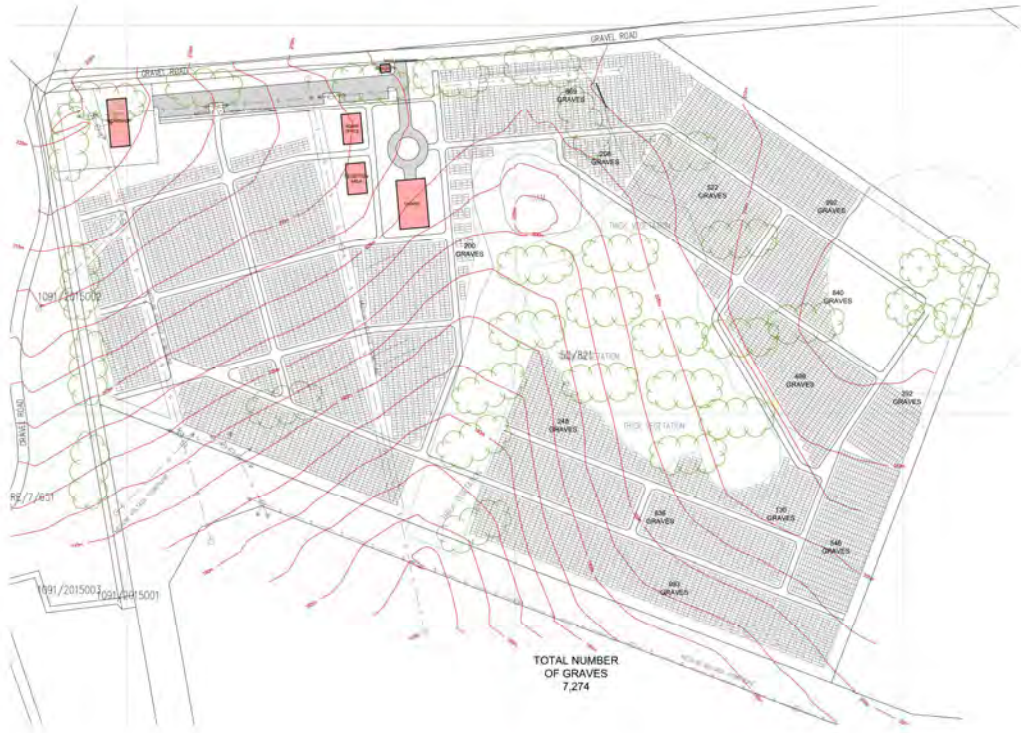
Figure 9: image noting the rocky terrain on the western portion of the site



Figure 10: eastern view of the depressional wetland feature on the eastern most boundary of the site.

PREFERRED ALTERNATIVE

LEVELS AND DIMENSIONS.
THE CONTRACTOR, SUB-CONTRACTOR AND SUPPLIER MUST VERIFY ALL DIMENSIONS AND LEVELS ON SITE AND RECONSTRUCT MUST BE REPORTED TO THE ARCHITECT BEFORE COMMENCING ANY WORK BEYOND THESE LIMITS.
FIGURES DIMENSIONS ARE TO BE TAKEN IN PREFERENCE TO SCALED DIMENSIONS AND LARGER SCALE DETAILS SUPERSEDE SMALL SCALE DIMENSIONS.



SITE PLAN - scale 1 : 1,000

No.	Date	Description	By
Mr.	Dr.	Revising	Drawn



CAPEVEST INVESTMENTS

DUCATS PRIVATE CEMETERY SDP

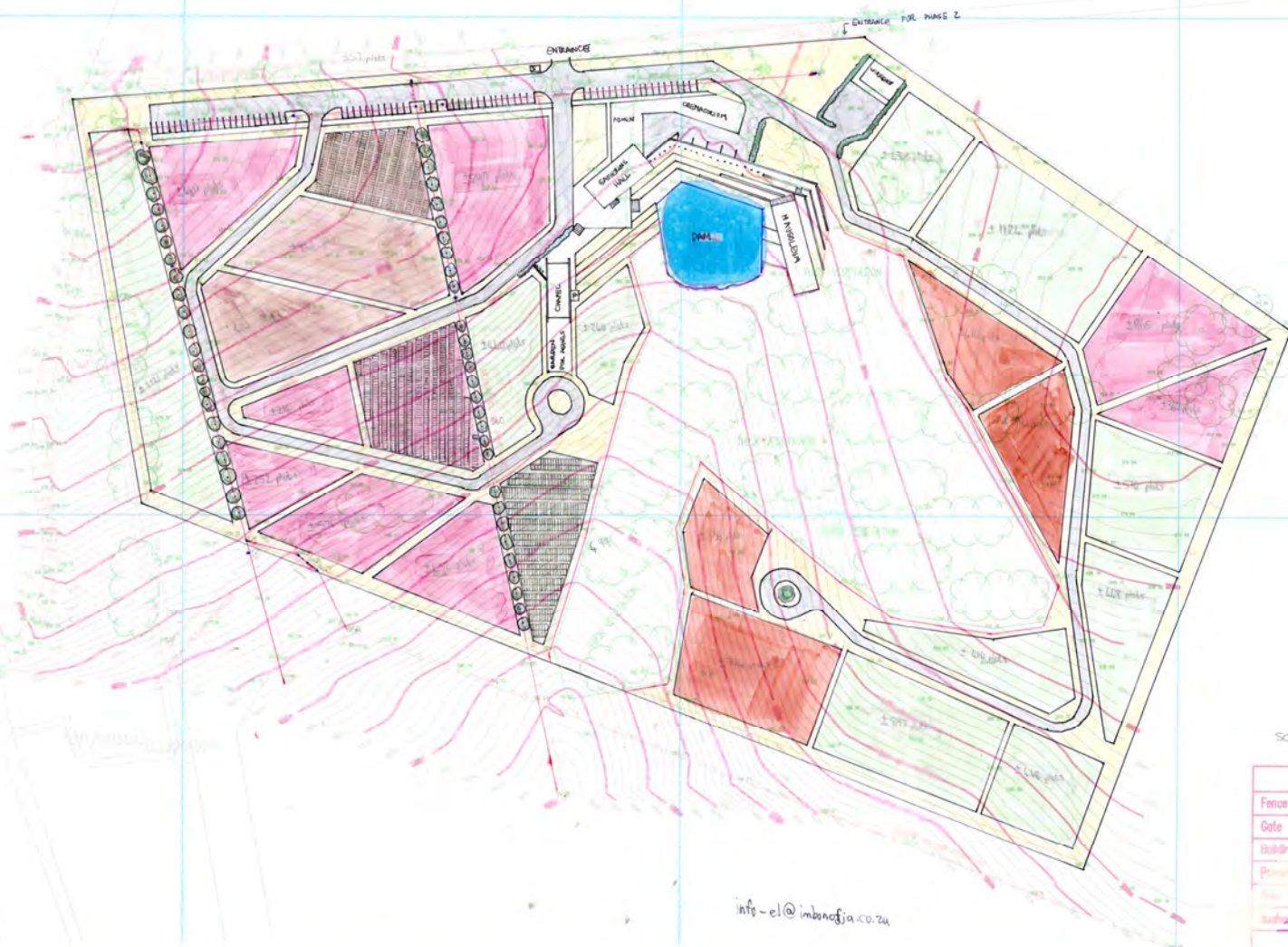
SDP - OPTION 1

EL20-056 SP 02

Author	Project Manager
AS SHOWN	F.JORD JORDANN
Revised	Revised
APRIL 2021	F.JORD JORDANN

100% complete

LEAST PREFERRED ALTERNATIVE



info-el@imbonofia.co.za

**A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED
MEMORIAL PARK AND PRIVATE CEMETERY ON PORTION 50 OF FARM 821, EAST
LONDON, BUFFALO CITY METROPOLITAN MUNICIPALITY, EASTERN CAPE
PROVINCE.**

Prepared for:

Indwe Environmental Consulting CC
2 Ayr Place
Bonnie Doon
East London
5241
Tel: 043 555 0656
Cell: 082 259 3981
Fax: 086 513 9734
Contact person: Ms Megan Hugo
Email: megan@indwecon.co.za

Compiled by:

Ms Celeste Booth
t/a Booth Heritage Consulting
8 Frances Street
Oatlands
Grahamstown
6140
Tel: 082 062 4655
Email: cbooth670@gmail.com
Contact person: Ms Celeste Booth

Date: January 2022

CONTENTS

1	EXECUTIVE SUMMARY	3
1.1	Purpose of the Study	3
1.2	Brief Summary of Findings	3
1.3	Recommendations and Mitigation	4
2	DECLARATION OF INDEPENDENCE	4
3	SUMMARY OF SPECIALIST EXPERTISE	4
4	INTRODUCTION	5
4.1	BACKGROUND INFORMATION	5
4.1.1	Type of Development	6
4.2.	Applicant	6
4.3	Environmental Assessment Practitioner (EAP)	6
5	SCOPE OF WORK AND TERMS OF REFERENCE	7
6	HERITAGE LEGISLATIVE AND POLICY FRAMEWORK	7
7	ARCHAEOLOGICAL BACKGROUND	8
7.1.	Early Stone Age (ESA) - 1.5 million to 250 000 years ago	8
7.2.	Middle Stone Age (MSA) – 250 000 – 30 000 years ago	9
7.3.	Later Stone Age (LSA) – 30 000 years ago – recent (100 years ago)	10
7.4.	Last 2 000 years – Khoekhoen Pastoralism	11
7.5.	Last 2 000 Years - The Iron Age	12
7.6.	Unmarked Burials and Exposed Human Remains	14
7.7.	Rock Art (Paintings and Engravings)	14
8	DESCRIPTION OF THE PROPERTY	15
8.1	Location data	15
8.2	Map	15
9	ARCHAEOLOGICAL INVESTIGATION	23
9.1	Methodology	23
9.2	Results of the Archaeological Investigation	23
10	COORDINATES AND SITES FOR THE PROPOSED MEMORIAL PARK ON PORTION 50 OF FARM 821, BEACON BAY, EAST LONDON, BUFFALO CITY METROPOLITAN MUNICIPALITY, EASTERN CAPE PROVINCE.	29
11	DESCRIPTION AND GRADING OF SITES	29
12	ASSESSMENTS OF IMPACTS ON THE ARCHAEOLOGICAL HERITAGE RESOURCES	29
13	LIMITATIONS AND GAPS IN KNOWLEDGE	30
13.1.	Literature Review	30
13.2.	Fieldwork	30
14	RECOMMENDATIONS AND MITIGATION	30
15	CONCLUSION	31
16	REFERENCES	31
17	RELEVANT ARCHAEOLOGICAL AND HERITAGE IMPACT ASSESSMENTS	35
18	GENERAL REMARKS AND CONDITIONS	40
	APPENDIX A: HERITAGE LEGISLATIVE REQUIREMENTS	40
	APPENDIX B: GRADING SYSTEM	48
	APPENDIX C: IDENTIFICATION OF ARCHAEOLOGICAL FEATURES AND MATERIAL FROM COASTAL AND INLAND AREAS: guidelines and procedures for developers	49

LIST OF FIGURES

Figure 1. 1:50 000 topographic map 3227DD CAMBRIDGE showing the location the proposed cemetery / memorial park development area on Portion 50 of Farm 821	16
Figure 2. Google Earth generated map of the location the proposed cemetery / memorial park development area on Portion 50, Farm 821 showing the surrounding towns and villages	17
Figure 3. View of the location the proposed cemetery / memorial park development area on Portion 50 of Farm 821 situated north-east of Ducats off the N6 National Road	18
Figure 4. View of the of farm portion, Portion 50 of Farm 821 proposed for the development of the cemetery / memorial park	19
Figure 5. Close-up aerial view of Portion 50 of Farm 821 proposed for the development of the cemetery / memorial park	20
Figure 6. Close-up view of the GPS coordinate location of the proposed cemetery / memorial park and the location of the isolated stone artefact occurrence.	21
Figure 7. Example of the preferred site plan for the proposed cemetery / memorial park (map courtesy of Indwe Environmental Consulting).	22
Figure 8. General view of the landscape for the proposed cemetery / memorial park development facing north-west.	24
Figure 9. General view of the landscape for the proposed cemetery / memorial park development facing south-west.	24
Figure 10. General view of the landscape for the proposed cemetery / memorial park development facing north.	24
Figure 11. General view of the landscape for the proposed cemetery / memorial park development facing west.	25
Figure 12. General view of the landscape for the proposed cemetery / memorial park development facing south-east.	25
Figure 13. General view of the landscape for the proposed cemetery / memorial park development facing south.	25
Figure 14. General view of the landscape for the proposed cemetery / memorial park development between the soccer field and access road (W Rd, MN10118).	26
Figure 15. View of the dense vegetation cover in the green belt / watercourse area.	26
Figure 16. View of the general landscape for the proposed cemetery / memorial park development facing south-east.	26
Figure 17. Example of surface exposed areas.	27
Figure 18. Example of surface exposed areas.	27
Figure 19. Example of surface exposed areas.	27
Figure 20. View of the soccer field located near the entrance to the property off W Rd (MN10118).	28
Figure 21 The isolated and weathered MSA stone artefact observed.	28

LIST OF TABLES

Table 1. Coordinates and sites for the proposed Memorial Park on Portion 50 of Farm 821, Beacon Bay, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province

A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED MEMORIAL PARK AND PRIVATE CEMETERY ON PORTION 50 OF FARM 821, EAST LONDON, BUFFALO CITY METROPOLITAN MUNICIPALITY, EASTERN CAPE PROVINCE.

NOTE: The phase 1 archaeological impact assessment was conducted as a requirement of the National Heritage Resources Act 25 of 1999, Section 38 (1)(a)(c)(i)

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as –

(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;

(c) any development or other activity which will change the character of the site –

(i) exceeding 5 000 m² in extent, or

This report follows the minimum standard guidelines required by the South African Heritage Resources Agency (SAHRA) and the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) for compiling a full Phase 1 Archaeological Impact Assessment (AIA).

1 EXECUTIVE SUMMARY

1.1 Purpose of the Study

The purpose of the study was to conduct a phase 1 archaeological impact assessment for the proposed Memorial Park and Private Cemetery on Portion 50 of Farm 821, East London, Buffalo City Metropolitan Municipality (BCMM), Eastern Cape Province.

The survey was conducted to establish the range and importance of the exposed and *in situ* archaeological heritage material remains, sites and features; to establish the potential impact of the development; and to make recommendations to minimize possible damage to the archaeological heritage.

1.2 Brief Summary of Findings

One weathered Middle Stone Age stone artefact was documented on the slopes in the western half of the proposed development adjacent to the green belt. No other archaeological and cultural heritage resources were identified within the proposed development area. The area has been heavily disturbed by previous agricultural activities so any chance findings of archaeological material in the previously surface disturbed ploughed lands is unlikely to occur *in situ*. It is, however, possible that archaeological material may be uncovered or disturbed during the proposed development and future excavations for individual graves.

Glass bottles dating back to the 1980's and 1990's was identified within the southern extent of the green belt area.

1.3 Recommendations and Mitigation

The area is considered as having a *low archaeological heritage significance*. Development may proceed as planned; however, the following recommendations must be considered and included as part of the environmental management plan for the project:

1. If concentrations of pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction of the proposed development and / or future excavations for individual graves, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) (043 745 0888) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the findings will then be conducted to establish the contextual status of the sites and remove the archaeological deposit before development activities continue.
2. Construction managers/foremen and/or the Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.

2 DECLARATION OF INDEPENDENCE

This section confirms a declaration of independence that archaeological heritage specialist, Ms Celeste Booth, has no financial or any other personal interests in the project for the proposed agricultural development.

Ms Celeste Booth was appointed on a strictly professional basis to conduct a Phase 1 Archaeological Impact Assessment in line with the South African national heritage legislation, the National Heritage Resources Act 25 of 1999 (NHRA 25 of 1999) and in response to the recommendations provided by the Department of Environmental Affairs according to the environmental impact assessment regulations.

3 SUMMARY OF SPECIALIST EXPERTISE

Ms Celeste Booth (BSc Honours: Archaeology) is an archaeologist who has had thirteen (13) years of full-time experience in Cultural Resource Management in the Eastern Cape and sections of the Northern Cape and Western Cape. Ms Booth has conducted several Archaeological Desktop Studies and Phase 1 Archaeological Impact Assessments within the Eastern Cape and in the Karoo region across the Eastern Cape, Northern Cape and Western Cape.

4 INTRODUCTION

4.1 BACKGROUND INFORMATION

4.1.1 Type of Development

Indwe Environmental Consulting cc have been appointed by Cape Vest Investments (Pty) Ltd as an independent Environmental Consultant to undertake the required application for Environmental Authorisation process in terms of the National Environmental Management Act (Act 107 of 1998) for the proposed development of a private cemetery and memorial park on Portion 50 of Farm 821, Buffalo City Metropolitan Municipality, Eastern Cape Province.

The proposed project includes the construction of a cemetery near the Ducats area of East London and is located approximately 10.7 km north of the East London CBD and is about 4 km from the Merrifield School turn off onto the N6 from East London, Beacon Bay. The study site is located at co-ordinates 32°55'8.77"S; 27°54'31.55"E and has access from Road W (MN10118) which is a Class 5 Provincial Minor Road. The predominant land use surrounding the site is agricultural.

The site in question is approximately 10.2 Ha in extent, and has evidence of old farm contours indicative of historical agricultural activities. In addition, the site has been intersected by two powerline servitudes, has an informal soccer field on site and has evidence of prevalent dumping activities. Obvious environmental features within the site include a greenbelt within the site which indicates a watercourse and an old borrow pit-turned-dam. The greenbelt and old borrow pit/ dam will be excluded from the total area of which the remaining development footprint is expected to be roughly 7.76 Ha.

In terms of services and town planning, the following applies:

Water:

A borehole will be drilled to supply water. There is no need for potable treated water. Supply is available if needed from the adjacent Ducats Settlement. The water supply authority for the area is the Buffalo City Metropolitan Municipality (BCMM) and water infrastructure is in place to allow for the development to proceed.

Sewerage and sanitation:

There is currently no sanitation infrastructure provided on the subject site. Proposed solutions would be either a septic tank system (least preferred alternative) or a conservancy tank as a preferred alternative.

Access:

As the site currently stands there is a single access point on the property at the Northern Boundary from Road W (MN10118) which is an unpaved provincial road and is

categorised as a Class 5 Provincial Minor Road. This provincial minor road known as Road W connects to the N6 to the west of the site. The location of the sites access road will not be changed however it will be upgraded and formalized in line with the development proposal needs. No change to current access and road network is proposed in terms of routing.

Electricity:

The demand for this development will be low and an application will be made via Eskom/BCMM when the phase 1 needs to commence. Per the current status quo there is electricity available on the property. An electrical load report will be completed before formal application is made to Eskom/ BCMM to indicate the electrical supply required. This electrical load report is still to be compiled.

Town Planning:

The applicant has submitted a formal application in terms of the Spatial Planning and Land Use Management Act of 2013, together with the BCMM Zoning Scheme of 2007. The application consists of a Permanent Departure to allow for the establishment of a Private Cemetery and Memorial Park, with a building line relaxation of 6m on all sides.

Key issues and typical environmental impacts associated with the project identified to date include:

- Introduction of a private cemetery option within BCMM;
- Loss of agricultural land;
- Loss of terrestrial vegetation;
- Possible danger of leachate into the drainage line to affect larger watercourse downstream if no buffer is applied;
- Potential employment opportunities during the construction phase (civil works) and operation phase (landscaping and maintenance); and
- Temporary dust emissions and spoil material during the construction phase.

4.2 Applicant

Cape Vest Investments Pty Ltd

4.3 Environmental Assessment Practitioner (EAP)

Indwe Environmental Consulting CC
 2 Ayr Place
 Bonnie Doon
 East London
 5241
 Tel: 043 555 0656
 Cell: 082 259 3981
 Fax: 086 513 9734

Contact person: Ms Megan Hugo

Email: megan@indwecon.co.za

5 SCOPE OF WORK AND TERMS OF REFERENCE

The purpose of the study was to conduct a phase 1 archaeological impact assessment for the proposed Memorial Park and Private Cemetery on Portion 50 of Farm 821, East London, Buffalo City Metropolitan Municipality (BCMM), Eastern Cape Province.

The survey was conducted to:

- Make a basic surface assessment of the study site (including a desktop study or brief background assessment of the area) to identify, describe, record the localities;
- Assign a heritage site significance rating to heritage resources protected by law; and
- Make recommendations to the relevant Provincial Heritage Resources Authority (PHRA) regarding the conservation or mitigation thereof for purposes of development.

Archaeological and historical material remains, features, and sites were evaluated and assessed based on the following points:

- Type of site;
- Location and environmental surrounds;
- Site category;
- Context and condition;
- Estimated size and depth of deposit;
- Cultural affinities;
- Record site content;
- Record basic information of finds;
- Estimate relative age of sites from cultural material and other information;
- Record and describe graves, graveyards, and informal burials;
- Assess the importance and significance of material remains, features, and sites; and
- Significance ratings based on local to international.

6 HERITAGE LEGISLATIVE AND POLICY FRAMEWORK

The phase 1 archaeological impact assessment was conducted as a requirement of the National Heritage Resources Act 25 of 1999, Section 38 (1)(a)(c)(i)

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as –

- (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (c) any development or other activity which will change the character of the site –
 - (i) exceeding 5 000 m² in extent, or

This report follows the minimum standard guidelines required by the South African Heritage Resources Agency (SAHRA) and the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) for compiling a Phase 1 Archaeological Impact Assessment.

7 ARCHAEOLOGICAL BACKGROUND

Little systematic archaeological research has been conducted within the immediate area of the proposed development. Most archaeological research that has been conducted in the wider regions of the former Ciskei and Transkei.

Several relevant archaeological and heritage impact assessments have been conducted within the region. These impact assessments have identified several Early, Middle, and Later Stone Age artefact scatters and sites as well as evidence of Iron Age agropastoralist occupation and/or interaction by the presence of broken earthenware pot sherds and associated material culture and settlement patterns.

7.1. Early Stone Age (ESA) - 1.5 million to 250 000 years ago

The Early Stone Age from between 1.5 million and 250 000 years ago refers to the earliest that *Homo sapiens sapiens* predecessors began making stone tools. The earliest stone tool industry was referred to as the Olduvai Industry originating from stone artefacts recorded at Olduvai Gorge, Tanzania. The Acheulian Industry, the predominant southern African Early Stone Age Industry, replaced the Olduvai Industry approximately 1.5 million years ago, is attested to in diverse environments and over wide geographical areas. The hallmark of the Acheulian Industry is its large cutting tools (LCTs or bifaces), primarily handaxes and cleavers. Bifaces emerged in East Africa more than 1.5 million years ago (mya) but have been reported from a wide range of areas, from South Africa to northern Europe and from India to the Iberian coast. The end products were similar across the geographical and chronological distribution of the Acheulian techno-complex: large flakes that were suitable in size and morphology for the production of handaxes and cleavers perfectly suited to the available raw materials (Sharon 2009).

One of the most well-known Early Stone Age sites in southern Africa is Amanzi Springs (Deacon 1970), situated about 10 km north-east of Uitenhage and 45 km south east of the WEF site. The site is situated on a north-facing hill overlooking the Coega River. The earliest reference to the spring was made by an early traveller, Barrow (1801). FitzPatrick first reported stone artefacts in the area in 1924. Ray Inskeep (Inskeep 1965) conducted a small-scale excavation of the site in 1963. It was only in 1964 and 1965 that large scale excavations were conducted by Hilary Deacon. In a series of spring

deposits, a large number of stone tools were found *in situ* to a depth of 3-4 m. Wood and seed material preserved remarkably very well within the spring deposits, and possibly date to between 800 000 to 250 000 years old.

Other Early Stone Age sites that contained preserved bone and plant material include Wonderwerk Cave in the Northern Province, near Kimberly and Montagu Cave in the Western Cape, near the small town of Montagu (Mitchell 2007). Early Stone Age sites have also been reported in the foothills of the Sneeuberge Mountains (in Prins 2011).

The location of Early Stone Age sites is biased by several factors, the change in land surface, so that the evidence of coastal exploitation is absent, the survival of Early Stone Age material either *in situ* or sealed within Pleistocene deposits is limited by soil and water activities and numerous processes in environmental change over time and research interests of professional archaeologists. Early Stone Age materials are the earliest evidence for human ancestors occupying the Transkei and Ciskei regions and typically occur on floodplains of perennial rivers and along drainage lines and water courses.

7.2. Middle Stone Age (MSA) – 250 000 – 30 000 years ago

The Middle Stone Age spans a period from 250 000 - 30 000 years ago and focuses on the emergence of modern humans through the change in technology, behaviour, physical appearance, art and symbolism. Various stone artefact industries occur during this time period, although less is known about the time prior to 120 000 years ago, extensive systemic archaeological research is being conducted on sites across southern Africa dating within the last 120 000 years (Thompson & Marean 2008). The large handaxes and cleavers were replaced by smaller stone artefacts called the Middle Stone Age flake and blade industries. Surface scatters of these flake and blade industries occur widespread across southern Africa although rarely with any associated botanical and faunal remains. It is also common for these stone artefacts to be found between the surface and approximately 50-80 cm below ground. Fossil bone may in rare cases be associated with Middle Stone Age occurrences (Gess 1969). These stone artefacts, like the Earlier Stone Age handaxes are usually observed in secondary context with no other associated archaeological material.

The Middle Stone Age is distinguished from the Early Stone Age by the smaller-sized and distinctly different stone artefacts and *chaîne opératoire* (method) used in manufacture, the introduction of other types of artefacts and evidence of symbolic behaviour. The prepared core technique was used for the manufacture of the stone artefacts which display a characteristic faceted striking platform and includes mainly unifacial and bifacial flake blades and points. The Howiesons Poort Industry (80 000 - 55 000 years ago) is distinguished from the other Middle Stone Age stone artefacts: the size of tools is generally smaller, the range of raw materials include finer-grained rocks such as silcrete, chalcedony, quartz and hornfels, and include segments, backed blades and trapezoids in

the stone toolkit which were sometimes hafted (set or glued) onto handles. In addition to stone artefacts, bone was worked into points, possibly hafted, and used as tools for hunting (Deacon & Deacon 1999).

Other types of artefacts that have been encountered in archaeological excavations include tick shell (*Nassarius kraussianus*) beads, the rim pieces of ostrich eggshell (OES) water flasks, ochre-stained pieces of ostrich eggshell and engraved and scratched ochre pieces, as well as the collection of materials for purely aesthetic reasons. Although Middle Stone Age artefacts occur throughout the Eastern Cape, the most well-known Middle Stone Age sites include the type-site for the Howiesons Poort stone tool industry, Howiesons Poort (HP) rock shelter, situated close to Grahamstown, and Klasies River Mouth Cave (KRM), situated along the Tsitsikamma coast. Middle Stone Age sites are located both at the coast and in the interior across southern Africa.

7.3. Later Stone Age (LSA) – 30 000 years ago – recent (100 years ago)

The Later Stone Age (LSA) spans the period from about 20 000 years ago until the colonial era, although some communities continue making stone tools today. The period between 30 000 and 20 000 years ago is referred to as the transition from the Middle Stone Age to Later Stone Age; generally, there is a lack of crucial sites and evidence that represent this change, however, several sites to the west of the proposed development in the eastern Cape Highlands, north in eastern Lesotho and the Drakensburg in KwaZulu Natal have been dated to this time period. By the time of the Later Stone Age the genus *Homo*, in southern Africa, had developed into *Homo sapiens*, and in Europe, had already replaced *Homo neanderthalensis*.

The Later Stone Age is marked by a series of technological innovations, new tools and artefacts, the development of economic, political and social systems, and core symbolic beliefs and rituals. The stone toolkits changed over time according to time-specific needs and raw material availability, from smaller microlithic Robberg (20/18 000-14 000 ya), Wilton (8 000-the last 500 years) Industries and in between, the larger Albany/Oakhurst (14 000-8 000ya) and the Kabeljous (4 500-the last 500 years) Industries. Bored stones were used as part of digging sticks, grooved stones for sharpening and grinding, and stone tools fixed to handles with mastic also become more common. Fishing equipment such as hooks, gorges and sinkers also appear within archaeological excavations. Polished bone tools such as eyed needles, awls, linkshafts and arrowheads also become a more common occurrence. Most importantly bows and arrows revolutionized the hunting economy. It was only within the last 2 000 years that earthenware pottery was introduced, before then tortoiseshell bowls were used for cooking and ostrich eggshell (OES) flasks were used for storing water. Decorative items like ostrich eggshell and marine/fresh water shell beads and pendants were made.

Hunting and gathering made up the economic way of life of these communities; therefore, they are normally referred to as hunter-gatherers. Hunter-gatherers hunted

both small and large game and gathered edible plant foods from the veld. For those that lived at or close to the coast, marine shellfish and seals and other edible marine resources were available for gathering. The political system was mainly egalitarian, and socially, hunter-gatherers lived in bands of up to twenty people during the scarce resource availability dispersal seasons and aggregated according to kinship relations during the abundant resource availability seasons. Symbolic beliefs and rituals are evidenced by the deliberate burial of the dead and in the rock art paintings and engravings scattered across the southern African landscape.

The majority of hunter-gatherer archaeological sites found usually date from the past 10 000 years where San hunter-gatherers inhabited the landscape living in rock shelters and caves as well as on the open landscape. These latter sites are difficult to find because they are in the open veld and often covered by vegetation and sand. Sometimes these sites are only represented by a few stone tools and fragments of bone. The preservation of these sites is poor and it is not always possible to date them (Deacon and Deacon 1999). Caves and rock shelters, however, in most cases, provide a more substantial preservation record of pre-colonial human occupation.

Later Stone Age sites occur both at the coast (caves, rock shelters, open sites and shell middens) and in the interior (caves, rock shelters and open sites) across southern Africa. There are more than a few significant Later Stone Age sites in the Eastern Cape. The most popular are the type-sites for the above-mentioned stone artefact industries, namely Wilton (for the Wilton Industry), Melkhoutboom (for the Albany Industry), both rock shelters situated to the west of Grahamstown, and Kabeljous Rock Shelter (for the Kabeljous Industry) situated just north of Jeffreys Bay. Caves and rock shelters that were occupied by the San during the Later Stone Age sometimes contain numerous paintings along the walls.

According to Derricourt (1977) open Later Stone Age sites in the Transkei and Ciskei are mostly located close to water regardless of whether it may be seasonal or perennial and water courses and notes that lydianite (indurated shale / hornfels) is predominant as a raw material. He also notes that it is possible that Later Stone Age open sites may be distinguished by those containing pottery and those without.

7.4. Last 2 000 years – Khoekhoen Pastoralism

Until 2 000 years ago, hunter-gatherer communities traded, exchanged goods, encountered and interacted with other hunter-gatherer communities. From about 2 000 years ago the social dynamics of the southern African landscape started changing with the immigration of two 'other' groups of people, different in physique, political, economic and social systems, beliefs and rituals. One of these groups, the Khoekhoen pastoralists or herders entered southern Africa with domestic animals, namely fat-tailed sheep and goats, travelling through the south towards the coast. Khoekhoen pastoralist sites are often found close to the banks of large streams and rivers. They also introduced thin-

walled pottery common in the interior and along the coastal regions of southern Africa. Their economic systems were directed by the accumulation of wealth in domestic stock numbers and their political make-up was more hierarchical than that of the hunter-gatherers.

The most significant Khoekhoen pastoralist sites in the Eastern Cape include Scott's Cave near Patensie (Deacon 1967), Goedgeloof shell midden along the St. Francis coast (Binneman 2007) and Oakleigh rock shelter near Queenstown (Derricourt 1977). Often, these archaeological sites are found close to the banks of large streams and rivers. It is much more difficult to locate Khoekhoen open sites, owing to their settlement pattern and lack of stone artefacts, makes evidence of occupation almost 'invisible'.

7.5. Last 2 000 Years - The Iron Age

The Nguni-speaking agropastoralists or 'first-farming communities' or Iron Age communities entered southern Africa along the east coast within the last 2 000 years. They owned domestic stock, namely goats, sheep and cattle. Their pottery was different to that of the Khoekhoe, in the shape, thickness, heavy decoration and variety of the vessels. First farming communities lived a relatively sedentary way of life, they planted sorghum and millet, and were therefore limited to settle in the summer rainfall areas. In addition, first farming communities possessed the skill of metal working, having the ability to mine and work iron, copper, tin and even gold. Their economic systems were also based on the accumulation of wealth through ownership and their political organization was slightly more hierarchical than that of the Khoekhoen.

Much research has been conducted on the Iron Age (IA) across southern Africa, therefore resulting in well-established chronological and typological frameworks and settlement and economic patterns for the Iron Age sequence (Huffman 2007). The Iron Age sequence is based on ceramic phases determined by vessel profile and decoration motif and placement.

According to Huffman (2007) an eastern migration stream, known as the Chifumbaze Complex spread southwards from East Africa south into southern Africa during the period of about AD 200–300 where several KwaZulu-Natal and north-Eastern Cape sites were occupied. The Early Iron Age sites in the Eastern Cape dates to between circa AD 600 to AD 900 and can be divided into the following ceramic facies (Maggs 1989; Huffman 2007):

- Msuluzi (AD 500-700);
- Ndondondwane (AD 700 – 800);
- Ntshekane (AD 800 – 900).

Thicker and decorated pottery sherds, kraals, possible remains of domesticated animals, upper and lower grindstones, storage pits, metal and iron implements are associated with identifying Early Iron Age sites. The sites are generally large settlements, but the

archaeological visibility may in most cases be difficult owing to the organic nature of the homesteads. Additional evidence of these agropastoralist groups derives from rock paintings of cattle painted by hunter-gatherer groups who encountered or interacted with these communities. The bones of cattle and sheep excavated at Oakleigh Shelter near Queenstown may be an indication of possible stock theft (Derricourt 1977). The Early Iron Age (EIA) first-farming communities during the first millennium AD generally preferred to occupy river valleys within the eastern half of southern Africa owing to the summer-rainfall climate that was conducive for growing millet and sorghum.

In comparison to other areas containing Iron Age sites only a small amount of Iron Age research has been conducted in the Eastern Cape thus far. Earlier investigations into the Early Iron Age in the Transkei and Ciskei includes work at Buffalo River Mouth (Wells 1934; Laidler 1935), at Chalumna River Mouth (Derricourt 1977) and additional research by Feely (1987) and Prins (1989). Early Iron Age Sites (EIA) sites also include Kulubele situated in the Great Kei River Valley near Khomga (Binneman 1996), Ntsitsana situated in the interior Transkei, 70 km west of the coast, along the Mzimvubu River (Prins & Granger 1993), and Canasta Place situated on the west bank of the Buffalo (Qonce) River (Nogwaza 1994). Along the coast, near Coffee Bay, Early Iron Age sites have been dated from AD 670 and includes the sites of Mpame and Mqanduli. Early Iron Age pottery scatters have been documented along several area of the Wild Coast coastline including Zig-Zag Cave near Port St Johns (Derricourt 1977).

Early Iron Age sites occur as far inland as the limit of the woodland (savanna) vegetation mainly in the Eastern Valley Bushveld in deeply incised river valleys in the basins of the Mzimvubu and Mzintlana Rivers up to 100 km (Feely & Bell-Cross 2011). Ntsitsana is a first millennium farming site (AD 650 - 950) located on alluvial flats on the outer bend of a meander of the Mzimvubu River (situated near Tanbankula 70 km inland from the coast and 30 km south of the current development site). Surface scatters of potsherds indicated that the site belonged to the oldest known phase of farming settlement in Transkei (Prins 1993). The pottery associated with the site is of the Msuluzi and Ndondwane facies (Huffman 2007).

There has in the past been some speculation that Early Iron Age populations may have spread well south of the Transkei into the Ciskei, possibly up to the Great Fish River (Binneman *et al.* 1992), however, no further research has been undertaken to confirm these statements.

Hilltop settlement is mainly associated with Later Iron Age (LIA) settlement patterns that occurred during the second millennium AD. The Later Iron Age communities later moved from settlement in river valleys to the hilltops. Later Iron Age settlements have been formally recorded by the Albany Museum With the exception of the Tembu, stone buildings which characterizes the Iron Age sites of Sotho areas, is absent in the Transkei and Ciskei, and a pattern of some mobility without, it is presumed, a stone working

technology of significance, makes the allocation of sites a major problem (Derricourt 1973).

Huffman's (2004) ceramic sequence among the Nguni groups contains three facies:

- Blackburn (AD 1 050 – 1 300): along north and south coasts of KwaZulu Natal;
- Moor Park (AD 1 300 – 1 700): first recorded in Estcourt Midlands then along Transkei coast where it was called Umgazana Ware. Appears south of the Mtamvuma River and it is suggested that it was the beginning of the division between southern and northern Nguni people and probably continued into the nineteenth century;
- Nqabeni (AD 1 700 – 1 850): style centres on KwaZulu Natal;

In relation to the proposed area for development three second millennium Late Iron Age sites, Ngosi, Nqukwe Traditional Cwera Homestead and Nqukwe dating to between AD 1820 and AD 1955 were identified near to the Ntsitsana site along the banks of the Mzimvubu River (Prins 1993).

Several Late Iron Age, historical settlements, as well as recent settlements have been documented near Mount Ayliff area and within the wider former Transkei region by cultural resource management practitioners.

7.6. Unmarked Burials and Exposed Human Remains

It is difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion or construction activities for development. Several human remains have been rescued eroding out of the dunes along this coastline. In some instances, packed stones or rocks may indicate the presence of informal pre-colonial burials.

The Albany Museum Database holds records of human remains that have been exposed and collected for conservation and curation within the wider region especially along the coastal areas. Cultural Resource Management practitioners whilst conducting archaeological heritage impact assessments have also recorded formal historical and contemporary cemeteries and informal burials within the wider region.

7.7. Rock Art (Paintings and Engravings)

Rock art is generally associated with the Later Stone Age period mostly dating from the last 5000 years to the historical period. It is difficult to accurately date the rock art without destructive practices. The southern African landscape is exceptionally rich in the distribution of rock art which is determined between paintings and engravings. Rock paintings occur on the walls of caves and rock shelters across southern Africa and are prolific in the Southern Drakensberg, north-eastern Cape extending the entire

Drakensberg range into KwaZulu-Natal and Lesotho. Rock engravings are limited to the Karoo and Northern Cape Regions and do not generally occur within the north-eastern Cape region and Transkei region.

Rock art research within the Southern Drakensberg has been conducted by several researchers and students from the Rock Art Research Institute, University of the Witwatersrand, over a period of 25 years, with a well-established database of site from Maclear, Tsolo, Barkly East, Ugie, Dordrecht and the wider region and extent of the Drakensberg range and Maluti Mountains. The South African Rock Art Database established by the Rock Art Research Institute is a useful source for rock art site information across southern Africa.

Rock painting sites have been recorded during a heritage assessment survey within the Mount Fletcher area to the north-east of the proposed development site (Anderson 2012).

8 DESCRIPTION OF THE PROPERTY

8.1 Location data

The proposed establishment of a cemetery and memorial park is located near the Ducats area of East London, approximately 10.7 km north of the East London CBD. The site is about 4 km from the Merrifield School turn off onto the N6 from East London, Beacon Bay. The study site is located at co-ordinates 32°55'08.77"S; 27°54'31.55"E and has access from Road W (MN10118) which is a Class 5 Provincial Minor Road. The predominant land use surrounding the site is agricultural.

8.2 Map

1:50 000 Topographic Maps: 3227DD CAMBRIDGE



Figure 1. 1:50 000 topographic map 3227DD CAMBRIDGE showing the location the proposed cemetery / memorial park development area on Portion 50 of Farm 821, East London.

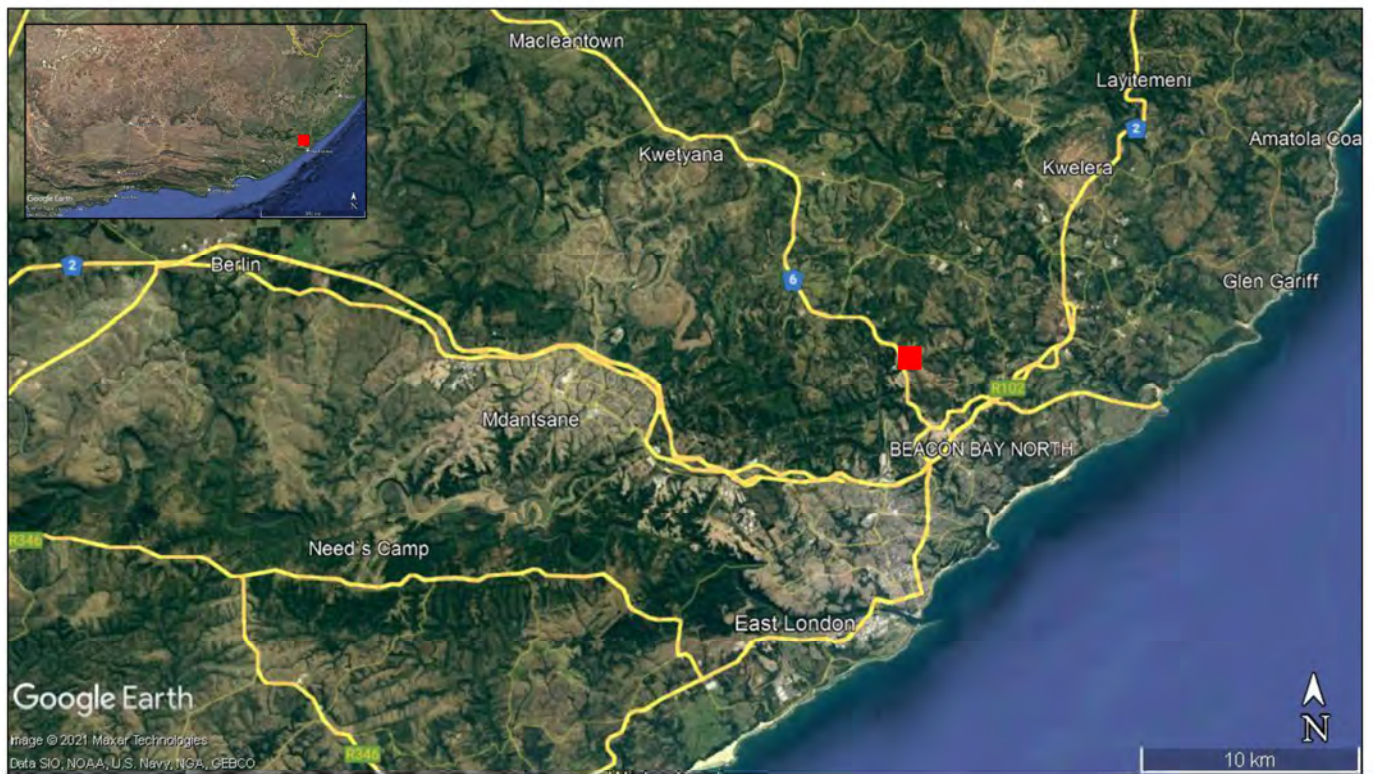


Figure 2. Google Earth generated map of the location the proposed cemetery / memorial park development area on Portion 50 of Farm 821 showing the surrounding towns and villages.

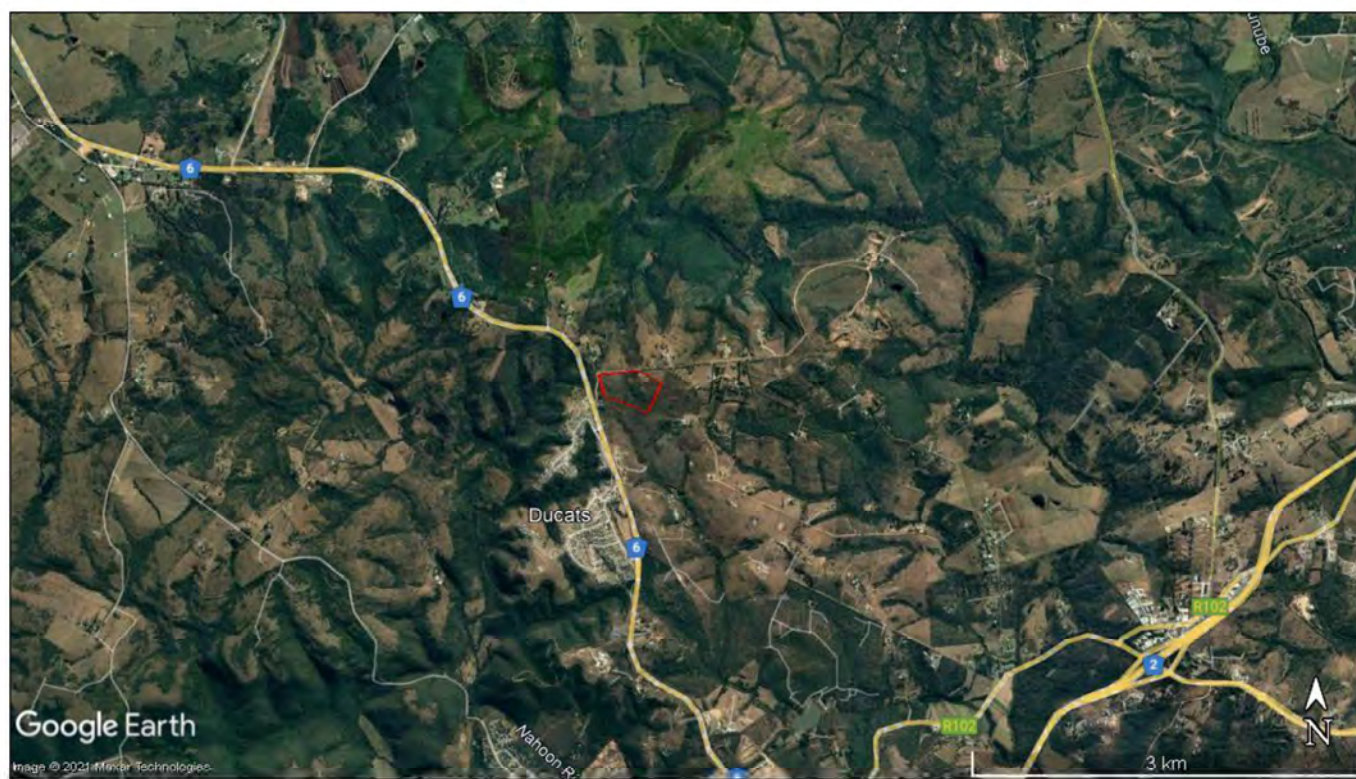


Figure 3. View of the location the proposed cemetery / memorial park development area on Portion 50 of Farm 821 situated north-east of Ducats off the N6 National Road.



Figure 4. View of the of farm portion, Portion 50 of Farm 821 proposed for the development of the cemetery / memorial park.



Figure 5. Close-up aerial view of Portion 50 of Farm 821 proposed for the development of the cemetery / memorial park.



Figure 6. Close-up view of the GPS coordinate location of the proposed cemetery / memorial park development and the location of the isolated stone artefact occurrence.



Figure 7. Example of the preferred site plan for the proposed cemetery / memorial park (map courtesy of Indwe Environmental Consulting).

9 ARCHAEOLOGICAL INVESTIGATION

9.1 Methodology

A literature review was conducted prior to the field survey to establish the potential archaeological and cultural heritage sites that may be encountered within the proposed area and provide insight into the archaeological background of the wider region. No systematic archaeological research has been conducted within the immediate area of the proposed development. Several archaeological, heritage and cultural impact assessments have been conducted within the wider region. An archaeological background section has been included as part of the literature review.

The survey was conducted on foot. GPS co-ordinates and photographs were taken using a Garmin Oregon 650 GPS unit.

9.2 Results of the Archaeological Investigation

The general landscape of the site varied across the site. Archaeological visibility was mostly poor due to the vegetation cover (Figures 8-16). Although some surface exposed and disturbed areas, allowed for the possibility of finding archaeological and / or other cultural material (Figures 17-20).

The western half of the site shows evidence of old farm contours indicative of historical agricultural activities. Due to related agricultural activities such as ploughing, digging, planting, and harvesting, it is unlikely that *in situ* archaeological sites would be uncovered within the top 50cm from the surface. One stone artefact was observed within this area on the lower slopes adjacent to the identified green belt area (Figure 21). The area had recently been burnt which allowed for good archaeological visibility before the full return of the vegetation cover.

The site has been intersected by two powerline servitudes, has an informal soccer field on site and has evidence of prevalent dumping activities. Surface exposed areas investigated included internal tracks and walkways, the borrow-pit turned dam area, as well as the recently burnt agricultural area in the western half of the site.

No other archaeological and cultural heritage resources were identified within the proposed development area. The area has been heavily disturbed by previous agricultural activities so any chance findings of archaeological material in the previously surface disturbed ploughed lands is unlikely to occur *in situ*. It is, however, possible that archaeological material may be uncovered or disturbed during the proposed development and future excavations for individual graves.

Glass bottles dating back to the 1980's and 1990's was identified within the southern extent of the green belt area.



Figure 8. General view of the landscape for the proposed cemetery / memorial park development facing north-west.



Figure 9. View of the general landscape for the proposed cemetery / memorial park development facing south-west.



Figure 10. View of the general landscape for the proposed cemetery / memorial park development facing north.



Figure 11. View of the general landscape for the proposed cemetery / memorial park development facing west.



Figure 12. View of the general landscape for the proposed cemetery / memorial park development facing south-east.



Figure 13. View of the general landscape for the proposed cemetery / memorial park development facing south.



Figure 14. View of the general landscape for the proposed cemetery / memorial park development between the soccer field and access road (W Rd, MN10118).



Figure 15. View of the dense vegetation cover in the green belt / watercourse area.



Figure 16. View of the general landscape for the proposed cemetery / memorial park development facing south-east.



Figure 17. Example of surface exposed areas.



Figure 18. Example of surface exposed areas.



Figure 19. Example of surface exposed areas..



Figure 20. View of the soccer field located near the entrance to the property off W Rd (MN10118).



10 COORDINATES AND SITES FOR THE PROPOSED MEMORIAL PARK AND PRIVATE CEMETERY ON PORTION 50 OF FARM 821, EAST LONDON, BUFFALO CITY METROPOLITAN MUNICIPALITY, EASTERN CAPE PROVINCE.

Table 1. Coordinates and sites for the proposed Memorial Park and Private Cemetery on Portion 50 of Farm 821, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province.

REFERENCE	DESCRIPTION	CO-ORDINATE	HERITAGE GRADING
Proposed Memorial Park	Centrepont of the proposed development.	32°55'09.08"S;27°54'30.58"E	N/A
MP_SA1	Location of the isolated MSA stone artefact observed.	32°55'09.22" S;27°54'29.74" E	Not Graded

11 DESCRIPTION AND GRADING OF SITES

One weathered Middle Stone Age stone artefact was documented on the slopes of the western half of the proposed development. No other archaeological cultural heritage resources were identified within the proposed development area. The area has been heavily disturbed by previous agricultural activities so any chance findings of archaeological material in the previously surface disturbed ploughed lands is unlikely to occur *in situ*. It is, however, possible that archaeological material may be uncovered or disturbed during the proposed development and future excavations for individual graves. The isolated occurrence of the stone artefact has not been graded.

Bottles dating back to the 1980's and 1990's was identified within the southern extent of the green belt area.

12. ASSESSMENT OF IMPACTS ON THE ARCHAEOLOGICAL HERITAGE RESOURCES.

Impacts on the archaeological heritage identified during the study may be considered as low. Only one surface find of a weathered Middle Stone Age Stone artefact was observed. However, it is possible that stone artefacts may be uncovered from below the surface during the proposed development activities for the building infrastructure as well as during the excavations of individual graves.

13. LIMITATIONS AND GAPS IN KNOWLEDGE

13.1. Literature Review

The gathering of information, consultation and research is limited to archaeological heritage data that is known and has been recorded over time. Little systematic archaeological research has been conducted within the immediate area of the proposed development. Most archaeological research that has been conducted in the wider regions of the regions of the former Ciskei and Transkei.

Several relevant archaeological and heritage impact assessments have been conducted within the region. These impact assessments have identified several Early, Middle, and Later Stone Age artefact scatters and sites as well as evidence of Iron Age agropastoralist occupation and/or interaction by the presence of broken earthenware pot sherds and associated material culture and settlement patterns.

13.2. Fieldwork

It is ideal for the entire area to be surveyed on foot especially areas that have not been researched extensively or at all. The identification of archaeological / historical heritage sites is limited to the surface and in areas where archaeological visibility may be hindered by dense vegetation cover, limited to the investigation of disturbed surface areas. The state of archaeological remains can only be determined by surface observation which in itself is limited and does not expose the true state of archaeological evidence. However, a physical survey observation is able to assess the environment where a desktop assessment cannot do justice in determining the significance of the archaeological sensitivity of the proposed development area.

Most importantly, archaeological and heritage resources are a non-renewable resource that cannot be replaced once lost or destroyed, therefore, every effort should be taken to preserve or conserve the most significant of heritage resources. Mitigation measures have been recommended by the author and should be respected and implemented prior to the commencement of the proposed development.

14. RECOMMENDATIONS AND MITIGATION

The area is considered as having a *low archaeological and cultural heritage significance*. Development may proceed as planned; however, the following recommendations must be considered prior to the commencement of development and be included as part of the environmental management plan for the project:

1. If concentrations of pre-colonial archaeological heritage material and/or human remains (including graves and burials) are uncovered during construction of the proposed development and / or future excavations for individual graves, all work must cease immediately and be reported to the Albany Museum (046 622 2312) and/or the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) (043 745 0888) so that systematic and professional investigation/excavation can be undertaken. Phase 2 mitigation in the form of test-pitting/sampling or systematic excavations and collections of the findings will then be conducted to establish the contextual status of the sites and remove the archaeological deposit before development activities continue.
2. Construction managers/foremen and/or the Environmental Control Officer (ECO) should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.

15. CONCLUSION

The proposed area for development is of low archaeological cultural sensitivity and development may proceed as planned taking into consideration the recommendations and mitigation measures included in this report.

The impact on archaeological heritage resources is conserved as being low as only one isolated stone artefact was observed during the survey. This however, may not reflect the true state of the archaeological and cultural resources within the proposed development site. Stone artefacts usually occur between the surface and up to 50 – 80 cm below the surface therefore if concentrations of stone artefacts are uncovered during the infrastructure development and upgrade activities as well as during the excavation of individual graves, an archaeologist must be contacted to assess the site. There is always a possibility that human remains or other archaeological and historical material may be uncovered during the development. Such material must be reported to the Eastern Cape Provincial Heritage Resources Agency (ECPHRA) (043 745 0888) or the Albany Museum (046 622 2312) if exposed.

16. REFERENCES

- Beinart, W. 2003. *The rise of conservation in South Africa*. Oxford University Press.
- Bester, . 1969. Transformation and Reconstitution of Khoe-San Identities: AAS Le Fleur 1, Griqua Identities and Post-Apartheid Khoe-San Revivalism (1894- 2004). PhD Thesis.
- Binneman, JNF. 1996. The symbolic construction of communities during the Holocene Later Stone Age in the south-eastern Cape. Unpublished D.Phil. thesis: University of the Witwatersrand.
- Binneman, JNF. 1997. Results from a test excavation at The Havens Cave, Cambria, south-Eastern Cape. *Southern African Field Archaeology* 6: 93-105.

- Binneman, JNF. 1998. Results from a test excavation at Kleinpoort Shelter in the Baviaanskloof, Eastern Cape Province. *Southern African Field Archaeology* 7: 90-97.
- Binneman, JNF. 1999a. Results from a test excavation at Groot Kommandokloof Shelter in the Baviaanskloof / Kouga region, Eastern Cape Province. *Southern African Field Archaeology* 8: 100-107.
- Binneman, JNF. 1999b. Mummified human remains from the Kouga Mountains, Eastern Cape. *The Digging Stick* 16: 1-12.
- Binneman, JNF. 2000. Results from two test excavations in the Baviaanskloof Mountains, Eastern Cape Province. *Southern African Field Archaeology* 9: 81-92.
- Binneman, JNF. 2001. An introduction to a Later Stone Age coastal research project along the south-eastern Cape coast. *Southern African Field Archaeology* 10: 75-87.
- Binneman, JNF. 2005. Archaeological research along the south-eastern Cape coast part 1: open-air shell middens. *Southern African Field Archaeology* 13 & 14: 49-77. 2004 / 2005.
- Binneman, JNF. 2007. Archaeological research along the south-eastern Cape Coast part 2, caves and shelters: Kabeljous River Shelter 1 and associated stone tool industries. *Southern African Field Archaeology* 15 & 16: 57-74.
- Binneman, J. & Hall, S. 1993. The context of four painted stones from the south-eastern Cape and Eastern Cape. *Southern African Field Archaeology*, 2:89-95.
- Broster, J. A. 2009. *Transkei Heritage*. Port Elizabeth: Downtown Printers.
- Deacon, H.J. 1970. The Acheulean occupation at Amanzi Springs, Uitenhage district, Cape Province. *Annals of the Cape Provincial Museums* 6:141-169.
- Collins, B. & Ames, C. 2015. Revisiting Grassridge Rockshelter in the Eastern Cape province of South Africa: results of the 2014 field season. Presented at the 80th Annual Meeting of the Society for American Archaeology, San Francisco, California. 2015 (tDAR ID: 396031)
- Deacon, H.J. 1995. Two late Pleistocene-Holocene Archaeological Depositories from the Southern Cape, South Africa. *Southern African Archaeological Bulletin*, 5:121-131.
- Deacon, J. 1965. Part 1: Cultural Material from the Gamtoos Valley Shelter (Andrieskraal). *The Southern African Archaeological Bulletin*, 20(80): 193-200.
- Deacon, H.J. 2008. The Context of the 1967-68 sample of human remains from Cave 1 KRM Main Site. *South African Archaeological Society, Goodwin Series*, 10: 143-149.
- Derricourt, R. M. 1977. *Prehistoric Man in the Ciskei & Transkei*. Johannesburg: C. Struik (Pty) Ltd.
- Dewar, G. & Pfeiffer, S. 2004. Postural Behaviour of Later Stone Age People in South Africa. *The South African Archaeological Bulletin*, 59(180): 52-58.
- Dondolo, L. 2005. Intangible Heritage: The Production of Indigenous Knowledge in Various Aspects of Social Life. *Ndilinga – African Journal of Indigenous Knowledge Systems* Vol 4 (1) 2005.

- Feely, J.M. 1987. The Early Farmers of Transkei, Southern Africa. *Bar International Series* 378, Cambridge Monographs in African Archaeology 24.
- Feely, J. M. & Bell-Cross, S. M. 2011. The Distribution of Early Iron Age Settlement in the Eastern Cape: Some Historical and Ecological Implications. *South African Archaeological Bulletin* 66(194): 105-112.
- Fischer, E. C.; Albert, R.; Botha, G.; Cawthra, H. C.; Esteban, I.; Harris, J.; Jacobs, Z.; Marean, C.; Neumann, F. H.; Pargeter, J.; Poupart, M. & Venter, J. 2013. Archaeological Reconnaissance for Middle Stone Age Sites along the Pondoland Coast, South Africa. *Palaeoanthropology* 2013: 104 – 137.
- Gess, W.H.R. 1969. Excavations of a Pleistocene bone deposit at Aloes near Port Elizabeth. *South African Archaeological Bulletin* 24:31-32.
- Green, M. 2006. A letter from 'the other side of silence': Dlodlushe Sondzaba and the Trappist mission in East Griqualand. *Missionalia* 34:2/3182-200
- Hall, S. & Binneman, J. 1987. Later Stone Age Burial Variability in the Cape: A Social Interpretation. *The South African Archaeological Bulletin*, 42(146): 140-142.
- Henderson, Z. 1992. The context of some MSA hearths at Klasies River Shelter 1 B: Implications for understanding human behaviour. *Southern African Field Archaeology*, 1:14-26.
- Hine, P. Sealy, J. Halkett, D. & Hart, T. 2010. Antiquity of Stone Walled Tidal Fish Traps on the Cape Coast, South Africa. *The South African Archaeological Bulletin*, 65 (191): 35-44.
- Hollman, J. 2005. Using Behavioural Postures and Morphology to Identify Hunter-Gatherer Rock Paintings of Therianthropes in Western and Eastern Cape Provinces, South Africa. *The Southern African Archaeological Bulletin*, 60(182): 84-95.
- Huffman, T. N. 2004. The Archaeology of the Nguni Past. *Southern African Humanities* 16: 79-111.
- Klein, R. 1986a. A provisional statement on terminal Pleistocene Mammalian extinctions in the Cape Biotic Zone, Southern Cape Province, South Africa. *Goodwin Series*, No. 2, Progress in Later Cenozoic Studies in South Africa, pp 39-45.
- Klein, R.G. 1986b. The Prehistory of the Stone Age Herders in the Cape province of South Africa. *Goodwin Series*, Vol. 5, Prehistoric Pastoralism in Southern Africa, pp 5-12.
- Maggs, T. 1977. Some recent radiocarbon dates from Eastern and Southern Africa. *The Journal of African History*, 18(2): 161-191.
- Maggs, T. 1993. Three decades of Iron Age Research in South Africa: Some Personal Reflections. *South African Archaeological Bulletin* 48(158): 70-76.
- Masina, E.M. 2006. Zulu Perceptions and Reactions to British Occupation of Land in Natal Colony and Zululand, 1850-1887: Are Capitulation Based on Surviving Oral and Written Sources.
- Mazel, A. D. 1992. Early Pottery from the East of Southern Africa. *South African Archaeological Bulletin* 47: 3-7.

- Mitchell, P.J. 1996. Prehistoric Exchange and Interaction in South-Eastern Southern Africa: Marine Shells and Ostrich Eggshell. *The African Archaeological Review*, 13(1): 36-76.
- National Heritage Resources Act 25 of 1999.
- Parkington, J. & Hall, M. 1987. Patterning in recent radiocarbon dates from Southern Africa as a reflection of prehistoric settlement and interaction. *The Journal of African History*, 28(1): 1-25.
- Pearce, D.G. 2005. Iconography and Interpretation of the Tierkloof Painted Stone. *Goodwin Series*, 9, Further Approaches to Southern African Rock Art, pp 45-53.
- Pfeiffer, S. & Harrington, L. 2011. Bioarchaeological evidence for the basis of small adult stature in Southern Africa. *Growth, mortality and small stature*. *Current Anthropology*, 52(3).
- Phillips, A. 1998. The nature of cultural landscapes – a nature conservation perspective. *Landscape Research* 23:1, 21-38.
- Plug, I. 1997. Late Pleistocene and Holocene hunter-gatherers in the Eastern Highlands of South Africa and Lesotho: A Faunal Interpretation. *Journal of Archaeological Science* 24: 715 – 727.
- Opperman, H. 1982. Some research results of excavations at Colwinton Rock Shelter, North-Eastern Cape. *South African Archaeological Bulletin* 37, 136: 51-56.
- Opperman, H. 1996. Strathalan Cave B, North Eastern Cape Province, South Africa: Evidence for human behaviour 29,000 – 26,000, *Quaternary International*, Vol 33 pp 45-53.
- Opperman, H. Hydenrych, B. 1990. A 22 000-year-old Middle Stone Age Camp Site with Plant Food Remains from the North-Eastern Cape. *South African Archaeological Bulletin* 45: 93-99, 1990.
- Prins, F. E. & Lewis, H. 1992. Bushmen as mediators in Nguni cosmology. *Ethnology* 31(2): 133-147.
- Prins, F. 1993. Aspects of Iron Age Ecology in Transkei. Master of Arts Thesis.
- Prins, F. E. & Granger, J. E. 1993. Early Farming Communities in Northern Transkei: The Evidence from Ntsitsana and Adjacent Areas. *Natal Museum Journal of Humanities* 5: 153-74.
- Prins, F. E. & Hall, S. 1994. Expressions of Fertility in the Rock Art of Bantu-speaking Agriculturalists. *African Archaeological Review* 12: 171-203.
- Prins, F. 1996. African Perceptions of Rock Paintings in the KwaZulu Natal and the Eastern Cape Provinces. *The Digging Stick* 13(1).
- Rapoort, A. 1992. On cultural landscapes. *TDSR* 3:3, 33-47.
- Rudner I J. 1968. Strandloper pottery from South and South West Africa. *Annals of the South African Museum* 49(2). Cape Town.
- Rudner, J. 1979. The use of stone artefacts and pottery among the Khoisan peoples in historic and protohistoric times. *The South African Archaeological Bulletin*, 34(129): 3-17.
- Sealy, J. & Pfeiffer, S. 2000. Diet, Body Size, and Landscape Use among Holocene People in the Southern Cape, South Africa. *Current Anthropology* 41(4): 642-655.

- Shrubsall, F. 1899. A Study of A-Bantu Skulls and Crania. *The Journal of the Anthropological Institute of Great Britain and Ireland*, Vol. 28, No. 1/2, pp. 55-94
- Steyn, M.; Binneman, J & Loots, M. 2007. The Kouga Mummified Human Remains. *South African Archaeological Bulletin*, 62(185): 3-8.
- South African Heritage Resources Agency (SAHRA): Minimum Standards for Archaeological Impact Assessments.
- South African History Online. Conquest of the Eastern Cape 1779-1878/www.sahistory.org.za
- South African History Online. Griqua Community. /www.sahistory.org.za
- South African History Online. 'Kraals of Guns' Fortifications in the Wars of Resistance and Dispossession in the Eastern Cape, 1780-1894. Chapter 6: Colonisation of the Remaining Independent Polities in the East of the Kei.
- Sparrman, A. 1785. *A voyage to the Cape of Good Hope towards the Antarctic polar circle and around the world, but chiefly into the country of the Hottentots and Caffres, from the year 1772 to 1776*. Vol. 1. London: Robinson.
- Stapleton, T.J. 2006. 'Him Who Destroys All': Reassessing the Early Career of Faku, King of the Mpondo, c.1818–1829. *South African Historical Journal*, 38:1, 55-78
- Steele, J. 2011. Potshards of Zig-Zag cave at Port St Johns, Eastern Cape, South Africa. Department of Fine Art, Walter Sisulu University, East London, Eastern Cape.
- Tankard, A.J. & Roger, J. 1978. Late Cenozoic palaeoenvironments on the west coast of Southern Africa. *Journal of Biogeography*, 5: 319-337.
- Taylor, K. 2008. Landscape and Memory: cultural landscapes, intangible values and some thoughts on Asia. In: 16th ICOMOS General Assembly and International Symposium: 'Finding the spirit of place between the tangible and intangible', 29 September – 4 October 2008, Quebec, Canada.
- Thackeray, F. & Feast, E.C. 1974. A Midden Burial from Cape St Francis, Eastern Cape Province. *The South African Archaeological Bulletin*, 29(115/116): 92.
- Turner, M. 1970. A Search for the Tsitsikamma Shelters. *The South African Archaeological Bulletin*, 28(98): 67-70.
- Vogel, J. C. & Fuls, A. Spatial Distribution and Radiocarbon Dates for the Iron Age in Southern Africa. *South African Archaeological Bulletin* 54(170): 97-101.
- Whitelaw, G. 2006. An archaeology of colonization: excavations at a stonewalled site near Rosetta, KwaZulu-Natal. *Southern African Humanities* 26: 83–100
- Wurz, S. 2008. Modern Behaviour at Klasies River. *Goodwin Series*, 10, Current Themes in MSA Research, pp 150-156.

17. RELEVANT ARCHAEOLOGICAL AND HERITAGE IMPACT ASSESSMENTS

Very little systematic archaeological research has been conducted within the immediate and surrounding areas for the proposed project, therefore, Cultural Resource Management

(CRM) Reports, such as archaeological and heritage impact assessments, assist in attempting to predict the archaeological and heritage resources that may be found within

the proposed development areas. The following reports are considered relevant to the current project:

- Anderson, G. 2009. Heritage Survey of the Marine Aquaculture Zone, East London Industrial Development Zone.
- Anderson, G. 2009. Heritage Survey of the Proposed Toboshane Valley Estate, East London.
- Anderson, G. 2009. Heritage Survey of the Proposed Heritage Eco-estate and Conservancy.
- Anderson, G. 2010. Comment on the East London Foreshore Reclamation Project.
- Anderson, G. 2011. Heritage Survey of the Proposed Ikwezi 10MW PV Solar Energy Facility, Site 60826.
- Becker, E. 2008. Phase 1 Heritage Impact Assessment for the Cata / Mnyameni Area, East London, Eastern Cape.
- Binneman, J. 2005. Archaeological Heritage Impact Assessment for the Proposed Gqunubie Valley Golf Estate.
- Binneman, J. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Weathered Dolerite (Sabungu) Mine on Potion 3 Farm No. 860, Mount Coke, East London, Amathole District Municipality.
- Binneman, J. & Webley, L. 1996. Proposed Eastern Cape Zinc and Phosphoric Acid Project: Baseline Report, Sensitivity of Cultural Sites Report for African Environmental Solutions.
- Booth, C. 2018. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application for a Hard Rock Quarry on the Farm Wansley, near East London, Buffalo City Municipality, Amathole District Municipality, Eastern Cape Province.
- Booth, C. 2020. A Phase 1 Archaeological Impact Assessment for The Proposed New Link Road and Box Culvert Within Ward 46, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province.
- Coetzee, F.P. 2008. Cultural Heritage Survey for Nungu Trading 672 (Pty) Ltd Prospecting Application, East London, Eastern Cape.
- Van Ryneveld, K. 2010. Addendum to the Phase 1 Archaeological Impact Assessment: Queenstown Substation and Powerline, East London, Eastern Cape, South Africa.
- De Jong, R. 2011. Heritage Impact Assessment Report: Installation of Long-Haul Dark Fibre Ducting Infrastructure along the N2 between Durban and East London, KZN and Eastern Cape Provinces.
- Hirst, M & Victor, S. A Heritage Impact Assessment of the Development of the East London Regional Waste Disposal Site on the Grave of the Xhosa Poet Laureate, S.E.K. Mqhayi (1874 – 1945), at Ntab'ozuko, Berlin, Eastern Cape.
- Minkley, G. 2008. Heritage Survey: Phase 1 Heritage Impact Assessment for the Atterbury Mixed-Use Development, Gonubie.
- Patrick, M. and Blackenberg, J. 2007. Fort Glamorgan Archaeological Impact Assessment of Historic Graves associated with Erf 20433, East London.

- Philip, L. 2015. Phase 1 Archaeological Impact Assessment: Report for the Proposed Rehabilitation and Refurbishment of the Existing Latimer's Landing Jetty at the Port of East London.
- Van Ryneveld, K. 2007. Phase 1 Archaeological Impact Assessment: Realignment of the Fairway, East London Golf Club, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2007. Phase 1 Archaeological Impact Assessment: Mount Coke Eco Residential and Golf Estate, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008. Phase 1 Archaeological Impact Assessment: Retails and Residential Development Portions 3 and 5 of Farm 1234, Gonubie, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008. Phase 1 Archaeological Impact Assessment: Residential Development, Farm 960, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008. Phase 1 Archaeological Impact Assessment: Riverleigh Township Development, Farm 817 / 53, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008. Phase 1 Archaeological Impact Assessment: Proposed Pipeline, Portion of Farm 1008, Winterstrand, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2009. Phase 1 Archaeological Impact Assessment: The Proposed Sunny South Housing Development, Buffalo City Metropolitan Municipality, Eastern Cape, South Africa.
- Van Ryneveld, K. 2009. Phase 1 Archaeological Impact Assessment: Subdivision and Residential Development, Farm 724/7, Kwelera, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2010. Phase 1 Archaeological Impact Assessment: Consolidation and Rezoning of Farm 640/01 and Farm 640/29. East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2012. Phase 1 Archaeological Impact Assessment: Oxford Harbour View Development, Erven 15833, 15834, 15835 and 33367, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2014. Phase 1 Archaeological Impact Assessment: Calypso Heights Commercial and Residential Development, Off Woolwash Road, Amalinda, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2014. Phase 1 Archaeological Impact Assessment: Final Report – Buffalo Bridge Replacement, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2014. Phase 1 Archaeological Impact Assessment: Upgrade and Expansion of the Cefane Mountain Holiday Resort, Portion of Farm RE/458, East London (near Chintsa), Eastern Cape, South Africa.
- Van Ryneveld, K. 2014. Phase 1 Archaeological Impact Assessment: Keigate Commercial Development Farm 1307 and Portion of Farm RE/1/665, East London, Buffalo City Metropolitan Municipality, Eastern Cape, South Africa.
- Van Ryneveld, K. 2015. Phase 1 Archaeological Impact Assessment: Orange Grove Residential Development, Farm RE/862, East London, BCMM, Eastern Cape.
- Van Ryneveld, K. 2015. Phase 1 Archaeological Impact Assessment: Residential Development, Farm RE/1234, Gonubie, East London, BCMM, Eastern Cape. 17532 and 49336, Orange Grove, East London, Eastern Cape, South Africa.

- Van Ryneveld, K. 2016. Phase 1 Archaeological Impact Assessment: Proposed Bengal Heights Residential Development, Erf RE/2368, Amalinda, East London, Buffalo City Metropolitan Municipality.
- Webley, L. Vernon, G. 2008. Phase 1 Heritage Impact Assessment: The Construction of a Dual Carriageway linking Fitzpatrick Road and Currie Street on the "Sleeper Site", Erf 15835, Buffalo City, Eastern Cape.

Surrounds:

- Anderson, G. 2009. Heritage Survey for the Peregrine Dunes Golf Estate, East London, Eastern Cape.
- Anderson G. 2010. Heritage survey of the proposed Lushington Park Windfarm.
- Coetzee, F.P. 2008. Cultural Heritage Survey for the Nungu Trading 672 (Pty) Ltd Prospecting Application, East London, Eastern Cape.
- Van Ryneveld, K. 2008a. Phase 1 Archaeological Impact Assessment: Cove Rock Golf Estate, Cove Rock, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008b. Phase 1 Archaeological Impact Assessment: Residential development, Portions 1 and 4 of farm 1245, Cove Rock, East London, Eastern Cape.
- Van Ryneveld, K. 2008c. Phase 1 Archaeological Impact Assessment: Hotel and conference centre development, Portion 2 of Farm 992, Cove Rock, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008d. Phase 1 Archaeological Impact Assessment: Development of a shopping mall and commercial offices, portions 21, 22, 23 of Farm 925, Cove Rock, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008e. Phase 1 Archaeological Impact Assessment: Rezoning and subdivision for mixed use development, Farm 939, Cove Rock, East London, Eastern Cape South Africa.
- Van Ryneveld, K. 2008f. Phase 1 Archaeological Impact Assessment: Rezoning and subdivision for purposes of mixed-use development, farm Re/961, Cove Rock, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008g. Phase 1 Archaeological Impact Assessment: Warehouse and light industrial development, Farm 922, Cove Rock, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008h. Letter of Recommendation: Exemption from a phase 1 archaeological impact assessment for the beachfront adjoining the Cove Rock Golf Estate and the Hotel and Conference centre development, Cove Rock, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008i. Phase 1 Archaeological Impact Assessment: Kidd's Beach Golfing Estate, Kidd's Beach, East London, Eastern Cape.

- Van Ryneveld, K. 2008j. Letter of Recommendation: Shell midden at Kidd's Beach Golfing Estate, portion of Farms 1075, 1076, 1077, 1078, 1079, 1086, Kidd's Beach, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2008k. Rezoning and mixed-use development, portion 4 of Farm 1050, Kidd's Beach, East London, Eastern Cape, South Africa.
- Van Ryneveld, K. 2009. Phase 1 Archaeological Impact Assessment: Extension of the Rock Cliff Golf Estate, Cove Rock, East London, Eastern Cape, South Africa.

18. GENERAL REMARKS AND CONDITIONS

NOTE: This report is a phase 1 archaeological impact assessment (AIA) only and does not include or exempt other required specialist assessments as part of the heritage impact assessments (HIAs).

The National Heritage Resources Act (Act No. 25 of 1999, Section 35 [Brief Legislative Requirements]) requires a full Heritage Impact Assessment (HIA) in order that all heritage resources including all places or objects of aesthetics, architectural, historic, scientific, social, spiritual, linguistic, or technological value or significance are protected. Thus, any assessment should make provision for the protection of all these heritage components including archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects.

It must be emphasized that the conclusions and recommendations expressed in this phase 1 archaeological impact assessment (AIA) are based on the visibility of archaeological remains, features and, sites and may not reflect the true state of affairs. Many archaeological remains, features and, sites may be covered by soil and vegetation and will only be located once this has been removed. In the event of such archaeological heritage being uncovered (such as during any phase of construction activities), archaeologists or the relevant heritage authority must be informed immediately so that they can investigate the importance of the sites and excavate or collect material before it is destroyed. The onus is on the developer to ensure that this agreement is honoured in accordance with the National Heritage Resources Act No. 25 of 1999 (NHRA 25 of 1999).

Archaeological Specialist Reports (desktops and AIA's) will be assessed by the relevant heritage resources authority. The final comment/decision rests with the heritage resources authority that may confirm the recommendations in the archaeological specialist report and grant a permit or a formal letter of permission for the destruction of any cultural sites.

APPENDIX A: HERITAGE LEGISLATIVE REQUIREMENTS

Sections 3, 34, 35, 36, 38, 48, 49 and 51 of the National Heritage Resources Act 25 of 1999 apply:

S3. National estate

(1) For the purposes of this Act, those heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations must be considered part of the national estate and fall within the sphere of operations of heritage resources authorities.

(2) Without limiting the generality of subsection (1), the national estate may include –

- (a) places, buildings, structures and equipment of cultural significance;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features of cultural significance;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and palaeontological sites;
- (g) graves and burial grounds, including –
 - (i) ancestral graves;
 - (ii) royal graves and graves of traditional leaders;
 - (iii) graves and victims of conflict;
 - (iv) graves of individuals designated by the Minister by notice in the Gazette;
 - (v) historical graves and cemeteries; and
 - (vi) other human remains which are not covered in terms of the Human Tissue Act, 1983 (Act No. 65 of 1983);
- (h) sites of significance relating to the history of slavery in South Africa;
- (i) movable objects, including –
 - (i) objects recovered from the soil or waters of South Africa, including archaeological and palaeontological specimens;
 - (ii) objects to which oral traditions are attached or which are associated with living heritage;
 - (iii) ethnographic art and objects;
 - (iv) military objects;
 - (v) objects of decorative or fine art;
 - (vi) objects of scientific or technological interest; and
 - (vii) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act (Act No. 43 of 1996).

(3) Without limiting the generality of subsections (1) and (2), a place or object is to be considered part of ¹⁹ national estate if it has cultural significance or other special value because of –

- (a) its importance in the community, or pattern of South Africa's history;
- (b) its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- (c) its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- (d) its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- (e) its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- (f) its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- (g) its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- (i) sites of significance relating to the history of slavery in South Africa.

S34. Structures

- (1) No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
- (2) Within three months of the refusal of the provincial heritage resources authority to issue a permit, consideration must be given to the protection of the place concerned in terms of one of the formal designations provided for in Part 1 of this Chapter.
- (3) The provincial heritage resources authority may at its discretion, by notice in the Provincial Gazette, make an exemption from the requirements of subsection (1) within a defined geographical area, provided that it is satisfied that heritage resources falling into the defined area or category have been identified and adequately provided for in terms of the provisions of Part 1 of this Chapter.
- (4) Should the provincial heritage resources authority believe it to be necessary if by, following a three-month notice period published in the Provincial Gazette, withdraw or amend a notice under subsection (3).

S35. Archaeology, palaeontology and meteorites

- (1) Subject to the provisions of section 8, the protection of archaeological and palaeontological sites and material and meteorites is the responsibility of a provincial heritage resources authority: Provided that the protection of any wreck in the territorial waters and maritime cultural zone shall be the responsibility of SAHRA.
- (2) Subject to the provisions of subsection (8)(a), all archaeological objects, palaeontological material and meteorites are the property of the State. The responsible heritage authority must, on behalf of the State, at its discretion ensure that such objects are lodged with a museum or other public institution that has a collation policy acceptable to the heritage resources authority and may in doing so establish such terms and conditions as it sees fit for the conservation of such objects.
- (3) Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development or agricultural activity must immediately report the find to the responsible heritage resources authority, or to the nearest local authority or museum, which must immediately notify such heritage resources authority.
- (4) No person may, without a permit issued by the responsible heritage resources authority—
 - (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
 - (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
 - (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
 - (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
- (5) When the responsible heritage resources authority has reasonable cause to believe that any activity or development which will destroy, damage or alter any archaeological or palaeontological site is under way, and where no application for a permit has been submitted and not heritage resources management procedure in terms of section 38 has been followed, it may –
 - (a) Serve on the owner or occupier of the site or on the person undertaking such development an order for the development to cease immediately for such period as is specified in the order;
 - (b) Carry out an investigation for the purpose of obtaining information on whether or not an archaeological or palaeontological site exists and whether mitigation is necessary;
 - (c) If mitigation is deemed by the heritage resources authority to be necessary, assist the person on whom the order has been served under paragraph (a) to apply for a permit as required in subsection (4); and
 - (d) Recover the costs of such investigation from the owner or occupier of the land on which it is believed an archaeological or palaeontological site is located or from the person proposing to undertake the development if no application for a permit is received within two weeks of the order being served.

- (5) The responsible heritage resources authority may, after consultation with the owner of the land on which archaeological or palaeontological site or a meteorite is situated, serve a notice on the owner or any other controlling authority, to prevent activities within a specified distance from such site or meteorite.
- (6)(a) Within a period of two years from the commencement of this Act, any person in possession of any archaeological or palaeontological material or object or any meteorite which was acquired other than in terms of a permit issued in terms of this Act, equivalent provincial legislation or the National Monuments Act, 1969 (Act No. 28 of 1969), must lodge with the responsible heritage resources authority lists of such objects and other information prescribed period shall be deemed to have been recovered after the date on which this Act came into effect.
- (b) Paragraph (a) does not apply to any public museum or university.
- (c) The responsible authority may at its discretion, by notice in the Gazette or the Provincial Gazette, as the case may be, exempt any institution from the requirements of paragraph (a) subject to such conditions as may be specified in the notice, and may by similar notice withdraw or amend such exemption.
- (8) and object or collection listed under subsection (7) –
 - (a) remains in the ownership of the possessor for the duration of his or her lifetime, and SAHRA must be notified who the successor is; and
- (9) must be regularly monitored in accordance with regulations by the responsible heritage authority.

S36. Burial grounds and graves

- (1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.
- (2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.
- (3)(a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—
 - (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
 - (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
 - (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
- (3) SAHRA or provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.
- (4) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)(b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority –
 - (a) Made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and
 - (b) Reached agreements with such communities and individuals regarding the future of such grave or burial ground.
- (5) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority –
 - (a) Carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

- (b) If such grave is protected or is of significance, assist any person who or community which is the direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.
- (6)(a) SAHRA must, over a period of five years from the commencement of this Act, submit to Minister for his or her approval lists of graves and burial grounds of persons connected with the liberation struggle and who died in exile or as a result of the action of State security forces or agents provocateur and which, after a process of public consultation, it believes should be included among those protected under this section.
- (c) The Minister must publish such lists as he or she approved in the Gazette.
- (6) Subject to section 56(2), SAHRA has the power, with respect to the graves of victims of conflict outside the Republic, to perform any function of a provincial heritage resources authority in terms of this section.
- (7) SAHRA must assist other State Departments in identifying graves in a foreign country of victims of conflict connected with the liberation struggle and, following negotiations with the next of kin, or relevant authorities, it may reinter the remains of that person in a prominent place in the capital of the Republic.

S.37 Public monuments and memorials

Public monuments and memorials must, without the need to publish a notice to this effect, be protected in the same manner as places which are entered in a heritage register referred to in section 30.

S38. Heritage resources management

- (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as –
 - (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
 - (b) the construction of a bridge or similar structure exceeding 50 m in length;
 - (c) any development or other activity which will change the character of the site –
 - (i) exceeding 5 000 m² in extent, or
 - (ii) involving three or more erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;
 - (d) the re-zoning of a site exceeding 10 000 m² in extent; or
 - (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must as the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.
- (2) The responsible heritage resources authority must, within 14 days of receipt of a notification in terms of subsection (1) –
 - (a) if there is a reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report. Such report must be compiled at the cost of the person proposing the development, by a person or persons approved by the responsible heritage resources authority with relevant qualifications and experience and professional standing in heritage resources management; or
 - (b) notify the person concerned that this section does not apply.
- (3) The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:
 - (a) The identification and mapping of all heritage resources in the area affected;
 - (b) An assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;
 - (c) An assessment of the impact of development on such heritage resources;

- (d) An evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
 - (e) The results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
 - (f) If heritage resources will be adversely affected by the proposed development, the consideration of alternative; and
 - (g) Plans for mitigation of any adverse effects during and after the completion of the proposed development.
- (4) The report must be considered timeously by the responsible heritage resources authority which must, after consultation with the person proposing the development, decide –
- (a) whether or not the development may proceed;
 - (b) any limitations or conditions to be applied to the development;
 - (c) what the general protections in terms of this Act apply, and what formal protections may be applied, to such heritage resources;
 - (d) whether compensatory action is required in respect of any heritage resources damaged or destroyed as a result of development; and
 - (e) whether the appointment of specialists is required as a condition of approval of the proposal.
- (5) A provincial heritage resources authority may not make any decision under subsection (4) with respect to any development with impacts on a heritage resource protected at national level unless it has consulted SAHRA.
- (6) The applicant may appeal against the decision of the provincial heritage resources authority to the MEC, who –
- (a) must consider the views of both parties; and
 - (b) may at his or her discretion –
 - (i) appoint a committee to undertake an independent review of the impact assessment report and the decision of the responsible heritage resources authority;
- And
- (ii) consult SAHRA; and
 - (c) must uphold, amend or overturn such decision.
- (7) The provisions of this section do not apply to a development described in subsection (1) affecting any heritage resource formally protected by SAHRA unless the authority concerned decides otherwise.
- (8) The provisions of this section do not apply to a development as described in subsection (1) if an evaluation of the impact of such development on heritage resources is required in terms of the impact of such development of heritage resources is required in terms of the Environment Conservation Act, 1989 (Act No. 73 of 1989), or the integrated environmental management guidelines issued by the Department of Environmental Affairs and Tourism, or the Mineral Act, 1991 (Act No. 50 of 1991), or any other legislation: Provided that the consenting authority must ensure that the evaluation fulfils the requirements of the relevant heritage resources authority in terms of subsection (3), and any comments and recommendations of the relevant heritage resources authority with regards to such development have been taken into account prior to the granting of the consent.
- (9) The provincial heritage resources authority, with the approval of the MEC, may, by the notice in the Provincial Gazette, exempt from the requirements of this section any place specified in the notice.
- (10) Any person who has complied with the decision of a provincial heritage resources authority in subsection (4) or of the MEC in terms of subsection (6) or other requirements referred to in subsection (8), must be exempted from compliance with all other protections in terms of this part, but any existing heritage agreements made in terms of section 42 continue to apply.

S48. Permits

- (1) A heritage resources authority may prescribe the manner in which an application is made to it for any permit in terms of this Act and other requirements for permit applications, including –
- (a) any particulars or information to be furnished in the application and any documents, drawings, plans, photographs and fees which should accompany the application;

- (b) minimum qualifications and standards of practice required of persons making application for a permit to perform specified actions in relation to particular categories of protected heritage resources;
 - (c) standards and conditions for the excavation and curation of archaeological and palaeontological objects and material and meteorites recovered by authority of a permit;
 - (d) the conditions under which, bore a permit is issued, a financial deposit must be lodged and held in trust for the duration of the permit or such period as the heritage resources authority may specify, and conditions of forfeiture of such deposit;
 - (e) conditions for the temporary export and return of objects under section 32 or section 35;
 - (f) the submission of reports on work done under authority of a permit; and
 - (g) the responsibilities of the heritage resources authority regarding monitoring of work done under authority of a permit.
- (2) On application by any person in the manner prescribed under subsection (1), a heritage resources authority may in its discretion issue to such person a permit to perform such actions at such time and subject to such terms, conditions and restrictions or directions as may be specified in the permit, including a condition –
- (a) that the applicant give security in such form and such amount determined by the heritage resources authority concerned, having regard to the nature and extent of the work referred to in the permit, to ensure the satisfactory completion of such work or the curation of objects and material recovered during the course of the work; or
 - (b) providing for the recycling or deposit in a materials bank of historical building materials; or
 - (c) stipulating that design proposals be revised; or
 - (d) regarding the qualifications and expertise required to perform those actions for which the permit is issued.
- (3) A heritage resources authority may at its discretion, in respect of any heritage resource protected by it in terms of the provisions of Chapter II, by notice in the Gazette or the Provincial Gazette, as the case may be, grant an exemption from the requirement to obtain a permit from it for such activities or class of activities by such persons or class of persons in such circumstances as are specified in the notice.

S49. Appeals

- (1) Regulations by the Minister and the MEC must provide for a system of appeal to the SAHRA Council for a provincial heritage resources council against a decision of a committee or other delegated representative of SAHRA or a provincial heritage resources body authority.
- (2) Anybody wishing to appeal against a decision of the SAHRA Council or the council of a provincial heritage resources authority must notify the Minister or MEC in writing within 30 days. The Minister or MEC, must have due regards to –
- (a) the cultural significance of the heritage resources in question;
 - (b) heritage conservation principles; and
 - (c) any other relevant factor which is brought to its attention by the appellant or the heritage resources authority.

S51. Offences and penalties

- (1) Notwithstanding the provisions of any other law, any person who contravenes –
- (a) sections 27(18), 29(10), 32(13) OR 32(19) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 1 of the Schedule;
 - (b) sections 33(2), 35(4) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 2 of the Schedule;
 - (c) sections 28(3) or 34(1) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 3 of the Schedule;
 - (d) sections 27(22), 32(15), 35(6), or 44(3) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 4 of the Schedule;
 - (e) sections 27(23)(b), 32(17), 35(3) or 51(8) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 5 of the Schedule;
 - (f) sections 32(13), 32(16), 32(20), 35(7)(a), 44(2), 50(5) or 50(12) is guilty of an offence and liable to a fine or imprisonment or both such fine and imprisonment as set out in item 6 of the Schedule.

(2) The Minister, with the concurrence of the relevant MEC, may prescribe a penalty of a fine or of imprisonment for a period not exceeding six months for any contravention or failure to comply with regulations by heritage resources authorities or by-laws by local authorities.

(3) The Minister or the MEC, as the case may be, may make regulations in terms of which the magistrate of the district concerned may –

- (a) levy admission of guild fines up to a maximum amount of R10 000 for infringement of the terms of this Act for which such heritage resources authority is responsible; and
- (b) serve a notice upon a person who is contravening a specified provision of this Act or has not complied with the terms of a permit issued by such authority, imposing a daily fine of R50 for the duration of the contravention, subject to a maximum period of 365 days.

(4) The Minister may from time to time by regulation adjust the amounts referred to in subsection (3) in order to account for the effect of inflation.

(5) Any person who-

- (a) fails to provide any information that is required to be given, whether or not on the request of a heritage resources authority, in terms of this Act;
- (b) for the purpose of obtaining, whether for himself or herself or for any other person, any permit, consent or authority in terms of this Act, makes any statement or representation knowing it to be false or not knowing or believing it to be true;
- (c) fails to comply with or perform any act contrary to the terms, conditions, restrictions or directions subject to which any permit, consent or authority has been issued to him or her in terms of this Act;
- (d) obstructs the holder of a permit in terms of this Act in exercising a right granted to him or her by means of such a permit;
- (e) damages, takes, or removes, or causes to be damaged, taken or removed from a place protected in terms of this Act any badge or sign erected by a heritage authority or a local authority under section 25(2)(j) or section 27(17), any interpretive display or any other property or thing.
- (f) receives any badge, emblem or any other property or thing unlawfully taken or removed from a place protected in terms of this Act; and
- (g) within the terms of this Act, commits or attempts to commit any other unlawful act, violates any prohibition or fails to perform any obligation imposed upon him or by its terms, or who counsels, procures, solicits or employs any other person to do so.

shall be guilty of an offence and upon conviction shall be liable to such maximum penalties, in the form of a fine or imprisonment or both such fine and such imprisonment, as shall be specified in the regulations under subsection (3).

(6) Any person who believes that there has been an infringement of any provision of this Act, may lay a charge with the South African Police Service or notify a heritage resources authority.

(7) A magistrate's court shall, notwithstanding the provisions of any other law, be competent to impose any penalty under this Act.

(8) When any person has been convicted of any contravention of this Act which has resulted in damage or to alteration of a protected heritage resource the court may –

- (a) order such person to put right the result of the act of which he or she was guilty, in the manner so specified and within such period as may be so specified, and upon failure of such person to comply with the terms of such order, order such person to pay to the heritage resources authority responsible for the protection of such resource a sum equivalent to the cost of making good; or
- (b) when it is of the opinion that such a person is not in a position to make good damage done to a heritage resources by virtue of the offender not being the owner or occupier of a heritage resources or for any other reason, or when it is advised by the heritage resources authority responsible for the protection of such resource that it is unrealistic or undesirable to require that the results of the act be made good, order such person to pay the heritage resources authority a sum equivalent to the cost of making good.

(9) In addition to other penalties, if the owner of a place has been convicted of an offence in terms of this Act involving the destruction of, or damage to, the place, the Minister on the advice of SAHRA or the MEC on the advice of a provincial heritage resources authority, may serve on the owner an order that no development of such place may be undertaken, except when making good the damage and maintaining the cultural value of the place, or for a period not exceeding 10 years specified in the order.

- (10) Before making the order, the local authority and any person with a registered interest in the land must be given a reasonable period to make submissions on whether the order should be made and for how long.
- (11) An order of no development under subsection (9) attaches to the land and is binding not only on the owner as at the date of the order, but also on any person who becomes an owner of the place while the order remains in force.
- (12) The Minister on the advice of SAHRA, may reconsider an order of no development and may in writing amend or repeal such order.
- (13) In any case involving vandalism, and whenever else a court deems it appropriate, community service involving conservation of heritage resources may be substituted for, or instituted in addition to, a fine or imprisonment.
- (14) Where a court convicts a person of an offence in terms of this Act, it may order for forfeiture to SAHRA or the provincial heritage resources authority concerned, as the case may be, of a vehicle, craft, equipment or any other thing used or otherwise involved in the committing of the offence.
- (15) A vehicle, craft, equipment or other thing forfeited under subsection (14) may be sold or otherwise disposed of as the heritage resources authority concerned deems fit.

APPENDIX B: GRADING SYSTEM

The National Heritage Resources Act 25 of 1999 stipulates the assessment criteria and grading of archaeological sites. The following categories are distinguished in Section 7 of the Act and the South African Heritage Resources Agency:

- National: This site is suggested to be considered of Grade 1 significance and should be nominated as such. Heritage resources with qualities so exceptional that they are of special national significance.
- Provincial: This site is suggested to be considered of Grade II significance and should be nominated as such. Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region
- Local: This site is suggested to be Grade IIIA significance. This site should be retained as a heritage register site (High significance) and so mitigation as part of the development process is not advised.
- Local: This site is suggested to be Grade IIIB significance. It could be mitigated and (part) retained as a heritage register site (High significance).
- 'General' Protection A (Field Rating IV A): This site should be mitigated before destruction (usually High/Medium significance).
- 'General' Protection B (Field Rating IV B): This site should be recorded before destruction (usually Medium significance).
- 'General' Protection C (Field Rating IV C): This site has been sufficiently recorded (in the Phase 1). It requires no further recording before destruction (usually Low significance).

APPENDIX C: IDENTIFICATION OF ARCHAEOLOGICAL FEATURES AND MATERIAL FROM COASTAL AND INLAND AREAS: guidelines and procedures for developers

1. Stone artefacts

Stone artefacts are the most common and identifiable precolonial artefacts occurring on the South Africa landscape. Early Stone Age, Middle Stone Age and Later Stone Age stone artefacts occur in various concentrations on the South Africa landscape. Stone artefacts are very commonly found occurring on flat floodplains in a mostly secondary or disturbed context. However, they can be also be found in an *in situ* or undisturbed context in areas where little human or animal impact happens such as open sites mostly near rocky outcrops, amongst boulders and caves.

These may be difficult for the layman to identify. However, large accumulations of flaked stones which do not appear to have been distributed naturally should be reported. If the stone tools are associated with bone remains, development should be halted immediately and archaeologists notified.



Early Stone Age (ESA) stone artefact
(1.5 million years ago – 250 000 years ago)



Middle Stone Age stone artefacts
(250 000 – 30 000 years ago)



Later Stone Age stone artefacts
(30 000 years ago – historical times)

2. Pottery scatters

Pottery scatters can be associated with either Khoekhoen pastoralists, the Nguni first farming communities (referred to as the South African Iron Age) or colonial settlement and can be dated to within the last 2 000 years which occur both at the coast and inland. Pottery associated with Bushmen / hunter-gatherers is generally thought to occur in the Karoo region. The most obvious difference between Khoekhoen and Nguni pottery are the decorations, shapes, sizes and wall thickness. Khoekhoen pottery is generally thinner than the thicker walled and robust Nguni pottery. Colonial ceramics ranges from

Later Stone Age stone age artefacts and associated cultural material
(last 40 000 years)

Precolonial pottery and colonial ceramics are more easily identifiable by the layman and should be reported.



Khoekhoen earthenware pottery
(last 2 000 years)



Iron Age earthenware pottery
(last 2 000 years)



Examples of 19th century European ceramics

3. Historical artefacts and features

These are easy to identify and include colonial artefacts (such as ceramics, glass, metal, etc.), foundations of buildings or other construction features and items from domestic and military activities associated with early travellers' encounters on the landscape and European settlement.



**Example of a Fortified Structure
(Fort Double Drift)**



Ruin of stone packed dwelling



Glass artefacts

4. Shell middens (marine and freshwater)

Shell middens can be defined as an accumulation of marine or freshwater shell deposited by past human populations rather than the result of natural or animal activity. Marine shell middens occur all along the coast and may extend within 5 km of the coastline. This area is generally regarded as being archaeologically sensitive. The shells are concentrated in a specific locality above the high-water mark and frequently contain various edible and sometimes inedible marine shells, stone tools, pottery, bone (fish and animal) and occasionally also human remains. Shell middens may be of various sizes and depths, but an accumulation which exceeds 1 m² in extent, should be reported to an archaeologist. Freshwater shell middens occur along river banks and comprise freshwater shell, fish and animal bone, stone tools, pottery, and sometimes human remains.



Examples of the occurrence of coastal shell middens

5. Large stone features

They come in different forms and sizes, but are easy to identify. The most common are roughly circular stone walls (mostly collapsed) and may represent stock enclosures, remains of wind breaks or cooking shelters. Others consist of large piles of stones of different sizes and heights and are known as *isisivane*. They are usually near river and mountain crossings. Their purpose and meaning are not fully understood; however, some are thought to represent burial cairns while others may have symbolic value.



Examples of stone packed features

6. Graves, Burials and Human Skeletal material

Formal historical graves are easily identifiable as they are in most cases fenced off or marked with engraved headstones. Informal stone packed graves in several instances also occur within these fenced off areas.

It is difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion or construction activities for development. Several human remains have been rescued eroding out of the dunes along this coastline and dongas in inland areas. In some instances, packed stones or rocks may indicate the presence of informal pre-colonial burials.

Human remains, whether the complete remains of an individual buried during the past, or scattered human remains resulting from disturbance of the grave, should be reported. In general, the remains are buried in a flexed position on their sides, but are also found buried in a sitting position with a flat stone capping and developers are requested to be on the alert for this.



Exposed human remains eroding out a coastal shell midden.



Exposed human remains eroding out an inland donga

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of 6 January 2021.

PROJECT TITLE

A PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED MEMORIAL PARK AND PRIVATE CEMETERY ON PORTION 50 OF FARM 821, EAST LONDON, BUFFALO CITY METROPOLITAN MUNICIPALITY, EASTERN CAPE PROVINCE.

SPECIALIST ¹	Celeste Booth t/a Booth Heritage Consulting		
Contact person:	Celeste Booth		
Postal address:	8 Frances Street, Oatlands, Makhanda		
Postal code:	6139	Cell:	082 062 4655
Telephone:	082 062 4655	Fax:	N/A
E-mail:	Cbooth670@gmail.com		
Professional affiliation(s) (if any)	N/A		

Project Consultant:
Contact person:
Postal address:

Indwe Environmental Consulting cc		
Megan Hugo (Registered EAP- EAPASA Reg No. 2019/1530)		
2 Ayr Place, Bonnie Doon, East London		
	Cell:	082 259 3981
Postal code:		
Telephone:		
E-mail:	Fax:	
5241		
043 555 0656		086 513 9734
megan@indwecon.co.za		

4.2 The SPECIALIST

I, **Celeste Booth**, declare that –

General declaration:

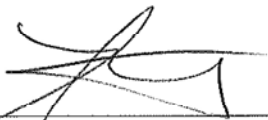
- I act as the independent Specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, 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 will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- 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;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by

interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;

- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.



Signature of the environmental assessment practitioner:

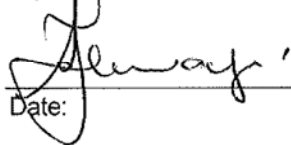
t/a Booth Heritage Consulting

Name of company:

16.05.2025

Date:

Signature of the Commissioner of Oaths:



Date:

16/05/2025

Designation:

¹ Curriculum Vitae (CV) attached

Official stamp (below).

SUZETTE FLANAGAN
MANAGER: ACADEMIC ADMINISTRATION
Commissioner of Oaths, Sarah Baartman District
Rhodes University, Drostdy Road
Makhanda, 6139

I certify that before administering the Oath affirmation I asked the deponent the following questions which were answered
a) Do you know and understand the contents of this declaration?
b) Do you have any objection to taking the prescribed oath?
c) Do you consider the prescribed oath to be binding on your conscience?
d) I further certify that the deponent has acknowledged that he/she knows and understands the contents of the deponent's signature/mark placed thereon in my presence

Date: 16/5/25

Signature:

SUZETTE FLANAGAN
MANAGER: ACADEMIC ADMINISTRATION
Commissioner of Oaths, Sarah Baartman District
Rhodes University, Drostdy Road, Makhanda, 6139

Annexure 1

CV

Curriculum Vitae

Celeste Booth

CURRICULUM VITAE

NAME: Celeste Booth

IDENTITY NUMBER: 8001290110089

DATE OF BIRTH: 29 January 1980

GENDER: Female

NATIONALITY: South African

QUALIFICATIONS:

1997: Matric Senior Certificate (Lawson Brown High School)

2005: Bachelor of Administration (B. Admin: Public Administration and Political Science as undergraduate majors)
University of Port Elizabeth/Nelson Mandela Metropolitan University

2006: Occasional Student for non-degree purposes focusing on the undergraduate Archaeology programme – completed the three years in one year.
University of Cape Town

2007: Bachelor of Science Honours (BSc Archaeology)
University of Cape Town

Current: Completed the course work for an MPhil in Bioethics at the University of Stellenbosch, currently conducting research and preparation for the thesis to complete the degree. Not currently registered.

MERITS AWARDED:

2004: Golden Key Member

2006: Merit Award for Archaeology in Practice

TERTIARY FIELD EXPERIENCE:

2006:

1. Clanwilliam Field School:
Excavation of historical labourer's cottage at Warmhoek (Cedric Poggenpoel), rock art survey of areas in and around Clanwilliam (Tony Manhire).
2. Middle Stone Age (MSA) excavation at Diepkloof Rock Shelter (Pierre-Jean Texier & Jean-Philippe Rigaud)
3. Survey for signs of pastoralism along the Breede River, Swellendam (Charlie Arthur) 2007:

1. Excavation at Hoffman's / Robberg Cave, Robberg Peninsula, Plettenberg Bay (Catharine Kyriaku & Judy Sealy)
2. Middle Stone Age (MSA) Excavation at Diepkloof Rock Shelter (Pierre-Jean Texier)

ARCHAEOLOGICAL / HERITAGE RESEARCH EXPERIENCE:

Five years archaeological research on the Western Cape focusing on the west coast of the south-western Cape and fourteen years archaeological research in the Eastern Cape. This includes the fields of Middle Stone Age, Later Stone Age, Coastal, the last 2000 years, Rock Art, and some historical.

Currently focussing on the curation and conservation of the archaeological and human remains collections in Albany Museum's Archaeology Repository. Research focusses on the ethics of the archaeological human remains collection, distinguishing between the unethical and ethical collected remains since the 1890's. These includes consultation with local Khoe and San and traditional communities on regular basis. However, at this point consultation with local Khoe communities is proving to be challenging until the implementation of the requirements and recognition of the Khoe and San leadership have been completed as per the Traditional and Khoi-San Leadership Act No. 3 of 2019.

CONFERENCES ATTENDED:

2004:

1. Anthropology of South Africa (ASA) Conference, Durban, South Africa. Presentation: "Indigenous Knowledge and Sustainable Development in the 21st Century".

2008:

1. Association of South African Professional Archaeologists (ASAPA) Biennial Conference, Cape Town, South Africa.

2009:

1. South African Museum Association (SAMA) National Conference, Port Elizabeth, South Africa.

Joint Presentation (with Dr J.N.F. Binneman): "Heritage Management and Conservation".

2011:

1. South African Museum Association (SAMA) Eastern Cape Conference, Port Elizabeth, South Africa.

Presentation: "Respecting Human Remains in Removal, Research and Repatriation".

2. Association of South African Professional Archaeologists (ASAPA) Biennial Conference, Mbabane, Swaziland.

Presentation: "The Last 2000 Years of Diepkloof Rock Shelter, Verlorenvlei, south-western Cape".

2012:

1. South African Museum Association (SAMA) National Conference, Paarl, South Africa.

Presentation: "The Evolving Heritage Sector and Adaptation for Success"

2013:

1. South African Museum Association (SAMA) Eastern Cape Conference, Port Alfred, Eastern Cape, South Africa.

Presentation: "The Evolving Heritage Sector and Adaptation for Success"

2016:

1. First National Cultural Observatory Conference, Port Elizabeth, Eastern Cape, South Africa.
2. South African Museum Association (SAMA) Eastern Cape Regional Conference, Grahamstown, Eastern Cape, South Africa.

Presentation: "Cultural Landscapes"

3. South African Museum Association (SAMA) 80th National Conference, 1-3 November 2016, Pretoria, Gauteng, South Africa.

Presentation: "Cultural Landscapes"

2017:

1. South African Museum Association (SAMA) Eastern Cape Regional Conference, Uitenhage, Eastern Cape, South Africa.

Presentation: "The Silence is Deafening: Rescue Mitigation of a Disturbed Burial Ground Near Addo".

2019:

1. Association of Southern African Archaeologists (ASAPA) Conference 2019, Sol Plaatje University, Kimberly, Northern Cape, South Africa.

Presentation: "A Social Justice Approach to Human Remains Management".

2. South African Museums Association (SAMA) National Conference, Pietermaritzburg, KwaZulu Natal, South Africa.

2020:

1. International Summit Nelson Mandela Museum, Mthatha, 10 & 11 February.

Presentation: A Unique Narrative

2. Commonwealth Association of Museums Conference. Living Forward, Looking Back: Museum Practice for Postcolonial Futures. Cape Town, South Africa, 9 – 15 March 2020

Presentation: Development of an Ethical Human Remains Policy, Albany Museum, Eastern Cape, South Africa

2021:

1. World Archaeology Congress 9 (WAC9) 2022, Prague, Czech Republic, July 03-08, 2022
Presentation: Ethics and Human Remains Management in A Provincial Museum in The Eastern Cape, South Africa.

2022:

1. Grahamstown History Society, Keynote Speaker.

Presentation: Rock Art of The Koonap River Valley and The Winterberg, Eastern Cape Province

2. Wildlife and Environmental Society of South Africa (WESSA) (Makhanda Branch) AGM, Keynote Speaker.

Presentation: Carter, The Curse, Tutankhamun, and How an 18th Dynasty Mummy Came to the Albany Museum.

WORKSHOPS ATTENDED

2008:

1. Rock Art Management Workshop, Mapungubwe, Limpopo Province. Presented by the Getty Conservation Institute in collaboration with the South African Rock Art Project (SARAP), the South African National Parks (SANParks) and the South African Heritage Resources Agency (SAHRA).

2009:

1. Rock Art Conservation, Treatment and Interventions, Clanwilliam. Presented by the Getty Conservation Institute in collaboration with the South African Heritage Resources Agency (SAHRA), Living Landscape Project, the Rock Art Research Institute (RARI) and Cape Nature.

2010:

1. Ceramics in Archaeology. Presented by the Department of Anthropology and Archaeology, University of Pretoria, Pretoria.
2. Geographical Information Systems (GIS) in Archaeology. Presented by the School of Geography, Archaeology and Environmental Studies (GAES), University of the Witwatersrand, Johannesburg.

2012:

1. The Association of Professional Archaeologists Cultural Resource Management (CRM) Workshop, University of Cape Town.

2014:

1. Bone Pathology / Palaeopathology Symposium, Forensic Anthropology Research Centre, University of Pretoria, Pretoria.

2016:

1. Palaeosciences Centre of Excellence Education Workshop, Centre of Excellence, Wits University, 13-15 September 2016.

2017:

1. Commonwealth Association of Museums: Human Remains Management and Repatriation Workshop, 13th -14th February, 2017, Iziko Museum, Cape Town, South Africa.

2018:

1. Exhibitions Workshop and the SAMA EC Annual General Meeting at the National English Literary Museum, Grahamstown, on the 15th and 16th of May 2018.

2019:

1. Human Remains Management: Extending the Conversation Workshop', University of Botswana, Gaborone, Botswana, 11 to 13 March 2019.
2. Forensic Archaeology - Excavating buried remains, 2 - 3 September 2019. The Human Variation and Identification Research Unit (HVIRU), School of Anatomical Sciences, University of the Witwatersrand, Johannesburg, Gauteng, South Africa.
3. Taphonomy and Decomposition - 4 - 6 September 2019. The Human Variation and Identification Research Unit (HVIRU), School of Anatomical Sciences, University of the Witwatersrand, Johannesburg, Gauteng, South Africa.
4. Department of Arts and Culture (DAC) National Workshop on the National Policy on the Repatriation and Restitution of Human Remains and Heritage Objects, 26 September, Gauteng.

5. Draft national policy on the repatriation of human remains and heritage objects
National Curator Workshop, 25 October 2019, Pietermaritzburg. Department of Sports, Arts and Culture (DSAC)

2023:

1. Museums Policy Workshop 2-3 March 2023, ICC East London, presented by the Department of Sport, Recreation, Arts and Culture

COURSES ATTENDED

2014:

1. Introduction to Museology, Presented by Historical Homes South Africa Ltd. Held at the National English Literature Museum (NELM), Grahamstown.
2. Heritage Conservation. Presented by Historical Homes South Africa Ltd. Held at the National English Literature Museum (NELM), Grahamstown.

2017:

1. Introduction to Paper Conservation (books and paper), Africana Library Kimberley, 14-17 August 2017

COMMITTEES:

2021-CURRENT: Member of The Eastern Cape Provincial Heritage Resources Authority (ECPHRA) Archaeology, Palaeontology and Meteorites and Burial Grounds Permit Committee.

CULTURAL RESOURCE MANAGEMENT EXPERIENCE: 15 years

Conducting specialist archaeological and cultural heritage impact assessment for development and monitoring during the construction process.

The assessments are conducted to:

- Identify and map possible heritage sites and occurrences using published and database resources;
- Provide a description of the archaeology and cultural heritage of the site and identify and map any sites of archaeology or cultural significance that may be impacted by the proposed project;
- Assess the sensitivity and conservation significance of any sites of archaeological or cultural heritage significance affected by the proposed project;
- Identify and assess the significance of the potential impacts of the proposed project on archaeological and cultural heritage;
- Make recommendations on the protection and maintenance of any significant cultural heritage and/or archaeological sites that may occur on site;
- Identify practicable mitigation measures to reduce negative impacts on the archaeological resources and indicate how these can be incorporated into the construction and management of the proposed project;
- Provide guidance for the requirement of any permits from the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) that might become necessary.

Archaeological and historical material remains, features, and sites were evaluated and assessed based on the following points:

- Type of site;
- Location and environmental surrounds;
- Site category;
- Context and condition;
- Estimated size and depth of deposit;
- Cultural affinities;
- Record site content;
- Record basic information of finds;
- Estimate relative age of sites from cultural material and other information;
- Record and describe graves, graveyards, and informal burials;
- Assess the importance and significance of material remains, features, and sites; and
- Significance ratings based on local to international.

CULTURAL RESOURCE MANAGEMENT PROJECTS WITH THE FOLLOWING COMPANIES INCLUDE:

AGES South Africa

Arcus Gibb Engineering and Science

Algoa Consulting Mining Engineers (ACME)

CEN Integrated Environmental Management Unit

Coastal and Environmental Services (CES)

Conservation Support Services

The Matrix cc

Amatola Quarry Products

Pro-Earth

Stellenryck Environmental Solutions

SRK Consulting

Terreco cc

Savannah Environmental (Pty) Ltd EOH

Coastal and Environmental Services

Imbono FJA Architects Cc.

Ethical Exchange Sustainability Services (Pty) Ltd.

Comply 360° Environmental Compliance Solutions.

Frank Silberbauer Consulting

Ecthea Environmental Services

Makheta Environmental Consultants

Environmental Impact Assessment Services (EIMS)

IX Engineers

East Cape Diverse Consultants

Habitat Link Consulting

Indwe Environmental Consulting

Lwethuma Environmental Consultants

CULTURAL RESOURCE MANAGEMENT DESKTOP STUDIES AND ARCHAEOLOGICAL IMPACT ASSESSMENTS:

2008:

- Binneman, J.N.F. & Booth, C. 2008. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Granite Mine on The Farm Castleton No. 53, Komgha, Amathole District Council, Eastern Cape Province. Prepared for Terreco cc.
- Binneman, J.N.F. & Booth, C. 2008. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Open Pit Mining Operation at Borrow pit 5, Kirkwood, Eastern Cape. Prepared For Terreco Cc.
- Binneman, J.N.F. & Booth, C. 2008. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Open Pit Mining Operation at Borrow pit 3, On Farm 537, Kirkwood, Eastern Cape
- Binneman, J.N.F. & Booth, C. 2008. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Limestone Mine on the Farm Patos Kop No. 219, Peddie District, Amathole District Municipality, Eastern Cape Province. Prepared for Imbewu Mineral Resources (Pty) Ltd.
- Binneman, J.N.F. & Booth, C. 2008. A Phase 1 Archaeological Heritage Impact Assessment for the Proposed Construction and Operation of an Ethanol Production Plant on Erven 31, 32, 33 and the Remaining Extent of Erf 1, Cradock, Inxuba Yethemba Local Municipality, Eastern Cape Province. Prepared for AGES South Africa.
- Binneman, J.N.F. & Booth, C. 2008. A Phase 1 Archaeological Impact Assessment: The Proposed Kei Beach Hotel and Apartment Development, Erven 160, 161, 162 and 163, Kei River, Amathole District Municipality, Eastern Cape Province. Prepared for ARCUS GIBB ENGINEERING AND SCIENCE.
- Binneman, J.N.F. & Booth, C. 2008. A Phase 1 Archaeological Heritage Impact Assessment of the Proposed Subdivision and Rezoning of Portions Off Garden Lot, Portion 20 of Farm No. 397 South Gorah, Kenton-On-Sea, Ndlambe Municipality, Eastern Cape. Prepared for Conservation Support Services.
- Binneman, J.N.F. & Booth, C. 2008. A Phase 1 Archaeological Impact Assessment: South African Police Services (Saps) 10111 Call Centre, Erven 530 And 4162, Central Hill, Port Elizabeth, Eastern Cape Province. Prepared for The Matrix...cc Urban Designers and Architects on behalf of the Department of Public Works.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Mining of Granite on Farm 269, District East London, Buffalo City, Amathole District Municipality, Eastern Cape Province. Prepared for Stellenryck Environmental Solutions.

2009:

- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Granite Mine at Idutywa, Mazammisa Community Area, Mbashe Municipality, Amathole District Municipality, Eastern Cape Province. Prepared for Stellenryck Environmental Solutions.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Granite Mine at Idutywa, Colossa Community Area, Mbashe Municipality, Amathole District Municipality, Eastern Cape Province. Prepared for Stellenryck Environmental Solutions
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Dolerite Mine on Portions 3 And 61 of Farm No. 648, Wilsonia Industrial Area, East London, Amathole District Municipality, Eastern Cape Province. Prepared For Stellenryck Environmental Solutions Cc.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Sand Mine on Portion 1 (Lemoenfontein) of the Farm Die Woud No. 500, District of Humansdorp, Eastern Cape Province. Prepared for Clean Stream Environmental Services: Coalfields Cc.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Sand Mine on Portion 20 Of Farm Strandfontein No. 442, District of Humansdorp, Eastern Cape Province. Prepared for Clean Stream Environmental Services: Coalfields cc.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Weathered Dolerite (Sabunga) Mine on Portion 1 Of Farm No. 800, Gonubie, East London, Amathole District Municipality, Eastern Cape Province. Prepared For Veduba Investments Cc.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Sand Mine on the Farm Happy Rest, Portion 1 Of 696, Komgha, Amathole District, Eastern Cape Province. Prepared For Amatola Quarry Products Cc
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Granite Mine on the Farm Holme Park, Remainder 203, Komgha, Amathole District Council, Eastern Cape Province. Prepared for Stellenryck Environmental Solutions.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Clay Mine on the Farm Burnside, Kwelera, Buffalo City, Amathole District Municipality, Eastern Cape Province. Prepared for Stellenryck Environmental Solutions.

- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Hard Rock Quarry on Portion 14 of the Farm Waggie No. 110, Paterson, Sunday's River Valley Municipality, Alexandria District, Eastern Cape Province. Prepared for Arcus Gibb (Pty) Ltd.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Sand Quarry on Farm No's. 1323 and 1286, Kayser's Beach, Amathole District Municipality, Eastern Cape Province. Prepared for Stellenryck Environmental Solutions.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Mining of Gypsum on a Portion of Portion 1 (Thorndale) of the Farm East of Gous Kraal, No. 257, Division of Jansenville in the Magisterial Area of Ikwezi, Cacadu District of the Eastern Province. Prepared for Algoa Consulting Engineers cc.
- Binneman, J.N.F. & Booth, C. 2009. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Heritage Impact Assessment for the Proposed Mining of Dolerite on Erf No. 702, Port St Johns District, O.R. Tambo District Municipality, Eastern Cape Province. Prepared for Terreco cc.
- Binneman, J.N.F. & Booth, C. 2009. A Phase 1 Archaeological Heritage Impact Assessment for the Proposed Subdivision and Rezoning of Erf 8517, Grahamstown, Makana Municipality, Cacadu District Municipality, for the Purposes of Constructing Residential and Town Housing, and Business Centre. Prepared for Conservation Support Services.
- Binneman, J.N.F. & Booth, C. 2009. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Installation of A 132kv Electricity Supply Line, Bloemendal to Tembani T-Off, Nelson Mandela Metropolitan Municipality, Port Elizabeth, Eastern Cape Province. Prepared for SRK Consulting.

2010:

- Binneman, J.N.F. & Booth, C. 2010. A Letter of Recommendation (with conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Opencast Clay Mine, Erf's 20 and 21 (Erf 561) of Wells Estate, Port Elizabeth, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared for Algoa Consulting Mining Engineers Cc (ACME).
- Binneman, J.N.F. & Booth, C. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Upgrading of the N2 Highway between Coega and Colchester as well as the Construction of the New Sundays River Bridge, and Four Borrow Pits, Nelson Mandela Metropolitan Municipality, Port Elizabeth, Eastern Cape Province. Prepared for SRK Consulting.
- Binneman, J.N.F. & Booth, C. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Construction and Upgrading of the New Glenhurd Road as well as the Construction of the Baakens River Bridge, Nelson Mandela

- Metropolitan Municipality, Port Elizabeth, Eastern Cape Province. Prepared for CEN Integrated Environmental Management Unit.
- Binneman, J.N.F. & Booth, C. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Motherwell NU 31 Housing Development, Portion 2 of 316, Uitenhage, Nelson Mandela Metropolitan Municipality, Port Elizabeth, Eastern Cape Province. Prepared for Arcus Gibb
- Binneman, J.N.F. & Booth, C. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the proposed Rosedale Low-Cost Housing project, Uitenhage, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Binneman, J.N.F. & Booth, C. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed 20mw Wind Farm on Three Alternative Sites: Erf 121, Driftsands (Site Alternative 1), Bushy Park Farm (Site Alternative 2) and Rietfontein Farm, Van Stadens East (Site Alternative 3), Nelson Mandela Metropolitan Municipality, Port Elizabeth, Eastern Cape Province. Prepared for SRK Consulting.
- Binneman, J.N.F.; Booth, C. & Higgitt, N. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Dorper Wind Energy Facility on a Site Near Molteno, Chris Hani District Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Binneman, J.N.F.; Booth, C. & Higgitt, N. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining on the Elva Heights Farm 102 and on the Difusi Land Trust Property Incorporating the Farms De Bruyns Kraal, Doorn Kloof and Lang Vley, Paterson, Alexandria Municipality, Cacadu District, Eastern Cape Province. Prepared For SRK Consulting.
- Binneman, J.N.F.; Booth, C. & Higgitt, N. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Coega Ridge Nu-Way Housing Development, Farms Welbadachtsfontein 300, Coega Kop 313, Coegas Kop 316, Coegas Kop 314, Nelson Mandela Metropolitan Municipality, Port Elizabeth, Eastern Cape Province. Prepared for SRK Consulting.
- Binneman, J.N.F.; Booth, C. & Higgitt, N. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Skietkuil Quarries 1 and 2 on the Farm Skietkuil No. 3, Victoria West, Central Karoo District, Western Cape Province. Prepared for Acer (Africa) Environmental Management Consultants.
- Binneman, J.N.F.; Booth, C. & Higgitt, N. 2010. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Riverbank Wind Energy Facility between Hamburg and Wesley, Amathole District Municipality, Eastern Cape Province. Prepared For Savannah Environmental (Pty) Ltd.
- Booth, C. 2010. An Archaeological Desktop Study for the Proposed Riverbank Wind Energy Facility between Hamburg and Wesley, Peddie, Amathole District Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Higgitt, N. 2010. An Archaeological Desktop Study for the Proposed Karoo Renewable Energy Facility on a Site South of Victoria West, Northern and Western Cape Province. Prepared for Savannah Environmental (Pty) Ltd.

2011:

- Binneman, J.N.F. & Booth, C. & Higgitt, N. 2011. An Archaeological Desktop Study and Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Clidet Data Cable Between Bloemfontein, Orange Free State and Graaff Reinet, Eastern Cape Province; Colesberg, Orange Free State and Port Elizabeth, Eastern Cape Province and; George, Western Cape Province and Port Elizabeth, Eastern Cape Province. Prepared for SRK Consulting.
- Binneman, J.N.F. & Booth, C. & Higgitt, N. 2011. A Phase 1 Archaeological Impact Assessment for the Proposed Kentani-Qolorha River Mouth-Kei River Mouth Road Upgrade, Mnquma Local Municipality, Amathole District Municipality, Eastern Cape Province. Prepared For SRK Consulting.
- Binneman, J.N.F. & Booth, C. & Higgitt, N. 2011. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mixed-Use Housing Development, Kwanobuhle, Extension 11, Uitenhage, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared For SRK Consulting.
- Binneman, J.N.F.; Booth, C. & Higgitt, N. 2011. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Karoo Renewable Energy Facility on a Site South of Victoria West, Northern and Western Cape Province on the Farms Phaisantkraal 1, Modderfontein 228, Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, and Rietkloofplaaten. Prepared for Savannah Environmental.
- Booth, C. 2011. An Archaeological Desktop Study for the Proposed Establishment of the Spitskop Renewable Energy Facility and Associated Infrastructure on a Site North-West of Riebeek East, Cacadu District Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. 2011. An Archaeological Desktop Study for the Proposed 200MW Wind Energy Facility near Aberdeen, Camdeboo Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. 2011. An Archaeological Desktop Study for the Proposed Mainstream Aberdeen Wind Energy Facility, Aberdeen, Camdeboo Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. 2011. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Solar Facility on the Farm Toitdale, Portion 1 of 167, situated near Noupoot, Northern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth C, 2011. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Solar Facility on the Farm Kleinfontein, Portion 4 of 167, situated near Noupoot, Northern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. 2011. A Phase 1 Archaeological Impact Assessment for the Proposed Cookhouse II Wind Energy Facility, Blue Crane Route Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. 2011. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mixed Residential Village on Portion 1 of Erf 319, Fairview Farm,

Fairewood Estate, Grahamstown, Makana Municipality, Cacadu District, Eastern Cape Province.

2012:

- Booth, C. 2012. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Jachtvlakte Precinct Sustainable Human Settlement Plan, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for SRK Consulting
- Booth, C. 2012. An Archaeological Desktop Study for the Proposed Elliot Wind Energy Facility on a Site West of Elliot, Sakhisizwe Local Municipality. Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed 75 MW Brakfontein Photovoltaic Solar Farm, Victoria West, Northern Cape Province. Prepared for SRK Consulting.
- Booth, C. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed 75 MW Dobbin Photovoltaic Solar Farm on the Farm Hetfontein 1/66, near Cradock, Inxuba Yethemba District Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed Upgrade of the National Route R61 Section 2 between Draairivier (KM 29,4) and Elinus Farm (KM 42,2) and three borrow pits (BPA, Q3, and BPE), Near Cradock, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed Hidden Valley Wind Energy Facility, near Sutherland, Northern Cape province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed Establishment of the ACED Middelburg Solar Park (Park 1 and Park 2) on the Farm Tweefontein Remainder of Farm 11 (Solar Park 1) and Tweefontein Portion 4 of Farm 11 (Solar Park 2), Middelburg, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment for the proposed Establishment of the Rodicon Solar Energy Facility of the Farm Zakfontyn 267, Between Middelburg and Cradock, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed Establishment of the Amandla Welanga Solar Energy Facility on the Remaining Extent of the Farm Rietfontein 140, near Noupoot, Northern Cape province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed Establishment of the DIDA Solar Energy Facility on Portion 3 of the Farm Rietfontein 140, near Noupoot, Northern Cape province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed Establishment of the Inkululeko Solar Energy Facility on Portion 2 of the Farm Carolus Poort 167, near Noupoot, Northern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.

- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment for Five proposed Borrow Pits, Whittlesea Area near Queenstown, Lukhanji Local Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed 75 MW Collett Photovoltaic Power Station and Associated Infrastructure at Collett Substation, On Farms 335/0 And Farm 180/0, Near Middleburg, Eastern Cape Province. Prepared for Centre for Environmental Management (CEM).
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment: Upgrade of N10 Section 3 From the Riet River (Km45.2) to Tarka Bridge (Km 68.5), near Cradock, Eastern Cape Province. Prepared for Coastal and Environmental Services (CES).
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment: Rehabilitation of the National R61 Section 2 Elinus Farm (Km42.2) To N10 (Km85), Between Cradock and Graaf-Reinet, Eastern Cape Province. Prepared for Coastal and Environmental Services (CES).
- Booth, C. & Sanker, S. 2012. An Archaeological Ground-Truthing Survey for the Proposed Power Line Corridor for the Metrowind Wind Energy Facility (WEF), Van Staden's, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. & Sanker, S. 2012. A Phase 1 Archaeological Impact Assessment for the Proposed Establishment of the Naaupoort Solar Energy Facility on the Remainder of the Farm Naauwpoort 1, near Noupoot, Umsobomvu Municipality, Northern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2012. An Archaeological Ground-Truthing Walk-Through Survey for the Nobelsfontein Wind Energy Facility Situated on a Site South of Victoria West on the Farms Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, and Rietkloofplaaten 239, Northern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2012. An Archaeological Ground-Truthing Walk-Through Survey for the Nobelsfontein Wind Energy Facility Situated on a Site South of Victoria West on the Farms Nobelsfontein 227, Annex Nobelsfontein 234, Ezelsfontein 235, And Rietkloofplaaten 239, Northern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2012. A Letter of Exemption to Conduct a Phase 1 Archaeological Impact Assessment as Part of the Environmental Assessment and Authorisation Process for the Proposed Mixed-Use Development on Part of R/Erf 361 And R/Erf 642 Adjacent to the Kowie River, Ndlambe Local Municipality, Port Alfred, Eastern Cape Province. Prepared for Bokamoso Landscape Architects & Environmental Consultants CC.

2013:

- Booth, C. 2013. A Phase 1 Archaeological Impact Assessment (AIA) for the Airports Company of South Africa (ACSA) proposed Port Elizabeth Airport Stormwater

- Upgrade, Walmer, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. 2013. A Phase 1 Archaeological Impact Assessment for The Proposed Witteklip Waste Water Treatment Works and Connecting Sewer Line, Van Stadens, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. 2013. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining of Gypsum on Erasmuslaagte No. 13 in the Bavians Local Municipality and Portion 1 of the Farm East of Gous Kraal No. 257 in the Ikwezi Local Municipality, Cacadu District Municipality, Eastern Cape Province. Prepared For Algoa Consulting Mining Engineers (ACME).
- Booth, C. 2013. A Phase 1 Archaeological Impact Assessment for The Proposed Establishment of a Camp Site for the Activities Associated with the Upgrade of the N10-4, Cradock [KM1.6] To Knutsford [KM29], Inxuba Yethemba Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. 2013. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Right Application for the Mining of Dolomite, Limestone, Sand (General), Stone Aggregate, Gravel and Sand on Portions of Portion 17 and the Remainder of the Farm Lombard's Post 289, Bathurst, Eastern Cape Province. Prepared For Algoa Consulting Mining Engineers (ACME).
- Booth, C. 2013. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application on Erf 118, Schoenmakerskop, Port Elizabeth, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared For Algoa Consulting Mining Engineers (ACME).
- Booth, C. & Sanker, S. 2013. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Rehabilitation and Upgrade of the Cannonville Intersection off the N2 National Road and a Short Section of Road North of the N2, Colchester, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. & Sanker, S. 2013. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Bulk Sewer Pipeline for Kwanobuhle Extension 11, near Uitenhage, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for SRK Consulting.
- Booth, C. & Sanker, S. 2013. A Phase 1 Archaeological Impact Assessment for the Proposed 200MW Eskom Wind Energy Facility, Near Aberdeen, Camdeboo Local Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.
- Booth, C. & Sanker, S. 2013. A Phase 1 Archaeological Impact Assessment for the Proposed Spitskop Wind Energy Facility and Associated Infrastructure on a Site North-West of Riebeeck East, Blue Crane Route Municipality and Makana Municipality, Eastern Cape Province. Prepared for Savannah Environmental (Pty) Ltd.

2014:

- Booth, C. 2014. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Langbos Bulk Water Supply Service and Waste Water Service Pipelines, Sunday's River Valley Municipality, Cacadu District Municipality, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2014. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Mining Permit Application on the Farm Altondale 408, Nelson Mandela Metropolitan Municipality (NMMM), Eastern Cape Province. Prepared for: Algoa Mining Consulting Engineers (ACME).
- Booth, C. 2014. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for a Mining Permit Application for Sand Mining on the Farm Tiger Springs 198, Near Bathurst, Amathole District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental.
- Booth, C. 2014. A Phase 1 Archaeological Impact Assessment for the Proposed Access Road Alternatives for the 75 MW Brakpoort Photovoltaic Solar Farm, Victoria West, Northern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2014. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for Two Additional Borrow Pits for the Upgrade of the N2 National Route (N2-13) between Grahamstown and the Fish River Bridge, Eastern Cape Province. Prepared for: Coastal and Environmental Services (CES).
- Booth, C. 2014. Phase 1 Archaeological Impact Assessments (AIAs) Prepared for the AHS Raymond Mhlaba Basic Assessment and Masakhane Village Housing Basic Assessment, 25 March 2014 – 11 April 2014. Prepared for: Coastal and Environmental Services (CES).
- Booth, C. 2014. Conservation Management Plan for the Mfengu Burial Site in Richmond Avenue, Richmond Hill, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: Imbono FJA Architects Cc.
- Booth, C. 2014. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Road Upgrade of the Dr 08376 from the R61 at St Marks to Sabalele Village and Associated Borrow Pits, Near Cofimvaba, Intsika Yethu Local Municipality, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2014. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Mining of Sand on Portion 15 of the Farm Lombard's Post 289, Southwell, Near Bathurst, Ndlambe Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared for: Comply 360° Environmental Compliance Solutions.
- Booth, C. 2014. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for an Application to Mine Sand in a Section of the Klein Fish River Situated on Portion 1 and Portion 8 of the Farm Grootvlakte 49, Division of Somerset East, Blue Crane

Municipality, Cacadu District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental.

Booth, C. 2014. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for a Mining Permit Application to Mine Gravel / Stone on the Farm Olive Woods Estate 169, Division of Bedford, Cacadu District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental.

Booth, C. 2014. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for a Mining Permit Application for a Hard Rock Quarry on the Farm Olive Woods Estate 169, Division of Bedford, Cacadu District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental.

Booth, C. 2014. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Walmer Gqebera Housing Development on a Portion of Erf 1948, Walmer, Port Elizabeth, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared for: SRK Consulting.

Booth, C. 2014. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Walmer Gqebera Low-Cost Housing Development on Erf 11305, Walmer, Port Elizabeth, Nelson Mandela Bay Municipality (NMBM), Eastern Cape Province. Prepared for: SRK Consulting.

Booth, C. 2014. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment for the Proposed Upgrade of the R335 Zuurberg Road, Km 90 To Km 163.70, Northern Section from Ann's Villa to Somerset East, Sunday's River Valley and Blue Crane Route Municipalities, Cacadu District Municipality, Eastern Cape Province. Prepared For: Ethical Exchange Sustainability Services (Pty) Ltd.

2015:

Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Kwanonkqubela Alexandria Community Health Centre on Erf 623, Alexandria, Ndlambe Local Municipality, Eastern Cape Province. Prepared for: CEN Integrated Environmental Management (IEM) Unit

Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Potgieter Quarry Mining Permit Application to Mine Stone / Aggregate / Gravel on Remainder of Portion 9 of the Farm Glen Craig 240, Grahamstown, District of Albany, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions

Booth, C. 2015. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Extension of The Existing Komsberg Substation and Widening of the Access Road, Near Sutherland, Northern Cape Province. Prepared for: Savannah Environmental (Pty) Ltd.

Booth, C. 2015. Archaeological Assessments Conducted for the Karusa Wind Energy Facility and Associated Infrastructure Situated South of Sutherland, Karoo

- Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province. Prepared for: Savannah Environmental (Pty) Ltd.
- Booth, C. 2015. Archaeological Assessments Conducted for the Soetwater Wind Energy Facility and Associated Infrastructure Situated South of Sutherland, Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province. Prepared for: Savannah Environmental (Pty) Ltd.
- Booth, C. 2015. Addendum: Archaeological and Heritage Investigation of Proposed Deviations and Repeater Sites for an Environmental Authorisation Amendment for a Section of the Fibreco Route 3 (Graaff-Reinet to Yzerfontein). Prepared for: SRK Consulting.
- Booth, C. 2015. Addendum: Archaeological and Heritage Investigation of Repeater Sites for an Environmental Authorisation Amendment for Fibreco Route 4 (George to Port Elizabeth) and 5 (Port Elizabeth to Durban). Prepared for: SRK Consulting.
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Construction and Upgrading of the New Glen Hurd Road as well as the Construction of the Baakens River Bridge, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for Coastal and Environmental Services (CES).
- Booth, C. 2015. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Demolition of the Existing Dwelling and the Building of New Residential Dwelling on Erf 181 (24 Seal Point Boulevard), Cape St Francis, within The Kouga Municipality of the Cacadu District, Eastern Cape Province. Prepared for: Frank Silberbauer Consulting
- Booth, C. 2015. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Residential Development on Erf 585, Cape St Francis, Eastern Cape Province. Prepared for: Frank Silberbauer Consulting.
- Booth, C. 2015. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Kabeljauws Beach Housing Development on Erf 6338, Da Gama Road, Jeffreys Bay, Kouga Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared for: Frank Silberbauer Consulting.
- Booth, C. 2015. A Phase 1 Archaeological Impact Assessment for the Proposed Spitskop East Wind Energy Facility Project, Cacadu District Municipality, Eastern Cape Province. Prepared for: Savannah Environmental (Pty) Ltd.
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Construction of the Transnet Freight Rail New Brighton – Swartkops Security Wall, Port Elizabeth, Mandela Bay Municipality, Eastern Cape Province. Prepared for: Coastal and Environmental Services (CES).
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Fuel Service Station and Associated Infrastructure on Erf 3139, Kariega Heights, Kenton-On-Sea, Ndlambe Local Municipality, Eastern Cape Province. Prepared for: SRK Consulting.

- Booth, C. 2015. A Phase 1 Archaeological Impact Assessment (AIA) For a Proposed Fuel Station and Associated Infrastructure at the Umzimvubu Bridge, Near Mount Frere, Umzimvubu Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2015. A Phase 1 Archaeological Impact Assessment (AIA) for a Proposed Inyanda-Roodeplaat Wind Energy Facility (WEF), Sundays River Valley Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2015. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Kingston Borrow Pit on Portion 7 of the Farm Salem 498, Salem, Eastern Cape Province. Prepared for Comply 360 (Pty) Ltd.
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mine Situated on Farm 294, Division of Bedford, Eastern Cape Province. Prepared for: Stellenryck Environmental.
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Application to Mine Sand on Portion 3 of the Farm Lifford 31, Magisterial District of Grahamstown, Eastern Cape Province. Prepared for: Stellenryck Environmental.
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Application to Mine Sand on Remainder of the Farm Milton 377, District of Queenstown, Eastern Cape Province. Prepared for: Stellenryck Environmental.
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Application to Mine Sand on Portion 2 of the Farm Welcome Valley 310, District of Queenstown, Eastern Cape Province. Prepared for: Stellenryck Environmental.
- Booth, C. 2015. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Wittekleibosch Dairy on the Farm Witte Kley Bosch 674, Koukamma Local Municipality, Eastern Cape Province. Prepared for: SRK Consulting.

2016:

- Booth, C. 2016 (June). A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Application for Environmental Authorisation for a Mining Permit on the Farm Klipfontein No. 242, Blue Crane Route Municipality, Division of Bedford, Eastern Cape Province. Prepared For: Afrimat Aggregates Trading (Pty) Ltd.
- Booth, C. 2016. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed

Residential and Mixed-Use Development on Portion 1 of the Farm Stuurmanskop No. 55, Patensie, Kouga Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared for: Ectheca Environmental Services

- Booth, C. 2016. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application on the Farm 379, Division of Maclear, Elundini Local Municipality, Joe Gqabi District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental.
- Booth, C. 2016. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed 132 kV Powerline, Walmer, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared For: SRK Consulting
- Booth, C. 2016 (March). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining on Erf 220 and Erf 252 of the Farm Coegas River Mouth 303, Coega, Nelson Mandela Metropolitan Municipality (NMMM), Eastern Cape Province. Prepared For: Algoa Mining Consulting Engineers (ACME).
- Booth, C. 2016 (March). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining on Portion 6 (Brandwag), a Portion of Airedale of Welbedachtsfontein 300, Division of Port Elizabeth, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental.
- Booth, C. 2016. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining on the Farm 384 Quaggas Vlake 139, Sundays River Valley Municipality, Division of Alexandria District, Sarah Baartman District Municipality, Eastern Cape Province. Prepared For: Stellenryck Environmental Solutions.
- Booth, C. 2016. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining on the Portion 1 of the Farm Kruis Rivier 337, Division of Uitenhage, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared For: Stellenryck Environmental Solutions.
- Booth, C. 2016. A Letter of Recommendation (with Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Lake Farm Centre Housing Development on Portion 88 of the Farm Cragga Kamma 23, Kragga Kamma, Port Elizabeth, Mandela Bay Municipality, Eastern Cape Province. Prepared For: Ectheca Environmental Services.
- Booth, C. 2016 (April). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Brandvalley Wind Energy Facility (WEF) situated in the Karoo Hoogland Local Municipality, Namakwa District Municipality and the Witzenburg Local Municipality and Laingsburg Local Municipality, Cape Winelands and Central Karoo District Municipalities. Prepared for: EOH Coastal and Environmental Services.
- Booth, C. 2016 (April). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Rietkloof Wind Energy Facility (WEF) situated in the Witzenburg

Local Municipality and Laingsburg Local Municipality, Cape Winelands and Central Karoo District Municipalities. Prepared for: EOH Coastal and Environmental Services.

- Booth, C. 2016. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Granor Passi Effluent Evaporation Ponds, Louterwater, Sarah Baartman District Municipality, Kouga Local Municipality, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2016. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Application for Environmental Authorisation for a Mining Permit on the Farm Klipfontein No. 242, Blue Crane Route Municipality, Division of Bedford, Eastern Cape Province. Prepared for: Africoast Consulting Engineers (Pty) Ltd.
- Booth, C. 2016. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Bulk Stormwater Infrastructure, Upper Chatty, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2016. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application on the Remaining Extent of Portion 19 of the Farm Ecowa 102, Elliot District, Drakensburg District Council, Eastern Cape Region. Prepared for: Stellenryck Environmental Solutions.
- Booth, C. 2016. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Expansion of the Bulk Water Supply Infrastructure of Potable Water to Seaview and Greenbushes Supply Areas, Nelson Mandela Bay Metropolitan, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2016. A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining Permit Application on Remainder of Farm 1089 in the District of East London, Amathole District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.
- Booth, C. 2016. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining Permit Application on Remainder of Farm 1090 Drummore, Cosy Corner, in the District of East London, Amathole District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.

2017:

- Booth, C. 2017 (March). A Letter of Recommendation (With Conditions) for the Exemption of a Full Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application on a Portion of Zadungeni Administrative Area No. 27, Zadungeni Allotment Area, Encgobo Municipality, District of Encgobo, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.

- Booth, C. 2017 (March). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application for a Hard Rock Quarry on a Portion Colosa Commonage, Municipality of Idutwya, Mbashe Municipality, Amatola District Council, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.
- Booth, C. 2017 (March). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining Permit Application on Remainder of Farm 1090 Drummore, Cosy Corner, in the District of East London, Amathole District Municipality, Eastern Cape Province. Prepared for: Comply 360 (Pty) Ltd.
- Booth, C. 2017. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Nelson Mandela Bay Municipality (NMBM) Seaview Low Income Housing Development, Seaview, Nelson Mandela Bay Metropolitan, Eastern Cape Province. Prepared for: SRK Consulting.
- Booth, C. 2017. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Housing Development on a Portion of Erf 8709, Wells Estate, Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: EOH Coastal & Environmental Services.
- Booth, C. 2017. A Phase 1 Archaeological Impact Assessment (AIA) for the Scarlet Ibis Wind Energy Facility and Distribution Line on the Farms Grassridge 226 and Welbedacht 300, near Port Elizabeth, Nelson Mandela Metropolitan Municipality (NMMM), Eastern Cape Province. Prepared for: EOH Coastal & Environmental Services.
- Booth, C. 2017. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application on the Southern Portion of Erf 118, Victoria Drive, Schoenmakerskop, Port Elizabeth, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared for: Algoa Consulting Mining Engineers (ACME).
- Booth, C. 2017 (May). An Archaeological Heritage Ground Truthing Walk-Through For The Final Layout of the 75 Mw Collett Photovoltaic Power Station and Associated Infrastructure at Collett Substation, On Farm 335/0 And Farm 180/0, Near Rosmead, Middelburg, Eastern Cape Province. Prepared for: Skypower Services ULC and AMDA Developments (Pty) Ltd.
- Booth, C. 2017. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Power Line Alternatives for the Scarlet Ibis Wind Energy Facility (WEF), near Port Elizabeth, Nelson Mandela Metropolitan Municipality (NMMM), Eastern Cape Province. Prepared for: EOH Coastal & Environmental Services.
- Booth, C. 2017. An Archaeological Assessment for the Amendment to Turbine Specifications and the Revised Layout of the Soetwater Wind Energy Facility Situated on The Farms: The Remainder of Portion 1, 2 And 4 of Farm Orange Fontein 203 and Annex Orange Fontein 185, Farm Leeuwe Hoek 183 and Farm Zwanepoelshoek 184, near Sutherland, Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province. Prepared for: Savannah Environmental (Pty) Ltd.
- Booth, C. 2017. An Archaeological Assessment for the Amendment to Turbine Specifications and the Revised Layout of the Karusa Wind Energy Facility

Situated on the Farms: De Hoop 202, Standvastigheid 210, Portion 1 of the Farm Rheeboeke Fontein 209, Portion 2 of the Farm Rheeboeke Fontein 209, Portion 3 of the Farm Rheeboeke Fontein 209 and the Remainder of the Farm Rheeboeke Fontein 209, near Sutherland, Karoo Hoogland Local Municipality, Namakwa District Municipality, Northern Cape Province. Prepared for: Savannah Environmental (Pty) Ltd.

Booth, C. 2017. A Phase 1 Archaeological Impact Assessment (AIA) for the Clearance of Vegetation on the Remainder of Portion 12 (Lupus Den) of the Farm Tregaron No. 92 in the Sundays River Municipality, in the Eastern Cape. Prepared for: Adri Barkhuizen.

Booth, C. 2017 (November). Survey Conducted for a Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Sand Mining on the Farm Fairview, in the Port Alfred District, Ndlambe Local Municipality, Eastern Cape Province. Prepared for: Mr Malcolm Cock.

Booth, C. 2017 (December). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Filling Station and Supporting Amenities as well as Associated Business Land Use Portions on Erf 8473, situated outside Grahamstown, Makana Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared For: Indwe Environmental Consulting Cc.

Booth, C. 2017 (December). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application on Portion 3 and 5 of Farm Zeekoe Gat No. 87, District of Steynsburg, Gariep Local Municipality, Joe Gqabi District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.

2018:

Booth, C. 2018 (January). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application to Mine Sand on Remainder of the Farm Milton 377, District of Queenstown, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions

Booth, C. 2018 (January). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application for a Hard Rock Quarry on the Farm Wansley, near East London, Buffalo City Municipality, Amathole District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.

Booth, C. 2018 (January). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Extension of the Hard Rock Quarry on the Farm Blinkwater, near Fort Beaufort, Nkonkobe Local Municipality, Amathole District Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.

Booth, C. 2018. A Phase 1 Archaeological Impact Assessment (AIA) for the Mining Permit Application to Mine Sand on the Farm Welgelegen 735, near Oyster Bay, Kouga Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared for: Earth Science Solutions.

Booth, C. 2018. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Raising Main Pipeline between Boknes Strand and Cannon Rocks,

Ndlambe Local Municipality, Sarah Baartman District, Eastern Cape Province.
Prepared for: P & S Consulting Engineers.

Booth, C. 2018 (February). A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Upgrade and Maintenance of National Roads R335 & R342 Between Addo and Paterson, Sarah Baartman District Municipality, Eastern Cape Province. Prepared For: SRK Consulting.

Booth, C. 2018. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Construction of a Grit Washing Facility and Associated Infrastructure Adjacent to Fish Water Flats Waste Water Treatment Works, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: Gibb (Pty) Ltd.

Booth, C. 2018. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Pipeline and Elevated Tank for Valencia Settlement in Addo, Sundays River Local Municipality, Eastern Cape Province. Prepared for: SRK Consulting.

Booth, C. 2018. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Albany Wind Energy Facility (WEF) and Associated Infrastructure, Situated near Grahamstown, Makana Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. EOH Coastal & Environmental Services.

Booth, C. 2018. An Archaeological Walk-Through Assessment for the Mining Permit Application on Portion 37 of the Farm Kleinfontein 172, Kouga Local Municipality, Eastern Cape Province. Prepared for: Algoa Consulting Mining Engineers (ACME).

2019:

Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Mine Permit Application, On A Site West of Alice, Nkonkobe Local Municipality, Eastern Cape Province. Prepared For: Algoa Consulting Mining Engineers

Booth, C. 2019. Archaeological Monitoring Progress Report for The Bush Flattening and Geotech Test Pit Excavations for the DHL/Mondelez New Logistics Facility in Zone 1 CDC, Coega Industrial Development Zone (IDZ), Nelson Mandela Metropolitan Municipality, Eastern Cape Province.
Prepared for: IX Engineers.

Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed RDP Housing Development on Portion 41 Of the Farm 807, Gonubie, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province. Prepared For: Indwe Environmental Consulting Cc

Booth, C. 2019. Phase 1 Archaeological Impact Assessment for the Proposed Low-cost Housing Development on Portions 21, 22, And 23 Of the Farm 807, Gonubie, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province. Prepared For: Indwe Environmental Consulting Cc

Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Bush Clearing for The Establishment of Citrus Orchards on The Farm Eindelik 186, Kirkwood, Sundays River Local Municipality, Eastern Cape. Prepared For: East Cape Diverse Consultants

- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Subdivision and Rezoning of The Remainder of The Farm Hogsback Plateau No. 21, Victoria East Division, Raymond Mhlaba Municipality, Eastern Cape Province. Prepared For: Habitat Link Consulting.
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Breidbach Cross Catchment Transfer Pumping Scheme (Sewer Pipeline), Breidbach, King Williams Town, Amathole District Municipality. Prepared For: Makhetha Environmental
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Marselle Bulk Water and Sewerage Upgrade, Nldambe Local Municipality, Eastern Cape. Prepared For: Indwe Environmental Consulting.
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Drought Relief Project, Mtshezi Village, Elundini Local Municipality, Eastern Cape Province. Prepared For: Makhetha Environmental
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Residential/Business Development on Erf 178 And Erf 2643, Kabega Park, Nelson Mandela Bay Municipality. Prepared For: JG Afrika
- Booth, C. 2019. A Phase 1 Archaeological Impact Assessment (AIA) For the Proposed Citrus Farm Development on Portion 2 Of Farm 144 (Doorndraai), Near Cookhouse, Blue Crane Route Municipality, Eastern Cape Province. Prepared For: Ecthecca Environmental Services
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Replacement of Perimeter and Internal Security Fencing Of 6 Sai Battalion: Military Base in Makhanda /Grahamstown, Eastern Cape. Prepared For: Lwethuma Environmental Consultants
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Extension of The Mount Coke Quarry, Near King Williams Town, Amathole District Municipality. Prepared For: Algoa Consulting Mining Engineers
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Mining Right Application on Several Erven in The Driftsands Area, Port Elizabeth, Nelson Mandela Bay Municipality (NMBM), Eastern Cape Province. Prepared For: Algoa Consulting Mining Engineers
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Road Upgrade - Sterkspruit to Mlamli Hospital (Road Dr08606, +1-12km) And Three Associated Borrow Pits, Senqu Local Municipality, Joe Qabi District Municipality, Eastern Cape Province. Prepared For: Environmental Impact Assessment Services (EIMS) Coastal and Environmental Services (Pty) Ltd
- Booth, C. 2019. An Archaeological Heritage Walk-Through (Final Layout and Power Line) For the Proposed Golden Valley II Wind Energy Facility, Blue Crane Route Local Municipality, Eastern Cape Province. Prepared For: Coastal and Environmental Services (Pty) Ltd
- Booth, C. 2019. Phase 1 Archaeological Impact Assessment for The Proposed Coffee Bay Regional Water Supply Scheme (Phase 3b), O.R. Tambo District Municipality, Eastern Cape Province. Prepared For: Makheta Environmental Consultants

- Booth, C. 2019. A Phase 1 Archaeological Impact Assessment (AIA) For the Proposed Extension of Matanzima Cemetery, Uitenhage, Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared For: SRK Consulting
- Booth, C. 2019. Archaeological Monitoring Progress Report for the Construction of the Nqura Tank Farm, Coega Industrial Development Zone (IDZ), Nelson Mandela Metropolitan Municipality, Eastern Cape Province. Prepared For: Phila Environmental Health and Safety Consultants
- Booth, C. 2019. Archaeological Monitoring Progress Report for the OTGC Development Coega Industrial Development Zone (IDZ), Nelson Mandela Metropolitan Municipality, Eastern Cape Province: Human Remains Exposed During Construction. Prepared For: Phila Environmental Health and Safety Consultants
- Booth, C. 2019. Archaeological Monitoring Conducted During the Construction of Landslide Structures and Infrastructure to the Bulk Liquid Storage and Handling Facility in the Port of Ngqura Within the Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality – October – December 2019. Prepared For: Environmental Impact Management Services (EIMS)

2020:

- Booth, C. 2020. Phase 1 Archaeological Impact Assessment for the Proposed Mine Permit Application, on a Site West of Alice, Raymond Mhlaba Local Municipality, Eastern Cape Province. Prepared For: Algoa Consulting Mining Engineers.
- Booth, C. 2020. Revised Report: Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Albany Wind Energy Facility (WEF) and Associated Infrastructure, situated near Grahamstown, Makana Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared For: EOH Coastal & Environmental Services
- Booth, C. 2020. A Phase 1 Archaeological Impact Assessment for the Proposed New Link Road and Box Culvert Within Ward 46, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province. Prepared For: Indwe Environmental Consulting CC
- Booth, C. 2020. Phase 1 Archaeological Impact Assessment for the Proposed Extension of an Existing Quarry on the R72, near Hamburg, Amathole District Municipality, Eastern Cape Province. Prepared For: Coastal and Environmental Services (CES) Environmental and Social Advisory Services.
- Booth, C. 2020. Phase 1 Archaeological Impact Assessment for the Proposed Mining Operation on Remainder of the Farm Coldstream No. 970 Within the Magisterial District of Indwe, under Emalahleni Local Municipality within Chris District Municipality in the Eastern Cape Province. Prepared For: Lwethuma Environmental Consultants
- Booth, C. 2020. Phase 1 Archaeological Impact Assessment for the Proposed Extension of a Quarry on the Farm Edendale 185, near Matatiele, Matatiele Local Municipality, Alfred Nzo District Municipality, Eastern Cape Province. Prepared For: Coastal and Environmental Services (CES) Environmental and Social Advisory Services

- Booth, C. 2020. Phase 1 Archaeological Impact Assessment for the Proposed Extension of the Oudtshoorn Cemetery, Oudtshoorn, Oudtshoorn Local Municipality, Western Cape Province. Prepared For: EOH Coastal & Environmental Services
- Booth, C. 2020. Phase 1 Archaeological Impact Assessment for the Proposed Development of the Refele Village Sports Facility, Mount Fletcher, Elundini Local Municipality, Eastern Cape Province. Prepared For: Coastal and Environmental Services (CES) Environmental and Social Advisory Services
- Booth, C. 2020. Phase 1 Archaeological Impact Assessment for the Proposed Agricultural Development on Portion 1 & 2 Of the Farm Kwade Hoek 52 and the Remaining Extent of the Farm Schelm Drift 53, Makana Local Municipality, Eastern Cape Province Prepared For: Habitat Link Consulting
- Booth, C. 2020. A Phase 1 Archaeological Impact Assessment for the Proposed Hewu PH9 Raw Water Supply to Sada Water Treatment Works (WTW), Enoch Mgijima Local Municipality, Eastern Cape Province. Prepared For: Indwe Environmental Consulting CC
- Booth, C. 2020. Report on the Site Visit and Assessment of a Stone Packed Feature Identified During the Construction of the Powerline for the Soetwater Wind Energy Facility, near Sutherland, Karoo Hoogland Municipality, Northern Cape Province. Prepared For: EIMS

2021:

- Booth, C. 2021. Phase 1 Archaeological Impact Assessment for the Proposed Office Buildings on Erf No. 944 and Erf No. 945, Holland Street, Addo, Sundays River Local Municipality, Sarah Baartman District Municipality, Eastern Cape Province. Prepared For: Indwe Environmental Consulting Cc
- Booth, C. 2021. An Archaeological Desktop Assessment for the Proposed Construction of The BNN Fuel Service Station and Associated Mini Shopping Complex, Berlin, Buffalo City Metropolitan Municipality, Eastern Cape Province. Prepared For: Earth Free Environmental Consulting
- Booth, C. 2021. A Phase 1 Archaeological Impact Assessment (AIA) For Bush Clearing on Bosfontein Farm Trading as "Just Milk", Alexandria Magisterial District, Ndlambe Municipality, Eastern Cape Province. Prepared For: Hortcouture Architects and Planning
- Booth, C. 2021. An Archaeological Desktop Assessment for the Proposed Construction of the Rebbelskloof Access Road, Sakhisizwe Local Municipality, Chris Hani District Municipality, Eastern Cape Province. Prepared For: All Green Environmental Consultant
- Booth, C. 2021. An Archaeological Desktop Assessment for the Proposed Construction of The Siphafeni Access Road, Sakhisizwe Local Municipality, Chris Hani District Municipality, Eastern Cape Province. Prepared For: All Green Environmental Consultant
- Booth, C. 2021. Phase 1 Archaeological Impact Assessment for the Proposed Upgrading Of 35km of the DR08344 and DR08429 District Roads, between Ebika and Willowvale via Nqadu in the Mquma Local Municipality and Mbhashe Local Municipality, Amatole District Municipality, Eastern Cape Province. Prepared For: Kimopax

- Booth, C. 2021. Phase 1 Archaeological Impact Assessment for the Proposed Establishment of Cattle Pastures on the Farm Bonavista (Portion 9 and 12 of Farm Platterug 303) near Kinkelbos, Sundays River Valley Municipality, Eastern Cape. Prepared For: Algoa Consulting Mining Engineers
- Booth, C. 2021. Phase 1 Archaeological Impact Assessment for the Proposed Mining Right Application on Allotment 50 Of Mdlankomo, near Libode, Nyandeni Local Municipality, OR Tambo District Municipality, Eastern Cape Province. Prepared For: Algoa Consulting Mining Engineers
- Booth, C. 2021. An Archaeological Desktop Assessment for the Proposed Construction of Mpume to Gate Access Road (2.3 Km), Ward 29, Mbashe Local Municipality, Amathole District Municipality, Eastern Cape Province. Prepared For: All Green Environmental Consultant
- Booth, C. 2021. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Construction of Mpume to Gate Access Road (2.3 Km), Ward 29, Mbashe Local Municipality, Amathole District Municipality, Eastern Cape Province. Prepared For: All Green Environmental Consultant
- Booth, C. 2021. Phase 1 Archaeological Impact Assessment for the Proposed Social Housing Development on the Remaining Extent of Erf 8709, Wells Estate, Gqeberha / Port Elizabeth, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared For: JG Afrika

2022:

- Booth, C. 2022. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Memorial Park and Private Cemetery on Portion 50 of Farm 821, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province. Prepared for: Indwe Environmental Consulting CC.
- Booth, C. 2022. Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Buffalo Kloof Airstrip Development on the Remainder of the Farm 1/294, Re/294, Holling Grove North Farm No 180 and Farm 467, Ndlambe Municipality, Eastern Cape. Prepared for: Hortcouture Architects and Planning.
- Booth, C. 2022. A Pre-Construction Archaeological Heritage Walk-Through for Coega Mining Right Application, Erf 220 And Erf 221 Coega, In Zone 10 of the Coega Special Economic Zone (Sez), Nelson Mandela Bay Municipality (NMBM), Eastern Cape Province. Prepared for: Glendore Sand and Stone.
- Booth, C. 2022. Archaeological Monitoring During Topsoil Removal and Trenching Activities for the MSC Site Development in the Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: Rand Civils
- Booth, C. 2022. A Phase 1 Archaeological and Cultural Heritage Impact Assessment (AIA) for the Proposed Upgrade of The R61 Section 6- Tsojana (Km 7.4) To Qumanco (Km 42.2) Between Cofimvaba and Engcobo, Intsika Yethu Local Municipality, Eastern Cape Province. Prepared for: Indwe Environmental Consulting CC.
- Booth, C. 2022. Phase 1 Archaeological Impact Assessment for the Proposed Establishment of Cattle Pastures on the Farm Bonavista (Portion 9 And 12 Of Farm Platterug 303) near Kinkelbos, Sundays River Valley Municipality, Eastern Cape. Prepared for: Algoa Consulting Mining Engineers.

- Booth, C. 2022. Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application Situated on the Remainder of Farm Elva Heights 102, Division of Alexandria, Sunday River Local Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.
- Booth, C. 2022. Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Draaibosch Quarry Mining Permit Application on Remainder of the Farm Draaibosch 45, near Komga, Great Kei Local Municipality, Eastern Cape Province. Prepared for: Algoa Mining Consulting Engineers (ACME).
- Booth, C. 2022. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Liv Lukhanyisa Village, Situated on a Portion of the Remaining Extent (Re) of the Farm Brakkefontein 24, Makhanda (Formerly Grahamstown), Makana Local Municipality, Eastern Cape Province. Prepared for: JG Afrika.
- Booth, C. 2022. Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application on the Farm No. 86, near Lusikisiki, Ingquza Hill Local Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.
- Booth, C. 2022. An Archaeological Assessment and Recommendation for Archaeological Sites Identified Within the Footprint of the Concrete Batch Plant and Pre-Cast Facility in Middelburg, Chris Hani District Municipality, Eastern Cape Province. Prepared for: InClover Consulting.
- Booth, C. 2022. Addendum To: An Archaeological Assessment and Recommendation for Archaeological Sites Identified Within the Footprint of the Concrete Batch Plant and Pre-Cast Facility in Middelburg, Chris Hani District Municipality, Eastern Cape Province: Mitigation of Site BULT_SP1. Prepared for: InClover Consulting.
- Booth, C. 2022. A Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Indlovu Prospecting Right Between Oyster Bay and Cape St Francis, Kouga Local Municipality, Eastern Cape Province. Prepared for: Algoa Consulting Mining Engineers.
- Booth, C. 2022. Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application Situated on the Remainder of Farm Elva Heights 102, Division of Alexandria, Sunday River Local Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.
- Booth, C. 2022. Phase 1 Archaeological Impact Assessment (AIA) for the Proposed Mining Permit Application Situated on a Portion of Portions 42 & 43 Of Farm 807, Division of East London, Buffalo City Metropolitan Municipality, Eastern Cape Province. Prepared for: Stellenryck Environmental Solutions.
- Booth, C. 2022. A Phase 1 Archaeological and Cultural Heritage Impact Assessment (AIA) for the Proposed Tsomo 66kv OHL, Chris Hani and Amathole District Municipality, Eastern Cape Province. Prepared for: Indwe Environmental Consulting CC.
- Booth, C. 2022. Phase 1 Archaeological Impact Assessment (AIA) For the Proposed Brakfontein Residential Settlement, Alexandria, Ndlambe Local Municipality, Eastern Cape Province. Prepared for: Hortcouture Architects and Planning

2023:

- Booth, C. 2023. A Phase 1 Archaeological and Cultural Heritage Assessment for The Proposed Tankatara 600 Mw Solar PV Facility, Portion 1 Of Farm Tankatara Trust No.

- 643, And Associated Overhead Powerlines Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: SLR Consulting
- Booth, C. 2023. Archaeological Monitoring After Bush Clearing Activities for the MSc Phase 4 Site Development in The Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: Rand Civils.
- Booth, C. 2023. Compliance Statement: Exemption of A Phase 1 Archaeological and Cultural Impact Assessment (AIA) For the Construction of A 5m X 5m Laboratory Room Within the Existing IGT Factory, Burman Road in Deal Party, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: Blue Leaf Environmental
- Booth, C. 2023. Phase 1 Archaeological Impact Assessment (AIA) Proposed Construction of Westbank Harbour Arterial Road, East London, Buffalo City Metropolitan Municipality (BCMM), Eastern Cape Province. Prepared for: AYAMPA SUSTAINABLE PROJECTS (PTY) LTD.
- Booth, C. 2023. A Phase 1 Archaeological and Cultural Heritage Assessment for The Proposed Development of Student Accommodation on Erf 9623, Makhanda, Makana Local Municipality, Eastern Cape Province. Prepared for: Habitat Link Consulting.
- Booth, C. 2023. Phase 1 Archaeological Impact Assessment (AIA) For the Proposed Settlement Rezoning and Service Infrastructure on Erf 79 (Ezidonkini), Nemato, Port Alfred, Ndlambe Local Municipality, Eastern Cape Province. Prepared for: DLine8 Landscape Architects and Planning CC.
- Booth, C. 2023. Phase 1 Archaeological Impact Assessment (AIA) For the Proposed Settlement Re-Zoning and Service Infrastructure Installation on Erf 556 Nemato (New Rest), Port Alfred, Ndlambe Local Municipality Eastern Cape Province. Prepared for: DLine8 Landscape Architects and Planning CC
- Booth, C. 2023. Phase 1 Archaeological Impact Assessment (AIA) For the Proposed Construction of a Sewage Grit and Sludge Washing Facility and Associated Infrastructure Adjacent to Fish Water Flats Waste Water Treatment Works, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: Gibb Environmental Port Elizabeth
- Booth, C. 2023. A Phase 1 Archaeological and Cultural Heritage Assessment for The Proposed Port Alfred Sewerage Infrastructure Upgrade: Phase 1, Ndlambe Municipality, Eastern Cape Province. Prepared for: DLINE8 PTY (LTD).
- Booth, C. 2023. Phase 1 Archaeological and Cultural Impact Assessment (AIA) For the Proposed Development of Existing Residential Erven and Associated Infrastructure for Erf Numbers 6889 To 7106, And the Subdivision and Development of New Residential Erven and Associated Infrastructure for Parcel Number 6850 Rosehill, Port Alfred, Ndlambe Local Municipality, Eastern Cape Province. Prepared for: Hortcouture Architects and Planning.
- Booth, C. 2023. Phase 1 Archaeological Impact Assessment (AIA) For the Proposed Mining Permit Application Situated on Portion 4 (Portion of Portion 1) Of the Farm Walsingham No. 287, Ndlambe Local Municipality, A Division of Bathurst, Eastern Cape Province. Prepared for: Algoa Mining Consulting Engineers (ACME).
- Booth, C. 2023. A Phase 1 Archaeological and Cultural Heritage Assessment for The Proposed Integrated Housing Precinct Development on Erf 10144, King Williams Town, Buffalo City Metropolitan Municipality, Eastern Cape Province. Prepared for: Lwethuma Environmental Consultants.

- Booth, C. 2023. Phase 1 Archaeological and Cultural Impact Assessment for The Proposed Development and Construction of Sustainable Housing Development, Associated Facilities and Infrastructure, Remainder of Portion 4 Of the Farm Thornhill No 388, Port Alfred, Ndlambe Local Municipality, Eastern Cape Province. Prepared for: Hortcouture Landscape Architects and Planning.
- Booth, C. 2023. A Phase 1 Archaeological and Cultural Impact Assessment for The Transnet Ngqura Manganese Export Terminal, Coega Special Economic Zone, Port of Ngqura, Nelson Mandela Bay Municipality, Eastern Cape. Prepared for: CEN Integrated Environmental Management Unit.
- Booth, C. 2023. A Phase 1 Archaeological and Cultural Heritage Assessment for The Proposed Burnside Sand Mining on Portion of The Farm Lower Hlabathi 162 Magisterial Division of Lusikisiki Within the Ingquza Hill Local Municipality, Eastern Cape Province, South Africa. Prepared for: Lwethuma Environmental Consultants.

2024:

- Booth, C. 2024. Phase 1 Archaeological and Cultural Impact Assessment (AIA) For the Proposed Arlington Multiple-Use Development, Walmer, Gqeberha, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: JG Afrika
- Booth, C. 2024. Phase 1 Archaeological and Cultural Impact Assessment (AIA) For the Proposed Development of a Resort & Supporting Infrastructure on Erf 1618, Colchester, Sundays River Valley Local Municipality, Eastern Cape Province. Prepared for: CEN Integrated Environmental Management Unit.
- Booth, C. 2024. Archaeological And Cultural Impact Assessment (AIA) For The Proposed Ibhino Sand Mining Permit Application On Portion 4 Of The Farm Schelmhoek 311, Uitenhage, Near Colchester, Nelson Mandela Bay Municipality, Eastern Cape Province. Prepared for: Ectheca Environmental Services Pty Ltd.
- Booth, C. 2024. Phase 1 Archaeological and Cultural Impact Assessment (AIA) For The Proposed Poultry Layer Facility On The Remaining Extent Of The Farm Nieuw Jaars Kop 300, Kinkelbos, Within The Sundays River Valley Local Municipality, Eastern Cape Province. Prepared for: Habitat Link Consulting.

Palaeontological impact assessment for Beacon Bay Memorial Park

Prepared for: Indwe Environmental Consulting CC

Compiled by: Robert Gess (PhD)
Rob Gess Consulting
(Research Associate of the Albany Museum)

Box 40
Bathurst
6166
robg@imagnet.co.za

March 2022

Contents:

page 1: **Title**

page 2: **Contents**

page 3: **Background**

page 4: **Geology and Palaeontology**

page 5: **Site Visit**

page 10: **Conclusions and Recommendations.**

Background

Indwe Environmental Consulting cc have been appointed by CapeVest Investments Pty Ltd as an independent Environmental Consultant to undertake the required Application for Environmental Authorisation process in terms of the National Environmental Management Act (Act 107 of 1998) for the proposed development of a private cemetery and memorial park on ptn 50 of Farm 821, Buffalo City Metropolitan Municipality, Eastern Cape.

The proposed project includes the construction of a cemetery near the Ducats area of East London and is located approximately 10.7 km north of the East London CBD and is about 4 km from the Merrifield School turn off onto the N6 from East London, Beacon Bay. The study site is located at co-ordinates 32°55'8.77"S; 27°54'31.55"E and has access from Road W (MN10118) which is a Class 5 Provincial Minor Road. The predominant land use surrounding the site is that of agriculture.

Indwe Environmental Consulting subcontracted Rob Gess Consulting to conduct a Palaeontological Impact Assessment.

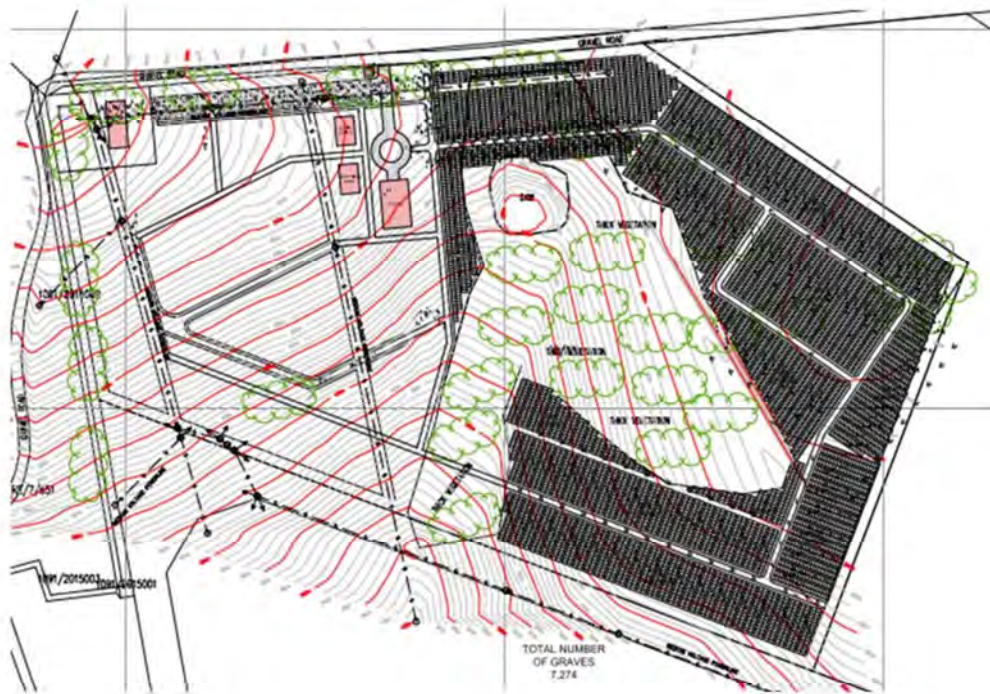


Figure 1: Layout of proposed memorial park

Geology and Palaeontology

The entire study area is underlain by Upper Permian strata of the Balfour Formation (Adelaide Subgroup, Beaufort Group, Karoo Supergroup). These are intruded by dolerite dykes and sills emplaced during the Jurassic.



Figure 2: Redrawn detail of the Council for Geosciences “Kingwilliamstown” map sheet (3226), showing the geology around the study area. Pale Green/Blue represents strata of the Balfour Formation (Pub); Plum colour represents dolerite intrusions and Pale Pink represents the proposed development area. *Note that the field survey indicated that the dolerite intrusion extends further into the proposed developmental area.*

The strata of the **Karoo Supergroup** were deposited within the Karoo sedimentary Basin, which resulted from shortening and thickening of the southern margin of Africa, with coeval folding and uplift of the Cape Supergroup strata along its southern margin. The Karoo Supergroup strata are between 310 and 182 million years old and span the Upper Carboniferous to Middle Jurassic Periods. During this interval the basin evolved from an inland sea flooded by a melting ice cap, to a giant lake (the Eccca Lake) fed by seasonal meandering (and at times braided) rivers. As the Eccca Lake silted up a subaerial (exposed) shoreline began to develop, initially in the south east of the basin. The lake steadily shrank towards the centre of the basin, leaving behind flat silty plains across which long rivers meandered from the Cape Mountains towards the much reduced lake. Sands were deposited along the river channels

whereas periodic flooding deposited muds on the broad flood plains. These in time came to form the interbedded sandstones and mudstones of the Koonap, Middleton and **Balfour formations** of the Adelaide Subgroup, (Beaufort Group, Karoo Supergroup), which are overlain by strata of the Tarkastad Subgroup (Beaufort Group, Karoo Supergroup). During the Jurassic Period the subcontinent was inundated with basaltic lava that issued from widespread linear cracks within the crust. Magma that cooled within the sub surface feeder systems of these basalt extrusions formed a network of dolerite intrusions that have been subsequently exposed by deep erosion of the subcontinent.

The flood planes of the **Beaufort** Group provide an internationally important record of life during the early diversification of land vertebrates. During its deposition giant amphibians coexisted with diapsid reptiles (the ancestors of dinosaurs, birds and most modern reptiles), anapsids and synapsids, the dominant group of the time which included the diverse therapsids (including the ancestors of mammals). Rocks of the Beaufort Group provide the world's most complete record of the important transition from early reptiles to mammals.

The Beaufort Group is subdivided into a series of biostratigraphic units on the basis of its faunal content. The middle (predominant) portion of the **Balfour Formation** is host to the ***Daptocephalus* Assemblage Zone**. Characterised by the co-occurrence of two therapsids, *Daptocephalus* and *Theriognathus*, this zone demonstrates the Beaufort Groups greatest diversity of vertebrate taxa, including numerous genera and species of dicynodont, biarmosuchian, gorgonopsian and therocephalian and cynodont therapsid Synapsida, together with diverse captorhinid Reptilia and less well represented eosuchian Reptilia, Amphibia and Pisces. Trace fossils of invertebrates and vertebrates as well as *Glossopteris* flora plants have also been described.

Site Visit

The study site was systematically surveyed on foot on the 5th of February 2022. The only outcrops of bedrock encountered during the survey comprised dolerite outcrops which extended further into the study area than predicted by the Geological Survey map. Dolerite was encountered in the small dam as well as underlying the woodland, both of which, according to the concept (Fig. 1) are not due to be altered during the development. Open grasslands within the study area exhibited signs of having been formerly utilised for agriculture. Balfour Formation strata, altered and hardened due to proximity to the dolerite intrusion were observed in the road bed adjacent to the study area.



Figure 3: Satellite image of proposed development area with photo numbered points marked.



Figure 3: View south eastwards from point 1 (Fig. 3).



Figure 4: View westwards from point 1 (Figure 3).



Figure 5: Dolerite exposed in the small dam at point 2 (Figure 3).



Figure 6: Dolerite outcropping in the wood at point 3 (Figure 3).



Figure 7: dolerite outcropping on the outskirts of the wood at point 4 (Figure 3).



Figure 8: View westwards from point 5 (Fig 3).



Figure 9: Metamorphosed Balfour Formation sedimentary strata, altered by proximity to the dolerite intrusion, observed in the road bed at point 6 (Figure 3).

Conclusions and Recommendations

The area is situated overlying strata of the late Permian Balfour Formation (of the Karoo Supergroup) which is world renowned for its abundant and diverse record of terrestrial vertebrates. Much of the area is however mantled by a layer of recent alluvium, which obscures the underlying strata and has in the past been ploughed along contour for agricultural purposes.

The only outcrops of rock encountered within the study are comprised of intrusive dolerite rock which, having cooled from molten igneous rock contains no fossils. It extends over a greater portion of the proposed developmental area than predicted by the geological survey map.

Baked sediments of the Balfour Group were encountered just outside the study area, suggesting that the palaeontological integrity of the rocks may be somewhat compromised by metamorphism in immediate proximity to the dolerite intrusion.

Most of the area where dolerite was encountered are likely not to be developed but to be conserved.

Areas that will principally be disturbed by developments appear to have a thick covering of alluvium (soil) that has previously been ploughed for agriculture. It is likely due to the even and low gradient topography, particularly at the top where most disturbance will occur, that the soil is underlain by extremely degraded leached mudstones.

There is therefore a very low likelihood that any significant palaeontological material will be disturbed during development of this site.

Should however any petrified (turned to stone) bones be encountered at any time ECPHRA or a professional palaeontologist should immediately be contacted.

References

- Anderson, J.M. and Anderson, H.M. (1985). *Palaeoflora of Southern Africa: Prodromus of South African Megafloras*; Devonian to Lower Cretaceous. A.A. Balkema, Rotterdam. p.423
- Council for Geosciences (Geological Survey) 1:250 000 Geological Maps, map 3124 Middleberg
- McCarthy, T. and Rubidge, B. (2005). *The Story of Earth and Life*. Struik Publishers, Cape Town
- Rubidge B.S. (Ed) (1995). Biostratigraphy of the Beaufort Group (Karoo Supergroup). South African Committee for Stratigraphy (SACS), *Biostratigraphic Series No. 1*. Council for Geosciences, Dept. of Mineral and Energy Affairs S.A. p.46.
- Smith, R., Rubidge, B. and van der Walt, M.(2012). Therapsid Biodiversity Patterns and Palaeoenvironments of the Karoo basin, south Africa in ed. Chinsamy Turan, A. *Forerunners of Mammals*. Indiana University Press



Province of the
EASTERN CAPE
ECONOMIC DEVELOPMENT,
ENVIRONMENTAL AFFAIRS & TOURISM

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

(For official use only)

File Reference Number:

NEAS Reference Number:

Date Received:

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of 6 January 2021.

PROJECT TITLE

PROPOSED MEMORIAL PARK AND PRIVATE CEMETERY ON PTN 50 FARM 821, BCM, EASTERN CAPE

SPECIALIST

Contact person:

DR ROBERT GESS

Postal address:

531 ORANGE ST BATHURST

Postal code:

6166

Cell:

083 651 1179

Telephone:

Fax:

E-mail:

rob@imaginat.co.za

Professional affiliation(s) (if any)

SACNASP

[Handwritten signature]

Project Consultant:
Contact person:
Postal address:

Indwe Environmental Consulting cc		
Megan Hugo (Registered EAP- EAPASA Reg No. 2019/1530)		
2 Ayr Place, Bonnie Doon, East London		
	Cell:	082 259 3981
Postal code:	5241	
Telephone:	043 555 0656	Fax:
E-mail:	megan@indwecon.co.za	086 513 9734

4.2 The SPECIALIST

I, DR ROBERT W. GESS, declare that –

General declaration:

- I act as the independent Specialist in this application
- 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 environmental impact assessments, 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 will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- 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;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by

- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.
- I have a vested interest in the proposed activity proceeding, such vested interest being:

A handwritten signature, possibly the letter 'L', is written on a set of three horizontal lines (top, middle, and bottom). The signature is formed by several overlapping, slightly curved strokes. The top part of the 'L' is formed by multiple parallel diagonal strokes, and the bottom part is a single horizontal stroke that curves slightly to the right.

Rob Gess Consulting

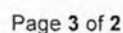
Date: 20 May 2025

V. Furtado ⁷¹⁴²⁹ V. Furtado FURTA

Date: 2025-05-20

CONTABLE

Official stamp (below).



CURRICULUM VITAE – ROBERT WOLFGANG GESS

Robert Gess has more than 30 years of experience in palaeontological research in the Eastern Cape, covering all geological units. He is currently South Africa's primary researcher on South African Devonian Palaeoichthyology and Palaeobotany. He has published numerous papers in international peer-reviewed journals in conjunction with colleagues, including a description of the oldest fossil lamprey (*Priscomyzon*), published in *Nature* in 2006, a second paper on *Priscomyzon* published in *Nature* in 2021 and focussed on overturning major evolutionary assumptions about lamprey larvae; a paper published in *Nature* utilising 3D scanning to redescribe the 'shark' *Dwykaselacus* and demonstrate the origin of Holocephalan fish; description of Africa's earliest known fossil tetrapods (legged vertebrates) by 80 million years, which overturns major biogeographic assumptions regarding tetrapod evolution published in *Science*, and descriptions of numerous other species including Gondwana's earliest known terrestrial animal, a Late Devonian scorpion. He has also discovered and helped describe and numerous new taxa of Devonian plants, including the oldest flora from Africa.

Date of birth: 9 November 1968

Nationality: South African

ID: 6811095109082

Phone: 083 6511179

Home address: Erf 531 Orange Lane, Bathurst (Box 40, Bathurst, 6166), Eastern Cape.

Research address: Devonian lab, Albany Museum, 87 Beaufort Street, Makhanda (Grahamtown), Eastern Cape, South Africa

Schooling: Saint Andrews, Grahamstown/Makhanda

Qualifications:

PhD (Palaeontology)	University of the Witwatersrand	2011
M.Sc. (Zoology/Palaeontology)	University of Fort Hare	2003
Higher Diploma in Education	Rhodes University	1992
B.Sc. (Geology and Zoology)	Rhodes University	1991

NRF Rating: C1 (2019)

Professional Associations

SACNASP registered Professional Scientist

Albany Museum, Makhanda, Research Fellow affiliated to Genus (the DSI-NRF Centre of Excellence in Palaeosciences)

Rhodes University Research Associate and part time lecturer.

Palaeontological Society of South Africa

South African Council for Stratigraphy Working Group for the Cape Supergroup. (since 2014)

South African Committee for Stratigraphy – Task group for Biostratigraphy (since 2018)

International Subcommission on Devonian Stratigraphy (since 2016)

Eastern Cape Provincial Heritage Resource Agency Council Member

Palaeontological Experience

January 2017 - Present: Albany Museum, Makhanda, Research Fellow affiliated to Genus (the DSI-NRF Centre of Excellence in Palaeosciences) and funded by the Millennium Trust

Consulting, part time lecturing – Rhodes Geology Department
in 2023 also part time lecturing in Rhodes Zoology Department

July 2015 - December 2016: Albany Museum, Grahamstown (now Makhanda), Post Doctoral Research Fellow affiliated to the DSI-NRF Centre of Excellence in Palaeosciences

Consulting, part time lecturing – Rhodes Geology Department

July 2013 - June 2015: Post Doctoral research at Rhodes University, Grahamstown.

Eastern Cape Provincial Heritage Resources Agency Permitting Committee –
palaeontological representative

Consulting, Part time lecturing – Rhodes Geology Department

July 2012 – June 2013: Post Doctoral research at Bernard Price Institute (now Evolutionary Studies Institute), University of the Witwatersrand.

Consulting, part time lecturing – Rhodes Geology Department

March 2011 – June 2011: Post Doctoral research at Bernard Price Institute (now Evolutionary Studies Institute), University of the Witwatersrand.

Consulting, part time lecturing – Rhodes Geology Department

July 2006 – December 2010: Doctoral Research at Bernard Price Institute, University of the Witwatersrand,

funded by the Palaeanthropology Scientific Trust (PAST) and the National Research Foundation (NRF).

Supervisors: Professor Bruce Rubidge (PhD), director of the Bernard Price Institute of Palaeontological Research, University of the Witwatersrand.
Professor Michael Coates (PhD), Department of Organismal Biology and Anatomy Chair, University of Chicago

Consulting

2003-2005: Self funded research. Tourguiding

2001-2002: Writing MSc in Palaeontology whilst doing research for Geodatec, Grahamstown.

Supervisors: Dr Norton Hiller, Canterbury Museum, New Zealand
Dr Jacques van Heerden, Zoology Department, University of Fort Hare

1996-2000: Self funded research.

Part time Palaeontological Consultancy, including evaluation of Palaeontological resources, and mitigatory excavations.

Visits to international institutions.

1993-1995: Graduate Palaeontological Research Assistant, Geology Department, Rhodes University

Supervisor: Dr Norton Hiller, Geology Department, Rhodes University.

Publications

Peer Reviewed Chapter in Book

Gess, R.W. (2016) Vertebrate biostratigraphy of the Witteberg Group and the Devonian Carboniferous boundary in South Africa, in eds. Linol, B. and de Wit, M. J., *The Origin and Evolution of the Cape Mountains and Karoo Basin*. Springer, Regional Geology Reviews. pp 131-140. Doi: 10.1007/978-3-319-40859-0_13

Palaeontological Papers in Peer-reviewed Journals

Gess, R.W. and Reddy, C. (2024) Oldest ophiuroid fossils in South Africa's Baviaanskloof Formation offer insights into Malvinohosan Realm. *South African Journal of Science*. **120** (11/12): 1-4. DOI: <https://doi.org/10.17159/sajs.2024/18896>

Gess, R. W. and Berry, C. (2024) *Archaeopteris* trees at high southern latitudes in the late Devonian. *Review of Palaeobotany and Palynology* **331**(1):105212
DOI: 10.1016/j.revpalbo.2024.105212

Marshall, J., Blom, H., Niedźwiedzki, G., Qvarnström, M., **Gess, R.**, Whiteside, J. and Ahlberg, P. (2024) The palaeoenvironmental record through a Devonian-Carboniferous boundary super-monsoon lake. *Geologica Balcanica* DOI: 10.52321/GeolBalc.53.3.91

Gess, R.W. and Burrow, C.J. (2024) A new gyracanthid (stem Chondrichthyes) from the Late Devonian (Famennian) of the Eastern Cape, South Africa. *Journal of Vertebrate Paleontology* **43**(4) DOI: 10.1080/02724634.2024.2305888

Reddy C., Thuy, B., Reid, M. and **Gess R.W.** (2023) Earliest known ophiuroids from high palaeolatitude, southern Gondwana, recovered from the Pragian to earliest Emsian Baviaanskloof Formation (Table Mountain Group, Cape Supergroup) South Africa. *PLoS ONE* **18**(10): e0292636. <https://doi.org/10.1371/journal.pone.0292636>

Gess, R.W. and Ahlberg, P.E. (2023) A high latitude Gondwanan species of the Late Devonian tristichopterid *Hyneria* (Osteichthyes: Sarcopterygii), *PLoS ONE* **18**(2): e0281333. <https://doi.org/10.1371/journal.pone.0281333>

Harris, C. and **Gess, R.W.** (2022) Insights from a monospecific lingulid brachiopod bed in the Late Devonian of South Africa, *Palaeos* **37**, 471–485. DOI: <http://dx.doi.org/10.2110/palo.2021.046>

Gess, R.W. and Prestianni, C. (2022) *Flabellopteris lococannensis* gen. et sp. nov.: A new fern-like plant from the Famennian of South Africa, *Review of Palaeobotany and Palynology* **297**(2):104585 : <https://doi.org/10.1016/j.revpalbo.2021>

Scholze, F. and **Gess, R.W.** (2021) Late Devonian non-marine *Naiadites devonicus* nov. sp. (Bivalvia: Pteriomorphia) from the Waterloo Farm Lagerstätte in South Africa. *Geobios* **69**: 55-67. <https://doi.org/10.1016/j.geobios.2021.07.002>

Harris, C., **Gess, R.W.**, Prestianni, C. and Bamford, M.K. (2021) A Late Devonian refugium for *Colpodexylon* (Lycopsidea) at high latitude *Review of Palaeobotany and Palynology* **293**: <https://doi.org/10.1016/j.revpalbo.2021.104481>

Gess, R.W. and Prestianni, C. (2021) An early Devonian flora from the Baviaanskloof Formation (Table Mountain Group) of South Africa. *Scientific Reports* 11(1):11859: pp 1-23 doi: 10.1038/s41598-021-90180-z

Harris, C., **Gess, R.W.**, Rubidge, B.S. and Penn-Clarke, C. (2021) Coombs Hill: A Late Devonian fossil locality in the Witpoort Formation (Witteberg Group, South Africa). *South African Journal of Science*: 117(3/4) pp 1-6. DOI: 10.17159/sajs.2021/9190

Miyashita, T., **Gess, R.W.**, Tietjen, K., and Coates, M.I., (2021) Non-ammocoete larvae of Palaeozoic stem lampreys. *Nature* 591(7850): 982-984. <https://doi.org/10.1038/s41586-021-03305-9>

Gess R.W. and Whitfield, A.K. (2020) Estuarine fish and tetrapod evolution: insights from a Late Devonian (Famennian) Gondwanan estuarine lake and a southern African Holocene equivalent. *Biological Reviews*: 95, pp. 865–888. doi: 10.1111/brv.12590

Gess R.W. and Clement A.M. (2019). A high latitude Devonian lungfish, from the Famennian of South Africa. *PeerJ*, 7:e8073 DOI 10.7717/peerj.8073

Fontanarrosa, G., Abdala, F., Kümmell, S. and **Gess, R.** (2019) The manus of Tetracynodon (Therapsida: Therocephalia) provides evidence for survival strategies following the Permo-Triassic extinction, *Journal of Vertebrate Paleontology*, 38:4, (1-13) doi.org/10.1080/02724634.2018.1491404

Prestianni, C. and **Gess, R.W.** (2018) *Rinistachya hilleri* gen. et sp. nov. (Sphenophyllales), from the upper Devonian of South Africa. *Organisms Diversity & Evolution*. doi.org/10.1007/s13127-018-0385-3

Gess, R.W. and Ahlberg, P.E. (2018) A tetrapod fauna from within the Devonian Antarctic Circle. *Science*: 360 (6393): 1120. DOI: 10.1126/science.aag1645

Gess, R.W. and Prestianni, C. (2018) *Kowieria alveoformis* gen. nov. sp. nov., a new heterosporous lycophyte from the Latest Devonian of Southern Africa. *Review of Palaeobotany and Palynology*: 249:1-8.

Gess, R.W. and Trinajstić, K.M. (2017) New morphological information on, and species of placoderm fish *Africanaspis* (Arthrodira, Placodermi) from the Late Devonian of South Africa. *PLoS ONE*: 12(4): e0173169. <https://doi.org/10.1371/journal.pone.0173169>

Scholze, F., **Gess, R.W.** (2017) Oldest known naiaditid bivalve from the high-latitude Late Devonian (Famennian) of South Africa offers clues to survival strategies following the Hangenberg mass extinction. *Palaeogeography, Palaeoclimatology, Palaeoecology*: 471 (2017) 31–39. DOI: 10.1016/j.palaeo.2017.01.018

Coates, M.I., **Gess, R.W.**, Finarelli, J.A., Criswell, K.E. and Tietjen, K. (2017) A symmoriiform chondrichthyan braincase and the origin of chimaeroid fishes. *Nature*: 541: 208-211 DOI: 10.1038/nature20806.

Gess, R.W. and Coates, M.I. (2015). Fossil juvenile coelacanths from the Devonian of South Africa shed light on the order of character acquisition in actinistians. *Zoological Journal of the Linnean Society*. **175**, 360–383. doi: [10.1111/zoj.12276](https://doi.org/10.1111/zoj.12276)

Gess, R.W. and Coates, M.I. (2015). High Latitude Chondrichthyans from the Late Devonian (Famennian) Witpoort formation of South Africa. *Palaeontologische Zeitschrift*: **89**: 147–169. DOI 10.1007/s12542-014-0221-9

Prestianni, C. and **Gess, R.W.** (2014). The rooting system of *Leptophloeum* Dawson: new material from the Upper Devonian, Famennian, Witpoort Formation of South Africa" (Prestianni and Gess). *Review of Palaeobotany and Palynology*: **209**: 35-40. DOI: 10.1016/j.revpalbo.2014.05.007

Gess, R.W. (2013) The earliest record of terrestrial animals in Gondwana: A scorpion from the Famennian (Late Devonian) Witpoort Formation of South Africa. *African Invertebrates*: **54** (2): 373–379. <https://doi.org/10.5733/afin.054.0206>

Gess, R. and Coates M. (2008) Vertebrate Diversity of the Late Devonian (Famennian) Deposit near Grahamstown, South Africa. *Journal of Vertebrate Paleontology*: **28** (3) conference supplement p 83.

Coates, M.I. and **Gess, R.W.** (2007). A new reconstruction of *Onychoselache traquairi*, comments on early chondrichthyan pectoral girdles, and hybodontiform phylogeny, *Palaeontology* **50**, 6: 1421-1446.

Gess, R.W., Coates, M.I. and Rubidge, B.S. (2006). A lamprey from the Devonian period of South Africa. *Nature* **443**: 981-984.

Gess, R.W. (2001). A new species of *Diplacanthus* from the Late Devonian (Famennian) of South Africa. *Annales de Paléontologie* **87**: 49-60.

Anderson, M.E., Long, J.A., **Gess, R.W.** and Hiller, N. (1999). An unusual new fossil shark (Pisces: Chondrichthyes) from the Late Devonian of South Africa. *Records of the Western Australian Museum* **57**: 151-156.

Long, J.A., Anderson, M.E., **Gess, R.W.** and Hiller, N. (1997). New placoderm fishes from the Late Devonian of South Africa. *Journal of Vertebrate Palaeontology* **17**: 253-268.

Hiller, N and **Gess, R.W.** (1996). Marine algal remains from the Upper Devonian of South Africa. *Review of Palaeobotany and Palynology* **91**: 143-149.

Anderson, H.M., Hiller, N. and **Gess, R.W.** (1995). *Archaeopteris* (Progymnospermopsida) from the Devonian of southern Africa. *Botanical Journal of the Linnean Society* **117**: 305-320.
<https://doi.org/10.1006/bojl.1995.0021>

Gess, R.W. and Hiller, N. (1995b). Late Devonian charophytes from the Witteberg Group, South Africa. *Review of Palaeobotany and Palynology* **89**: 417-428. [https://doi.org/10.1016/0034-6667\(95\)00007-8](https://doi.org/10.1016/0034-6667(95)00007-8)

Gess, R.W. and Hiller, N. (1995a). A preliminary catalogue of fossil algal, plant, arthropod, and fish remains from a Late Devonian black shale near Grahamstown, South Africa. *Annals of the Cape Provincial Museums (Natural History)* **19**: 225-304.

Anderson, M.E., Hiller, N. and **Gess, R.W.** (1994). The first *Bothriolepis*-associated Devonian fish fauna from Africa. *South African Journal of Science* **90**: 397-403.

Ecological Papers in Peer-reviewed Journals

Gess, F.W., Gess, S.K. and **Gess, R. W.** (1995). An Australian Masarine, *Rolandia angulata* (Richards) (Hymenoptera: Vespidae): nesting and evaluation of association with *Goodenia* (Goodeniaceae). *Journal of Hymenoptera Research*: **4**: 25-32.

Gess, S.K., Gess, F.W. and **Gess, R.W.** (1997). Update on the flower associations of southern African Masarinae with notes on the nesting of *Masarina strucki* Gess and *Celonites gariensis* Gess (Hymenoptera: Vespidae: Masarinae). *Journal of Hymenoptera Research*: **6**:75-91.

Non Peer Reviewed articles (Palaeontology)

Gess, R.W. (2012). The oldest animals (comment and opinion), *South African Journal of Science* **108**,1: 1.

Chapter in popular book

Rob Gess (2021) Palaeontology: the fossils of the Grahamstown Region (pp. 69-82) in *Guide to the Natural and Cultural History of Grahamstown/Makhanda*, ed. Lubke, R. and de Moor, I. (2021). Wessa Makhanda Branch, Makhanda.

Conference Proceedings

Gess, R. (2024) A symmoriid (stem holocephalan) from the Devonian of South Africa offers insight into the origins of post End Devonian Extinction recovery faunas. *Abstract book of 22nd Biennial Conference of the Palaeontological Society of southern Africa, 8-12 September 2024, Graaff-Reinet, Eastern Cape.*

Harris, C., **Gess, R.**, Penn-Clarke, C., and Jinnah, Z. (2024) A transgressive model for the Waterloo Farm black shale lagerstätte (Late Devonian Period). *Abstract book of 22nd Biennial Conference of the Palaeontological Society of southern Africa, 8-12 September 2024, Graaff-Reinet, Eastern Cape.*

Nel, R., Trinajstić, K. and **Gess, R.** (2024) New morphological insights on adult and juvenile arthrodire placoderm from the Late Devonian, Famennian deposits of Waterloo Farm. *Abstract book of 22nd Biennial Conference of the Palaeontological Society of southern Africa, 8-12 September 2024, Graaff-Reinet, Eastern Cape.*

Marshall, J., Blom, H., Niedźwiedzki, G., Qvarnström, M., **Gess, R.**, Whiteside, J., Ahlberg, P. (2024) The palaeoenvironmental record through a Devonian-Carboniferous boundary supermonsoon lake. Joint ISSS-SDS Meeting, 12–17 September 2024, Sofia, Bulgaria. *Geologica Baltica*: **53** (3), Sofia, December 2024, pp. 91–94.

Gess, R.W. (2024) A symmoriid (stem holocephalan) with a Damocles-like spine from the Devonian of South Africa. 17th International Symposium on Early and Lower Vertebrates (Rimousli-Miguasha, Quebec, Canada. June 2024). *Ichthyolith Issues Special Publication 16*. ISSN 1302-1314.

Lukševičs, E., Ahlberg, P. E., Niedźwiedzki, G., Alksnītis, V., **Gess, R. W.**, Stinkulis, Ģ. (2024) *Ventastega* and a new tetrapod from the Upper Famennian of Latvia. 17th International Symposium on Early and Lower Vertebrates (Rimousli-Miguasha, Quebec, Canada. June 2024). *Ichthyolith Issues Special Publication 16*. ISSN 1302-1314.

Choo, B. and **Gess, R.W.** (2023) Dawn of African ray-fins. A new actinopterygian fish from the Upper Devonian Waterloo Farm lagerstätte, South Africa. Abstract volume of 18th Conference on Australasian Vertebrate Evolution, Palaeontology and Systematics (CAVEPS), 27 -30 November 2023, Melbourne, Australia.

During, M., Clays, P., Goderis, P., **Gess, R.** and Ahlberg, P. (2023) Unique Preservation and REE enrichment of Famennian fossils from the Waterloo Farm Deposit, South Africa Abstract

volume of *83rd Annual Meeting of the Society of Vertebrate Paleontology*: 18-23 October, Cincinnati, Ohio, USA

Nel, R., Trinajstić, K. and **Gess, R.**, (2023) Placoderm diversity in the high palaeolatitude Waterloo Farm Lagerstätte. Abstract volume of *Palaeo Down Under 3 Conference*, 10 - 14 July, Perth, Australia.

Harris, C., **Gess, R.W.**, Penn-Clarke, C. and Jinnah, Z.A. (2023) *Zoophycos* in the Witpoort Formation (Witteberg Group, Cape Supergroup, South Africa). *Abstract volume of GeoCongress 2023*, Stellenbosch, 11-13 January.

Nel, R., **Gess, R.W.**, Trinajstić, K. (2022). Insight into the morphological disparity in the rarely preserved soft tissue portion of antiarch placoderm fish, *Bothriolepis africana*. *Abstracts of Annual Student Symposium for Natural Science, Pretoria, Gauteng, South Africa*. 02-04 November.

Gess, R.W. (2022) Implications of non-ammocoete larvae in the earliest known lampreys. *Proceedings of the 21st Biennial Conference of the Palaeontological Society of Southern Africa*, Golden Gate, September 12th – 15th, 2022. *Palaeontologia africana*: **55**.

Gess, R.W. (2022) Reconstruction of the high-latitude Late Devonian (Famennian) Waterloo Farm Lagerstätte from the Witpoort Formation (Witteberg Group, Cape Supergroup) of South Africa. *Proceedings of the 21st Biennial Conference of the Palaeontological Society of Southern Africa*, Golden Gate, September 12th – 15th, 2022. *Palaeontologia africana*: **55**.

Nel, R., **Gess, R.W.**, Trinajstić, K. 2022. Insight into the morphological disparity in the rarely preserved soft tissue portion of antiarch placoderm fish, *Bothriolepis africana*. *Proceedings of the 21st Biennial Conference of the Palaeontological Society of South Africa conference*, Golden Gate, September 12th – 15th, 2022. *Palaeontologia africana*: **55**.

Harris, C., Jinnah, Z.A., Penn-Clarke, C.R. and **Gess, R.W.** (2022) *Zoophycos* in the Witpoort Formation. *Proceedings of the 21st Biennial Conference of the Palaeontological Society of South Africa conference*, Golden Gate, September 12th – 15th, 2022. *Palaeontologia africana*: **55**.

Gess, R.W. and Ahlberg P.E. (2022) A new Famennian species of *Hyneria* from the terra incognita of southern Gondwana – evidence from the Waterloo Farm Lagerstätte in South Africa. *Proceedings of the 16th International Symposium on Early and Lower Vertebrates* Valencia, Spain, 20 – 30 June 2022.

Prestianni, C. and **Gess, R.W.** (2022) Ovule and ovule-like structures in the Famennian of South Africa. *Abstract volume: 11th EPPC* (European Palaeobotany and Palynology Conference), Stockholm, Sweden. 19-22 June, 2022.

Harris, C., Jinnah, Z.A., Tshibubudze, A., Penn-Clarke, C.R. and **Gess, R.W.** (2021) High latitude marginal marine deposits of the Witpoort Formation, South Africa, problems and solutions. *35th IAS (International Association of Sedimentologists) Meeting of Sedimentology Book of Abstracts*, Prague, Czech Republic, 21-25 Jun 2021.

Miyashita, T., **Gess, R.W.** and Coates, M. (2020) The Evolutionary Origin of the Filter-feeding Larval Phase in Lampreys. *Integrative and Comparative Biology*: 60: E164. Oxford University Press. (Abstract of The Society for Integrative and Comparative Biology annual meeting in Austin, Texas, January 3-7, 2020)

Gess, R.W. (2019) The Palaeoenvironment of the high latitude Devonian tetrapods from Waterloo Farm, South Africa. 15th International Symposium on Early and Lower Vertebrates, Qujing, Yunnan Province, China, August 8th – 13th 2019. *Ichthyolith Issues* Special Publication 14.

Trinajstić, K. and **Gess, R.W.** (2019) The palaeoecology of Placoderm neonate and juveniles from the Late Devonian of South Africa. 15th International Symposium on Early and Lower Vertebrates, Qujing, Yunnan Province, China, August 8th – 13th 2019. *Ichthyolith Issues* Special Publication 14.

Miyashita, T. and **Gess, R.W.** (2019). Ontogeny of Palaeozoic stem lampreys as a test for the ammocoete-based model of the vertebrate ancestry. 15th International Symposium on Early and Lower Vertebrates, Qujing, Yunnan Province, China, August 8th – 13th 2019

Harris, C. and **Gess, R.W.** (2018) A monotaxic brachiopod bed provides information on palaeoenvironments in the Upper Devonian Witpoort Formation Witteberg Group, Cape Supergroup, South Africa. *Proceedings of the 5th International Palaeontology Conference, Paris (France), July 9th – 13th, 2018*.

Harris, C. and **Gess, R.W.** (2018) *Archaeopteris*, the earliest tree in South Africa. *Proceedings of the 5th International Palaeontology Conference, Paris (France), July 9th – 13th, 2018*.

Gess, R.W. (2018) New clues to the origin of tetrapods from the South African Upper Devonian. *Proceedings of the 20th Biennial Conference of the Palaeontological Society of Southern Africa, Bloemfontein, July 4th – 6th, 2018*.

Harris, C. and **Gess, R.W.** (2018) New information on *Archaeopteris notosaria* – southern Africa's earliest known tree from the Upper Devonian (Famennian). *Proceedings of the 20th*

Biennial Conference of the Palaeontological Society of Southern Africa, Bloemfontein, July 4th – 6th, 2018.

Harris, C. and **Gess, R.W.**, Rubidge, B.S and Penn-Clarke, C. (2018) Coombs Hill: A new Devonian fossil bearing locality in the Witpoort Formation, Eastern Cape, South Africa. *Proceedings of the 20th Biennial Conference of the Palaeontological Society of Southern Africa, Bloemfontein, July 4th – 6th, 2018.*

McKay, I., Mudau, M., Prevec, R., Gess, R.W. and Harris, C. (2018) Collaborative palaeosciences engagement: Grahamstown Science Festival as a case study. 20th Biennial conference of the Palaeontological Society of Southern Africa. Bloemfontein. South Africa. July 2018.

Gess, R.W. (2017) Estuarine fish breeding grounds: a comparison of the Famennian aged Waterloo Farm lagerstätten and contemporary systems. 14th International Symposium on Early and Lower Vertebrates, Chęciny, Poland, 3-8.07.2017 *Ichthyolith Issues* Special Publication 13

Harris, C. and **Gess, R.W.** (2017) A trace fossil assemblage from ‘lingulid mud beds’ in the Upper Devonian Witpoort Formation, Witteberg Group, South Africa. in Bordy, EM (ed.) *Proceedings of the 2nd International Conference of Continental Ichnology (ICCI 2017)*, Nuy Valley (Western Cape Winelands), 1-8 October 2017. *Palaeontologia africana* vol 52, p. 158-159 — ISSN 2410-4418

Gess, R.W. (2016) Estuarine breeding grounds: a tale of two times *Proceedings of the 19th Biennial Conference of the Palaeontological Society of Southern Africa, Stellenbosch, July 4th – 9th, 2016.*

Harris, C. and **Gess, R.W.** (2016) Environmental and depositional setting of a low diversity lingulid brachiopod assemblage from the Witpoort Formation (Witteberg Group, Cape Supergroup) east of Grahamstown *Proceedings of the 19th Biennial Conference of the Palaeontological Society of Southern Africa, Stellenbosch, July 4th – 9th, 2016.*

Gess, R. W. (2015) A high latitude Late Devonian (Famennian) lagerstätten from South Africa: an ecological window into marginal marine and terrestrial Gondwanan ecosystems. *Abstract volume, 13th International symposium on Early and Lower Vertebrates: Royal Society of Victoria, Melbourne Australia, August 3rd-7th, 2015.*

Gess, R. W. and Coates, M. I. (2015) A Middle Devonian (Givetian) fossilised shark jaw from South Africa. Abstract volume, 13th International symposium on Early and Lower Vertebrates: Royal Society of Victoria, Melbourne Australia, August 3rd-7th, 2015. *Abstract volume, 13th International symposium on Early and Lower Vertebrates: Royal Society of Victoria, Melbourne Australia, August 3rd-7th, 2015.*

Coates, M. I., **Gess, R. W.**, Finarelli, J. A., Criswell, K. E. and Sansom, I. J. (2015) Diversity, homoplasy and uncertainty among the earliest sharks. Abstract volume, 13th International symposium on Early and Lower Vertebrates: Royal Society of Victoria, Melbourne Australia, August 3rd-7th, 2015. *Abstract volume, 13th International symposium on Early and Lower Vertebrates: Royal Society of Victoria, Melbourne Australia, August 3rd-7th, 2015.*

Gess, R.W. (2015) The Witteberg Group fossil record and the End Devonian Mass Extinction event. *Abstract volume, Cape Karoo IMBIZO: Origin and Evolution of the Cape Mountains and Karoo Basin, Port Elizabeth, 25th to 27th November, 2015.*

Prestianni, C., **Gess, R.**, Rustán, J. J., Balseiro, D., Vaccari, E., & Sterren, A. F. (2015) Brussels, Belgium, September 2015. (2015). Continental ecosystems at high palaeolatitude before and after the Devonian–Carboniferous boundary: two examples from South Africa and Argentina. STRATA, 122, Brussels, Belgium, September 2015.

Gess, R.W. (2014). A high latitude Late Devonian (Famennian) lagerstätten from South Africa: a window into marginal marine and terrestrial Gondwanan ecosystems. *Proceedings of the fourth International Palaeontology Congress, Mendoza, Argentina, September 28 –October 3, 2014.*

Gess, R.W., (2014) New specimens of *Africanaspis*, an arthrodire placoderm genus from the Devonian, Famennian, Witpoort Formation Waterloo Farm lagerstätte allow for the definition and full reconstruction of two species. *Proceedings of the 18th Biennial Conference of the Palaeontological Society of Southern Africa, Johannesburg, July 11–14, 2014.*

Fernandez, V., **Gess, R.W.**, and Rubidge, B.S., (2014) Large helical burrow casts from the Late Permian of South Africa. *Proceedings of the 18th Biennial Conference of the Palaeontological Society of Southern Africa, Johannesburg, July 11–14, 2014.*

Mabotha M.E., Abdala, F., and **Gess, R.** (2014), A new skeleton of a scaloposaurian therocephalian (Therapsida, Eutheriodontia) from the Late Permian of the Karoo Basin *Proceedings of the 18th Biennial Conference of the Palaeontological Society of Southern Africa, Johannesburg, July 11–14, 2014.*

Gess, R.W. (2013). Waterloo Farm – A Devonian palaeoheritage site with immense possibilities for education and geotourism. *Geoheritage Series Number 2 : 26-27(Extended Abstracts) – Geoheritage Conference, 8-11 September 2013, Outhoorn.*

Gess, R.W. (2012). Distribution patterns of Devonian tetrapodomorphs revealed by study of pectoral girdle morphologies. *Proceedings of the 17th Conference of the Palaeontological Society of Southern Africa, Cape Town, 5-8 September, 2012.*

Gess, R.W. (2010). Relative abundance or variable preservational potential? A Late Devonian study. *Proceedings of the 16th Conference of the Palaeontological Society of Southern Africa, Pietermaritzburg, 5-8 August, 2010.*

Gess, R.W. and Coates, M.I. (2008). Vertebrate diversity of the Late Devonian (Famennian) deposit near Grahamstown South Africa. *Abstracts of the 68th Annual Meeting of the Society of Vertebrate Palaeontology, Cleveland, Ohio, USA.* In *Journal of Vertebrate Palaeontology*, **28**, 3, conference supplement.

Gess, R.W. (2008). The Vertebrate Fauna of the Late Devonian, Famennian, Witpoort Formation, Waterloo Farm locality, near Grahamstown. *Palaeontological Society of Southern Africa 15th Conference, Matjiesfontein, 12-14 September 2008, abstracts.*

Gess, R.W. (2007). Chondrichthyan fossils from the Famennian of South Africa. 11th *Conference on Australasian Vertebrate Evolution, Palaeontology and Systematics. Geological Society of Australia Abstracts 85.*

Gess, R.W. (2006). Recent advances in the study of the Late Devonian, Famennian, Witpoort Formation (Upper Witteberg, Cape Supergroup) fauna of the Grahamstown district. *14th Biennial Congress of the Palaeontological Society of Southern Africa, Grahamstown, 07-10 September 2006, abstracts.*

Gess, R.W. (2004). A large Cyrtactenid Eurypterid from a Witpoort Formation (Upper Devonian, Famennian) exposure near Grahamstown in the Eastern Cape. *Geoscience Africa 2004, Abstract Volume.*

Gess, R.W. (2002). Important new chondrichthyan material from the Witpoort Formation of the Devonian Witteberg Group. *Palaeontological Society of Southern Africa, 12th Biennial Meeting, Abstracts, National Museum, Bloemfontein. 3-7 October 2002.*

Gess, R.W. (2000). A late Devonian diplocanthid: a new discovery from the Witteberg Group (Witpoort Formation). *Proceedings of the 11th Biennial Conference of the Palaeontological Society of Southern Africa, Pretoria 4-8 September, 2000.*

Hiller, N and **R.W. Gess.** (1994). Algal fossils in South African Devonian. *Proceedings of the 8th Biennial Conference of the Palaeontological Society of Southern Africa, Grahamstown, 5-7 September 1994.*

Anderson, M.E., N.Hiller and **R.W. Gess.** (1994). New discoveries of Devonian fishes at Grahamstown. *Proceedings of the 8th Biennial Conference of the Palaeontological Society of Southern Africa, Grahamstown, 5-7 September 1994.*

Gess, R.W. (1994). Plant, algal, arthropod and fish material from the Late Devonian Witteberg Group, Grahamstown. *Proceedings of the 8th Biennial Conference of the Palaeontological Society of Southern Africa, Grahamstown, 5-7 September 1994.*

Theses

Gess, R.W. (2011). High latitude Gondwanan Famennian biodiversity patterns – evidence from the South African Witpoort formation (Cape Supergroup, Witteberg Group). PhD thesis, University of the Witwatersrand.

Gess, R.W. (2003). The palaeoecology of a coastal lagoon of the Witpoort Formation (Upper Devonian, Famennian). M.Sc. thesis, University of Fort Hare.

Palaeontological Impact Assessment surveys and reports

118 between 2006 and 2024.

Students supervised

2023 Ms Cait Reddy, Masters (*cum laude*), Rhodes University, principal supervisor

2022 Mr Ryan Nel, PhD (ongoing, expected 2025), Rhodes University, principal supervisor

2022 Ms Cait Reddy, Honors, Rhodes University, principal supervisor

2020 Mr Chris Harris, PhD (ongoing, expected 2025), Wits, ESI, co-supervisor

2019 Mr Chris Harris, Masters (*cum laude*), Wits ESI, co-supervised

2019 Ms Naadiya Hoosen, Honours (*cum laude*), Rhodes University, co-supervised

2017 Mr Chris Harris, Honours, Wits ESI, co-supervised

**AQUATIC BIODIVERSITY SPECIALIST ASSESSMENT
PROPOSED MEMORIAL PARK, PORTION 50 of FARM 821,
EAST LONDON, BUFFALO CITY MUNICIPALITY, EASTERN CAPE**



APRIL 2025

Prepared for:

Indwe Environmental
2 Ayr Place
Bonnie Doon, East London
5241



Prepared by:

Laughing Waters Environmental & Aquatic Consultants
12 Bluegum Ave
Gonubie, East London
5257



SPECIALIST DETAILS

PROJECT LEADER

Dr Amanda Uys
Laughing Waters
Environmental and Aquatic Consulting
12 Bluegum Avenue, Gonubie 5257
East London

Mobile: (082) 0823369838
Email: laughingh2o@icon.co.za

FIELD OF EXPERTISE: Freshwater Ecology
SACNASP Registration: Aquatic Scientist
SACNASP Number: 400130/12

WETLAND AND RIPARIAN SPECIALIST

James MacKenzie
Independent Ecologist: Riparian and Wetland Vegetation
Postal: Private Bag X3, Postnet Suite 538
Northriding, 2162
South Africa

Mobile: [+27\(0\)829273362](tel:+27(0)829273362)
Email: bioriver@outlook.com

FIELD OF EXPERTISE: Wetland and Riparian Specialist

SPECIALIST CVs and STATEMENTS OF INDEPENDENCE: SEE APPENDIX 1

EXECUTIVE SUMMARY

CapeVest Investments (Pty) Ltd proposes to develop a private cemetery and memorial park on Portion 50 of Farm 821 near Ducats, East London, in Buffalo City Metropolitan Municipality (BCMM), Eastern Cape Province. The proposed project involves the development of 7274 graves, a memorial wall area, a chapel, workshop, administration office and reception area, with associated parking areas and a network of internal roadways.

Laughing Waters *Aquatic and Environmental Consultants* was appointed by the EIA Consultant, Indwe Environmental, to prepare an Aquatic Specialist Study that would meet the requirements of both the Environmental and the Water Use Licence (WUL) Application processes for this development. A least preferred and preferred development layout were supplied. The study involved a literature review, and a desktop investigation and a site investigation in March 2025.

The site is located in sub-quaternary catchment R30F-08005 in Water Management Area 5: Mzimvubu to Tsitsikamma, and Ecoregion (ER) Level 1, No 31, Eastern Coastal Belt. The DFFE Screening Tool assessed the site as having 'very high' aquatic biodiversity sensitivity, on account of it being located within the Amathole Strategic Water Source Area: Surface Water.

This specialist report includes a description, current state assessment, delineation and buffer zone for each of the three main surface water bodies on the site: a depressional wetland in the eastern portion of the site, an artificial wetland (modified to a farm dam) in the central northern section of the site, and a non-perennial watercourse, which is a tributary of the Qinira River system. A risk assessment was conducted and mitigation measures and recommendations were devised.

The Present Ecological State and Ecological Importance and Sensitivity were revised from the DWS Desktop Model output of a category D and Moderate (for the sub-quaternary); to a B category and Moderate for the depressional wetland, a D category and Moderate for the artificial wetland, and a B/C category and Moderate for the non-perennial watercourse. Each of these surface waters was delineated and a buffer zone applied outside of the delineated area: 20m for the depressional wetland and the non-perennial watercourse, and 15m for the artificial wetland (dam).

The existing impacts on the site include historic alteration of the land surface for farming, informal pathways, solid waste dumping, and alien vegetation infestation.

The potentially high risk and impacts associated with the cemetery development relate largely to groundwater contamination. The risk of this in turn contaminating surface water quality, both on the site and downstream of it, is assessed as moderate, at a low confidence, as the interaction between ground and surface water on the site (particularly in the flatter areas) is not well understood. The downstream surface waters within 250m of the site are non-perennial watercourses and farm dams, the latter being in use for domestic water supply (not known to be used for potable water).

Potential construction and operational phase impacts to the surface water ecosystems on the site include loss of indigenous vegetation, disturbance of wetland and riparian habitat, and alteration of surface water quality and quantity due to stormwater runoff, sedimentation and construction-related chemicals. These impacts are moderated to a low risk by the buffering of the three surface water systems, by the exclusion of any built structures within these areas, by construction management measures, and by treating the buffer areas as NO GO areas during construction.

A comprehensive groundwater and surface water monitoring plan is required and should be initiated ahead of development to ensure that a water quality baseline is established. This should be implemented continuously and for at least two years after the final burial. Additional management plans required are an Emergency Response and Action Plan, Stormwater, Sanitation and Water Demand Management plans, and Construction Method Statements. These should be supplied prior to final design as they may influence the site layout. Once the Stormwater Management Plan is complete it is recommended that the groundwater and surface water specialists are given a chance to review it together.

The Specialists are of the opinion that provided all mitigation measures and recommendations are implemented and adhered to timeously this development can be authorized. Recommendations should be included as conditions of authorization. Option 2 is the preferred layout plan.

TABLE OF CONTENTS

1	INTRODUCTION.....	1
2	SPECIALIST TEAM.....	3
3	TERMS OF REFERENCE AND SCOPE OF WORK	3
3.1	Terms of Reference	3
3.2	Scope of Work	4
3.2	Assumptions and limitations	5
4	METHODS AND GUIDELINES	6
4.1	Desktop Study.....	6
4.2	Site Visit	6
4.3	Determination AnD REVISION of PES and EIS.....	7
4.4	Riparian and Wetland Delineation	7
4.5	Buffer zone determination	8
4.6	Risk and Impact Assessment and Mitigation.....	8
4.7	Specialist Report.....	8
4.9	Guidelines for cemeteries in South Africa.....	8
5	PROJECT DESCRIPTION AND SITE SENSITIVITY	9
5.1	Preferred and least preferred layout options based on design	9
5.2	National DFFE Screening Tool Findings	12
5.3	Services and town planning associated with the development.....	12
6	DESKTOP ASSESSMENT OF REGIONAL SETTING and SENSITIVITY	15
6.1	Locality of site with respect to water resources	15
6.2	Ecoregional setting	15
6.3	Climate and rainfall	15
6.4	Geology.....	16
6.5	Site topography, slope and drainage.....	16
6.6	Vegetation	17
6.7	Surface waters: Rivers and Wetlands	19
6.8	Groundwater	24

7	SITE SURVEY	26
7.1	Description of surface waters on site	26
7.2	Summary of Revised PES	32
7.3	Ecosystem services	32
7.4	Delineation and Buffer determinations.....	33
7.3	Sensitivity Mapping	34
8	IMPACT AND RISK ASSESSMENT	38
8.1	Risk and impact assessment methodology	38
8.2	Potential impacts identified	38
8.3	Impact assessment: Design and Preconstruction Phase	39
8.3	Impact assessment: Construction Phase	41
8.4	Impact assessment: Operational Phase	42
8.3	Summary of impacts.....	49
9	RECOMMENDATIONS AND CONCLUSIONS	50
10.	REFERENCES	54
11.	APPENDIX 1: SPECIALIST CVs & StEMENTS OF INDEPENDENCE	57
12.	APPENDIX 2. DESCRIPTION OF THE VEGETATION UNIT	69
13.	APPENDIX 3: PES AND EIS CATEGORY DESCRIPTIONS	71
14.	APPENDIX 4. REVISION OF DEPRESSIONAL WETLAND PES	73
15.	APPENDIX 5. DATA FOR BUFFER DETERMINATION	74
16.	APPENDIX 6. IMPACT ASSESSMENT METHODS	80
17.	APPENDIX 7. EXTRACTS FROM DIPPENAAR ET AL (2018)	85

LIST OF FIGURES

Figure 1.1	Locality maps of the development site, Portion 50 of Farm 821, East London.....	2
Figure 5.1	Option 1: The least preferred layout for the Memorial Park site.	10
Figure 5.2	Option 2: The preferred layout for the Memorial Site development.	11
Figure 5.3	Locality of the perennial spring on the study site.....	13
Figure 5.4	Photograph of the spring area from the western side looking eastward.....	13
Figure 6.1	Average monthly rainfall and temperature data for East London.....	16
Figure 6.2	Surface drainage directions at the study area. Source: Smith 2022.....	17
Figure 6.3.	Map showing general vegetation at and surrounding the site.....	18
Figure 6.4.	An aerial comparison of the site in 1938 (left) and 2024 (right).....	18
Figure 6.5	The locality of the project site within (inset) WMA 5:	19
Figure 6.6	The main surface water features on the study site. Basemap: Google Earth ©	20
Figure 6.7	The downstream area of the catchment	20
Figure 6.8	Map showing the 2021 refined delineated areas comprising the Amathole SWSA.....	21
Figure 6.9	Terrestrial Critical Biodiversity Area (CBA) map of the site area	23
Figure 6.10	ECBCP Freshwater CBA and ESA map of the area in which the study site occurs.	23
Figure 6.11	Wetlands within 500m of the study site	23
Figure 6.12	The locality of the boreholes, dams and spring identified by AGES 2022.	25
Figure 7.1	Photographs of the depressional wetland.....	26
Figure 7.2.	Google Earth imagery of approx slope of the drainage channel and dam	28
Figure 7.3	Photographs of the non-perennial watercourse	28
Figure 7.4	Aerial comparison of the dam in 1938 and 2024.....	29
Figure 7.5	Photographs of the dam	30
Figure 7.6	Photographs of the indigenous thicket	31
Figure 7.7	Google Earth © imagery slope of the hillside supporting s the indigenous thicket	31
Figure 7.8	Delineation and buffering of of areas of interest.	35
Figure 7.9	Option 2 Development Plan overlaid on the delineation and buffer map..	37

LIST OF TABLES

Table 1.1.	Information on the water resources which may be impacted by the proposed activities	1
Table 2.1	Specialist Details for this report.....	3
Table 6.1	Summary of the main attributes of the Eastern Coastal Belt Ecoregion	15
Table 6.2	Summary of the desktop PES and EIS assessments R30F-08005).....	22
Table 7.1	Revision of PES and EIS assessments for the watercourses on the site	32
Table 8.1	Risk Assessment Matrix for PRECONSTRUCTION AND DESIGN PHASE.....	44
Table 8.2	Risk Assessment Matrix for CONSTRUCTION PHASE (1)	45
Table 8.3	Risk Assessment Matrix for CONSTRUCTION PHASE (2)	46
Table 8.4	Risk Assessment Matrix for OPERATIONAL PHASE (1)	47
Table 8.5	Risk Assessment Matrix for OPERATIONAL PHASE (2)	48
Table 8.6	Summary of the risk rating of each impact identified, post- mitigation.....	49
Table 11.1	Descriptive categories used to describe the PES and EIS	71
Table 11.2	Ecological importance and sensitivity (EIS) categories (Kleynhans 1999)	72

LIST OF ACRONYMS

DEAT	Department of Environmental Affairs and Tourism
DEDEA	Department of Economic Development and Environment Affairs
DFFE	Department of Forestry, Fisheries and the Environment
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECBCP	Eastern Cape Biodiversity Conservation Plan
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
GIS	Geographical Information System
ESA	Ecological Support Area
GN	Government Notice
masl	metres above sea level
mbgl	metres below ground level
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act
NEM: BA	National Environmental Management: Biodiversity Act
NFEPA	National Freshwater Ecosystem Priority Area
NWM5	National Wetlands Map 5
PES	Present Ecological State
REC	Recommended Ecological Category
SWSA (SW)	Strategic Water Source Area (Surface Water)

1 INTRODUCTION

CapeVest Investments (Pty) Ltd proposes to develop a private cemetery and memorial park on Portion 50 of Farm 821 near Ducats, East London, in Buffalo City Metropolitan Municipality (BCMM), Eastern Cape Province (Table 1.1, Figure 1.1).

The proposed project involves the development of 7274 graves, a memorial wall area, a chapel, workshop, administration office and reception area, with associated parking areas and a network of internal roadways.

Indwe Environmental has been appointed as the Independent Environmental Consultant to undertake the required application for Environmental Authorisation in terms of the National Environmental Management Act (Act 107 of 1998), and the Water Use Licence on process in terms of the National Water Act (Act 36 of 1998).

The results from the National DFFE Online Screening report presented a 'Very High' sensitivity score for the Aquatic Biodiversity Theme, based on the site's location within a Strategic Water Source Area: Surface Water (SWSA). Given the nature, location and footprint of the development, Laughing Waters was approached by Indwe Environmental to prepare an Aquatic Specialist Study that will meet the requirements of both the Environmental and the Water Use Licence (WUL) Application processes for this development.

Laughing Waters has provided this report in line with the requirements stipulated in the Government Notice GN 320 (20 March 2020) "*Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) of the National Environmental Management Act, 1998, when applying for Environmental Authorisation*".

Table 1.1. Key information related to the water resources which may be impacted by the proposed activities

Descriptor		
Water Management Area	WMA5	Mzimvubu-Tsitsikamma
Quaternary Catchment	R30F	Qinira
Sub-Quaternary Catchment	R30F-08005	
Ecoregion	ER Level 2 No 31.02	Eastern Coastal Belt
Desktop Present Ecological State	D	
Desktop Ecological Importance and Sensitivity	Moderate	



Figure 1.1 Locality maps of the development site, Portion 50 of Farm 821, East London, shown with a white boundary. Google Earth ©.

2 SPECIALIST TEAM

This report has been prepared in accordance with the General Requirements for Environmental Assessment Practitioners or a person compiling a specialist report or undertaking a specialised process as per Section 13 of GN 733 (NEMA - Environmental Impact Assessment Regulations, 2014). It has been prepared independently of influence or prejudice by any parties. The specialist details are shown in Table 2.1. The Authors' CVs and statements of independence are attached as Appendix 1.

Table 2.1 Specialist Details for this report

Specialist & role	Qualification and accreditation	Signature	Date
Dr Amanda (Mandy) Uys <i>Field survey, Risk Assessment, Reporting</i>	PhD, River Ecology Professional Natural Scientist: Aquatic Science, No 400130/12 (SACNASP) SA Society of Aquatic Scientists (SASAqS) Society for Ecological Restoration (SER)		15.4.2025
Mr James MacKenzie <i>Riparian Vegetation Delineation and Buffer Inputs to Impact</i>	MSc Botany, Wits University, >25 Years experience SA Society of Aquatic Scientists SA Wetland Society		15.4.2025

3 TERMS OF REFERENCE AND SCOPE OF WORK

3.1 TERMS OF REFERENCE

The supplied Terms of Reference was as follows.

This study should be undertaken according to the various gazetted requirements issued by DWS and DFFE respectively. The following is to be utilised, at a minimum:

- *Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity. GNR 320*
- *A Practical Field Procedure for Delineation of Wetlands and Riparian Area (2005)*
- *Impact/Risk Assessment in terms of the Risk Assessment Protocol issued by DWS of the S21(c) & (i) water use activities on affected watercourses*
- *Guideline: assessment of activities/ developments affecting wetlands (DWS provided).*

The assessment and delineation of watercourses associated with the study should include the following, at a minimum:

- *Gathering of background information as defined by provincial and national databases.*
- *Site surveys for data collection.*
- *Identification, delineation and assessment of the watercourses within 32m (and within 500m of natural wetlands) of the project footprint.*
- *Identification and assessment of impacts likely to occur during the construction and operational phase.*
- *Recommendation of mitigation measures to reduce any negative impacts.*
- *Commentary on, and conducting of, a comparative analysis of the impacts associated with the preferred, least preferred and no-go alternatives.*

3.2 SCOPE OF WORK

Requirements stipulated in the “Procedures to be followed for the assessment and minimum criteria for reporting of identified environmental themes in terms of section 24(5)(a) and (h) of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (GN 320, 20 March 2020) protocol for the assessment and reporting of environmental impacts on aquatic biodiversity, were followed and are presented in this report:

- Prepared by a SACNASP registered specialist
- Provide a baseline site description (and details of site visit)
- Assess threat status of site ecosystem as well as national/provincial priority status of adjacent systems
- Determine Ecological Importance of the system
- Identify potential environmental impacts likely to occur during the demolition, construction and operational phases of the development
- Assess potential impacts – *it was agreed that the DWS Risk Assessment Matrix for Section 21 c and i activities would be used for this purpose*
- Prescribe mitigation measures relevant to every potential impact and provide recommendations in order to minimise negative environmental impacts
- Prepare a signed report including the above information.

According to GN 320, a site sensitivity verification must be undertaken to verify the rating recorded in the Screening Report, through the use of:

- desk top analysis, using satellite imagery
- on-site inspection, and
- any other available and relevant information.

3.2 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations apply to this study:

- This study does not include groundwater, which is the environmental water most threatened by a cemetery development. The Geohydrology Report (AGES 2022) has been referred to. Where there is a risk of groundwater-surface water interaction this has been noted and assessed at low confidence.
- Site-based information was acquired during one visit during summer. Areas of the site are inaccessible due to dumping, alien invasive vegetation and indigenous bush encroachment.
- The desktop investigation was undertaken using available literature.
- The preferred layout plan provided does not provide details regarding the use of the western portion of the site. It is assumed that as stated, this western portion will be used for Memorial plaques. The east of the site is marked up for cemeteries.
- The following project-specific information regarding the proposed development was not available at the time of doing the DWS Risk Assessment Matrix and compiling this report:
 - Stormwater management plan
 - Sanitation plan
 - Construction method statements
 - Water demand details (potable water, irrigation water)
 - Emergency response and action plan.

4 METHODS AND GUIDELINES

4.1 DESKTOP STUDY

Various background reports, project development information and satellite imagery were used in the desktop review of the site. The use of Geographical Information Systems (GIS) and other mapping tools included consideration and mapping of the following data sets:

- Google Earth satellite imagery
- Strategic Water Source Areas (Le Maitre et al., 2018)
- The National Freshwater Ecosystems Priority Areas (NFEPA) (Nel et al., 2011)
- National Biodiversity Assessment (NBA, 2018) and National Wetlands Map 5 (NWM5)
- National Terrestrial Vegetation Map (VEGMAP, 2018)
- The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019)
- South African Water Management Areas and Quaternary Catchments
- South African Ecoregions Level 1 and 2.

The specialist team were provided with the following background reports:

- Online Screening Report (Indwe Environmental 2024)
- Google Earth KMZ file of the Site, Portion 50 of Farm 821
- PDF copies of the Preferred and Least Preferred Site Development Plans
- KML of the Preferred Development Plan
- Memorial Park Motivation Report (DBP Consulting 2021)
- Baseline aquatic and wetland assessment (JS Environmental Consulting 2022)
- Biodiversity Assessment Report (J. Pote, February 2022)
- Ducats Private Cemetery Geohydrological Assessment (AGES July 2022)
- Palaeontological Assessment Report (Rob Gess, March 2022)
- Beacon Bay Memorial Archaeological Impact Assessment Report (Celeste Booth Jan 2022).

Additional literature consulted is listed in the Reference section.

4.2 SITE VISIT

A site visit was conducted during late summer, March 6th 2025 by Dr Mandy Uys, from 09h00 to 15h30, to assess onsite and adjacent aquatic surface water resources, riparian areas, and any wetlands present. The relevance of the summer sampling is that this is the warm-weather wet season, and surface water was likely to be present, making investigations of aquatic environments both possible and more likely to yield information regarding shallow surface water and the non-perennial tributary.

Prior to the trip, the riparian vegetation and wetland specialist, Mr James MacKenzie, had mapped and marked up areas for investigation for the purposes of wetland and riparian delineation. These areas were walked where it was possible, GPS points were taken, photographs taken, notes made and specimens collected. All aquatic surface waters were investigated and assessed as far as

possible. Equipment was available for SASS5 macroinvertebrate sampling, however sampling was not possible due to lack of surface water flow.

4.3 DETERMINATION AND REVISION OF PES AND EIS

Department of Water and Sanitation's desktop PES/EIS information (DWS 2014; DWS in prep) were consulted for the sub-quaternary level PES and EIS. While these data represent an integrated picture of the water resources of the sub-quaternary, there is generally a need to refine the PES/EIS following the site investigation.

Depressional wetland: Since the Wet-Health and Wetland IHI tools are mainly designed for the assessment of floodplain and valley bottom wetlands and not designed to deal with depressional, flat or seepage wetlands, the DWS DSP (Ollis et al., 2014) provides the option of using the RDM-99 scoresheet with criteria for assessing Habitat Integrity of 'Palustrine Wetlands' to determine the PES. This is because, for these wetland types, the Geomorphological PES cannot be determined using the existing methods and so it is not possible to derive an overall score by weighting and combining the various component scores. Within the DSP, the RDM-99 wetland PES assessment method (Duthie, 1999), which is the only other nationally-applicable wetland PES assessment method in South Africa besides WET-Health and Wetland-IHI (Ollis and Malan, 2014), has been included in the matrix table of the DSP that deals with the derivation of an overall Wetland PES score/category, specifically for depressions and wetland flats.

Artificial wetland (Dam): The PES of the dam was maintained at the category set by the DWS Desktop PES/EIS information already described as this was considered valid based on field observation of the dam area and vegetation, investigation of the historical aerial imagery, and the water quality data presented in AGES Geohydrological report (2022), despite the fact that this is now somewhat outdated. It is unlikely to have improved.

Non-perennial watercourse: The PES/EIS for the non-perennial watercourse was adjusted on the basis of field observation and interpretation of historic and present ecological signals, as sampling was not possible in the absence of surface water.

Downstream surface waters: The PES of downstream water sources (farm dams within 250m of the site periphery), while not necessary for this study, was maintained at the category set by the DWS desktop PES/EIS category, as these were not investigated in the field. This was considered valid on the basis of water quality data.

4.4 RIPARIAN AND WETLAND DELINEATION

Satellite imagery (Google Earth ©) was used to do a desktop assessment of all possible wetland and riparian features. These were noted and each possible feature visited for field verification by Dr Uys. All wetland and riparian features that may be influenced by the proposed study were delineated in accordance with guidelines set out by DWS (DWAf, 2008), using topography, evidence of water movement through the landscape, evidence of water pooling in the landscape and changes in vegetation species composition and structure associated with such features.

On site, GPS coordinates were taken at the edge of riparian features and wetlands to support delineation.

National wetland coverages were also assessed to see if any recognised wetlands occur within or near the site (New National Wetland Map 5, Van Deventer et al., 2018; NFEPA, Nel et al., 2011). Wetland and riparian zone plant indicator species were used to aid delineation.

4.5 BUFFER ZONE DETERMINATION

The establishment of buffer zones to rivers and wetlands is intended to play a meaningful role in reducing impacts to aquatic resources and in so doing, protect the range of goods and services that these resources provide to society. The site-based buffer zone tools provided by Macfarlane and Bredin (2016a; b) were used to help determine buffer zone characteristics and the modified fixed-width approach was employed. These tools help to determine appropriate buffer zones for rivers and wetlands and also provide a record of key aspects taken into consideration. In addition, both desktop and site-based assessments were conducted.

4.6 RISK AND IMPACT ASSESSMENT AND MITIGATION

The impact and risk assessment was done in accordance with the DWS Risk Assessment Protocol Version 2.1.1 (2024) for the S21(c) & (i) water use activities on affected watercourses.

4.7 SPECIALIST REPORT

This report provides the findings of the desktop study (literature review, GIS dataset review) and the site visit conducted in March 2025. Potential impacts that may occur due to the proposed activities on site were identified and assessed in terms of the NEMA and NWA requirements. Mitigation measures and recommendations are provided.

4.9 GUIDELINES FOR CEMETERIES IN SOUTH AFRICA

The Buffalo City Municipal By-laws governing cemeteries do not make mention of environmental threats or means of mitigating these.

Relevant guidelines from the following two South African publications have been consulted and taken into consideration in this study:

- 1) SALGA, 2016. Good practices in cemetery management – Building local government capacity in cemetery management.
- 2) Dippenaar et al. 2018. Environmental Risk Management, Monitoring and Management of Cemeteries. Water Research Commission Report No. 2449/1/18

The Council for Geoscience has also published general guidelines for Geological investigations for cemetery sites. These are referenced in the Geohydrology Report (AGES 2022).

5 PROJECT DESCRIPTION AND SITE SENSITIVITY

The proposed Memorial Park site (hereinafter, 'the study site' or 'the site') is located to the east of the N6, approximately 4km north of Merrifield School, and is accessed via 'Road W' (MN10118), a Class 5 Provincial Minor Road. The coordinates of the approximate centre point of the study site are 32°55'8.77"S; 27°54'31.55"E.

The site is approximately 10.2 Ha in extent. The desktop study of historic aerial and satellite imagery provides evidence of historical agricultural activities and former farm contours. The predominant surrounding land-use is agricultural, and to the west of the N6, formal and informal residential. There is ongoing evidence of extensive dumping activities. The site is intersected by two powerline servitudes.

The surface water and riparian features of interest to this study include a non-perennial watercourse and riparian zone, an artificial wetland (farm dam), and a depressional wetland. The large thicket patch has also been assessed. The watercourse in question is a non-perennial tributary of the Qinira River, which traverses the site, and feeds into a series of downstream water storage dams (outside of the property boundary). All of the delineated surface waters and their buffer zones are to be excluded from the development area. The remaining development footprint is expected to be roughly 7 Ha.

5.1 PREFERRED AND LEAST PREFERRED LAYOUT OPTIONS BASED ON DESIGN

The proposed project has both a preferred and a least preferred layout option, based on design. The least preferred alternative design layout, Option 1 (Figure 5.1) has the cemetery components situated both on the eastern and western sides of the site. This is the least preferred site as the western side of the site is the site of shallow bedrock, and is not ideal for the excavation of graves. This layout plan includes a mausoleum, gathering hall, administration building, a workshop and chapel. The crematorium noted on the least preferred alternative has since been removed from the design proposal and is no longer included as part of the least preferred proposed project development plan. In terms of parking, the least preferred alternative makes provision for 65 parking bays in total.

The preferred alternative, Option 2 (Figure 5.2) has its private cemetery/graveyard component focused towards the eastern extent of the site and the memorial park component focused towards the western extent of the site. The latter, which is not clearly annotated on the plan, will reportedly make provisions for memorial plaques. In total the development will have five buildings situated on the north-western quadrant of the site, consisting of a chapel, reception area, admin office, workshop and a security house at the entrance. In terms of parking, the preferred alternative makes provision for 40 parking bays in total.



Figure 5.1 Option 1: The least preferred layout for the Memorial Park site.



Figure 5.2 Option 2: The preferred layout for the Memorial Site development.

5.2 NATIONAL DFFE SCREENING TOOL FINDINGS

The DFFE National Web Based Screening Tool report findings for this project are as follows:

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

5.3 SERVICES AND TOWN PLANNING ASSOCIATED WITH THE DEVELOPMENT

The following are the known services and town planning associated with the development. Information has been supplied by Indwe Environmental. Additional information from desktop examination or other sources is referenced accordingly.

5.3.1 Water supply

Drinking water is likely to be sourced from rainwater tanks (Indwe, pers.comm. 2025). For domestic water supply, it has been suggested that one of the monitoring boreholes proposed by AGES (2022) could be used to supply water for the development (Indwe pers.comm. March 2025). This option had not been confirmed by the time of completing this report. The borehole recommended as a water source is referred to in the AGES (2022) Geohydrological report as a spring. This is assessed by the Wetland Specialist, Mr James MacKenzie, as a depressional wetland, PES Category B. Allocation of water from this wetland would, for this reason, be not be recommended, but would be a DWS decision.

Daily volumes of water required were not supplied at the time of completing this report. It is assumed that water would be required, at a minimum, for offices, bathrooms (basins and toilet flushing), and irrigation of the grass areas around the grave sites.

It was also noted (Indwe pers.comm. 2025) that treated potable water supply would be available if required from the adjacent Ducats Settlement. The water supply authority for the area is the Buffalo City Metropolitan Municipality (BCMM) and water infrastructure is supposedly in place to allow for the development to proceed. It should be noted however that in recent months Ducats residents have not had assured water supply (March 2025).

Further clarity is required regarding water demand, potential supply sources, and wastewater management.

5.3.2 Sewerage and sanitation

There is currently no sanitation infrastructure provided on the subject site however sewerage supply

for a development of this nature is considered to be small-scale as the only ablations that would be required is for the admin building. This would be remedied by the construction of either a septic tank system (least-preferred) or a conservancy tank (preferred).



Figure 5.3 Locality of the perennial spring on the study site



Figure 5.4 Photograph of the spring area from the western side looking eastward.

5.3.3 Access

There is currently a single access point on the property at the northern boundary from Road W (MN10118). This is not the official existing access, but was created by illegal dumping activities, and serves as the present 'entrance'. Road W connects to the N6 to the west of the site. The location of the site's access point will be relocated approximately 120m west of this existing point.

Current site access point: 32°55'4.37"S, 27°54'34.14"E

Proposed new entrance: 32°55'4.72"S, 27°54'29.41"E (approx.120m west of current access).

5.3.4 Electricity

The demand for this development will be low and an application will be made via Eskom/BCMM when the phase 1 needs to commence. Currently there is electricity available on the property. An electrical load report will be completed before formal application is made to Eskom/ BCMM to indicate the electrical supply required. This electrical load report is still to be compiled.

5.3.5 Town Planning

The applicant has submitted a formal application in terms of the Spatial Planning and Land Use Management Act of 2013, together with the BCMM Zoning Scheme of 2007. The application consists of a Permanent Departure to allow for the establishment of a Private Cemetery and Memorial Park, with a building line relaxation of 6m on all sides.

5.3.6 Stormwater Management

No stormwater management plan was available by the time of completing this report. This is required prior to finalization of the development layout plan, and should be reviewed by both Geohydrologist and Aquatic Specialist.

6 DESKTOP ASSESSMENT OF REGIONAL SETTING AND SENSITIVITY

A desktop assessment of the aquatic features on the site and their sensitivity, was done on the basis of available information.

6.1 LOCALITY OF SITE WITH RESPECT TO WATER RESOURCES

The study area falls within Water Management Area 5, Mzimvubu to Tsitsikamma, in Quaternary Catchment R30F, and in sub-quaternary catchment R30F-08005. It is situated within the Amathole Strategic Water Source Area: Surface Water (SWSA:SW, described in Section 6.7).

6.2 ECOREGIONAL SETTING

The proposed development site is situated in Ecoregion (ER) Level 1, No 31, Eastern Coastal Belt, and ER Level 2 No 31.02 Eastern Coastal Belt (Kleynhans et al. 2005). The main attributes associated with this Ecoregion are presented in Table 6.1.

Table 6.1 Summary of the main attributes of the Eastern Coastal Belt Ecoregion (Source: Kleynhans et al. 2005)

MAIN ATTRIBUTES	EASTERN COASTAL BELT
Terrain Morphology: Broad division (dominant types in bold) (Primary)	Plains: Moderate Relief (limited); Closed Hills, Mountains; Moderate and High Relief;
Vegetation types (dominant types in bold) (Secondary)	Coastal Bushveld\Grassland (Limited); Eastern Thorn Bushveld; Valley Thicket; Dune Thicket (limited); Short Mistbelt Grassland (limited); Coastal Grassland Patches Coastal forest and Patches Afromontane Forest
Altitude (m a.m.s.l) (Secondary)	0-500, 500-900 (limited)
MAP (mm) (modifying)	400 to 1000
Coefficient of Variation (% of annual precipitation)	<20 to 35
Rainfall concentration index	<15 to 50
Rainfall seasonality	Early to very late summer to all year
Mean annual temp. (°C)	16 to 20
Mean daily max. temp. (°C): February	24 to 28
Mean daily max. temp. (°C): July	18 to 22
Mean daily min. temp. (°C): February	14 to 20
Mean daily min temp. (°C): July	4 to >10
Median annual simulated runoff (mm) for quaternary catchment	20 to >250



6.3 CLIMATE AND RAINFALL

The climate of the area is classified as Oceanic (Köppen Cfb), with a relatively narrow range in temperatures annually and rainfall occurring throughout the year, with a high coefficient of variability (Figure 6.1). Annual rainfall for East London can exceed 1000 mm, with the majority of rain falling, on average, during February/March and again during October/November. The driest months are, on average, June and July. The Mean Annual Rainfall for quaternary catchment R30F is in the order of 790mm.

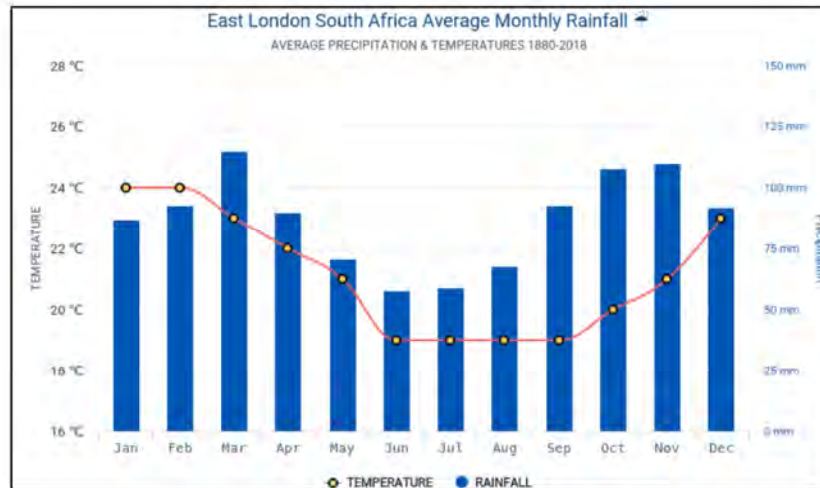


Figure 6.1 Average monthly rainfall and temperature data for East London (Source: www.hikersbay.com)

6.4 GEOLOGY

According to AGES (2022), the study area is underlain by sedimentary rocks of the Balfour Formation that is part of the Adelaide Subgroup of the Beaufort Group, all part of the Palaeozoic Upper Permian of the Karoo Supergroup. The lithology of the Balfour Formation generally comprises grey mudstone, shale and sandstone. Dolerite intruded into the sedimentary formations during the Jurassic in the form of sills (horizontal structures) and dykes (vertical structures). A prominent dolerite sill occurs along the north-eastern part of the study area. There are several areas in which outcropping of dolerite rocks occurs.

According to Gess (2022), the bedrock on the site comprises dolerite outcrops which extend further into the study area than predicted by the Geological Survey map. There are large dolerite boulders in the vicinity of the farm dam (artificial wetland), underlying the thicket area, and on the periphery of the depressional wetland area. According to the development plan, most of the areas where dolerite is encountered are not likely to be altered during the development, but conserved (Gess 2022).

6.5 SITE TOPOGRAPHY, SLOPE AND DRAINAGE

The study area is located at an elevation between 160 and 200 mamsl, with the highest portion occurring in the most north-eastern portion of the site and the lowest elevation in the central southern portion of the site.

While no detailed slope analysis has been done, based on Google Earth Professional elevation profiles, the project area generally exhibits slopes of up to 5.5° (AGES 2022). Within the General Guidelines for Geological Studies for Cemeteries (Council for Geoscience, cited by AGES 2022), ideal slope conditions are between 2 and 6°. The north-eastern quadrant of the site is flatter land, with slopes less than 2°.

The northern boundary of the study area is located on a local catchment divide (where tributaries of the Qinira River are located), and the western boundary is close to the Nahoon River/Qinira River catchment divide, which is approximately indicated by the routing of the adjacent N6.

The drainage directions are predominantly south-east and south-west over the project area, into non-perennial tributaries of the Qinira River. The mainstem of the Qinira River drains in a southeasterly direction into the Indian Ocean at Bonza Bay. The surface water general drainage directions are indicated in Figure 6.2

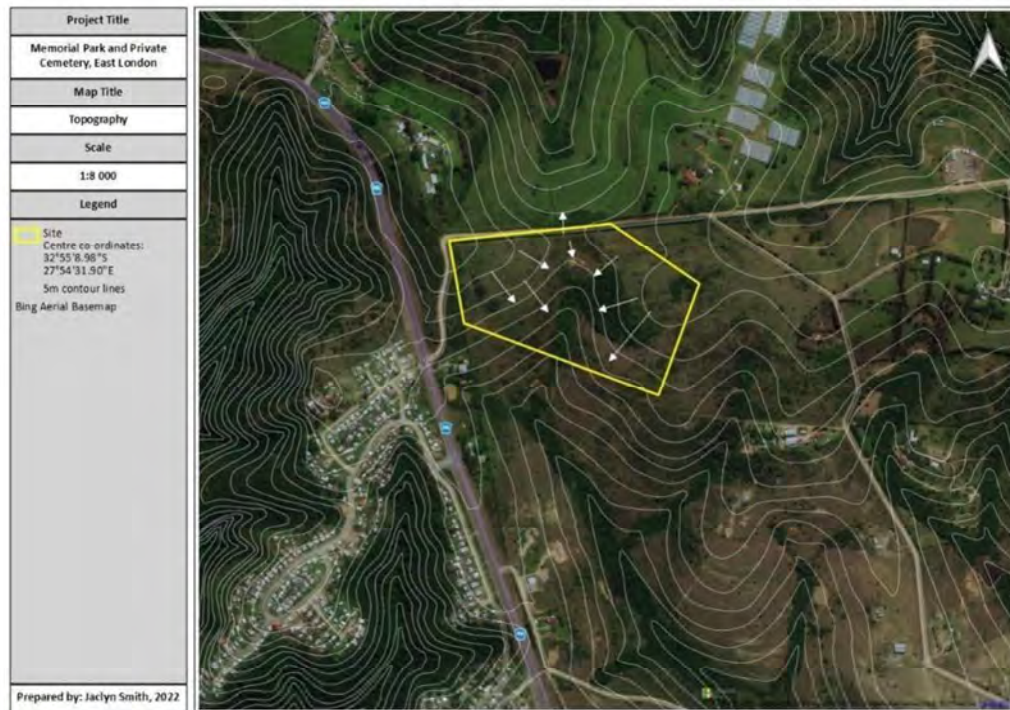


Figure 6.2 Surface drainage directions at the study area. Source: Smith 2022.

6.6 VEGETATION

The proposed cemetery site, and a 500m buffer around the site, fall within the Savanna Biome, the Sub-Escarpment Savanna Bioregion and the South Eastern Coastal Thornveld vegetation unit (Mucina and Rutherford, 2006, 2012, 2018 NBA update). A general description of the vegetation unit is provided in Appendix 2 (as per Mucina and Rutherford, 2006) as a reference point for the baseline vegetation composition.

Surrounding vegetation units include Buffels Mesic Thicket, which occurs in the Albany Thicket Bioregion and has a more developed woody (tree) composition, some elements of which occur within the pocket of indigenous thicket on the study site. A comparison of historic aerial images of the study site shows a notable increase in woody vegetation from 1938 to present (Figure 6.4) with an associated loss of grass cover. Several alien and invasive plant species also occur across the site, notably Wattle clumps (*Acacia mearnsii*) and thicket fringe invasive species including Bugweed (*Solanum mauritanus*), Lantana (*Lantana camara*), Guava (*Psidium guajava*) and Syringa (*Melia azedarach*).

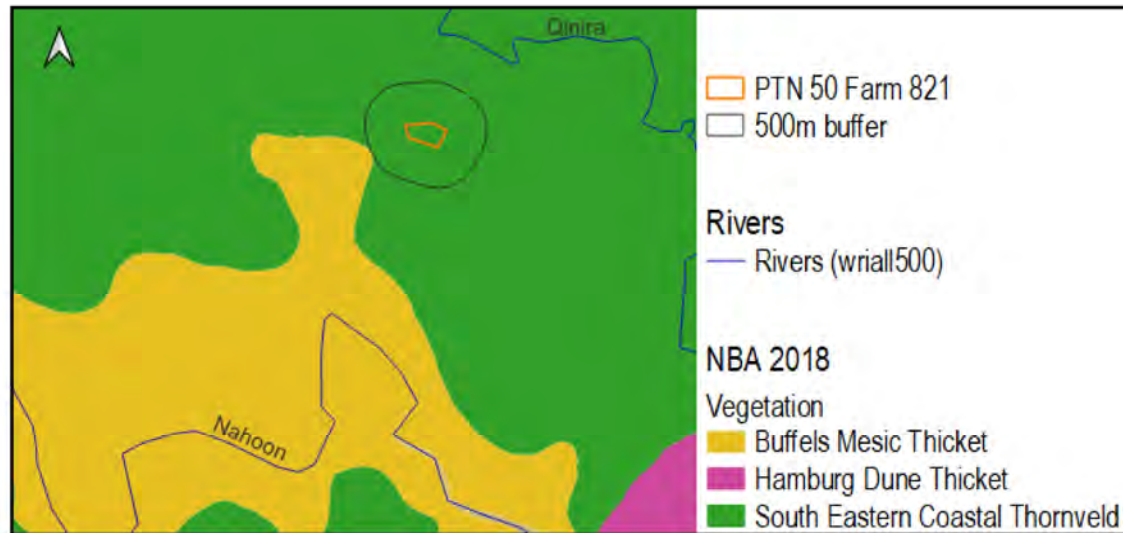


Figure 6.3. Map showing general vegetation at and surrounding the site (Mucina & Rutherford, 2006; 2012; mapped vegetation shows 2018 NBA update).

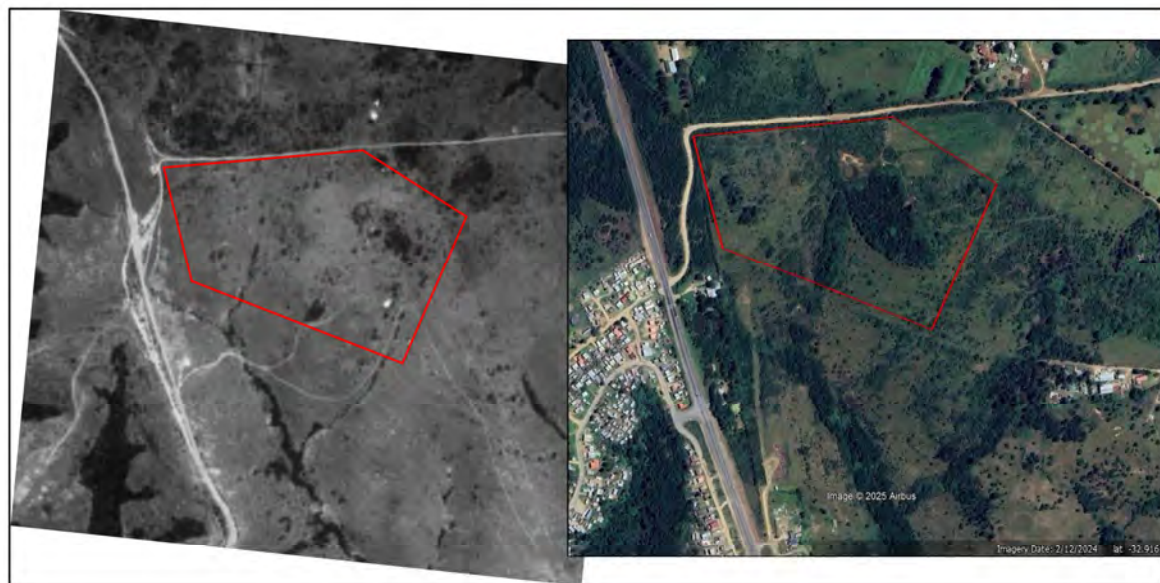


Figure 6.4. An aerial comparison of the site showing an historical photograph of the area in 1938 (left) and the current Google Earth © satellite imagery, 2024 (right)

6.7 SURFACE WATERS: RIVERS AND WETLANDS

The proposed site is situated within the Mzimvubu-Tsitsikamma Water Management Area (WMA 5), quaternary catchment R30F and sub-quaternary catchment R30F-08005. R30F is the catchment of the Qinqira River.

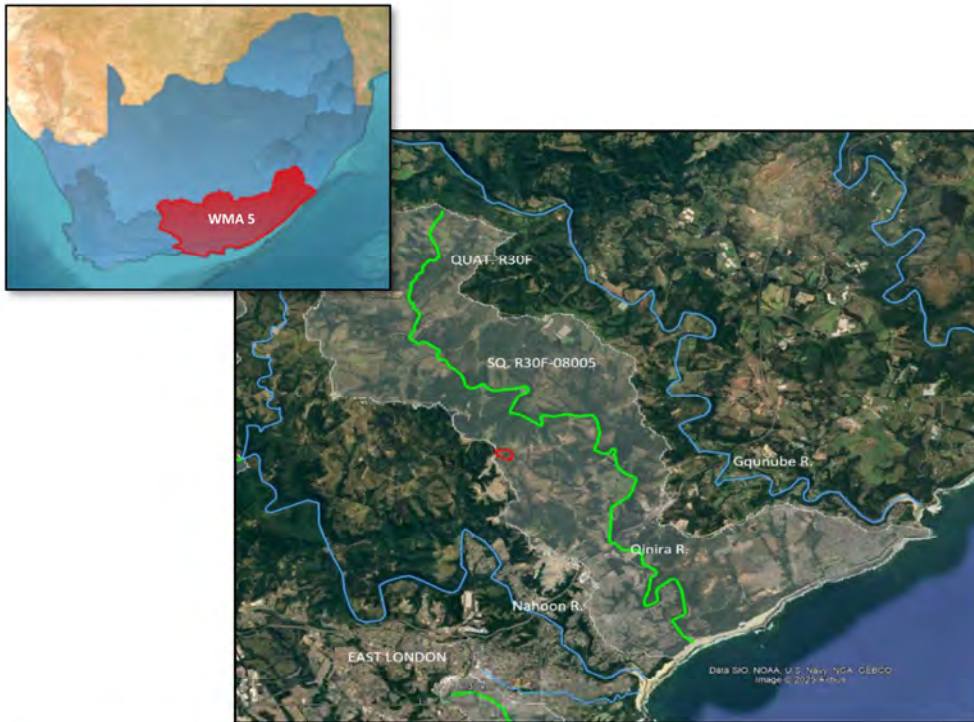


Figure 6.5 The locality of the project site within (inset) WMA 5: Mzimvubu to Tsitsikamma, and Sub-Quaternary Catchment R30F-08005: Qinqira River. (Coloured green to indicate PES status of D). Google Earth ©

The non-perennial tributary of the Qinqira River traverses the proposed development site from NNE to SSW. This short section of tributary within the site area is approximately 5km upstream of the confluence with the Qinqira River mainstem. There are several downstream in-channel and off-channel farm dams before the confluence. Several temporary (non-perennial) tributaries of the Qinqira also occur to the north, east and south of the study area. The tributary is fed by runoff and seepage from a small dam situated in the central to northern portion of the site. This dam is assessed as a natural wetland which has been historically excavated as a water supply. It appears on the NBA 2018 Wetland Map as an artificial wetland. A natural depressional wetland is situated in the easternmost corner of the site area, this has been referred to be AGES (2022) as a spring (see Section 7.1.1).

The site and surrounding area form part of the 2021 **Amathole Strategic Water Source Area: Surface Water** (SWSA:SW, Figure 6.5). For this reason the aquatic biodiversity sensitivity is rated as 'Very High' in the DFFE-based Screening Report (Indwe 2025). The SWSAs for the Eastern Cape are presented in Figure 6.8. The 2021 refinement of the Amathole SWSA includes the lower reaches of the Buffalo, Nahoon, Qinqira and Gqunube Rivers. The critical importance of protecting SWSAs in terms of water quantity and quality is detailed in Text Box 6.1.

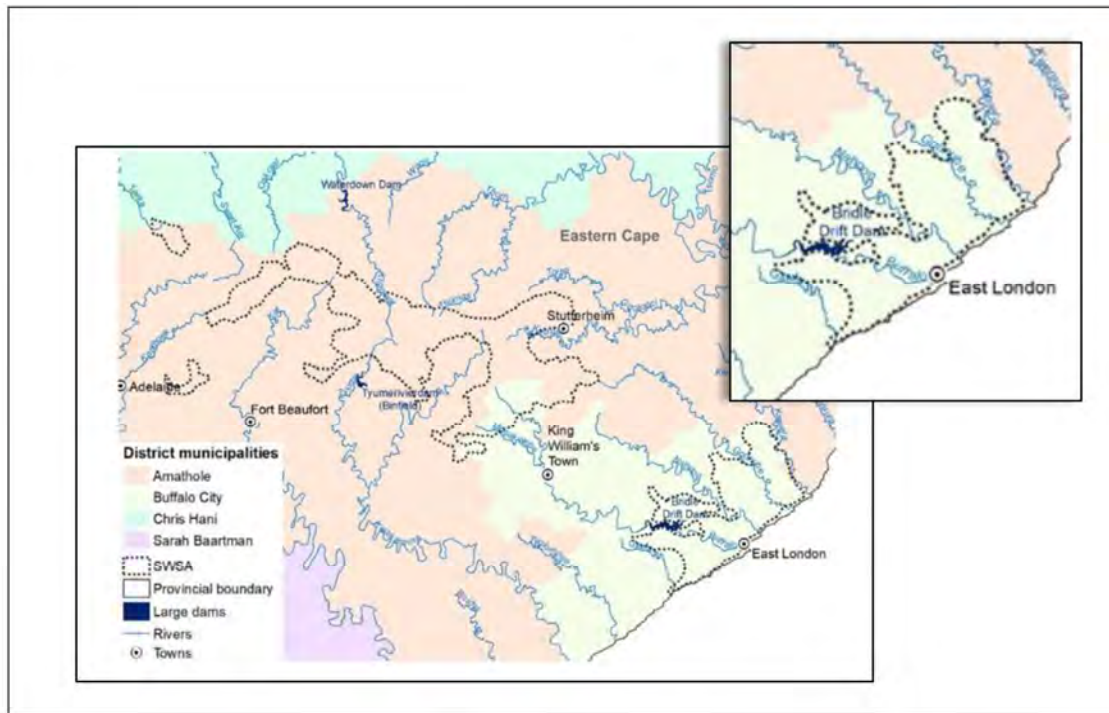


Figure 6.8 Map showing the 2021 refined delineated areas comprising the Amathole SWSA.
Source: Stats SA 2023

Text Box 6.1 A description of SWSAs and their importance. Source: CSIR, Stats-SA.

Strategic Water Source Areas (SWSAs): Surface Water, such as the Amathole SWSA: SW, are defined as areas of land that supply a disproportionate quantity of mean annual surface water runoff in relation to their size, and so are considered nationally important. All surface water SWSAs are located in high rainfall areas where baseflow is at least 1125 mm per annum, which is evidence of a strong link between groundwater and surface water in these areas. The aquifers sustain baseflow, contribute to runoff and, especially, contribute to dry season flows. Sustained river flows are important as they support people and communities who depend directly on rivers for their water, especially during the dry season and droughts. There are 22 SWSAs for surface water, which make up 10% of the total land area of South Africa, Lesotho and Eswatini and provide 50% of the combined mean annual run-off of these three countries. (<https://www.csir.co.za/strategic-water-source-areas-south-africa>).

The protection and restoration of SWSAs is of direct benefit to all downstream users. This dependence needs to be considered in decisions relating to these primary headwater catchments. The protection of both water quantity (flows) and quality must be addressed. Any failure to address impacts on water quality or quantity will have impacts on the water security of all those depending on that water downstream.

Socio-economic activity within SWSAs can have a profound impact on the ecological condition of water-related ecosystems in these areas, such as rivers and wetlands and their associated catchments. Factors such as cultivation, urbanisation, erosion and pollution can affect both the quality and quantity of the water that these ecosystems provide. The key to sustaining the health of water-related ecosystems, and in turn SWSAs, is to ensure that these areas remain in a predominantly natural or semi-natural state. There is also a need to ensure that the use and management of land, rivers and wetlands in SWSAs does not compromise their ability to provide water (www.statssa.gov.za/?p=16223).

6.7.1 Present Ecological State and Ecological Importance and Sensitivity of Surface Waters

Present Ecological State (PES)

According to the available desktop PES/EIS data (DWS 2014, and DWS in prep.), the Present Ecological State (PES) for the Qinqira River system including tributaries and wetlands in sub-quaternary catchment R30F-08005 is a **Category D**, described as Largely Modified (see Table 13.1, Appendix 3). The PES in this instance represents an ecologically integrated state, combining the assessed state of the physical system 'drivers' (hydrology, geomorphology, physico-chemical condition) and the biotic system 'responses' (fish, aquatic invertebrates and riparian vegetation) of water resources in the sub-quaternary. The PES is representative of the entire sub-quaternary, and may not be representative of the condition of individual tributaries or wetlands.

Ecological Importance and Sensitivity

According to the Desktop Model for sub-quaternary R30F-08005, the integrated Ecological Importance (EI) is **Moderate** and Ecological Sensitivity (ES) is **Moderate** (DWS 2014). The EI is an expression of the importance of a water resource to the maintenance of ecological diversity and functioning on local and wider scales. The ES refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred (Kleynhans 1999). These are combined to provide an Ecological Importance and Sensitivity (EIS) rating, which is also **Moderate** (DWS 2014). Categories used to describe Ecological Importance and Sensitivity (EIS) are described in Table 13.2, and are determined by scoring certain abiotic and abiotic components of the ecosystem.

Table 6.2. A summary of the desktop PES and EIS assessments for the Qinqira sub-quaternary R30F-08005 (DWS 2014, DWS in Prep.)

Surface Water Resource	PES	EI	ES	EIS
Depressional wetland (DW)	D	Moderate	Moderate	Moderate
Artificial wetland (dam; AW)	D	Moderate	Moderate	Moderate
Non-perennial tributary (T)	D	Moderate	Moderate	Moderate

6.7.2 NFEPA Status

The watercourses of R30F-08005 are not classified as NFEPA systems.

6.7.3 Critical Biodiversity Area (CBA) and Ecological Support Area (ESA) Status

- **AQUATIC CBA:** The study site does not fall within an aquatic CBA.
- **TERRESTRIAL CBA:** The study site falls within a terrestrial CBA2 as illustrated in Figure 6.9.
- **FRESHWATER ESA:** The study site falls outside of, but in close proximity to, a freshwater ESA, as illustrated in Figure 6.11.

6.7.4 Wetlands within 500m of the site

A 500m buffer around the proposed cemetery site was used to detect wetlands within this zone of potential influence, using both the NFEPA (Nel *et al.*, 2011) and NBA (Van Deventer *et al.*, 2018) datasets. Figure 6.11 shows the resultant map. All of the wetlands within the current 2018 wetland map are denoted as artificial and are all small dams, including the one within the study area (labelled as point 1 in Figure 7.8).

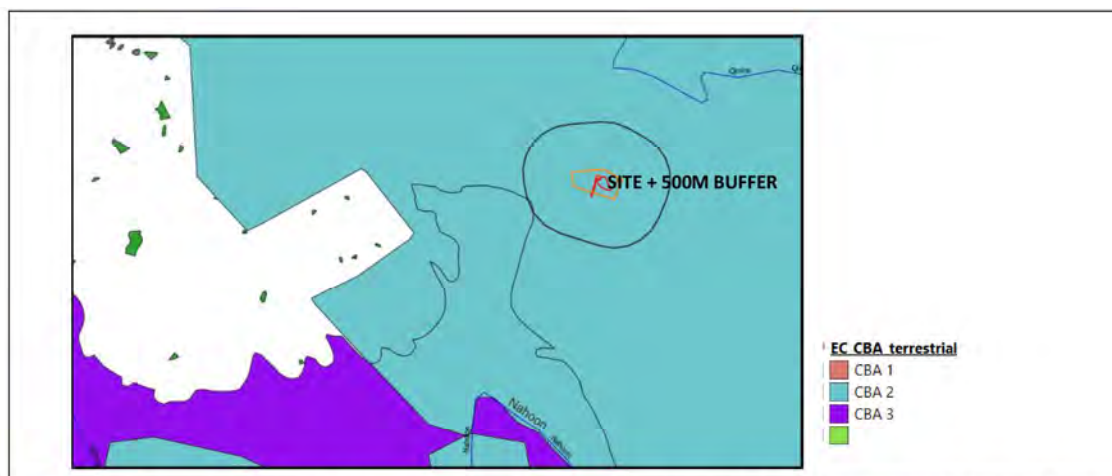


Figure 6.9 Terrestrial Critical Biodiversity Area (CBA) map of the area in which the study site occurs.

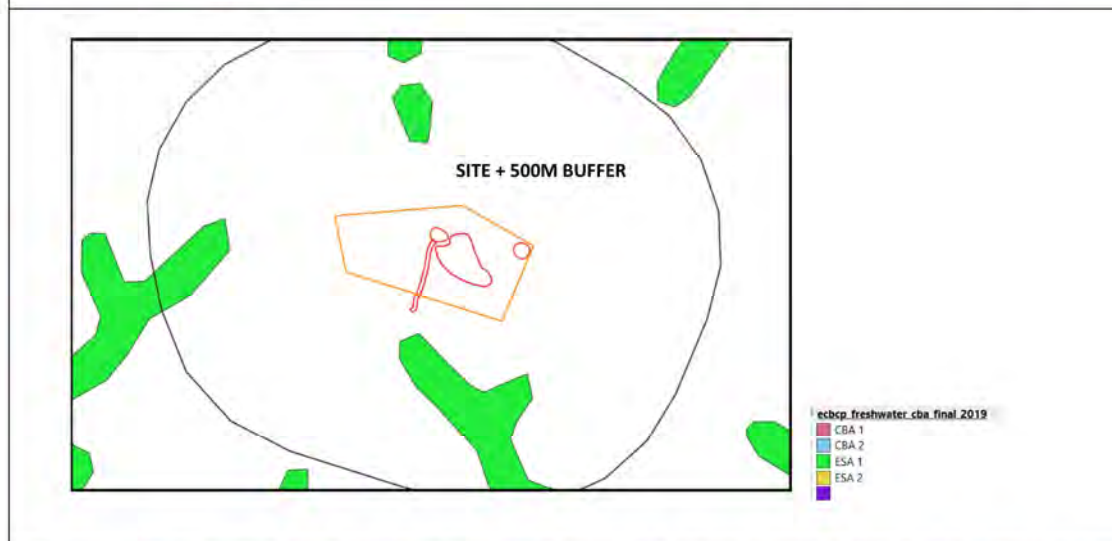


Figure 6.10 ECBCP Freshwater CBA and ESA map of the area in which the study site occurs. ESA 1 areas occur close to the site.

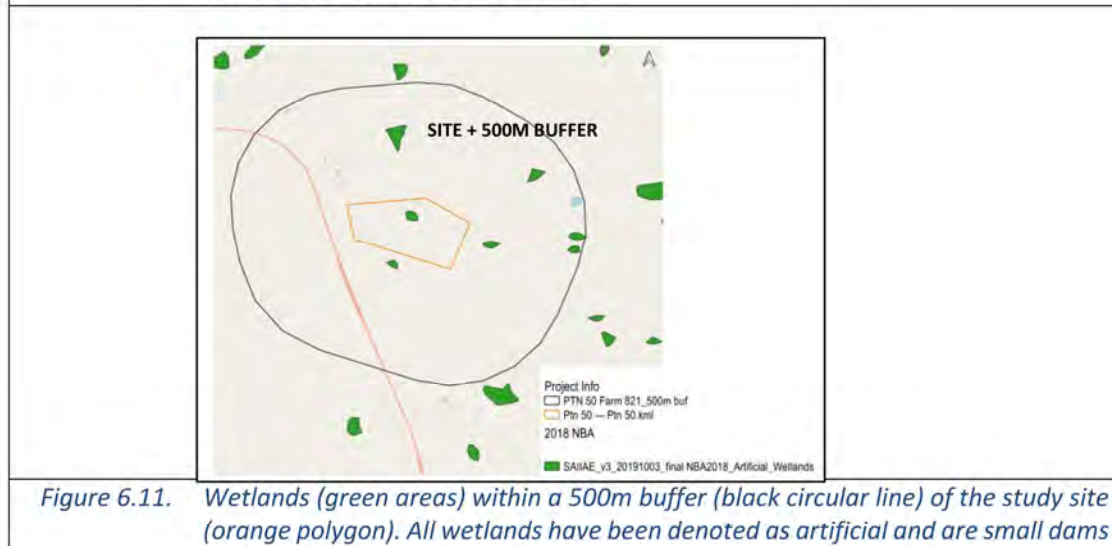


Figure 6.11. Wetlands (green areas) within a 500m buffer (black circular line) of the study site (orange polygon). All wetlands have been denoted as artificial and are small dams

6.8 GROUNDWATER

The interaction between groundwater and surface water is complex but an important factor in assessing potential risks to aquatic ecosystems in this study. Dippenaar et al. (2018) point out that groundwater and surface water interact constantly: 'By some means or other, the surface water is either supplied by the groundwater, or it is supplying the groundwater'. Interaction occurs through movement of water in the vadose zone ('basal buffer zone' of AGES 2022, see Appendix 7, Block 5). For this reason, relevant groundwater information is summarized here.

According to the Groundwater Report of 2022 for this site (AGES 2022), the groundwater potential of the area is deemed to be moderate to high. The AGES (2022) report notes that the strategic value of the aquifer in the project area and surroundings can be classified as important to very important as groundwater is a current domestic and agricultural water source to all surrounding properties. AGES (2022) note that it is important that this aquifer be protected.

6.8.1 Hydrocensus

A hydrocensus of the existing groundwater geosites and groundwater use within a 500m radius of the project area was conducted during the Geohydrology site investigation (AGES 2022). Nine boreholes, 1 spring (assessed in this report as a depressional wetland), and 14 soil dams were identified during the hydrocensus, as indicated in Figure 6.12. The hydrocensus results indicated that groundwater was a prominent water source used by all owners surrounding the proposed cemetery site. The Guideline for Geohydrological Studies for Cemeteries (AGES 2022) states that a buffer zone of 2.5 m between base of graves and groundwater level (static or perched) should provide adequate barrier conditions within the recommended permeability limits in order to prevent microbiological pollutants from reaching the water table. AGES (2022) state that no existing boreholes were identified on the site and the static groundwater level could not be measured. They did however report a shallow perched aquifer on localised portions of the site, as reported in a prior Controlab report, where slight groundwater seepage was encountered in a test pit (TP2) in the north-western quadrant. AGES (2022) comment that they expect the shallow aquifer is limited to the upper portion of the site, associated with the drainage conditions from the road as well as the spring identified as Geosite 2 (identified in this study as a depressional wetland). The general static groundwater level of the downstream boreholes was measured between 27.44 and 29.82 mbgl.

6.8.2 Groundwater Chemistry

Two water samples were taken by AGES (2022), one at the site of the 'spring' identified here as a depressional wetland (Site 2 in Figure 6.12) the other at the closest private borehole (Site BH4 in Figure 6.12). The water quality of the samples was compared to the SANS 241-2015 standards (see AGES 2022 report, Appendix C for detailed results).

The water at 'spring' (depressional wetland) Site 2 on Figure 6.12 was described as:

- An Aesthetic Risk due to Colour of 497 mg/l PT-Co (> limit of 15 mg/l PT-Co), Turbidity value of 66 NTU (> limit of 5 NTU) and the Iron concentration of 8,576 µg/l (> limit of 300 µg/l);
- An Operational Risk due to a Standard Plate Count of 2001 bacterial colonies per ml (> limit of 1000 Colonies per ml), Total Coliform count of 2080 Colonies per 100ml (> limit of 10 Colonies per 100 ml), Turbidity value of 66 NTU (> the limit of 1 NTU) and an Aluminium Value of 15,623 µg/l (> the limit of 300 µg/l);
- An Acute Health Risk due to an *E.coli* value of 1220 Colonies per 100 ml (> limit of 0 Colonies per 100 ml) and

- A Chronic Health Risk due to the Iron concentration of 8576 $\mu\text{g/l}$ (in excess of the 2000 $\mu\text{g/l}$ limit) and Total Organic Carbon value of 34 mg/l (> the limit of 10 mg/l).

The water at Private Borehole BH4 (Figure 6.12) was described as:

- An Aesthetic Risk due to Phenols of 12 $\mu\text{g/l}$ (> limit of 10 $\mu\text{g/l}$); and
- An Operational Risk due to the Standard Plate Count of 2001 Colonies per ml (> the limit of 1000 Colonies per ml), and a Total Coliform count of 20 Colonies per 100ml (> the limit of 10 Colonies per 100 ml).

All other tested determinands were below the SANS STD limits.

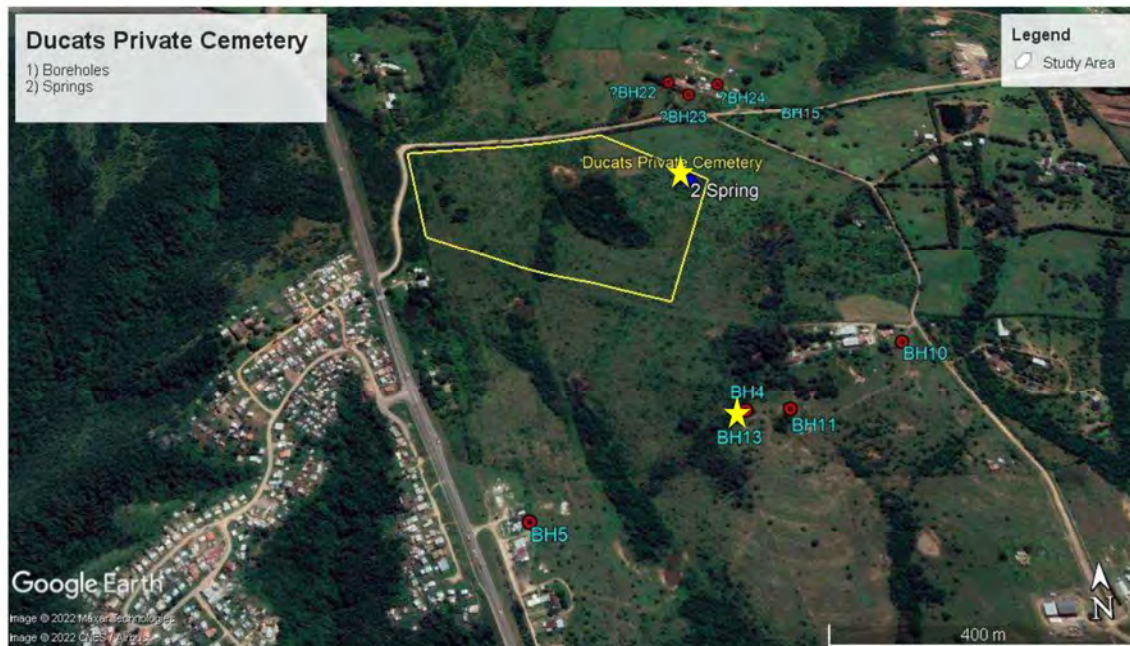


Figure 6.12 The locality of the boreholes (BH), dams and spring identified by AGES during their Hydrocensus (2022). Sampling points marked with yellow stars.

7 SITE SURVEY

7.1 DESCRIPTION OF SURFACE WATERS ON SITE

The surface waters already described in Section 6 were verified on site:

- A depressional wetland in the eastern-most portion of the site
- A modified wetland in the form of a farm dam in the centre and north of the site
- A non-perennial watercourse which is a tributary of the Qinira River.

7.1.1 Depressional Wetland (DW)

The depressional wetland occurs in the eastern-most corner of the study area, locality 32°55'8.66"S and 27°54'39.68"E (approximate centre point). It is roughly circular with a diameter of about 25-30m (see Figure 7.1 for photographs and Figure 7.8 for delineation). Although it is identified as an artificial wetland on the NBA 2018 Wetland Coverage, it is a natural feature. Note: This system is described as a spring in the Geohydrology report (AGES 2022), and an artificial wetland in the 2022 Aquatic Specialist Report (Smith 2022). Soils and vegetation in the central area indicate permanent saturation, and the area was inundated at the time of the field assessment. It is likely that some level of inundation is also permanent. The depressional centre is dominated by wetland obligate species, mainly *Cyperus polystachyos*, *C. textilis* (endemic to South Africa, particularly the Western and Eastern Cape), *C. longus*, *Centella asiatica*, and *Commelina erecta*, and the raised outer rim of doloritic rocks, by terrestrial, mostly woody species, mainly *Erythrina afra*, *Cussonia spicata*, *Vachellia karroo*, *Strelizia reginae*, *Diospyros villosa*, *Brachylaena elliptica* and *Harpephyllum caffra*. Beyond this mostly indigenous woody fringe, vegetation opens with predominantly grass and shrub, but alien plant species are common, and include *Lantana camara*, *Solanum mauritianum*, and



Figure 7.1 Photographs of the depressional wetland (see marked area 3 in Figure 7.8, showing the circular centre and surrounding raised vegetation composition).

Revision of PES for the Depressional Wetland

The PES for the depressional wetland was revised using the RDM-99 scoresheet with criteria for assessing Habitat Integrity of 'Palustrine Wetlands' to determine the PES. This is because, for depressional wetlands, the Geomorphological PES cannot be determined using the existing methods, so it is not possible to derive an overall score by weighting and combining the various component scores. Within the DSP, the RDM-99 wetland PES assessment method (Duthie, 1999), which is the only other nationally-applicable wetland PES assessment method in South Africa besides WET-Health and Wetland-IHI (Ollis and Malan, 2014), has been included in the matrix table of the DSP that deals with the derivation of an overall Wetland PES score/category, specifically for depressions and wetland flats.

The PES was assessed as 73% of natural, Category B, described as 'Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modifications. Most aspects of the biotic assemblage as expected under natural unperturbed conditions' (see Appendix 3). The calculation of the PES is shown in Appendix 4.

7.1.2 Non-perennial watercourse (NW)

The channel of the non-perennial watercourse was largely inaccessible from the surrounding area of riparian forest and grassland, however it was accessed at the lower end of the site.

The channel, which drains from the dam in a south-westerly direction, is natural earth, seasonal, 1-2m wide in different areas, and mostly incised (1-3m deep). The in-channel woody debris and leaf-drop represents the major instream habitat which would be utilized by macroinvertebrates and other river fauna during periods of adequate surface water. At the time of the survey, there was only residual water present in limited areas, suggesting that there had been little recent surface flow. SASS5 aquatic macroinvertebrate sampling was not possible with these surface water levels.

The channel supports a linear area of increased woody (relative to the upland) density and stature with a well-defined understorey (see Figure 7.2 for delineation and Figure 7.3 for photographs). The only species which can be considered riparian is *Syzygium cordatum*, which is uncommon, but can also be simply associated with areas of increased moisture, such as seepage areas. The dam doesn't show clear signs of overtopping and it is likely that the watercourse receives upstream water from hillslope seepage.

Woody species aligned along the channel include *Erythrina afra*, *Vachellia karoo*, *Gymnosporia buxifolia*, *Cussonia spicata*, *Harpephyllum afrum*, *Diospyros villosa*, *Canthium spinosum*, *Carissa bispinosa*, *Coddia rudis*, *Grewia occidentalis*, *Hippobromus pauciflorus*, *Olea europaea subsp. africana*, *Pterocelastrus tricuspidatus*, *Scutia myrtina*, *Searsia lucida*, *Euclea natalensis* and *Sideroxylon inerme*, while understorey species include *Dietes grandiflora*, *Setaria megaphylla*, *Crocosmia aurea*, *Strelitzia reginae* and *Scadoxus punicea*. Alien plant species, notably *Lantana camara* and *Solanum mauritianum* were mostly limited to the sunnier fringes.

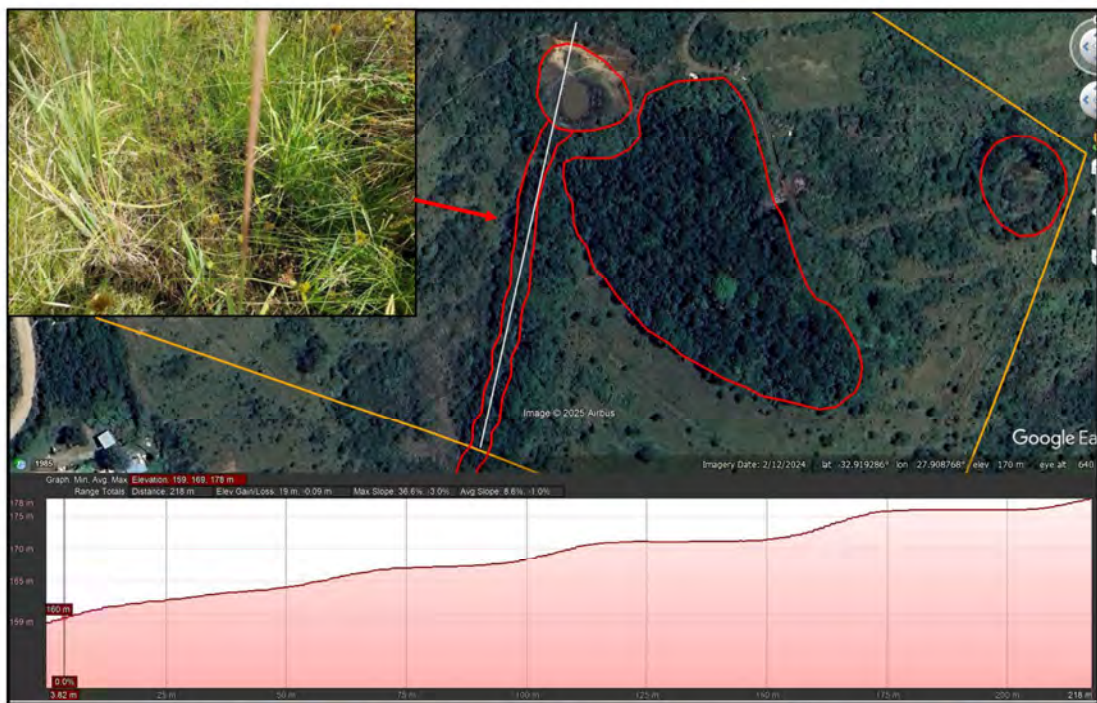


Figure 7.2. Google Earth © imagery showing approximate slope of the drainage channel and upslope dam (white line) as well as a photograph of later seepage towards the channel (inset, red arrow shows position).



Figure 7.3 Photographs of the drainage channel (marked area 2 in Figure 7.8), showing incision and surrounding vegetation composition.

Tributary PES and EIS

As field sampling of the tributary was not possible due to the lack of surface water in the tributary, these PES/EIS values provide a baseline value. The tributary is likely to have a higher PES than the Desktop PES as it has been minimally affected by land-use activities over time (as noted in historic satellite imagery). Indigenous vegetation cover on either bank have protected the system from erosion and effects of land-use alterations. It should also be noted that tributaries and their headwaters - particularly those with indigenous riparian vegetation - under flow conditions, can serve as refuge or source areas for aquatic biota, particularly those which, under flow conditions, are able to 'drift' to downstream areas. Thus the importance of these small systems in terms of the resilience of system aquatic biodiversity should be taken into account, particularly within a SWSA: Surface Water. The specialist opinion, following the site investigation, is that this watercourse should be assigned a PES of a B/C and EIS of Moderate.

7.1.3 Dam (artificial wetland, AW)

Historical aerial photographs show that the dam existed in 1938 already (Figure 6.4 for overall view; Figure 7.4 for closer view). In the years that follow the 1938 photographs the area was extensively cultivated (Indwe Aquatic Report, 2022) and it is highly likely that the dam was a seepage wetland area, similar to the other seepage wetland within the study area, that was excavated to hold water for irrigation purposes or other uses. While the dam does not support an aquatic vegetation component, it does support a number of wetland obligate emergent species (notably *Typha capensis*, *Ischaemum fasciculatum*, *Centella asiatica*, *Commelina erecta*, *Cyperus polystachyos*, *C. dives*, *Juncus effusus* and *Persicaria decipiens*) that suggest perennality. Fringe vegetation comprised dense woody terrestrial vegetation (besides cleared access areas), notably *Vachellia karroo*, *Erythrina caffra*, *Brachylaena elliptica* and *Cussonia spicata*, with a clear band of alien woody species, mostly *Solanum mauritianus*, *Lantana camara* and *Melia azedarach*.

The dam is recognised in the national wetland map (NBA, 2018) as an artificial wetland, but a wetland none-the-less. As it has been modified to the extent that it has, it is referred to as an artificial wetland in this report.



Figure 7.4 Closer view of aerial comparison of the dam showing an historical photograph in 1938 (left) and the current Google Earth satellite imagery, 2024 (right). Dam indicated by red arrow.



Figure 7.5 Photographs of the dam (marked area 1 in Figure 7.8) showing (Top) the water surface and (Bottom) the fringe vegetation composition.

7.1.4 Indigenous Thicket

The indigenous thicket is a dense woody area of about 1.2 Ha towards the central region of the study area and supports a medium to tall woody thicket, with high density and some trees with tall stature, as well as a well-defined understorey (see Figure 7.6 for photographs and Figure 7.8 for delineation). The thicket area was delineated as an important area because it protects the downslope environments from hillslope erosion, and the drainage channel is at its foot, so maintenance of dense woody vegetation on these steep slopes will facilitate hillslope stability. Figure 7.7 shows the approximate slope of the hillside that supports the thicket, as well as its position (geographically and vertically) relative to the depressional wetland and drainage channel. The approximate slope of the thicket, calculated roughly in Google Earth Professional, is a drop of ca.24m over a distance downslope of 90m (average slope = 10% or 5.7°).

The thicket is dominated by indigenous woody vegetation, including *Harpephyllum caffra*, *Cussonia spicata*, *Erythrina afra*, *Diospyros villosa*, *Canthium spinosum*, *Coddia rudis*, *Grewia occidentalis*, *Hippobromus pauciflorus*, *Olea europaea subsp. africana*, *Pterocelastrus tricuspidatus*, *Scutia myrtina*, *Searsia lucida*, *Euclea natalensis* and *Sideroxylon inerme*, while understorey species include *Dietes grandiflora*, *Setaria megaphylla*, *Crocosmia aurea*, *Carissa bispinosa*, *Strelitzia reginae* and *Scadoxus punicea*. Fringe vegetation includes *Vachellia karroo*, *Gymnosporia buxifolia* and notable alien species, especially on the east side, including *Lantana camara* and *Solanum mauritianum*.



Figure 7.6 Photographs of the indigenous thicket (marked area 4 in Figure 7.8) showing tall, dense woody vegetation composition.

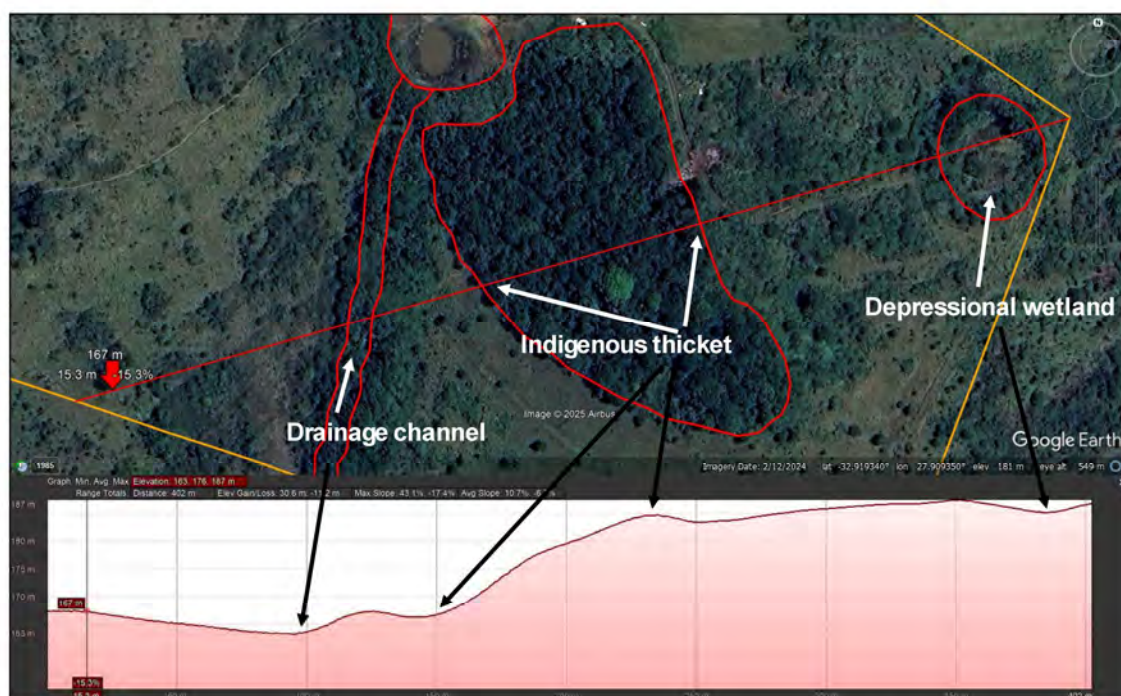


Figure 7.7 Google Earth © imagery showing approximate slope of the hillside that supports the indigenous thicket as well as its position (geographically and vertically) relative to the depressional wetland (upslope) and the drainage channel (downslope).

7.2 SUMMARY OF REVISED PES

A summary of the revised PES for the surface waters on site and downstream is presented in Table 7.1. Note that the PES for the artificial wetlands (dams) on site and downstream has been maintained at the DWS 2014 Desktop PES/EIS value.

Table 7.1. Revision of PES and EIS assessments for the watercourses on the site

Surface Water Resource	PES	EI	ES	EIS
Depressional wetland (DW)	B	Moderate	Moderate	Moderate
Artificial wetland (dam; AW)	D	Moderate	Moderate	Moderate
Non-perennial watercourse (NW)	B/C	Moderate	Moderate	Moderate
Downstream watercourses (DSW) (non-perennial and dams)	D	Moderate	Moderate	Moderate

7.3 ECOSYSTEM SERVICES

The key ecosystem services provided by the aquatic ecosystems on the site are presented in Table 7.2. Note that in the case of the artificial wetland or dam, these services are non-natural.

Table 7.2 Ecosystem services supplied by the aquatic ecosystems assessed on site. Where the relevant service is supplied, a cross is entered. More than one cross indicates a greater level of supply.

	Depressional Wetland	Non-Perennial Watercourse	Artificial Wetland (dam; non-natural ecosystem services)
Water supply to downstream environment		X	
Flood attenuation	X	X	
Streamflow regulation		X	
Groundwater recharge	X		
Sediment trapping	X	X	X
Phosphate assimilation	X		X
Nitrate assimilation	X		X
Toxicant assimilation	X		X
Erosion control	X		X
Carbon storage	X		X
Habitat Provision (plants, birds, amphibians, invertebrates, etc)	XX	X	X
Provision of recreational (sitting) value	X	X	X

7.4 DELINEATION AND BUFFER DETERMINATIONS

Regulated, or buffer, zones are found around aquatic resources, in terms of the legislation of the country, and are used in land-use planning to protect natural resources and limit the impact of one land use on another. Should development take place in these areas, listed activities trigger the requirement for authorisation from the respective competent authorities.

Buffer zones associated with water resources have been shown to perform a wide range of functions, and are a standard means of protecting water resources and associated biodiversity.

Some of these key functions include:

- Maintaining basic aquatic processes;
- Reducing impacts on water resources from upstream activities and adjoining land uses;
- Providing habitat for aquatic and semi-aquatic species;
- Providing habitat for terrestrial species; and
- A range of societal benefits (Macfarlane and Bredin 2017).

7.2.1 Depressional Wetland

The depressional wetland is a natural feature which displays a central region that is permanently saturated and at least seasonally inundated. The wetland has a small immediate catchment with dense woody vegetation that will channel some rainfall into its centre during rainfall events but is mainly driven by shallow groundwater via seepage. A buffer of 20m is therefore proposed to minimise risk to the hydrological characteristics of this wetland and to protect its immediate catchment and associated vegetation, the density of which is important for rainfall dissipation. It is therefore also proposed that any form development or excavation, including roads be excluded from within the buffer zone. Figure 7.8 shows the delineation of the depressional wetland and its 20m buffer.

7.2.2 Dam (Artificial Wetland)

The delineation of the dam was based on field verification of wetted perimeter as well as the distribution of hydrophytes surrounding the dam and included an assessment of historical Google Earth © imagery to include years when the dam was at its fullest. The dam is noted as an artificial wetland, but it is highly likely to have been an excavated depressional wetland in the past. Nevertheless, a buffer of 15m has been proposed. This distance includes sufficient surrounding woody vegetation and a portion of the dam's immediate catchment area to promote infiltration or slow laminar flow during rainfall events to prevent nearby erosion of the slopes or sediment delivery to the dam. Figure 3 shows the delineation of the dam and its 15m buffer.

7.2.3 Non-perennial watercourse (NW)

The non-perennial watercourse channel is a natural feature that conveys surface water downhill and supports a linear woody element. Other than direct rainfall during events, it likely receives most of its water from hillslope and lateral seepage, including from the upslope dam. Protection of lateral slopes which are often wet due to seepage (Figure 7.2 inset) and dense vegetation cover for channel and bank stabilisation are important. As such, and given the steep slope of (approximate drop of 16m over 170m = slope of 0.094; Figure 7.2) a buffer of 20m is proposed, within which all forms of development or excavation should be excluded. The delineation of the drainage channel and its 20m buffer are shown in Figure 7.8.

7.2.4 Indigenous Thicket

The section above outlines the importance of protecting the integrity of the indigenous thicket to protect hillslopes from eroding into the drainage channel. A buffer zone of 3m in the northern part of the thicket, and 5m in the southern portion is proposed, within which no excavations or any other development should take place, to protect the average rooting zone of woody plants that comprise the thicket and fringe vegetation. This buffer zone should also be kept free of invasive alien plants. Figure 7.8 shows the delineation of the indigenous thicket and its 3 to 5m buffer.

7.3 SENSITIVITY MAPPING

The aquatic ecosystems and their buffers are mapped on Figure 7.8. The sensitivity of these areas is mapped in Figure 7.9.

Allocation (map colour)	Description/Rationale
High sensitivity	No-go area for construction and operations without prior approval/authorisations from DWS or DEDEAT. This sensitivity rating applies to: - the depressional wetland (DW) and its 20m buffer zone, and - the non-perennial watercourse (NW) as delineated.
Moderate sensitivity	Moderate sensitivity. No vehicular access in these areas. Any installations (e.g. paths, boardwalk, sitting area) must be done manually, and with prior approval of the relevant departments (DWS and DEDEAT). This sensitivity rating applies to: - the artificial wetland (AW, dam) and its buffer zone (15m from delineated edge) - the non-perennial watercourse (NW) buffer zone (20m from delineated edge) - the thicket zone.
Low sensitivity	Low sensitivity areas. These areas should be kept clear of graves, and should be considered accessible during operations. It is advised that vehicles are kept out of these areas. This sensitivity rating applies to: the thicket zone buffer.

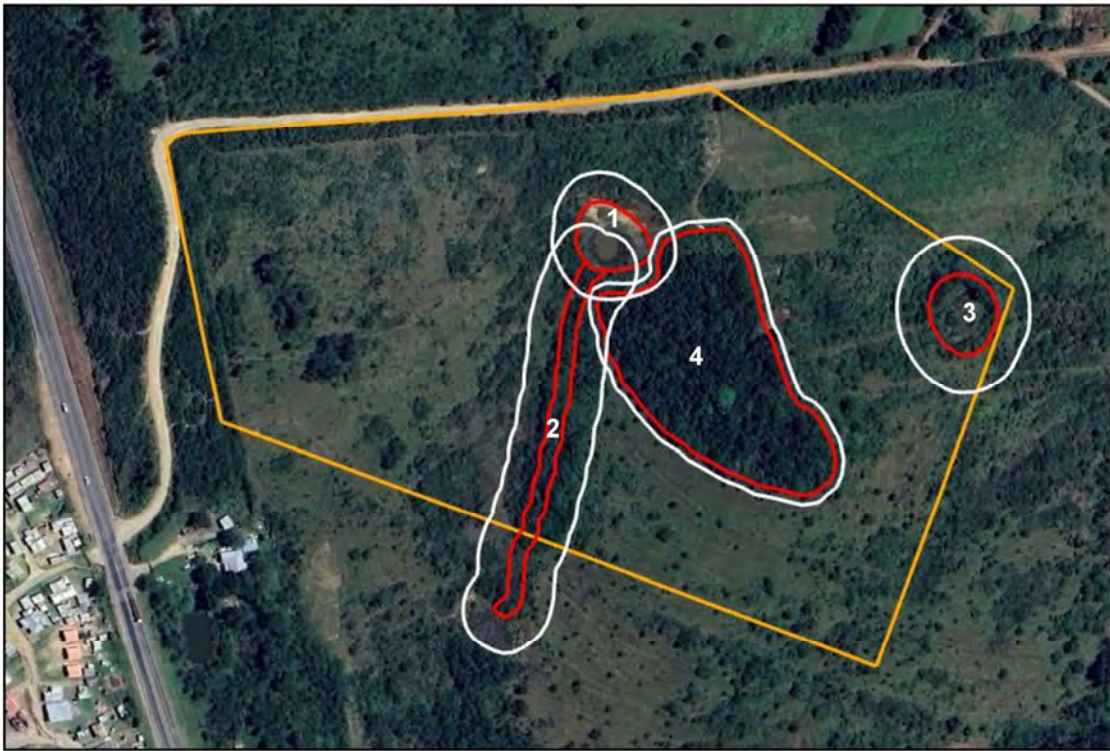


Figure 7.8 Satellite imagery showing the study area (orange) and delineation of areas of interest (red), each with a proposed buffer (white). The sensitive ecosystems include the artificial wetland or dam (point 1) and associated non-perennial watercourse (point 2), the depressional wetland (point 3) and the indigenous thicket (point 4).

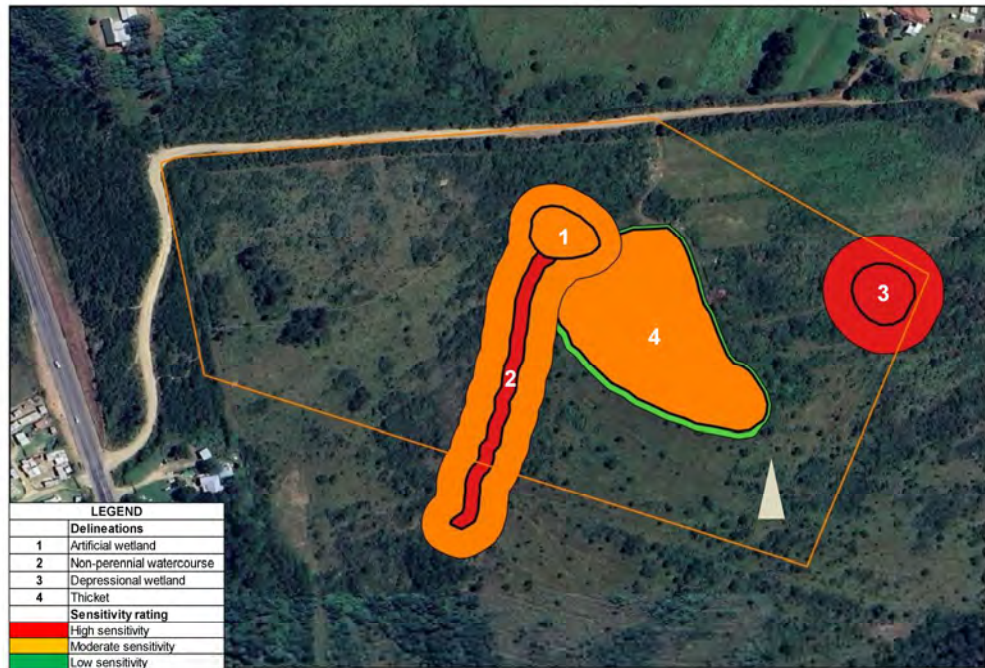


Figure 7.9 Sensitivity map showing the project area with delineated and buffered aquatic ecosystems and indigenous thicket area, and their sensitivity ratings.

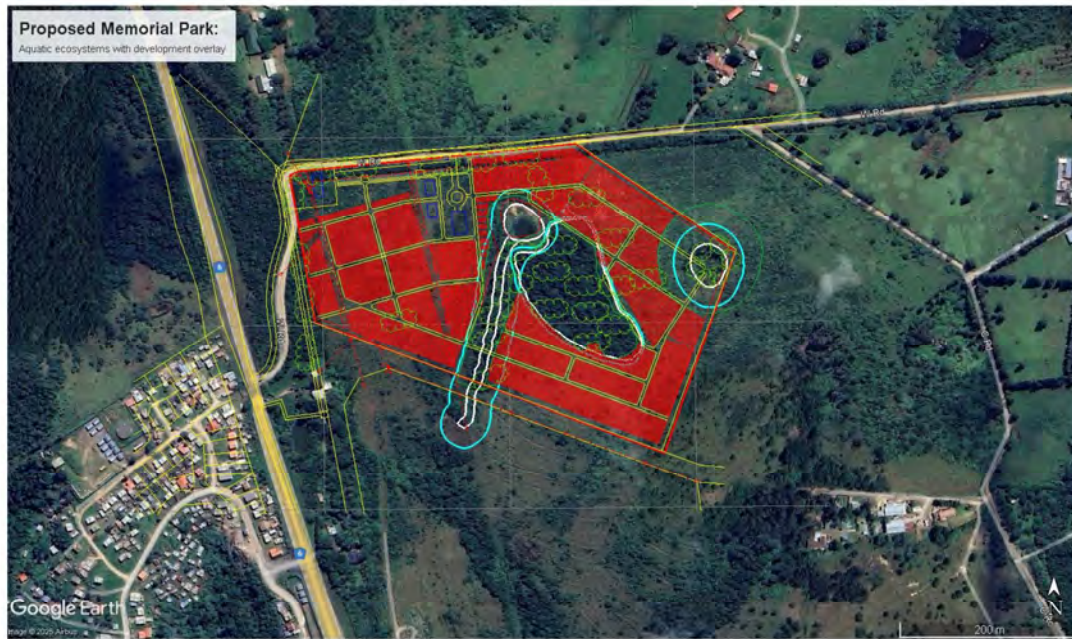


Figure 7.10 A guideline image of Option 2 Development Plan overlaid on the Google Earth delineation and buffer map.

Note: The two images do not overlay accurately due to file conversion factors. This should be addressed with more accurate conversions and imagery in order to interpret any layout changes required.

8 IMPACT AND RISK ASSESSMENT

8.1 RISK AND IMPACT ASSESSMENT METHODOLOGY

Two impact assessments were necessary:

- The IA measures required in terms of the DFFE '*Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity*' (GN 320, 20 March 2020). The assessment criteria and scoring for this method are presented in Appendix 6.1. Here the assessment is both pre- and post-mitigation.
- The prescribed method followed for the IWUL application to DWS is the '*DWS Risk Assessment Matrix (RAM) Protocol Version 2.1.1 for developments affecting watercourses and requiring Section (c) and (i) authorization*'. The RAM with mitigation measures is copied on the following pages. The spreadsheet version for submission to DWS is attached as an electronic file. The Risk Rating tables for this method are presented in Appendix 6.2. Here the ratings are for a 'with mitigation measures implemented' scenario, which is the standard method for the RAM.

The same potential impacts are cited in both methods and assessed according to the relevant specifications of each.

8.2 POTENTIAL IMPACTS IDENTIFIED

Potential risks to, and impacts on aquatic systems were identified for three phases: the Design and pre-Construction phase, Construction phase and the Operational phase. There is no decommissioning phase anticipated.

8.2.1 Existing impacts

The existing impacts to the site include:

- Invasive alien vegetation
- Solid waste dumping
- Informal pathways
- Historic clearing for agriculture
- Modification of a wetland to form a water supply dam
- Cutting of indigenous vegetation for firewood.

8.2.2 Risks and potential impacts

For both proposed layout plans, there are numerous potential impacts relating to the Design, Construction and Operational phases of the Memorial Park. The risk assessment is focused on impacts to (1) the depressional wetland (DW), (2) the artificial wetland (AW; dam); and (3) the non-perennial tributary (NT) of the Qinira River, and (4) Downstream surface waters within 250m of the site (DSW). The majority of risks to downstream surface waters are linked to the threat of groundwater contamination, which are documented in the Geohydrology Report for this study (AGES 2022). The most serious risk is that of contamination of downstream surface waters being used for domestic purposes. In the absence of a good understanding of the linkage between ground and surface water, which would require further specialist investigation, these impacts are difficult to assess, and the precautionary principle applies.

The threats and potential impacts are as follows:

- Loss of, or disturbance to, riparian, wetland and artificial wetland (dam) ecosystem function, services, and habitat;
- Loss of riparian species;
- Change in hydrology, increase in erosion, sedimentation of nearby watercourses;
- Pollution of on-site and downstream surface waters due to groundwater contamination associated with cemeteries. This is now well documented (e.g. Dippenaar et al. 2018), but complex to predict without more data and information;
- Waterlogging of graves.

8.3 IMPACT ASSESSMENT: DESIGN AND PRECONSTRUCTION PHASE

PHASE: DESIGN AND PRECONSTRUCTION							
POTENTIAL IMPACT 1:	Deterioration of surface water ecosystems on, and downstream of the study site, due to absence of recommended buffer zones						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
1	2	3	6	Medium	Definite	Low (-ve)	M
MITIGATION MEASURES:	Update of design to take all recommended aquatic ecosystem buffer zones into account. These are NO GO areas during construction. Design of 'restricted access' areas around wetland and thicket area for visitors to walk, sit and reflect. Only manual methods to be used in these areas. Removal of invasive alien plants in these areas will be necessary during the construction phase.						
IMPACT ASSESSMENT WITH MITIGATION							
1	1	3	5	Medium	Improbable	Low (+ve)	M

PHASE: DESIGN AND PRECONSTRUCTION							
POTENTIAL IMPACT 2:	Loss of depressional wetland ecosystem functionality and ecosystem services due to current routing of road through this ecosystem buffer.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
1	3	3	7	High	Probable	Medium (-ve)	M
MITIGATION MEASURES:	The section of road currently routed through the depressional wetland and its recommended buffer should be removed from the design, as this is a NO-GO area for construction. The remaining roads in this area should be realigned / rerouted to avoid any construction intervention in the depressional wetland buffer zone, and to ensure access to graves and site periphery. There should be no hard infrastructure within any of the recommended buffer zones.						
IMPACT ASSESSMENT WITH MITIGATION							
1	2	3	6	Low	Improbable	Very Low (-ve)	M

PHASE: DESIGN AND PRECONSTRUCTION							
POTENTIAL IMPACT 3:	Threat to aquatic ecosystem and to indigenous riparian zone species and riparian zone functionality, due to graveyard areas currently located (on plan) in recommended buffer zones.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
2	2	3	7	HIGH	PROBABLE	MEDIUM (-VE)	M
MITIGATION MEASURES:	Graveyard areas should be situated outside of the prescribed buffer zones. Guideline criteria regarding depth and alignment of graves must be met (see AGES 2022).						
IMPACT ASSESSMENT WITH MITIGATION							
1	1	3	5	MEDIUM	POSSIBLE	LOW (-VE)	M

PHASE: DESIGN AND PRECONSTRUCTION							
POTENTIAL IMPACT 4:	Contamination of on-site and downstream surface waters.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
2	2	3	7	HIGH	POSSIBLE	MEDIUM (-ve)	M
MITIGATION MEASURES:	In the Design Phase, the site should be zoned according to the risk of presence of, and contamination of, groundwater and surface water, including temporarily or seasonally waterlogged areas, perched groundwater areas, seep areas, and downstream surface waters (e.g. farm dams), some of which are used for domestic water supply. This is a preventative mitigation measure. The following zones could be included: administrative and religious areas (including all buildings), memorial areas (cremation memorial plaques only), cemetery areas (graves), limited access areas for visitors walking and reflection, and total no-go areas (where surface water occurs temporarily or permanently). It is important to note that some seasonally wet areas may only become apparent during clearing for construction, or even during operations. These should be avoided (particularly for grave excavation), and should be buffered by an additional 10m.						
IMPACT ASSESSMENT WITH MITIGATION							
2	1	3	6	MEDIUM	POSSIBLE	LOW (-ve)	L

8.3 IMPACT ASSESSMENT: CONSTRUCTION PHASE

PHASE: DESIGN AND PRECONSTRUCTION							
POTENTIAL IMPACT 1:	Removal and loss of indigenous vegetation, exposure of soil surfaces, potential for degradation of riparian zones and aquatic habitat of all surface waters.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
1	2	2	5	MEDIUM	PROBABLE	MEDIUM (-ve)	M
MITIGATION MEASURES:	Adopt the recommended buffer zones which are additional to the delineated areas. Depressional wetland (DW): 20m, Artificial wetland (AW, dam): 15m, Non-Perennial Watercourse (NW): 20m. These buffer zones are to be clearly demarcated with a PVC bunting or robust material on site. These boundaries represent NO GO zones for any construction activities, plant, and labour. An Alien Invasive Plant (AIP) clearing and management plan within the delineated areas and buffer zones is also required for the Construction and Operational Phases. All AIPs should be removed and stems treated following nationally recommended AIP clearing guidelines. This must be done under the supervision of a qualified botanist with AIP management experience. AIPs to be cleared manually within buffer zones, and with a TLB outside of buffer zones. All cleared and disturbed construction areas must be rehabilitated as soon as possible to minimise the risk of erosion and sedimentation.						
IMPACT ASSESSMENT WITH MITIGATION							
1	1	2	4	LOW	POSSIBLE	V.LOW (-ve)	M

PHASE: CONSTRUCTION							
POTENTIAL IMPACT 2:	Potential for runoff over cleared surfaces during rainfall events, resulting in erosion of exposed surfaces and sedimentation of water resources.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
1	1	2	4	LOW	PROBABLE	LOW (-ve)	M
MITIGATION MEASURES:	Adopt all buffer zones as discussed. Limit vegetation clearance to the construction footprint. Protect all cleared exposed surfaces using appropriate erosion control measures such as geofabrics, silt fences and stop-boards. Stockpile the cleared plant, soil and other material > 20m from the outer edge of the demarcated buffer zones, in piles less than 1,5m in height. Stockpiled soil should be covered and the covers secured during windy or rainy periods and monitored for the appearance of erosion channels. Stormwater management should be put in place and monitored during the construction phase. Should any erosion channels become evident these must be backfilled, compacted and re-vegetated as soon as possible. The artificial wetland (dam) should not be used as a water source for construction purposes. If this is absolutely necessary, a single access road should be cleared on the site of the current dam access, with a clear turn-around area further than 15m from the water's edge. No vehicles or plant to be within 15m of the dam. The northern bank of the dam, which is currently exposed and eroded soil, should be clad with rock riprap to prevent further erosion. Ideally riprap will comprise a combination of irregular shaped rocks placed over gravel bedding and (at minimum) a sand filter or geotextile fabric layer. The riprap layer should be substantial, if it is sparse or if the filter or bedding material is inadequate, the sediment collected here will wash out easily, allowing the embankment material to erode. Note: The artificial wetland (dam) may be incorporated into the Memorial Park as a recreational feature in the future. Thus while the NO GO buffer zone around this surface water applies to construction activities, it is recognised that low-level interventions (such as a boardwalk) may, in future, be constructed in the buffer zone.						
IMPACT ASSESSMENT WITH MITIGATION							
1	1	1	3	V.LOW	POSSIBLE	V.LOW (-ve)	M

PHASE: CONSTRUCTION							
POTENTIAL IMPACT 3:	Pollution of surface and groundwater as a direct or indirect result of cement-mixing or washoff of cement water.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
1	1	1	3	VERY LOW	PROBABLE	V. LOW (-ve)	M
MITIGATION MEASURES:	Implement the NO GO feature of all prescribed buffer zones during construction. All cement mixing to take place inside the construction camp or demarcated area, sited outside of the recommended buffer zones. Ready-mix concrete to be brought to site. No cement mixing or cement trucks to be within 20m of the demarcated buffer zones, and no cement or concrete to be in the vicinity of the artificial wetland (dam). No washing of equipment, concrete trucks or any part thereof, on site. All construction staff must be trained to observe this measure, and fines should be imposed for non-adherence.						
IMPACT ASSESSMENT WITH MITIGATION							
1	1	1	3	V. LOW	POSSIBLE	INSIGNIFICANT	M

8.4 OPERATIONAL PHASE

PHASE: OPERATIONAL							
POTENTIAL IMPACT 1:	Contamination of surface waters on site or downstream (largely farm dams), as a result of excavations and burials. According to Dippenaar et al (2018) the sources of potential contamination typically include (i) the actual decomposition of the corpse and the associated microbial contamination, (ii) the metals and organic compounds mobilised from the ornamental coffins and embalming processes, and (iii) nutrients from the landscaping. Surface waters on site and downstream are threatened if groundwater contamination occurs, and in other instances (e.g. when the hydrology of the site is influenced by the presence of multiple excavations, as discussed by Dipennar et al. 2018). With climate change predictions indicating higher rainfall, the effects should not be underestimated. See Specialist Report Appendix 7: Impacts of Cemeteries on Water Resources. NOTE: the potential for Groundwater contamination is dealt with in the Geohydrology Report (AGES 2022)						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
2	3	3	8	V. HIGH	PROBABLE	V.HIGH (-ve)	L
MITIGATION MEASURES:	Implement all buffer zones as exclusion zones for all operations, excepting for low-impact recreational use of the artificial wetland (dam), as per the Aquatic Specialist Report. Zone the whole site so that any surface water areas (which may not yet have been noted) are excluded from excavation activities (as per the Mitigation for Potential Impact 4: Design and Preconstruction phase). It is particularly important to ensure that the depressional wetland/spring area and other seep areas which represent high groundwater levels, are adequately protected by buffers. There may be new areas of surface water which have yet not been identified, after the unusually high rainfall of summer 2024/25. If any such areas are found during construction or operation, these should be excluded from the operations, and buffered with at least 10m buffers. Fencing of the buffer area around the depressional wetland areas has been recommended (Ages, 2022). A monitoring plan for surface waters on, and in the vicinity of, the site is required. Monitoring boreholes are recommended by AGES (2022). Monitoring of potentially threatened surface waters should supplement this monitoring. This should commence pre-construction, preferably during a wet season (to provide baseline data), during the construction process, and post-construction, quarterly/seasonally. Baseline monitoring should commence 3-6 months ahead of site clearing at the following points at a minimum: Depressional wetland; artificial wetland (dam), non-perennial watercourse, and downstream dams within 250m of the site boundary. The monitoring protocol should be accompanied by an emergency response plan, should the concentration of particular indicator variables increase or exceed the limits. Specialist investigation would be required to establish the source of the contamination, and to address this. More detail is supplied in the Recommendations of the Aquatic Specialist Report.						
IMPACT ASSESSMENT WITH MITIGATION							
2	2	3	7	HIGH	POSSIBLE	MED(-ve)	L

PHASE: OPERATIONAL							
POTENTIAL IMPACT 2:	Waterlogging of graves, potential contamination of surface water. This may occur as a result of excavation of graves in areas where there may be seasonal inundation (or perched groundwater) that has not yet been identified by studies.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
1	2	3	6	MEDIUM	POSSIBLE	LOW (-ve)	L
MITIGATION MEASURES:	1. In the event that a grave is excavated and, within 24 hours becomes wet as a result of the inflow of groundwater, the gravesite should be closed, backfilled and flagged for observation, and another site excavated. The new site should be at least 10m further away from the first site, in a direction away from any other watercourse, or surface water. In this instance it is advised that a wetland specialist be appointed to map the area of inundation, which should then be included in a NO GO buffer zone. It should be established whether this is a widespread surface inundation or restricted to a small area. In the case of the former, this area should be buffered, and set aside as a NO GO area (particularly for excavation) or a limited access area. 2. Following the recommendations of AGES (2022), it is advised that minimal irrigation for landscaping takes place. AGES (2022) state that 'Graves will likely cause zones of preferential infiltration if somewhat depressed, or will likely increase erosion or obstruct runoff if mounded. Optimal landscaping practices with minimal irrigation at low intensity will ensure that grass can grow without extensive mobilisation of possible contaminants.'. Waterwise indigenous grasses and plants only should be included in the planting plan, which should be prepared by a local landscaper with good experience of working with local indigenous plants.						
IMPACT ASSESSMENT WITH MITIGATION							
1	1	3	5	MEDIUM	POSSIBLE	LOW (-ve)	L

PHASE: OPERATIONAL							
POTENTIAL IMPACT 3:	Alteration of surface hydrology due to increased hardened surfaces on the site and a related increase in stormwater runoff (rather than infiltration to groundwater, which would occur on the undeveloped site). Increased runoff of this nature will also lead to erosion of land surface and contamination and sedimentation of surface waters.						
IMPACT ASSESSMENT WITHOUT MITIGATION							
A. EXTENT	B. INTENSITY	C. DURATION	SUM: A, B, C	CONSEQUENCE	PROBABILITY	SIGNIFICANCE AND STATUS OF IMPACT	CONFIDENCE
1	2	3	6	MEDIUM	POSSIBLE	LOW (-ve)	L
MITIGATION MEASURES:	A Stormwater Management Plan is required. This must ensure that surface runoff is diverted away from graves and roads, and that measures to encourage infiltration are adopted. See recommendations regarding Stormwater Management, this report.						
IMPACT ASSESSMENT WITH MITIGATION							
1	1	3	5	MEDIUM	POSSIBLE	LOW (-ve)	L

Table 8.0.1 Risk Assessment Matrix for PRECONSTRUCTION AND DESIGN PHASE

Phase	Activity	Impact	Layout to which the impact applies (1 or 2)	Mitigation measures	Potentially affected watercourses		Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 4)	Duration (max = 2)	Sensitivity (max = 20)	Importance rating (max = 5)	Consequences (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Comments/Notes	
					Name/s	PES	Overall Watershed Importance	Abiotic habitat (Drivers)			Biotic (Responders)											
								Hydrology	Water Quality	Geomorph	Vegetation											Fauna
PRE-CONSTRUCTION AND DESIGN	<1> Revision of design to accommodate recommended buffer zones for aquatic resources.	<1> Minimisation of risk of impact to surface water ecosystems on, and downstream of the study site.	1,2	<1> Update of design to take recommended aquatic ecosystem buffer zones into account. Design of restricted access areas around wetland and thicket areas for visitors to walk, sit and reflect. Removal of invasive alien plants in these areas will be necessary during the construction phase to accommodate this.	DW, AW, NW		Medium	0	0	0	1	1	2	1	5	8	3	24	40%	9.6	L	Medium
	<2> Realignment of road currently routed through Depressional Wetland and its buffer.	<2> Minimisation of risk of loss of depositional wetland habitat and functionality due to current routing of road through this ecosystem.	2	<2> The section of road currently routed through the depressional wetland should be removed from the design, as this is a 600,000 area for construction. The remaining roads in this area should be realigned / rerouted to avoid any construction intervention in the depressional wetland buffer zone, and to ensure access to graves and site periphery. There should be no hard infrastructure within any buffer zone.	DW	B	Medium	2	2	1	1	1	4	1	2	7	3	21	40%	8.4	L	Medium
	<3> Revision of layout of certain graveyard areas currently planned inside delineated or buffered surface waters.	<3> Minimisation of threats to wetland habitat and functionality, and to indigenous riparian zone species and riparian area functionality.	1,2	<3> Graveyard areas should be outside of the prescribed buffer zones. Guideline criteria regarding depth and alignment of graves must be met (see AGES 2022).	DW, AW, NW		Medium	2	2	1	2	2	4	1	2	7	3	21	40%	8.4	L	Medium
	<4> Zonation of Memorial Park into administrative and religious areas, grave areas, memorial areas, limited-access natural areas, and no-go areas.	<4> Maximisation of available space, provision of a more reflective and peaceful experience for visitors, minimisation of risk of contamination of on-site and downstream surface waters.	1,2	<4> The site should be zoned according to the risk of contamination of groundwater and surface water, including temporarily waterlogged areas, perched groundwater areas, seep areas, and downstream surface waters (e.g. farm dams), some of which are used for domestic water supply. This is a preventative mitigation measure. The following zones could be included: administrative and religious areas (including all buildings), memorial areas (cremation memorial plaques only), cemetery areas (graves), limited access areas, for visitors walking and reflection, and total no-go areas (where surface water occurs temporarily or permanently). It is important to note that some seasonally wet areas may become apparent during clearing for construction. These should be avoided and buffered by an additional 10m.	DW, AW, NW, area of surface-water inundation		Medium	0	1	0	1	1	2	2	4	8	3	24	40%	9.6	L	Medium

Table 8.0.2 Risk Assessment Matrix for CONSTRUCTION PHASE (1)

Phase	Activity	Sensitivity	Layer 1 Effect Magnitude (1 to 2)	Mitigation measures	Potentially affected watercourses		Intensity of Impact on Resource Quality										Overall Intensity (max = 10)	Biodiversity (max = 5)	Geological (max = 5)	Cultural (max = 5)	Socio-economic (max = 5)	Cumulative (max = 10)	Consequences (max = 10)	Likelihood (max = 10)	Significance (max = 10)	Risk Rating	Control/avoid								
					Surface	FWS	Channel (stream/river)	Abiotic Habitat (Drivers)				Biotic (Responses)		Overall Intensity (max = 10)	Biodiversity (max = 5)	Geological (max = 5)												Cultural (max = 5)	Socio-economic (max = 5)	Cumulative (max = 10)	Consequences (max = 10)	Likelihood (max = 10)	Significance (max = 10)	Risk Rating	Control/avoid
								Hydrology	Water Quality	Geomorph	Vegetation	Fauna	Flora																						
CONSTRUCTION	+11 Clearing of the site for roads, temporary areas and buildings	+1a) Removal and loss of indigenous vegetation: exposure of soil surfaces (potential for degradation of riparian zones, physical habitat) and water quality of all surface waters	1.2	+1a) Adopt the recommended buffer zones for which are set out in the Environmental Management Plan (EMP). Artificial wetlands (AW) (dry), Non-Perennial Wetlands (NPW) (dry). These buffer zones are to be clearly demarcated with a PVC lining for erosion control. These boundaries represent NO GO zones for any construction activities plant and labour.	Day	8	Medium	0	2	1	1	1	1	4	2	3	3	3	9	3	27	80%	16.2	1	Low										
				An Alien Invasive Plant (AIP) clearing and management plan within the disturbed area and buffer zones is also required for the Construction Phase. All AIPs should be removed and debris treated following nationally recommended AIP clearing guidelines. This must be done under the supervision of a qualified person with AIP management experience. AIPs to be cleared manually within buffer zones, and with a 1.5m outside of buffer zones.	AW	0	Medium	0	2	1	1	1	1	4	2	3	3	3	9	3	27	80%	16.2	1	Low										
					NPW	0	Medium	0	2	1	1	1	1	4	2	3	3	3	9	3	27	80%	16.2	1	Low										
	+11 Clearing of the site for roads, temporary areas and buildings	+1b) Potential for runoff over cleared surfaces during rainfall events, resulting in erosion of exposed surfaces and sedimentation of water resources	1.3	+1b) Adopted buffer zones as discussed. Limit vegetation clearance to the construction footprint. Protect all cleared riparian buffer zones using appropriate erosion control measures such as geotextiles, jute mats and rip-rap. Stockpiles of cleared material, soil and other material - 50m from the disturbed buffer zone, is plus less than 1.5m in height. These should be covered and the covers secured during windy or rainy periods and monitored for the appearance of erosion channels. Stormwater management should be put in place and maintained during the construction phase. Should any erosion channels become evident there must be a suitable, continuous and re-vegetated as soon as possible. The artificial wetlands (AW) should not be used as a water source for construction purposes. If this is absolutely necessary, a single access road should be cleared on the side of the wetland (AW) access, with a clear demarcation and buffer zone 15m from the water's edge. No vehicles or plant should enter 15m of the dam. The northern bank of the dam, which is currently exposed and eroded, will be covered with rock rip-rap to prevent further erosion. Ideally rip-rap will comprise a combination of irregular shaped rock, placed over gravel bedding and (at minimum) a 1mm filter in geotextile fabric under the rip-rap. Rip-rap should be sustainable. It is a species or if the filter or bedding material is inadequate, the sediment collected here will wash away, allowing the embankment material to erode. Note: The artificial wetland (AW) may be incorporated into the Memorial Park as a recreational feature in the future. Thus while the buffer zone around the surface water applies to construction activities, it is recognised that low water intertidal (such as a beach) may be subject to construction in the future. (13) Should areas of surface water (e.g. rivers, ponds, groundwater) be encountered during the site clearing or construction process, especially following rainfall events, these should be protected and buffered by a further 10m to protect both surface water resources and adjacent land waters. (14) A full water management plan is required to reduce the risk. Rip-rap surfaces should preferably be laid or, if available, particularly on the North East quadrant of the site, paved with permeable pavers which would be relatively porous. To reduce runoff from road surfaces, overhead and sub-surface, graded swales should be constructed alongside internal roads. These are an effective means of capturing and managing runoff. Some permeable flow installed can garden/permeable all lanes roads as an additional sustainable urban drainage system (SuDS) and aesthetic feature. When drains may be installed at regular intervals along the roads to encourage lateral drainage. When drain areas must be grassed or clad with gravel or rip-rap to minimise the threat of erosion. Stormwater can also be directed in the direction of the dam, via grassed or stone-lined channels (for filtration of sediment and contaminants).	All	0	Medium	1	2	1	1	1	1	4	2	5	11	3	3	3	33	80%	26.4	3	Medium										
					NW and external surface water	0	Medium	1	2	1	1	1	1	4	2	5	11	3	3	3	33	80%	26.4	3	Medium										

Table 8.0.3 Risk Assessment Matrix for CONSTRUCTION PHASE (2)

Phase	Activity	Impact	Layout in which this applies (1 or 2)	Mitigation measures	Potentially affected watercourses			Intensity of Impact on Resource Quality						Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 25)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (probability) of impact	Significance (max = 100)	Risk Rating	Confidence level	
					Name/s	PES	Overall Watercourse Importance	Abiotic Habitat (Drivers)			Biota (Responses)													
								Hydrology	Water Quality	Geomorph	Vegetation	Fauna												
CONSTRUCTION	<2> Construction activities including haulage, excavation, coating, cement / concrete mixing, refuelling of vehicles, washing of vehicles and construction areas, use of hazardous chemicals	<2a> Pollution of surface and groundwater as a direct or indirect result of cement-mixing or washoff of cement water	1,2	<2a> implement the NO GO feature of all prescribed buffer zones. Ready-mix concrete preferably be brought to site. No cement mixing or cement trucks to be within 50m of the demarcated NO GO buffer zones, including that of the dam. No washing of equipment, concrete trucks or any part thereof, on site. All construction staff must be trained to observe this measure, and fines should be imposed for non-adherence, henceforth.	DW	C	Moderate	0	1	0	0	3	6	3	2	11	3	33	40%	13.2	L	Medium		
					AW	C	Moderate	0	1	0	2	3	6	3	2	11	3	33	40%	13.2	L	Medium		
					NW	BC	Moderate	0	1	0	1	1	2	2	2	6	3	18	40%	7.2	L	Medium		
		<2b> Pollution of surface and groundwater as a direct or indirect result of contamination by hazardous chemicals or petrochemicals			<2b> implement the NO GO feature of all prescribed buffer zones. Apply best construction management practices regarding the storage of all hazardous substances, petrochemicals and other fuels, the refuelling of all plant and vehicles, and the washing of any vehicles. All hazardous substances and hazardous waste must be stored in impermeable structures placed in secondary impermeable bunded structures with a volume 110% the volume of the primary structure. No hazardous substances or waste matter should be placed less than 50m from the demarcated buffer area. An emergency response plan must be drawn up to deal with any hazardous spillages/accidental leakages. Spill kit and a drip tray should be kept on-site at all times during the construction phase. All chemical spill/leak/abandon facilities must be placed >50m from the demarcated NO GO zones, properly secured, and regularly serviced. Appropriate temporary stormwater management measures (slop-boards, silt fences) should be installed along runoff paths prior to clearing and kept in place during construction to capture possible sediment-laden or polluted stormwater.	DW	B	Moderate	1	1	0	2	2	4	3	2	9	3	27	40%	10.8	L	Medium	
						AW	D	Moderate	0	2	0	2	2	4	3	2	9	3	27	40%	10.8	L	Medium	
						NW	BC	Moderate	0	1	0	1	1	2	2	2	6	3	18	40%	7.2	L	Medium	

Table 8.0.4 Risk Assessment Matrix for OPERATIONAL PHASE (1)

Phase	Activity	Measure	Linked to which (SAC) objective (1) or 2?	Mitigation measures	Potentially affected watercourses			Intensity of Impact on Resource Quality										Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood of impact	Significance (max = 100)	Risk Rating	Confidence level
					Name(s)	VES	Overall Resource Vulnerability	Abiotic Habitat (Drivers)				Biotic (Responses)															
								Hydrology	Water Quality	Geomorph	Vegetation	Fauna															
OPERATIONAL	<1> Burials (particularly where bodies have been treated with formaldehyde)	<1a> Contamination of surface waters, on site or downstream (drainage/dumps). According to Dapinavar et al (2018) the sources of potential contamination typically include: (i) the actual decomposition of the corpse and the associated microbial contamination; (ii) the metals and organic compounds mobilised from the contaminated coffins and embalming processes, and (iii) nutrients from the landscaping. Surface waters on site and downstream are threatened if groundwater contamination occurs, and in other instances (e.g. when the hydrology of the site is influenced by the presence of multiple excavations, as discussed by Dapinavar et al 2018). See Specialist Report/Appendix 7. Impacts of Contamination on Water Resources - NOTE: the potential for Groundwater contamination is dealt with in the Geohydrology Report (AGES 2022)	1.2	<1a> Implement all buffer zones as exclusion zones for all operations, including for low-impact use of the artificial wetland (bank), as per the Aquatic Specialist Report. It is particularly important to ensure that the depositional wetland/dumping area and other steep areas which represent high groundwater levels, are adequately protected by these buffers. Fencing of buffer areas around the depositional wetland area has been recommended (AGES, 2022).	DW	0	Minor	1	4	0	3	4	8	5	5	18	3	54	60%	32.4	M	Low					
					AV	0	Minor	1	4	0	3	4	8	5	5	18	3	54	60%	32.4	M	Low					
					NW	0	Minor	2	4	0	3	4	8	5	5	18	3	54	60%	32.4	M	Low					
					DW	0	Minor	2	4	0	3	4	8	5	5	18	3	54	60%	32.4	M	Low					

Table 8.0.5 Risk Assessment Matrix for OPERATIONAL PHASE (2)

Phase	Activity	Impact	Layout to which this applies (1 or 2)	Mitigation measures	Potentially affected watercourses		Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Impairment rating (max = 5)	Consequence (max = 100)	Likelihood (probability of impact)	Significance (max = 180)	Risk Rating	Confidence level	
					Hermitry	PES	Direct watercourse importance	Abiotic Habitat (Drivers)			Biota (Responses)											
								Hydrology	Water Quality	Geomorph	Vegetation											Fauna
OPERATIONAL	<2> Excavation of graves in areas where there may be seasonal dysfunction (or perched groundwater) that has not yet been identified by studies	<2a> Waterlogging of graves; potential contamination of surface water. Dipenhar et al (2018) comment that the groundwater table can be affected by the so-called 'bucket effect', where graves serve as preferential infiltration zones for surface water due to their poorer compaction relative to the surrounding natural soils. Water can then flood the grave from where percolation is promoted to deeper subsurface. The authors point out that this can result in saturation of certain organic and microbial contaminants, while it may store and temporarily precipitate some salts and metals. Contaminants stored in the vadose zone may be flushed out to the groundwater table at later stages (e.g. following intense rainfall).	1,2	Waterlogging: In the event that a grave is excavated and, within hours to a day, becomes wet as a result of the inflow of groundwater, the gravesite should be closed, backfilled and flagged for observation, and another site excavated. The new site should be at least 10m further away from the first site, in a direction away from any other watercourse, or surface water. In this instance it is advised that a wetland specialist be appointed to map the area of inundation, which should then be included in the NO GO buffer zone. It should be established whether this is a widespread surface inundation or restricted to a small area. In the case of the former, this area should be buffered, and set aside as a no-go (particularly for excavation) or limited access area. Irrigation: It is advised that minimal irrigation for landscaping takes place. AGES (2022) state that 'Graves will likely create zones of preferential infiltration if somewhat depressed, or will likely increase erosion or runoff runoff if rounded. Optimal landscaping practices with minimal irrigation at low intensity will ensure that grass can grow without extensive mobilisation of possible contaminants'. Regarding planting on the site, it is recommended that only waterwise indigenous grasses and plants be considered, and that landscaping is done by a local landscaper with good experience of working with indigenous plants.	OW	B	Moderate	2	4	1	2	2	6	3	4	16	3	45	80%	27	L	Low
					RW	C	Moderate	2	4	1	2	2	8	3	4	16	3	45	80%	27	L	Low
					NW	B/C	Moderate	1	3	1	2	2	6	3	4	13	3	39	80%	23.4	L	Low
	<3> Stormwater runoff	<3a> Alteration of surface hydrology due to increased hardened surfaces, erosion of land surface and contamination and sedimentation of surface waters.		<3a> Stormwater management plan to ensure that surface runoff is diverted away from graves and roads, and that measures to encourage infiltration are adopted. See recommendations regarding Stormwater Management above and in the Specialist Report Recommendations.	DW	B	Moderate	3	2	2	2	2	6	3	4	13	3	39	80%	23.4	L	Medium
					AQ	C	Moderate	4	3	2	2	2	8	3	4	15	3	45	100%	45	M	Medium
					NW	B/C	Moderate	3	2	2	2	2	6	3	4	13	3	39	100%	39	M	Medium

8.3 SUMMARY OF IMPACTS

The identified activities, impacts and risk ratings are summarized in Table 8.6. The risks have been rated on the assumption that mitigation measures have been implemented.

Table 8.6 Summary of the risk rating of each impact identified, post-mitigation.

Phase	Activity	Impact	Risk Ratings			
			DW	AW	NPW	DSW
PRE-CONSTRUCTION (DESIGN)	<1> Revision of design to accommodate recommended buffer zones for aquatic resources.	<1> Minimisation of risk of impact to surface water ecosystems on, and downstream of, the study site.	L	L	L	
	<2> Realignment of road currently routed through depressional wetland and its buffer.	<2> Minimisation of risk of loss of depressional wetland habitat and functionality due to current routing of road through this ecosystem.	L			
	<3> Revision of locality of certain graveyard areas currently planned inside delineated or buffered surface waters.	<3> Minimisation of threat to wetland habitat and functionality, and to indigenous riparian zone species and riparian zone functionality.	L	L	L	
	<4> Zonation of Memorial Park into administrative and religious areas, grave areas, memorial areas, limited-access natural areas, and no-go areas.	<4> Maximisation of available space, provision of a more reflective and peaceful experience for visitors, minimisation of risk of contamination of on-site and downstream surface waters.	L	L	L	
CONSTRUCTION	<1> Clearing of the site for roads, cemetery areas and buildings.	<1a> Removal and loss of indigenous vegetation, exposure of soil surfaces, potential for degradation of riparian zones and aquatic habitat of all surface waters.	L	L	L	
		<1b> Potential for runoff over cleared surfaces during rainfall events, resulting in erosion of exposed surfaces and sedimentation of water resources.	L	L	L	
	<2> Construction activities including haulage, excavation, clearing, cement / concrete mixing, refuelling of vehicles, washing of vehicles and construction areas, spraying of concrete surfaces.	<2a> Pollution of surface and groundwater as a direct or indirect result of cement-mixing or washoff of cement water.	L	L	L	
		<2b> Pollution of surface and groundwater as a direct or indirect result of accidental spillages, poor storage, handling or disposal of hazardous substances or petrochemicals.	L	L	L	
OPERATIONAL	<1> Burials (particularly where bodies have been treated with formaldehyde)	<1a> Contamination of surface waters on site or downstream (largely farm dams). According to Dippenaar et al (2018) the sources of potential contamination typically include (i) the actual decomposition of the corpse and the associated microbial contamination, (ii) the metals and organic compounds mobilised from the ornamental coffins and embalming processes, and (iii) nutrients from the landscaping. Surface waters on site and downstream are threatened if groundwater contamination occurs, and in other instances (e.g. when the hydrology of the site is influenced by the presence of multiple excavations, as discussed by Dipennar et al. 2018). See Specialist Report Appendix 7: Impacts of Cemeteries on Water Resources). NOTE: the potential for Groundwater contamination is dealt with in the Geohydrology Report (AGES 2022)	M	M	M	M
	<2> Excavation of graves in areas where there may be seasonal inundation (or perched groundwater) that has not yet been identified by studies	<2a> Waterlogging of graves, potential contamination of surface water.	L	L	L	
	<3> Stormwater runoff	<3a> Alteration of surface hydrology due to increased hardened surfaces, erosion of land surface and contamination and sedimentation of surface waters.	L	M	M	
DW- Depressional Wetland, AW- Artificial Wetland (Dam), NW - Non-perennial watercourse, DSW (Downstream watercourses)						

9 RECOMMENDATIONS AND CONCLUSIONS

9.1 RECOMMENDATIONS

Based on the outcomes of the site visit and the risk assessment for the Site, the following recommendations are made. These are based largely on the mitigation measures proposed. It is recommended that all points included here are included in the event of project authorization, as Conditions of Authorisation.

General

- **Protection of surface water resources:** As the site occurs within the Amathole SWSA:SW, the surface water resources associated with the site should be treated as important. According to CSIR, all surface water SWSAs are located in high rainfall areas where baseflow is at least 1125 mm per annum, which is evidence of a strong link between groundwater and surface water. AGES (2022) also remark that the strategic value of the aquifer in the project area and surrounds is classified as important to very important, as it is a water source for both domestic and agricultural use, and the aquifer must be protected. The protection of surface waters (both on site, and downstream of the site) *by all means possible* is non-negotiable.

Design and Pre-construction

- **Site Zoning:** The site currently comprises the following areas or zones:
 - **BUILDINGS:** All buildings and parking areas (offices, chapel, ablutions, parking areas)
 - **GRAVE AREAS:** Over 7000 grave sites are planned on the eastern portion of the site
 - **MEMORIAL AREAS:** These are situated on the western portion of the site, and are assumed to be, in the main, memorial plaques for cremations.
 - **NO GO AREAS (Construction):** These comprise the buffer zones of the surface waters on site.

LIMITED ACCESS AREAS should be included on this list and should include areas where low-impact activities can take place during the operational phase, e.g. manual creation of paths and seating areas. The buffer zones of the artificial wetland (dam) and thicket, and the edges of the buffer zone of the watercourse and depressional wetland can be included as LIMITED ACCESS areas, but only during the operational phase.

It is recommended that the zonation and layout of the site be finalized once the revised design has been drafted and the Stormwater Management Plan is available. This zonation should be shown on the development plan for clarity.

- **Buffer Areas:** Delineated areas plus buffer areas should be accommodated in the final design, and associated guidelines must be adhered to during construction and operation. The buffers are: 20m for the depressional wetland, 20m for the non-perennial watercourse, and 15m for the artificial wetland (dam). The buffer on the thicket area is 3m in the northern and middle sections and 5m on the steep southern section. It is recommended that this buffer be treated in the same way as the aquatic ecosystem buffers, as the thicket protects the watercourse and downstream water resources from erosion and provides habitat corridor value within a terrestrial CBA2 area. All buffers are strictly NO GO areas for all construction activities and most operational activities, excluding the development of low-impact pathways and seating areas/areas for reflection, in the future. All roads and graves currently planned within these buffer zones should be excluded from the design.

During the operational phase, low-impact paths may be created within the artificial wetland buffer, around the periphery of the thicket zone, and at the edges of the buffer zones of the depressional wetland and watercourse. Strictly manual construction/installation methods are to be used.

- Monitoring:** A surface water monitoring plan is required together with the recommended groundwater monitoring plan (AGES 2022). Sampling sites should include the depressional wetland, the artificial wetland (dam), the non-perennial watercourse if wetted, and farm dams within 250m down-slope of the boundary of the site (there are three of these – one on the north side and two on the south). Sampling frequency should be biannual at a minimum, as close to groundwater sampling frequency and timing as possible. Sampling should commence pre-construction in order to establish baseline status. Variables tested for should be the same as those tested for in groundwater samples (see AGES 2022). An Emergency Response and Action Plan is required, in order to trigger an immediate and adequate response in the event that the concentration of any contaminant tested is found to have a concentration outside of the acceptable range.
- Groundwater levels:** As it is understood, the static groundwater level could not be determined at the time of the geohydrological investigation (AGES 2022), however trial pits that were dug in 2021 provided information on soil moisture levels and seepage. The trial pit data are valid for the end of a protracted drought period. Groundwater Specialists should advise if it may be necessary to repeat some of these tests during the current wet period. This may not be necessary if boreholes are installed on site. Any new finding that suggest that there is permanently or seasonally shallow groundwater (i.e. not meeting guideline values) in this area may materially affect the acceptable extent of area available for graves.
- Stormwater Management:** A Stormwater Management Plan is required and should inform the final design for the site. The plan should ensure that surface drainage is diverted away from graves, and where slopes allow, towards the artificial wetland (dam) and the non-perennial watercourse. Road surfaces should preferably be tarred or, if affordable, paved with permeable pavers which could be selectively planted. To reduce the risk of erosion due to runoff from road surfaces, grassed swales can be constructed alongside the interior roads. These are an effective means of capturing and managing runoff. Alternatively, miter drains may be installed at regular intervals along the roads to encourage lateral drainage. Miter drain areas must be grassed or clad with gravel or riprap to minimise the threat of erosion. Areas of low slope (e.g. the most north-eastern portion of the site where slopes are less than the guideline minimum of 2°, AGES 2022) and potential seasonal inundation or perched groundwater must be subject to formal drainage, due to the increased risk of waterlogging of graves and/or contamination of both ground and surface waters in these areas. Graves should be orientated with long axis parallel to the natural surface contours to prevent surface erosion.
- Water supply:** Water is required for drinking, for washing, and for irrigation. Drinking water will reportedly be provided from rainwater tanks. The plans for water supply for other purposes must be clarified and submitted. The depressional wetland should not be used as a water source for the development.
- Sanitation:** A Sanitation Management Plan should be submitted pre-construction. Conservancy tanks are likely to be installed. In the event that more than one conservancy tank per hectare is to be installed, a full water use licence application must be applied for.

Construction

- **Construction water supply:** The artificial wetland (dam) should not be used as a water source for construction purposes. If absolutely necessary, a single access road should be cleared on the site of the current dam access, with a clear turn-around area further than 15m from the water's edge. No vehicles or plant to be within 15m of the dam.
- **Clearing of Vegetation:** Limit vegetation clearance to the construction footprint. Protect all cleared exposed surfaces using appropriate erosion control measures such as geofabrics, silt fences and stop-boards. Stockpile the cleared vegetation, soil and other material > 20m from the outer edge of the demarcated buffer zones, in piles less than 1.5m in height. Stockpiled soil should be covered and secured during windy or rainy periods.
- **Cement Mixing:** All cement mixing to take place inside the construction camp or demarcated area, sited outside of the recommended buffer zones. Ready-mix concrete to be brought to site. No cement mixing or cement trucks to be within 20m of the demarcated buffer zones, and no cement or concrete to be in the vicinity of the artificial wetland (dam) or near any natural surface water. No washing of equipment, concrete trucks or any part thereof, on site. All construction staff must be trained to observe this measure, and fines should be imposed for non-adherence.
- **Seasonally wet areas:** It is important to note that some seasonally wet areas (pooled or trickling surface water) may only become apparent during clearing for construction, or even during operations. These areas should be avoided, and excluded from construction and operational activities, particularly any form of excavation. These areas should be delineated by a wetland specialist, and buffered with an additional 10+m around their periphery.

Operations

- **Irrigation:** It is recommended that minimal irrigation for landscaping takes place. AGES (2022) state that 'Graves will likely cause zones of preferential infiltration if somewhat depressed, or will likely increase erosion or obstruct runoff if mounded. Optimal landscaping practices with minimal irrigation at low intensity will ensure that grass can grow without extensive mobilisation of possible contaminants.' Regarding planting on the site, it is recommended that only waterwise indigenous grasses and plants be considered, and that landscaping is done by a qualified local landscaper with good experience of the use of Eastern Cape indigenous plants in landscaping or rehabilitation.
- **Wetland drainage:** The depressional wetland (DW) may previously have been intentionally drained via a channel, to supply water to a neighbouring farmer (F. de Jager, pers. comm. 2025). This could not be verified on site, nor in discussion with the relevant farmer (A. Scheun, pers. comm. 2025), nor with historic aerial imagery. It is possible that the 'channel' referred to was a fenceline-related excavation. However, in the event that the wetland was indeed drained in this way, it is possible that in the absence of this drainage, the water level will rise and overtop the depressional wetland border, and a natural channel or drainage line will form as a runoff path. In this instance, it is advised that this resultant natural drainage line is protected with a buffer of 10m, and that graves are excluded from this area to avoid the threat of waterlogging. The channel should not be excavated or diverted to supply surface water to the dam, as it is a feature of the wetland system (assessed as a Category B system). Ideally the issue of historic drainage of this wetland should be clarified, and the extent of inundation of this wetland area should be monitored for as long as possible prior to clearing and construction.

- **Alien Invasive Vegetation (AIV) Management.** An AIV management programme is required for the site. In particular, AIV should be cleared from all buffer zones, and appropriate indigenous species planted in their place. All AIV management should be done with the guidance and supervision of an experienced individual with a proven track record in AIV management.

9.2 CONCLUSION

The development of the proposed Memorial Park is assessed as posing a moderate risk to the quality and usability of surface waters on site and downstream surface waters within 250m of the site. The threat is largely in the instance that groundwater contamination occurs as a result of construction activities or decomposition of buried human bodies. The moderate risk is a low-confidence assessment. The groundwater-surface water linkages are not well understood, particularly in the case of a cemetery where excavations can affect the normal flow paths. Groundwater specialists should be consulted as to whether or not further investigations are advised, as the last set of trial pits were dug at the end of a protracted drought (2021). East London is currently (April 2025) experiencing abnormally high rainfall and a very wet period, which is likely to influence groundwater levels.

All other impacts associated with the construction and operation of the site are assessed as low risk if the relevant recommendations are implemented. The preferred site layout is Option 2, which is a modification of Option 1 based on the recommendations of specialist reports during 2021/2022.

This study concludes that the development should be authorized, with conditions of the approval to include all recommendations presented here. These, turn, enact the mitigation measures.

10. REFERENCES

AGES 2022. Ducats private cemetery. Geohydrological Assessment. Technical Report No. 3033/06/11/GENV. Prepared for CapeVest Investments.

Booth, C. 2022, A phase 1 archaeological impact assessment (AIA) for the proposed memorial park and private cemetery on on portion 50 of Farm 821, East London, Buffalo City Metropolitan Municipality, Eastern Cape Province.

Council for Geoscience. General guidelines: Geological investigations for cemetery sites. Published by the Council of GeoScience. Cited in AGES, 2022.

CSIR. Strategic Water Source Areas of South Africa. Source: <https://www.csir.co.za/strategic-water-source-areas-south-africa>

Department of Water Affairs, 2013. National Water Resource Strategy (NWRS): Water for an Equitable and Sustainable Future. Department of Water Affairs (DWA), Pretoria.

Department of Agriculture, Forestry and Fisheries. ECBCP Aquatic Critical Biodiversity Areas 2007 [vector geospatial dataset] 2007. Available from the Biodiversity GIS website, downloaded on Wednesday, March 19, 2025

Department of Water and Sanitation (DWS). 2014. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reach for Secondary Catchments in South Africa. Secondary: R3. Compiled by RQIS-RDM.

Dippenaar, M.A., Olivier, J., Lorentz, S., Ubomba-Jaswa, E., Abia, Akebe L.K, Diamond, R. 2018. Environmental Risk Assessment, Monitoring and Management of Cemeteries. WRC Report No. 2449/1/18 ISBN 978-1-4312-0978-1

Duthie, A. 1999. Appendix W4: IER (Floodplain wetlands): Present Ecological Status (PES) Method. In: DWAF; Resource Directed Measures for Protection of Water Resources; Volume 4: Wetland Ecosystems; Version 1.0. Department of Water Affairs and Forestry, Pretoria, pp. W4/1-W4/6.

DWAF (DWS) 2008. Updated Manual for the Identification and Delineation of Wetlands and Riparian Areas, prepared by M. Rountree, A. L. Batchelor, J. MacKenzie and D. Hoare. Department of Water Affairs and Forestry. Sub-Directorate: Stream Flow Reduction Activities.

Eastern Cape Department: Economic Development, Environmental Affairs and Tourism. 2019 Eastern Cape Biodiversity Conservation Plan Freshwater [Vector] 2020. Available from the Biodiversity GIS website, downloaded on Thursday, March 20, 2025

Gess. 2022. Palaeontological impact assessment for Beacon Bay Memorial Park. Report prepared for Indwe Consulting cc.

Indwe Environmental Consulting (Compiler) 2025. Screening report for environmental authorisations – proposed site environmental sensitivity. Proposed Memorial Park and Cemetery, Ptn 50 of Farm 821, East London, Eastern Cape.

Kleynhans, C.J., Thirion, C and Moolman, J. 2005. A Level I River Ecoregion classification System for South Africa, Lesotho and Swaziland. Report No. N/0000/00/REQ0104. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria, South Africa.

Macfarlane, D.M. and Bredin, I.P. 2016. Buffer zone guidelines for rivers, wetlands and estuaries. Part 1: Technical Manual. WRC Report No (tbc), Water Research Commission, Pretoria.

Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L., and Nienaber, S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas Project. WRC Report No. 1801/2/11.

Nel, J.L., Le Maitre, D.C., Roux, D.J., Colvin, C., Smith, J.S., Smith Adao, L.B., Maherry, A, and Sitas, N. 2017. Strategic water source areas for urban water security: Making the connection between protecting ecosystems and benefiting from their services. *Ecosystem Services* Vol 28(Part B), pp 251-259.

Macfarlane, D.M. and Bredin, I.P. 2016a. Buffer zone guidelines for rivers, wetlands and estuaries. Part 1: Technical Manual. WRC Report No (tbc), Water Research Commission, Pretoria.

Macfarlane, D.M. and Bredin, I.P. 2016b. Buffer zone guidelines for rivers, wetlands and estuaries. Part 2: Practical Guide. WRC Report No (tbc), Water Research Commission, Pretoria.

Ollis, D.J. and Malan, H.L. 2014. Development of Decision-Support Tools for Assessment of Wetland Present Ecological Status (PES). Final Report: Volume 1. Review of available methods for the assessment of the ecological condition of wetlands in South Africa. WRC TT 608/14 Report. Water Research Commission, Pretoria.

Ollis, D.J., Day, J.A. Malan, H.L., Ewart-Smith, J.L. and Job, N.M. 2014. Development of Decision-Support Tools for Assessment of Wetland Present Ecological Status (PES) Vol 2: Development of a Decision-Support Framework for Wetland Assessment in South Africa and a Decision-Support Protocol for the Rapid Assessment of Wetland Ecological Condition. Report to the Water Research Commission. WRC Report No. TT 609/14.

Smith, J. 2022. Proposed Private Cemetery and Memorial Park on Portion 50 of Farm 821, East London, Eastern Cape Province. Baseline aquatic and wetland assessment. Report prepared for Indwe Environmental Consulting.

South African Local Government Association (SALGA) 2016. Good practices in cemeteries management: Building local government capacity in cemetery management.

Statistics South Africa (Stats SA). 2023. Natural Capital Series 3: Accounts for Strategic Water Source Areas, 1990 to 2020. Discussion document D0401.3. Produced in collaboration with the South African National Biodiversity Institute and the Department of Forestry, Fisheries and the Environment. Statistics South Africa, Pretoria.

Van Deventer, H., Smith-Adao, L., Mbona, N., Petersen, C., Skowno, A., Collins, N.B., Grenfell, M., Job, N., Lötter, M., Ollis, D., Scherman, P., Sieben, E. & Snaddon, K. 2018. South African National Biodiversity Assessment 2018: Technical Report. Volume 2a: South African Inventory of Inland Aquatic Ecosystems (SAIIAE). Version 3, final released on 3 October 2019. Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI): Pretoria, South Africa.

Report Number: CSIR report number CSIR/NRE/ECOS/IR/2018/0001/A; SANBI report number <http://hdl.handle.net/20.500.12143/5847>.

11. APPENDIX 1: SPECIALIST CVS & STATEMENTS OF INDEPENDENCE

Abbreviated Curriculum Vitae: Amanda (Mandy) Uys 2025

Summary

Mandy Uys is a PhD Aquatic Scientist, certified to practise in South Africa as a Professional Natural Scientist. She has over 25 years experience in her field. She trained as a freshwater ecologist with a focus on riverine ecology, biomonitoring, and resource management, and leads or joins teams in a wide variety of aquatic ecosystem projects (Environmental Impact Assessments, Environmental Reserve Determinations, Specialist Aquatic Assessments, Management Plans, River restoration planning, etc). Her current key interest and research field is aquatic ecosystem restoration. She is currently on a team that is writing a series of river restoration guidelines for SA Rivers. Mandy is the Sole Proprietor of Laughing Waters & Associates in East London, providing scientific consulting, research and media services related to aquatic environments. She is an open-water swimmer and Director of Swim for Rivers, a South African Public Benefit Organisation focussed on raising awareness of the state of rivers in South Africa, and on water provision to rural communities in the Eastern Cape. She is also a founding director of the Gonubie Estuary and Marine Community (GEM), established with a view to assisting with maintenance, management and protection of the estuary and ocean in this area.

Details

Address	12 Bluegum Ave, Gonubie 5257, East London, SA
Contact	(+27) 082 3369838
Email	laughingh2o@icon.co.za
Date of Birth	June 9 1963
Languages	English, Afrikaans, partial French
Marital Status	Married, one child
Qualifications	
Ph.D. (Freshwater Ecology)	Rhodes University, Grahamstown, 1998
B.Sc. Honours (Zoology)	University of Natal, Pietermaritzburg, 1987
B.Sc. (Zoology & Geography)	University of Cape Town, 1984

Current Positions

Sole Proprietor	Laughing Waters & Associates
Director	Swim for Rivers PBO; GEM Community NPC7
Trustee	Buffalo City Environmental Trust
Freelance Journalist	Various publications

Certification and Training

Registered Professional Services Provider	Accredited as an Aquatic Scientist by SA Council for Natural Sciences Professions (SACNASP No 400130/12)
Associate Editor 2020	African Journal for Aquatic Science
SASS5 Practitioner	Re-certified 2023
Wetlands Management & Evaluation	University of Pretoria 2005
GIS Certificate Course	GIMS, Pretoria, 2003
Publishing Short Course	Cape Technikon, 1989
Competent Crew Course	Buffalo River Sailing Club 2017

Work History

- Sole Proprietor, Laughing Waters & Associates, 1998 to Present.
- Visiting (Honorary) Fellow: Cooperative Research Centre for Hydrology, Melbourne University. With Prof Ian Rutherford (River Rehabilitation studies). 2000.
- PhD Student: Institute for Water Research, Rhodes University, Grahamstown. SA. 1993-1997.

Ph.D. entitled 'The Ecology of Temporary Rivers in the Eastern Cape'. Awarded in 1998.

- Photojournalist and Subeditor: Daily Dispatch Newspaper, East London, SA. 1990 – 1992. News reporter, investigative reporting, sub-editing.
- Editor (Academic and General Titles): Oxford University Press, Cape Town, SA. 1988 – 1990.
- Game Ranger: Mabula Game Lodge. 1985.

Skills and Project Experience

- Project Management
- Aquatic Ecosystem Rewilding and Restoration Planning
- Aquatic Specialist Studies for Environmental Impact Assessments, Ecosystem rehabilitation planning, Environmental Management Plans, Strategic Environmental Assessments etc. (Project Leader and Technical Team Member)
- Environmental Flow Requirement Studies (Ecological Reserve Determinations; specialist scientist)
- R&D into aquatic ecosystems
- Aquatic ecosystem assessment and monitoring
- Risk assessment (wetlands and rivers)
- Ecoclassification – Present Ecological State, Ecological Importance and Sensitivity (river)
- Inputs to regional biodiversity plans
- Biological monitoring (development of programmes, technical monitoring, data assessment)
- Invertebrate assessment and monitoring (SASS5 /MIRAI methods)
- Development of training manuals and material
- Training and facilitation
- Development of Protected Area Management Plans
- Voluntary assistance with case-related research for Environmental Attorneys

Clients and Funders

- Liz Day Consulting, Cape Town
- Water Research Commission, Pretoria
- Streamflow Solutions, East London
- Indwe Environmental, East London
- Scherman Environmental, Grahamstown
- Coastal and Environmental Services (CES) East London
- Amatola Water, East London
- Fieldwork, East London
- Source to Sea Environmental, Pretoria
- DMA (Investment company), Johannesburg

CURRICULUM VITAE: JAMES MACKENZIE

- 1 **Proposed Position:** Riparian & Wetland Specialist **Contact:** bioriver@outlook.co.za
 2 **Name of Firm:** MacKenzie Ecological Services CC +27-(0)82-927-3362
 3 **Family Name:** MacKenzie
 4 **First Names:** James Alexander
 5 **Profession:** Ecologist: Riparian and Wetland Specialist
 6 **Date of Birth:** 28 April 1968
 7 **Nationality:** South African
 8 **Place of Residence:** Johannesburg, South Africa
 9 **Civil Status:** Married
 10 **Education:**

Institution (Date from - Date to)	Degree(s) or Diploma(s) obtained:
1992: University of the Witwatersrand (Wits)	B.Sc. Degree (Botany & Zoology)
1993: Wits	B.Sc. (Hons.) Majored in Plant Ecology
1994 - 1995: Wits	M.Sc. (Riparian Ecology) (upgraded, not completed)
1996 - 2002: Wits	Converted M.Sc. to PhD (PhD now in abeyance)

11 **Language Skills:**

Language	Reading	Speaking	Writing
English	Mother Tongue		
Afrikaans	Excellent	Excellent	Excellent

12 **Membership of Professional Associations:**

Member of the South African Wetland Society (membership No.: 1015096)

13 **Other skills:**

Microsoft Office (full suite): Professional user
 Hydrological and hydraulic modelling software (participant)
 GIS and other mapping software
 VBasic

14 **Present Position:**

Director (sole Member of CC)

15 **Years within the Firm:**

25 years

16 **Key qualifications:**

Seven (7) years as a research ecologist at the Centre for Water in the Environment while conducting postgraduate studies at the University of the Witwatersrand, Johannesburg, South Africa. Research was interdisciplinary and resulted in the development of rule-based models as management tools for decision support, concerning the rivers of the Kruger National Park. Monitoring programmes were designed to support models and provide data for their ongoing use and refinement. Protocols for using management goal audits in decision making and transferring rule-based modelling techniques were produced. Skills developed included the conduction of detailed and rapid research, writing reports, proposals and scientific communications, personal communication skills, computer and programming proficiency, the ability to work in a team of specialists from different disciplines, project management and exposure to natural resource management.

Since 2000, experience has been gained in riparian and wetland specialist work including vegetation & wetland surveys, including Present Ecological State (PES), wetland and riparian delineation (with contribution to the riparian delineation methodology manual, adopted by DWS, South Africa), determination of Environmental Flow Requirements (BBM, DRIFT, ProbFlo), assessment of Ecological Importance and Sensitivity, assessment of Habitat Integrity, including wetland integrity and health, wetland offset calculations and management planning strategies, the development of monitoring protocols and programmes (e.g. RHAM), the development and definition of management goals for Strategic Adaptive Management (Ecological Specifications and

Thresholds of Probable Concern), the development of Flow Stressor Response techniques for hydrological scenario assessment, the development of VEGRAI (Riparian Vegetation Response Assessment Index – a tool developed for the assessment of PES of riparian zones and now endorsed and used by the South African Department of Water & Sanitation), and presentation of VEGRAI training courses to multiple benefactors, and multiple participations in EIA's with focus on the riparian and wetland component of specialist aquatic surveys.

1 Specific experience in the region:

Country	Date from - Date to
South Africa	2000 to date
Guinea	2017 - 2018 ^d
Mali	2017 - 2018 ^d
Loas, Cambodia, Thailand, Viet Nam	2016 - 2017
Lesotho	2010; 2013 – 2017
Mozambique	2005 - 2006; 2006-2007
Namibia	2010; 2012; 2018
Botswana	2010-2012
Zambia	2009; 2013
Swaziland	2006-2007
Kenya, Tanzania	2015-2016
Nile River Basin Countries: Egypt, Sudan, South Sudan, Ethiopia, Uganda, Kenya, Rwanda, Burundi, Tanzania, DRC	2019-2020 ^d

^d - desktop study only, no site visit

2 Relevant / Recent Professional Experience:

REGION	NAME OF PROJECT	CLIENT	DATES	ROLE IN PROJECT
Incomati Catchment, South Africa, Swaziland and Mozambique	RISK FRAMEWORK FOR MULTIPLE STRESSORS AND INTEGRATED SUSTAINABILITY MANAGEMENT OF THE TRANS-BOUNDARY WATER RESOURCES OF THE INCOMATI BASIN, SOUTHERN AFRICA.	Rivers of Life at The University of Mpumalanga for the Water Research Commission.	2022 – 2024	Riparian and wetland vegetation specialist; ecosystems services contributor, Risk analysis contributor, E-flow determination
The Keiskamma and Fish to Tsitsikamma catchments within the Mzimvubu to Tsitsikamma Water Management Area (WMA7)	Determination of Water Resource Classes, Reserve and the Resource Quality Objectives in the Keiskamma and Fish to Tsitsikamma Catchments. Project No. WP11354	GROUNDTRUTH CC	2022 – 2025	Riparian specialist Vegetation

Usuthu Mhlathuze Water Management Area, South Africa	CLASSIFICATION OF SIGNIFICANT WATER RESOURCES AND DETERMINATION OF RESOURCE QUALITY OBJECTIVES FOR WATER RESOURCE IN THE USUTU TO MHLATHUZE CATCHMENTS. Project number WP 11387	Scherman Environmental	2022 – 2024	Wetland and riparian vegetation components:
Limpopo River Basin, South Africa	THE DETERMINATION OF WATER RESOURCE CLASSES, RESERVE AND RESOURCE QUALITY OBJECTIVES STUDY FOR SECONDARY CATCHMENTS A5-A9 WITHIN THE LIMPOPO WATER MANAGEMENT AREA (WMA 1) AND SECONDARY CATCHMENT B9 IN THE OLIFANTS WATER MANAGEMENT AREA (WMA 2) PROJECT WP:11352	Myra Consulting (PTY) Ltd	2021 – 2024	Wetland and riparian vegetation components:
Limpopo Basin	E-flows for the Limpopo River Basin - building more resilient communities and ecosystems through improved management of transboundary natural resources	International Water Management Institute (IWMI)	2020 / 2022	Conduct a literature review of the Limpopo Basin; a detailed riparian zone assessment; set Environmental flow requirements for riparian component and determine the ecological effects of scenarios with contribution to ProbFlo.

Mzimvubu Catchment; SA	Determination of Ecological Water Requirements for Surface Water (River, Estuaries And Wetlands) and Groundwater in the Mzimvubu Catchment	Rivers for Africa, eFlows: DWS	2016 / 2017	Wetland and Riparian specialist. Determination of ecostatus, importance, flow requirements and RQOs for rivers and wetlands
Lower Orange River Catchment; SA	Determination of Ecological Water Requirements for Surface Water (River, Estuaries And Wetlands) and Groundwater in the Lower Orange WMA	Rivers for Africa, eFlows: DWS	2015 / 2017	Wetland and Riparian specialist. Determination of ecostatus, importance, flow requirements and RQOs for rivers and wetlands

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications and my experience.



Date: 15 April 2025

James MacKenzie

10.1 DECLARATION OF INDEPENDENCE: AMANDA UYS


DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of 6 January 2021.

PROJECT TITLE

PROPOSED MEMORIAL PARK AND PRIVATE CEMETERY ON PTN 50 FARM 821, BCMM, EASTERN CAPE
--

SPECIALIST ¹	AMANDA UYS		
Contact person:	AMANDA UYS		
Postal address:	NA		
Postal code:	NA	Cell:	082 3369838
Telephone:	082 3369838	Fax:	
E-mail:	Laughingh2o@icon.co.za		
Professional affiliation(s) (if any)	SACNASP, SASAQS, SOCIETY FOR ECOLOGICAL RESTORATION		

Project Consultant:	Indwe Environmental Consulting cc		
Contact person:	Megan Hugo (Registered EAP- EAPASA Reg No. 2019/1530)		
Postal address:	2 Ayr Place, Bonnie Doon, East London		
		Cell:	082 259 3981
Postal code:	5241		
Telephone:	043 555 0656	Fax:	086 513 9734
E-mail:	megan@indwecon.co.za		

4.2 The SPECIALIST

I **AMANDA UYS**, declare that –

General declaration:

- I act as the independent Specialist in this application
- 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 environmental impact assessments, 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 will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- 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;

~~interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;~~

- ~~I will keep a register of all interested and affected parties that participated in a public participation process; and~~
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.
- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~



Signature of the environmental assessment practitioner.

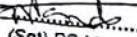
LAUGHING WATERS AQUATIC AND ENVIRONMENTAL CONSULTING

Name of company:

16.04.2025

Date:

Signature of the Commissioner of Oaths:


 7189286-9
 (Sgt) BS Mtanda

Date:

SEKSEANT

Designation:

¹ Curriculum Vitae (CV) attached

Official stamp (below).

SOUTH AFRICAN POLICE SERVICE
VISPOL COMMANDER
2025 -04- 17
GONUBIE
EASTERN CAPE PROVINCE

10.3 JAMES MACKENZIE STATEMENT OF INDEPENDENCE



DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of 6 January 2021.

PROJECT TITLE

PROPOSED MEMORIAL PARK AND PRIVATE CEMETERY ON PTN 50 FARM 821, BCMM, EASTERN CAPE			
SPECIALIST ¹	Riparian and wetland specialist		
Contact person:	James MacKenzie		
Postal address:	Postnet Suite 538, Northriding		
Postal code:	2162	Cell:	0829273362
Telephone:		Fax:	
E-mail:			
Professional affiliation(s) (if any)			

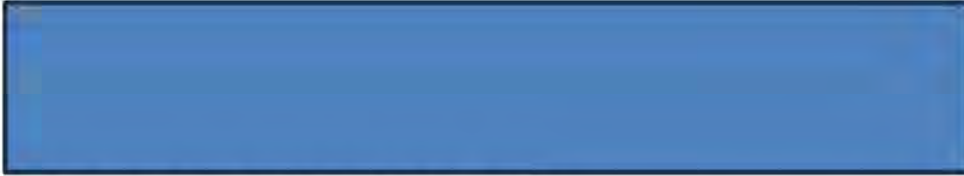
Project Consultant:	Indwe Environmental Consulting cc	
Contact person:	Megan Hugo (Registered EAP- EAPASA Reg No. 2019/1530)	
Postal address:	2 Ayr Place, Bonnie Doon, East London	
	Cell:	082 259 3981
Postal code:	5241	
Telephone:	043 555 0656	Fax:
E-mail:	megan@indwecon.co.za	086 513 9734

4.2 The SPECIALIST

I, **James MacKenzie**, declare that –

General declaration:

- I act as the independent Specialist in this application
- 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 environmental impact assessments, 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 will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;



- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended.

Signature of the environmental assessment practitioner:

A handwritten signature in black ink, appearing to be 'M. Langton'.

Name of company:

Mackenzie Ecological & Developmental Services CC

Date: 17 April 2025

Signature of the Commissioner of Oaths:

Date: 17 April 2025

Commissioner of Oaths

Designation:

¹ Curriculum Vitae (CV) attached

Official stamp (below).

A handwritten signature in black ink, appearing to be 'Lesley Langton'.

Lesley Langton
Commissioner of Oaths
Admitted Attorney
37 Conrad Road, Florida North 1709

12. APPENDIX 2. DESCRIPTION OF THE VEGETATION UNIT

South Eastern Coastal Thornveld vegetation unit

Distribution:

This vegetation type occurs in the Eastern Cape province, along the south-eastern seaboard of the Eastern Cape, from the Gamtoos River in the west to the Kei River in the east, typically within 15 - 20 km of the coast (up to 35 km in some areas).

Vegetation & Landscape Features:

Occurs in gently to moderately undulating landscapes and dissected hilltop slopes close to the coast. Short grassland (*Cynodon dactylon*, *Digitaria* spp., *Eragrostis* spp., *Themeda triandra*) with scattered bush clumps, dominated by small trees and woody shrubs, and with emergent *Euphorbia triangularis* occasional. Solitary *Vachellia karoo* trees are also common.

Geology and Soils:

Occurs on the Nanaga, Middleton and Balfour Formations. The main land types are Fa, Db and Ae.

Climate:

Non-seasonal rainfall dominates the region, with MAP between 485 mm and 1118 mm. Frost is present approximately 3 days per year. The mean monthly maximum is 26.20 °C in February and the mean monthly minimum is 8.34 °C in July. Altitude ranges from 0 – 541 masl.

Important Taxa:

(d=dominant, e=South African endemic, et=possibly endemic to a vegetation type)

- Small tree: *Vachellia karoo* (d), *Brachylaena elliptica* (e), *Canthium spinosum*, *Cussonia spicata*, *Ficus sur*, *Ochna arborea*, *Sideroxylon inerme*, *Zanthoxylum capense*
- Succulent herb: *Plectranthus verticillatus* (d), *Crassula pellucida* subsp. *marginalis* (e)
- Succulent tree: *Euphorbia triangularis*
- Geophytic herb: *Cheilanthes hirta*, *Moraea pallida*, *Oxalis smithiana*, *Sansevieria hyacinthoides*
- Herb: *Chamaecrista mimosoides* (d), *Abutilon sonneratianum*, *Acalypha ecklonii* (e), *Centella asiatica*, *Commelina africana*, *Cynoglossum hispidum*, *Eriosema squarrosum*, *Lactuca inermis*, *Lobelia erinus*, *Monsonia emarginata* (e), *Phyllopodium cuneifolium* (e), *Senecio burchellii* (e), *Sonchus dregeanus*, *Strelitzia reginae*
- Low shrub: *Rhynchosia ciliata* (d, e), *Carissa bispinosa*, *Chrysocoma ciliata*, *Dyschoriste setigera* (e), *Helichrysum asperum*, *Pelargonium alchemilloides*, *Phyllanthus maderaspatensis*, *Selago corymbosa* (e), *Senecio pterophorus*, *Tephrosia capensis*
- Graminoid: *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Dactyloctenium australe* (d), *Digitaria natalensis* (d), *Ehrharta calycina* (d), *Eragrostis capensis* (d), *Eragrostis curvula* (d), *Eragrostis plana* (d), *Heteropogon contortus* (d), *Panicum deustum* (d), *Panicum maximum* (d), *Setaria sphacelata* (d), *Sporobolus africanus* (d), *Themeda triandra* (d), *Tristachya leucothrix* (d), *Cymbopogon marginatus*, *Ehrharta erecta*, *Elionurus muticus*, *Melica racemosa*, *Setaria megaphylla*, *Trachypogon spicatus*
- Tall shrub: *Clausena anisata*, *Volkameria glabra*, *Coddia rudis*, *Croton rivularis* (e), *Diospyros villosa*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Hippobromus pauciflorus*, *Myroxylon aethiopicum*, *Pavetta lanceolata*, *Psydrax obovata*, *Pterocelastrus tricuspidatus* (e), *Scutia myrtina*, *Searsia lucida* (e), *Tarchonanthus littoralis* (e), *Turraea obtusifolia*
- Woody succulent climber: *Cynanchum viminalis*
- Herbaceous climber: *Rhynchosia caribaea*, *Rhynchosia totta*, *Thunbergia capensis* (e), *Pilogyne scabra*
- Woody climber: *Asparagus aethiopicus*, *Capparis sepiaria* var. *citrifolia*, *Clematis brachiata*, *Rhoicarpus capensis*, *Rhoicissus digitata*, *Rhoicissus tridentata*, *Secamone alpini*, *Tecomaria capensis*
- Tall tree: *Ekebergia capensis*, *Erythrina caffra*

Conservation: Least Concern

Conservation Target: 19 %

Conserved in Addo Elephant National Park, Indalo Protected Environment

Area transformed: 39.24 %

Threat activities: Cultivation, plantations, bush encroachment, urban sprawl, altered fire regime,

Erosion: low to medium

Protection Level: Poorly protected

Remarks: The region in which this unit occurs is a mosaic of several different structural vegetation types, ranging from grasslands to forest, and is a result of post-disturbance succession gradients as well as natural variation in geology, soil patterns and distribution of water in the landscape. It is likely that the current vegetation mosaic typical of the South-Eastern Coastal Thornveld is anthropogenic and that the original (pre-settlement) vegetation was dominated by nonseasonal, dense thicket. The area of this unit was prime agricultural land which attracted early settlers who, presumably, cleared the vegetation for pastures (Hoare et al. 2006).

References: Vlok, J.H.J. and Euston-Brown, D.I.W. 2002.

13 APPENDIX 3: PES AND EIS CATEGORY DESCRIPTIONS

Table 13.1 Descriptive categories used to describe the present ecological status (PES) of biotic components (adapted from Kleynhans 1999)

CATEGORY	BIOTIC INTEGRITY	DESCRIPTION OF GENERALLY EXPECTED CONDITIONS
A	Excellent	Unmodified, or approximates natural conditions closely. The biotic assemblages compares to that expected under natural, unperturbed conditions.
B	Good	Largely natural with few modifications. A change in community characteristics may have taken place but species richness and presence of intolerant species indicate little modifications. Most aspects of the biotic assemblage as expected under natural unperturbed conditions.
C	Fair	Moderately modified. A lower than expected species richness and presence of most intolerant species. Most of the characteristics of the biotic assemblages have been moderately modified from its naturally expected condition. Some impairment of health may be evident at the lower end of this class.
D	Poor	Largely modified. A clearly lower than expected species richness and absence or much lowered presence of intolerant and moderately intolerant species. Most characteristics of the biotic assemblages have been largely modified from its naturally expected condition. Impairment of health may become evident at the lower end of this class.
E	Very Poor	Seriously modified. A strikingly lower than expected species richness and general absence of intolerant and moderately tolerant species. Most of the characteristics of the biotic assemblages have been seriously modified from its naturally expected condition. Impairment of health may become very evident.
F	Critical	Critically modified. Extremely lowered species richness and an absence of intolerant and moderately tolerant species. Only tolerant species may be present with complete loss of species at the lower end of the class. Most of the characteristics of the biotic assemblages have been critically modified from its naturally expected conditions. Impairment of health generally very evident.

Table 13.2 *Ecological importance and sensitivity (EIS) categories (Kleynhans 1999)*

EIS CATEGORIES	GENERAL DESCRIPTION
VERY HIGH	Quaternaries/delineations that are unique on a national or even international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.
HIGH	Quaternaries/delineations that are unique on a national scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases, may have a substantial capacity for use.
MODERATE	Quaternaries/delineations that are unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually not very sensitive to flow modifications and often have a substantial capacity for use.
LOW/MARGINAL	Quaternaries/delineations that are not unique at any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have a substantial capacity for use.

14 APPENDIX 4. REVISION OF DEPRESSIONAL WETLAND PES

RDM 1999 Scoresheet with criteria for assessing habitat integrity of 'Palustrine Wetlands'

Criteria	Relevance	Score	Confidence
Hydrological	COMPARE results with [List of Hydrological Impacts] and/or [WET-Health (Level 1) Hydrology module]		
Flow modification	Consequence of abstraction, regulation by impoundments or increased runoff from human settlements or agricultural land. Changes in flow regime (timing, duration, frequency), volumes, velocity which affect inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.	2	2
Permanent inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.	5	2
Water quality	COMPARE results with [List of Water Quality Impacts] and/or [Landuse/WQ spreadsheet] and/or [Wetland-IHI Water Quality module]		
Water quality modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland	4.5	2
Sediment load modification	Consequence of reduction due to entrapment by impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and change in habitats.	4	2
Hydraulic / Geomorphological	COMPARE results with [List of Geomorphological Impacts]		
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.	2	2
Topographic alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities which reduces or changes wetland habitat directly or through changes in inundation patterns.	5	2
Biota	COMPARE results with [List of Vegetation Alteration Impacts] and/or [WET-Health (Level 1) Vegetation module] and/or [Wetland-IHI Vegetation Alteration module]		
Terrestrial encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.	4	2
Indigenous vegetation removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.	3.5	2
Invasive plant encroachment	Affect habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).	1	3
Alien fauna	Presence of alien fauna affecting faunal community structure.	5	2
Overutilisation of biota	Overgrazing, over-fishing, etc.	4	2
MEAN SCORE		3.6	2.1
MINIMUM SCORE		1	
Overall PES% Score (without "override")		73%	
Overall PES Category (without "override")		B	

15 APPENDIX 5. DATA FOR SITE-BASED BUFFER DETERMINATION TOOL (DEPRESSIONAL WETLAND)
(MACFARLANE 2016)

SITE-BASED TOOL: DETERMINATION OF BUFFER ZONE REQUIREMENTS FOR WETLAND ECOSYSTEMS			
Note: For further guidance on the application of this tool, users should refer to the guideline for the determination of buffer zones. It is also important to note that buffer widths calculated by the model only cater for impacts associated with diffuse-source surface runoff. Additional mitigation measures should therefore be defined to cater for other potential impacts. Finally, please note that this buffer zone tool has been designed to be completed sequentially for a single site - users must therefore use a new template for each assessment rather than "breaking" previous assessments.			
Name of Assessor	James MacKenzie	Project Details	Memorial Park Cemetery
		Date of Assessment	2025/04/10
Step 1: Define objectives and scope of assessment and determine the most appropriate level of assessment			
Level of assessment	Site-based		
Step 2: Map and categorize water resources in the study area			
Approach used to delineate the wetland boundary?	Site-based delineation	Wetland type	Depression
Step 3: Refer to the DWA management objectives for mapped water resources or develop surrogate objectives			
Present Ecological State	B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	
Ecological importance & sensitivity	Medium	Features that are considered to be ecologically important and sensitive at a local scale. The functioning and/or biodiversity of these features is not usually sensitive to anthropogenic disturbances. They typically play a small role in providing ecological services at the local scale.	
Management Objective	Maintain		
Step 4: Assess the risks from proposed developments and define mitigation measures necessary for protecting mapped water resources in the study area			
Assess threats of planned activities on water resources and determine desktop buffer requirements			
Proposed development / activity	Sector	Civic and Social	This category includes buildings and land associated with public and private service providers and administrative/government functions including education, health, pension offices, museums, libraries, correctional facilities and community halls.
	Sub-Sector	Cemetery	Land used for public and private cemeteries, memorial parks, funeral chapel and crematoria.

Climatic factors		MAP Class		Rainfall Intensity	
		301 - 1000mm		Zone 4	
Threat Posed by the proposed land use / activity		Desktop Threat Rating	Specialist Threat Rating	Justification for changes in threat ratings	
Construction Phase	1. Alteration to flow volumes	NA	NA		
	2. Alteration of patterns of flows (increased flood peaks)	NA	NA		
	3. Increase in sediment inputs & turbidity	NA	NA		
	4. Increased nutrient inputs	NA	NA		
	5. Inputs of toxic organic contaminants	NA	NA		
	6. Inputs of toxic heavy metal contaminants	LC	LC		
	7. Alteration of acidity (pH)	NA	NA		
	8. Increased inputs of salts (salinization)	NA	NA		
	9. Change (elevation) of water temperature	NA	NA		
	10. Pathogen inputs (i.e. disease-causing organisms)	NA	NA		
Operational Phase	1. Alteration to flow volumes	NA	NA		
	2. Alteration of patterns of flows (increased flood peaks)	LC	LC		
	3. Increase in sediment inputs & turbidity	LC	LC		
	4. Increased nutrient inputs	LC	LC		
	5. Inputs of toxic organic contaminants	NA	NA		
	6. Inputs of toxic heavy metal contaminants	NA	NA		
	7. Alteration of acidity (pH)	NA	NA		
	8. Increased inputs of salts (salinization)	NA	NA		
	9. Change (elevation) of water temperature	NA	NA		
	10. Pathogen inputs (i.e. disease-causing organisms)	LC	LC		

Assess the sensitivity of water resources to threats posed by lateral land-use impacts

Overall size	Size of the wetland relative to (as a percentage of) its catchment	Average slope of the wetland's catchment	The inherent runoff potential of the soil in the wetland's catchment	The extent to which the wetland (HGM) setting is generally characterized by sub-surface water input
0.5-5 ha	Small (<10%)	>3%	Low (<6 A/P)	High phyllocladus swamps
Perimeter to area ratio	Vulnerability of the HGM type to sediment accumulation	Vulnerability of the wetland to erosion given the wetland's slope and size	Extent of open water in relation to the extent of the HGM unit	Sensitivity of the vegetation to burial under sediment
Intermediate (1200m x 800 m per ha)	Disturbance - endophytic, flat	Modestly low (Vulnerability Score 2)	Very low (<0.5%)	Low (e.g. tall grasses & fast colonizing)
Peat / high organic content versus mineral soils	Inherent level of nutrients in the landscape	Sensitivity of the vegetation to increased availability of nutrients	Sensitivity of the vegetation to toxic inputs, changes in acidity & salinization	Natural wetness regimes
High organic content	Modest to low status	Intermediate (e.g. short vegetation with moderate natural grass diversity)	Modestly low	Mix of low diversity and vulnerability grassland types
Natural salinity levels	Level of domestic, livestock and contact/recreational use	Mean Annual Temperature	Note: See the Technical Manual for further information on the rationale for indicator selection and how these attributes affect the sensitivity of wetlands to lateral inputs.	
Non Saline (<20 mS/m)	Low	Zone 4 (18.7 - 19.5 deg C)		

Assess the sensitivity of important biodiversity elements to threats posed by lateral land-use impacts

Threat Posed by the proposed land use / activity		Sensitivity		Site-Based Risk Class	Justification for increasing the sensitivity to cater for any important biodiversity elements including special habitats and species of conservation concern.
		Water Resource	Biodiversity		
Construction Phase	1. Alteration to flow volumes	M	L	MS	
	2. Alteration of patterns of flows (increased flood peaks)	H	MS	MS	
	3. Increase in sediment inputs & turbidity	M	MS	MS	
	4. Increased nutrient inputs	M	MS	MS	
	5. Inputs of toxic organic contaminants	H	L	MS	
	6. Inputs of toxic heavy metal contaminants	H	L	L	
	7. Alteration of acidity (pH)	M	MS	N/A	
	8. Increased inputs of salts (salinization)	M	MS	N/A	
	9. Change (elevation) of water temperature	M	MS	MS	
	10. Pathogenic insects (i.e. disease-causing organisms)	M	MS	MS	
Operational Phase	1. Alteration to flow volumes	M	L	MS	
	2. Alteration of patterns of flows (increased flood peaks)	H	MS	L	
	3. Increase in sediment inputs & turbidity	M	L	L	
	4. Increased nutrient inputs	M	MS	L	
	5. Inputs of toxic organic contaminants	H	L	MS	
	6. Inputs of toxic heavy metal contaminants	H	L	MS	
	7. Alteration of acidity (pH)	M	MS	N/A	
	8. Increased inputs of salts (salinization)	M	MS	MS	
	9. Change (elevation) of water temperature	M	MS	MS	
	10. Pathogenic insects (i.e. disease-causing organisms)	M	MS	L	

Refine desktop buffer requirements based on site-based investigations

Buffer attributes	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Slope of the buffer	Very Gentle (0 - 2%)			
Vegetation characteristics (Construction phase)	Good, Moderately robust vegetation with good interception potential (e.g. good condition tufted grass stands).			
Vegetation characteristics (Operational phase)	Good, Moderately robust vegetation with good interception potential (e.g. good condition tufted grass stands).			
Soil permeability	Moderate: Deep moderately textured soils (e.g. sandy loams), DR shallow (<40cm) less drained soils.			
Micro-topography of the buffer zone	Concentrated flow paths dominate. Area of topography dominated by concentrated flow paths (i.e. depression, erosion gullies, drains).			
Site-based aquatic impact buffer requirements (without additional mitigation measures)				
Construction Phase	15	Not Assessed	Not Assessed	Not Assessed
Operational Phase	15	Not Assessed	Not Assessed	Not Assessed

Where appropriate, identify additional mitigation measures and refine aquatic impact buffer width accordingly

Threat Posed by the proposed land use / activity		Specialist Threat Rating	Description of any additional mitigation measures	Refined Threat Class	Specialist justification for refined threat ratings with clear reference to supporting documentation
Construction Phase	1. Alteration to flow volumes	Low			
	2. Alteration of patterns of flows (increased flood peaks)	Low			
	3. Increase in sediment inputs & turbidity	Low			
	4. Increased nutrient inputs	Low			
	5. Impacts of toxic/organic contaminants	Low			
	6. Impacts of toxic heavy metal contaminants	Low			
	7. Alteration of acidity (pH)	N/A			
	8. Increased inputs of salts (salinisation)	N/A			
	9. Change (elevation) of water temperature	Low			
	10. Pathogen inputs (i.e. faecal coliform organisms)	Low			
Operational Phase	1. Alteration to flow volumes	Low			
	2. Alteration of patterns of flows (increased flood peaks)	Low			
	3. Increase in sediment inputs & turbidity	Low			
	4. Increased nutrient inputs	Low			
	5. Impacts of toxic/organic contaminants	Low			
	6. Impacts of toxic heavy metal contaminants	Low			
	7. Alteration of acidity (pH)	Low			
	8. Increased inputs of salts (salinisation)	Low			
	9. Change (elevation) of water temperature	Low			
	10. Pathogen inputs (i.e. faecal coliform organisms)	Low			
			Describe mitigation measures	Low	No plant or machinery in buffer zone; no paths near roadways
			Describe mitigation measures	Low	No excavation within wetland not buffer

	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Revised aquatic impact buffer requirements (including additional mitigation measures)				
Construction Phase	15	Not Assessed	Not Assessed	Not Assessed
Operational Phase	15	Not Assessed	Not Assessed	Not Assessed

Additional mitigation measures to consider		Y/N	Comments
Have additional mitigation measures been identified to cater for any point-source discharges?		Y	buffer zone to be treated as a no-go zone
Have additional mitigation measures been identified to cater for potential groundwater impacts?		Y	Predictive mitigation i.e. borehole monitoring of water quality

Where necessary review and refine aquatic impact buffer requirements to cater for practical management considerations

	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Final aquatic impact buffer requirements (including practical management considerations)				
Construction Phase	15	Not Assessed	Not Assessed	Not Assessed
Operational Phase	15	Not Assessed	Not Assessed	Not Assessed
Final aquatic impact buffer requirement	15	Not Assessed	Not Assessed	Not Assessed
Rationale for any increases in final buffer requirements	The exact extent of lateral seepage connectivity remains uncertain, thus an increase in buffer width to 20m is proposed.			

Step 5: Assess risks posed by proposed development on biodiversity and identify management zones for biodiversity protection

Key aspects to be considered	Y/N	Comments
Have important biodiversity elements been flagged for specific consideration?	N	
Has a survey been undertaken to verify occurrence and to establish the need to cater for these in development planning?	Y	

Has recreational use values been considered and been accounted for?	N/A	
---	-----	--

Step 7: Document management measures necessary to maintain the effectiveness of the final buffer zone areas

Relevant management measures should feed into the licensing recommendations and conditions in the WULA and Environmental Management Programme.

Key management considerations	Y/N	Comments
Has consideration been given to the demarcation of buffer zone areas?	Y	
Have management measures necessary to maintain the functioning of buffer zone areas been defined?	Y	
Have buffer management requirements been tailored to account for biodiversity protection?	N	
Has specific consideration been given to integration of social imperatives including access and use of buffer zones and how such use will be managed?	Y	
Have management measures to ensure the continued functioning of additional mitigation measures been defined?	Y	

Step 8: Monitor implementation and review effectiveness

Successful implementation will require regular monitoring of implementation to ensure that mitigation measures are effective. As such, it is important that monitoring requirements are clearly defined.

Monitoring requirements	Y/N	Comments
Have construction-phase monitoring requirement for buffer zones been defined?	N	
Have operational-phase monitoring requirements for buffer zones been defined?	Y	

Reference: Macfarlane, D.M., 2016. Site-based tool for the determination of buffer zone requirements for wetland ecosystems. Version 2.0. Prepared for the Water Research Commission, Pretoria.

Version No: 2.0
 Date: 30/12/2016

16. APPENDIX 6. IMPACT ASSESSMENT METHODS

16.1 IMPACT ASSESSMENT METHOD 1 (APPLICATION TO DEDEAT/DFFE)

INTRODUCTION

The purpose of this method is to qualitatively determine the significance of potential environmental impacts that could occur as a result of a proposed project and its related aspects and activities. Each potential impact is rated both without, and with, mitigation. For this method, the significance of an impact is defined as a combination of the consequence of the impact occurring and the probability that the impact will occur.

METHOD

The IA method used is described below. The Tables with descriptions of each rating follow overleaf.

Ranking Impact Criteria

Each potential environmental impact was ranked according to specific criteria, namely Extent, Intensity/Severity, and Duration. Each criterion was assigned a qualitative rating and corresponding score.

Determining Consequence

The combined scores from the Impact Criteria were added and allocated to a Consequence Rating.

Deriving Probability

The probability of the potential impact occurring was subjectively derived from a probability classification table.

Deriving Impact Significance

The Significance of each potential impact was determined by considering the Consequence and Probability of the impact and assigning a Significance rating from the table below.

Impact Status

The status of each potential environmental impact was subjectively ranked, as Positive (+ve), Negative (-ve) or Neutral (N).

Degree of Confidence

The degree of confidence of the Specialist in ranking and predicting potential impacts based on available information and experience was ranked (low, medium, high).

Other Considerations

Other aspects that were taken into consideration were:

- Impacts were described before and after proposed mitigation and management measures were implemented;
- All impacts were evaluated over their full life cycle for the proposed development including construction and operational phases and
- The impact evaluation took into account the cumulative effects of other activities which have occurred or are in the process of occurring within the study.

RATING	DEFINITION OF RATING FOR EACH CRITERIA	ALLOCATED SCORE
EXTENT - <i>The area over which the impact will be experienced</i>		
Local	Confined to project or study area or part thereof i.e. site.	1
Regional	The region, which may be defined in various ways i.e. cadastral, catchment, topographic.	2
(Inter) National	Nationally or beyond.	3

INTENSITY/SEVERITY - <i>The magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources.</i>		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered.	1
Medium	Site- specific and wider natural and/or social functions and processes continue albeit in a modified manner.	2
High	Site- specific and wider natural and/or social functions and processes are severely altered or permanently cease.	3

DURATION - <i>The timeframe over which the impact will be experienced.</i>		
Short- term	Up to 2 years	1
Medium- term	2 to 15 years	2
Long- term	More than 15 years	3

CONSEQUENCE RATING		
Combined Score (A+B+C)	Consequence Rating	
1 to 3	Very Low	
4	Low	
5 to 6	Medium	
7	High	
8 to 9	Very High	

PROBABILITY- <i>The likelihood of the impact occurring</i>	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

SIGNIFICANCE OF POTENTIAL IMPACT		
POSSIBLE IMPACT COMBINATIONS		
CONSEQUENCE	PROBABILITY	SIGNIFICANCE RATING
Very Low	Possible	INSIGNIFICANT
Very Low	Improbable	
Very Low	Definite	VERY LOW
Very Low	Probable	
Low	Possible	
Low	Improbable	
Low	Definite	LOW
Low	Probable	
Medium	Possible	
Medium	Improbable	
Medium	Definite	MEDIUM
Medium	Probable	
High	Possible	
High	Improbable	
High	Definite	HIGH
High	Probable	
Very High	Possible	
Very High	Improbable	
Very High	Definite	VERY HIGH
Very High	Probable	

STATUS OF POTENTIAL IMPACT	
Positive (+ve)	Indicates whether impact is positive (a benefit)
Negative (-ve)	Indicates whether impact is negative (a cost)
Neutral (N)	Indicates whether impact has no positive or negative impact

CONFIDENCE OF PRACTITIONER	
Degree of confidence is based on available information and experience of EAP	Low
	Medium
	High

16.2 IMPACT ASSESSMENT METHOD 2

Ranking criteria applied in the DWS Risk Assessment Matrix, Vs. 2.1.

TABLE 1 – ECOLOGICAL IMPORTANCE OF AFFECTED WATERCOURSE/S

What is the ecological importance of the watercourse/s, based on the criteria and guidelines provided below?*

Low EIS; OESAs; presence of species/habitats of Least Concern on the IUCN Red List or on a regional/national Red List and/or species which are common and widespread and/or habitats of low conservation interest	Low = 2
Medium EIS; ESAs; presence of species/habitats listed as VU or NT on the IUCN Red List; or listed as VU or NT on a regional/national Red List	Moderate = 3
High EIS; CBA2; presence of species/habitats listed as EN or CR on the IUCN Red List; or listed as EN or CR on a regional/national Red List	High = 4
Very high EIS; CBA1, NFEPA; presence of species/habitats listed as EN or CR on the IUCN Red List; or listed as EN or CR on a regional/national Red List; KBA or IBAs	Very high = 5

* EIS=Ecological Importance and Sensitivity; OESA=Other Ecological Support Areas; IUCN=International Union for Conservation of Nature; ESA=Ecological Support Areas; VU=Vulnerable; NT=Near Threatened; EN=Endangered; CR=Critically Endangered; CBA=Critical Biodiversity Area; NFEPA=National Freshwater Priority Area; KBA=Key Biodiversity Area; IBA=Important Bird Area.

TABLE 2- INTENSITY OF IMPACT

What is the intensity of the impact on the resource quality (hydrology, water quality, geomorphology, biota)?

Negative Impacts	
Negligible / non-harmful; no change in PES	0
Very low / potentially harmful; negligible deterioration in PES (<5% change)	+1
Low / slightly harmful; minor deterioration in PES (<10% change)	+2
Medium / moderately harmful; moderate deterioration in PES (>10% change)	+3
High / severely harmful; large deterioration in PES (by one class or more)	+4
Very high / critically harmful; critical deterioration in PES (to E/F or F class)	+5
Positive Impacts	
Negligible; no change in PES	0
Very low / potentially beneficial; negligible improvement in PES (<5% change)	-1
Low / slightly beneficial; minor improvement in PES (<10% change)	-2
Medium / moderately beneficial; moderate improvement in PES (>10% change)	-3
Highly beneficial; large improvement in PES (by one class or more) and/or increase in protection status	-4
Very highly beneficial; improvement to near-natural state (A or A/B class) and/or major increase in protection status	-5

NOTE: Positive Impacts must be given a negative Intensity Score

***PES of affected watercourses must be considered when scoring Impact Intensity**

TABLE 3 – SPATIAL SCALE (EXTENT) OF IMPACT

How big is the area that the activity is impacting on, relative to the size of the impacted watercourses?

Very small portion of watercourse/s impacted (<10% of extent)	1
Moderate portion of watercourse/s impacted (10-60% of extent)	2
Large portion of watercourse/s impacted (60-80%)	3
Most or all of watercourse/s impacted (>80%)	4
Impacts extend into watercourses located well beyond the footprint of the activities	5

TABLE 4 – DURATION OF IMPACT

How long does the activity impact on the resource quality?

Transient (One day to one month)	1
Short-term (a few months to 5 years) OR repeated infrequently (e.g. annually) for one day to one month	2
Medium-term (5 – 15 years)	3
Long-term (ceases with operational life)	4
Permanent	5

TABLE 5 – LIKELIHOOD OF THE IMPACT

What is the probability that the activity will impact on the resource quality?

Improbable / Unlikely	20%
Low probability	40%
Medium probability	60%
Highly probable	80%
Definite / Unknown	100%

TABLE 6: RISK RATING CLASSES

RATING	CLASS	MANAGEMENT DESCRIPTION
1 – 29	(L) Low Risk OR (+) Positive (+ +) Highly positive	Acceptable as is or with proposed mitigation measures. Impact to watercourses and resource quality small and easily mitigated, or positive.
30 – 60	(M) Moderate Risk	Risk and impact on watercourses are notable and require mitigation measures on a higher level, which costs more and require specialist input. Licence required.
61 – 100	(H) High Risk	Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve. Licence required.

A low risk class must be obtained for all activities to be considered for a GA

TABLE 7: CALCULATIONS AND MAXIMUM VALUES

Intensity = Maximum Intensity Score (negative value for positive impact)	MAX = 5
Severity = Intensity + Spatial Scale + Duration (<Intensity - Spatial Scale - Duration> for positive impact)	MAX = 15 (MIN = -15 for +ve impacts)
Consequence = Severity X Importance rating	MAX = 75
Significance/Risk = (Consequence X Likelihood) X (100/75)	MAX = 100

RISK ASSESSMENT **MUST BE CONDUCTED BY A SACNASP REGISTERED PROFESSIONAL MEMBER** AND THE ASSESSOR MUST:

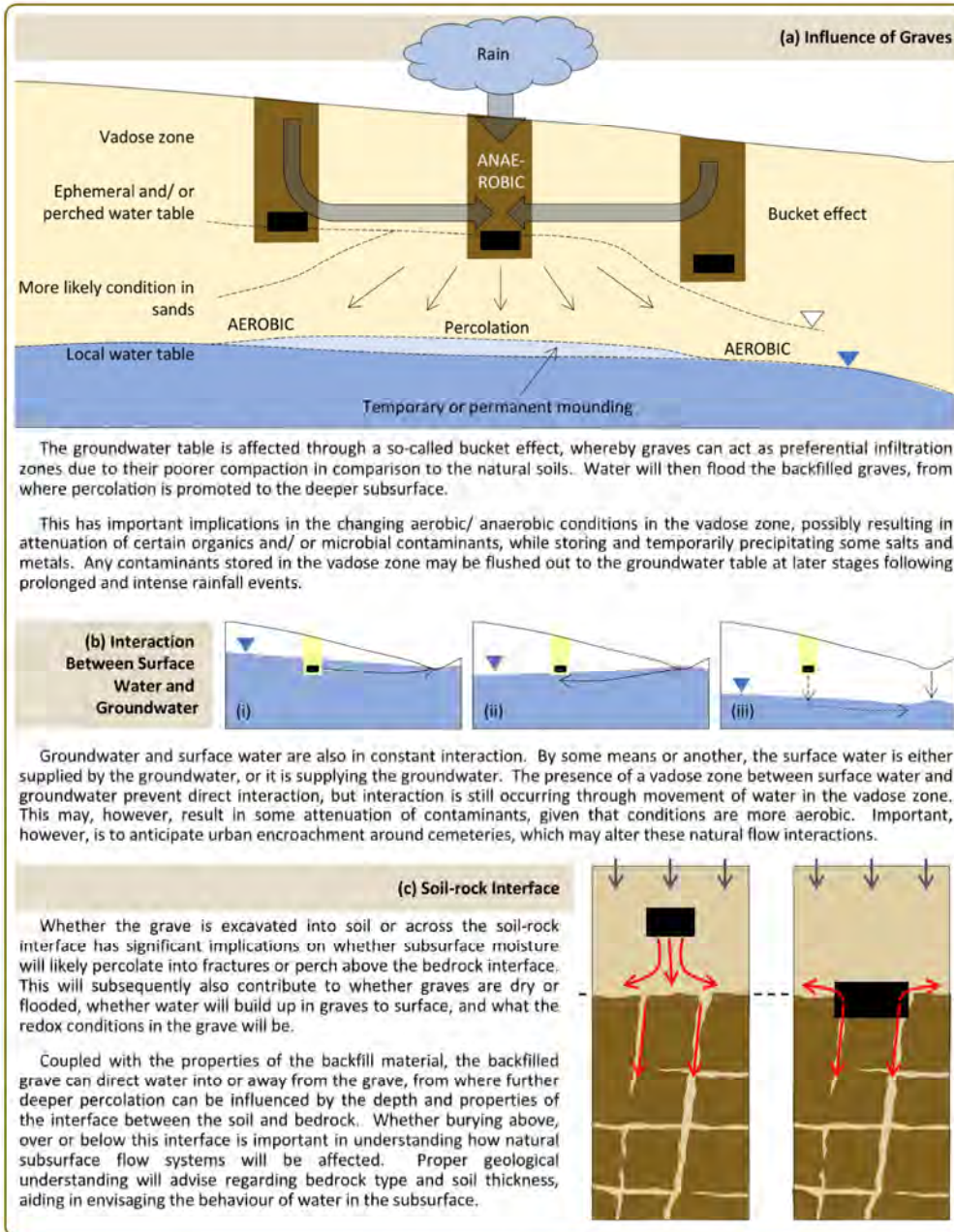
- 1) CONSIDER ALL THE RELEVANT PHASES OF PROPOSED ACTIVITIES (CONSTRUCTION AND OPERATIONAL PHASES, AS A MINIMUM);
- 2) CONSIDER RISKS TO RESOURCE QUALITY WITH THE PROPOSED CONTROL MEASURES (AS SPECIFIED) ASSUMED TO BE IN PLACE;
- 3) CONSIDER THE PRESENT ECOLOGICAL STATUS (PES) AND ECOLOGICAL IMPORTANCE & SENSITIVITY (EIS) OF THE WATERCOURSE AS RECEPTOR OF RISKS POSED;
- 4) RATE POSITIVE IMPACTS/RISKS REDUCTION USING NEGATIVE IMPACT INTENSITY SCORES IN THE RISK ASSESSMENT MATRIX;
- 5) INDICATE CONFIDENCE LEVEL OF SCORES PROVIDED IN THE LAST COLUMN AS A CATEGORY (LOW / MEDIUM / HIGH).

ON THE EXCEL SPREADSHEETS, ROWS THAT ARE NOT NEEDED CAN BE DELETED AND ADDITIONAL ROWS CAN BE ADDED IF REQUIRED

17. **APPENDIX 7. IMPACTS OF CEMETERIES; GUIDELINES; CONTAMINANTS
(EXTRACTS FROM DIPPENNAAR ET AL. 2018)**

BOX

5. IMPACTS OF CEMETERIES ON WATER RESOURCES

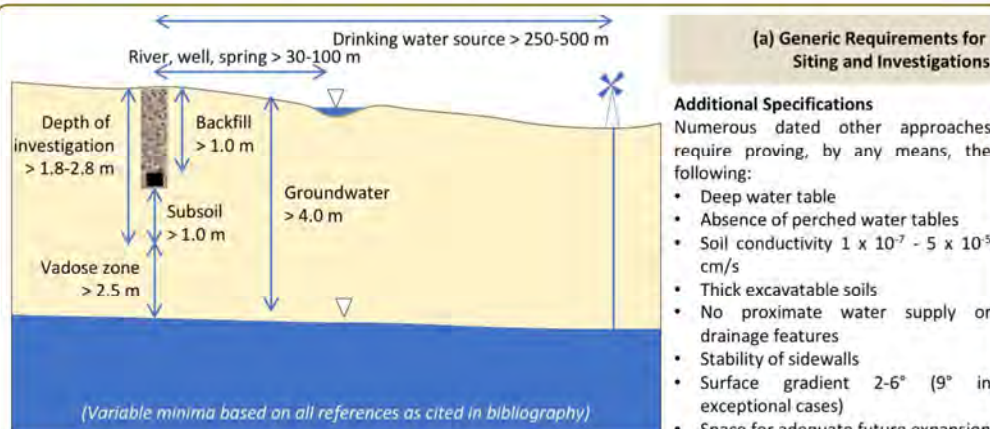


READ MORE: (a) Dent and Knight 1998; (a),(b) Dippenaar et al. 2014; Dippenaar 2014; (c) this document, Brouwers
ADAPTED FROM: 2017; Brouwers and Dippenaar 2018

GUIDELINES APPROPRIATE TO CEMETERY DEVELOPMENTS IN SOUTH AFRICA

Source: Dippenaar et al., 2018.

BOX

11. GENERIC MINIMUM REQUIREMENTS FOR CEMETERIES**(b) Standard Rating Scores (Hall and Hanbury 1990)**

Engineering Geological/ Geotechnical	Excavatability	Assessment	Score
Excavatability ease to 1.80 m	Easy spade	Geological pick pushed in 50 mm with ease	15
	Pick and spade	Geological pick causes slight indentation	10
	Machine	Firm blows with pick cause 1 - 3 mm indentations	5
	Blasting	Backactor refusal	0
Stability sidewalls stable for prolonged periods	Stability	Assessment	Score
	Stable	Little overbreak with safe excavation profiling	20
	Overbreak	Overbreak between 1.3 and 1.8 m	15
	Slightly unstable	Minor falls of material	8
Workability material to be used as compacted backfill	Unstable	Collapse of excavation likely	1
	Workability	Unified	MOD AASHTO
	Excellent to good	GW, SW, GP	> 1 800 kg/m ³
	Fair	SP, SM	< 1 800 kg/m ³
Sanitary/ Environmental/ Hydrogeological	Poor	OL, CL, ML	< 1 700 kg/m ³
	Very poor	OH, CH, MH	< 1 500 kg/m ³
	Water Table	Water Table Depth (m)	Score
	Deep water table	> 8	25
Water table thickness of protective vadose zone	Intermediate water table	4 - 8	5
	Possible perched water	0 - 4	5
	Waterlogged soil	0 - 4	Fail
Subsoil permeability preventing ponding and rapid infiltration	Subsoil Permeability	Percolation Rate	Approx. Permeability
	Impermeable	Not measurable	< 10 ⁻⁷ m/s
	Relatively impermeable	10 - 15 mm/h	10 ⁻⁶ - 10 ⁻⁷ m/s
	Relatively permeable	15 - 50 mm/h	10 ⁻⁵ - 10 ⁻⁶ m/s
Backfill permeability preventing ponding and rapid infiltration	Permeable	50 - 1 000 mm/h	< 10 ⁻⁵ m/s
	Backfill Permeability	Unified Class	Score
	Impermeable	OH, CL, CH	5
	Relatively impermeable	GC, SC, MH	10
Final Ranking	Suitability	Backfill Permeability	Score
	> 90	Impermeable	OH, CL, CH
	75 - 90	Relatively impermeable	GC, SC, MH
	60 - 75	Relatively permeable	GP, SP, GW
	< 60	Very permeable	SW, SP

READ MORE: (a) Croucamp and Richards 2002; Dent and Knight 1998; Dippenaar 2014; EA 2004; Engelbrecht 2000; Fisher 1992; Fisher 1994; Fisher and Croucamp 1993; Hall and Hanbury 1990; NIEA 2012; WHO 1996; Young et al. 2002; (b) Hall and Hanbury 1990

A GRAPHIC ILLUSTRATING COMMON CONTAMINANTS FROM CEMETERIES

Source: Dippennaar et al., 2018.

BOX

7. CONTAMINATION FROM CEMETERIES

(a) Typical Contaminants and their Sources

Cemeteries pose different types of contaminants that include not only the decomposition of the body itself, but also all chemicals used in the embalming processes and coffins, metals from the ornamental hinges on coffins and jewellery, and other nutrients and pathogens sourced from poor sanitary practices or landscaping.

Approximately 0.4-0.6 litres of leachate is produced per kilogram of body mass. With a high density of roughly 1.23 kg/l, it has a high electrical conductivity, pH and biochemical oxygen demand.

Apart from the decomposition of the body itself, additional contaminants can include:

M	Metals	Ti, Cr, Cd, Pb, Fe, Mn, Ni, Zn, As
N	Nutrients	NO ₃ , PO ₄ , Cl, salts of Ca, Na, K, Mg
O	Organics	formaldehyde, methanol
P	Pathogens	bacteria, viruses, microorganisms, fungi

These are typically sourced from:

- Chemical substances such as those used in chemotherapy or the embalming processes (including arsenic, formaldehyde and methanol)
- Makeup such as cosmetics, pigments and other chemical compounds
- Other items such as cardiac pacemakers, paints, varnishes, metal hardware, chemicals from batteries and dentures
- Microorganisms such as bacteria, viruses, intestinal fungi, protozoa and other pathogens.

(b) Sources and Corrosivity of Metals

Metals are typically sourced from the accessory materials buried with the corpse, i.e. jewellery and screws and hinges used in the coffin.



These metals are corroded with the corrosion rates strongly affected by environmental conditions such as soil type (governing porosity, permeability and surface tension), pH (governing acidity versus alkalinity), temperature (for mild temperate to warm climates), wetting (intermittent or flushing rain events versus permanently waterlogged) and hardness (specifically as calcium carbonate, related to the mineralization of soil moisture).

The table below indicates some environmental parameters **promoting** (and **retarding**) the corrosion of selected metals used in coffins. This is further exacerbated by, for instance, the presence of organic matters, and nutrients such as chloride or sulphate. Sand is well-drained, and therefore the initial water leachate may be more contaminated, whereas this is retained and thus retarded in clayey soils. In general, finer-grained soils are known to be more corrosive.

	Al, Cu, Fe	Zn
Soil type	clay (sand)	silt (sand)
pH	acidic (alkaline)	acidic (alkaline)
Temperature	high (low)	high (low)
Wetting	intermittent (waterlogged)	intermittent (waterlogged)
Hardness	(hard water)	(hard water)

	Contaminant	Mobility and Rate of Leaching	Persistence in Vadose Zone	Toxicity
M	Metals	Corrosion of interred materials Leaches out in months to years	Stored in vadose zone Years or more	Variable; chronic Occasionally carcinogenic
N	Nutrients	Source variable and not solely due to interment	Stored/ attenuated Months to years	Variable; chronic Organoepctic; non-carcinogenic
O	Organics	Embalming agents: days Lacquers, etc.: days to months	Days Highly variable	Variable Often carcinogenic
P	Pathogens	Interred body and environment Leaches in days to weeks	Variable: days to years <i>E.coli</i> days	Variable; acute to chronic Infectious disease

READ MORE: (a),(c) Fineza et al. 2014; Dent et al. 2004; EA [Environmental Agency] 2004; Rodriguez and Bass 1985;
ADAPTED FROM: Zychowski and Bryndal 2015 ; (b),(c) this document; Van Allemann 2017; Van Allemann et al. 2018



Terrestrial Biodiversity Assessment

Date: 07/02/2022
Version: Draft
Author: J. Pote

Terrestrial Biodiversity Assessment

Compiled by: **Jamie Pote** (Pr. Sci. Nat.)

Postnet Suite 57, Private Bag X13130, Humewood, Port Elizabeth, 6013, South Africa
jamiepote@live.co.za +27 (0)76 888 9890

Compiled for: **Indwe Environmental**

Date of report: **07/02/2022**

Final Report

This Report has been prepared with all reasonable skill, care and diligence within the scope of appointment by Mr Jamie Pote, with consideration to the resources devoted to it by agreement with the client, incorporating our Standard Terms and Conditions of Business.

This Report is prepared exclusively for use by the client, and the author disclaims any liability in respect of its use by any party other than the client and for the purpose for which it was written. The Report is subject to all the copyright and intellectual property laws and practices of South Africa and contains intellectual property and proprietary information that is protected by such copyright in favour of the author. No person, other than the client, may reproduce, distribute to any third party, or rely on the content of any portion of this report, without the prior written consent of the author.

The author accepts no responsibility of whatsoever nature to third parties to whom this Report, or any part thereof, is made known. Any such persons or parties rely on the report at their own risk.

Revisions

Report/Revision Version	Date:	Approved by:
First Draft	26/11/2021	Jamie Pote
Revisions/Comments	02/02/2022	Nicola Domoney
Final	07/02/2022	Jamie Pote

Table of Contents

Revisions	ii
Table of Contents	i
List of Figures	iii
List of Tables	iv
1 Introduction & Background	1
1.1 Background.....	1
1.2 Purpose of Report.....	1
1.2.1 Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes	1
1.3 Project Description.....	2
1.3.1 Activity Location and Description.....	2
1.3.2 Aspects of the project that could potentially have Biodiversity related Impacts	2
1.4 Methodology and Approach.....	2
1.4.1 Site visit	3
1.4.2 Data sources and references	3
1.4.3 Assumptions, Uncertainties and Gaps in Knowledge.....	4
2 Policy	4
2.1 Company Policy	4
2.2 Legislation Framework.....	4
2.3 Systematic Planning Frameworks	6
2.3.1 National Environmental Screening Tool.....	8
2.3.2 Sustainable Development Goals.....	10
2.3.3 Vegetation of Southern Africa	11
2.3.4 National Biodiversity Assessment	13
2.3.5 Sub-Tropical Ecosystem Planning (STEP).....	14
2.3.6 Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007).....	16
2.3.7 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019).....	18
2.3.8 Other Biodiversity Sector Plans	24
2.3.9 Protected areas	24
2.3.10 Strategic Water Source Areas.....	25
2.3.11 Freshwater Ecosystem Priority Areas	26
2.3.12 Regional Hotspots and Centres of Endemism	27
2.3.13 Key Biodiversity Areas.....	28
2.4 Vegetation and Ecological Processes and Corridors	29
2.4.1 Critical Biodiversity Areas.....	29
2.4.2 Ecosystem Processes	29
2.4.3 Ecosystem Services	29
2.4.4 Ecological Support Areas	31
3 Biodiversity Risk Identification and Assessment	32
3.1 Baseline Biodiversity Description	32

3.1.1	Site Locality.....	32
3.1.2	Topography and Drainage	32
3.1.3	Terrestrial Landscape Features (Habitat)	32
3.1.4	Aquatic Habitat.....	36
3.1.5	Present Ecological State	38
3.1.6	Flora.....	41
3.1.7	Fauna.....	41
3.1.8	Species of Conservation Concern occurring in the region	42
3.1.9	Critical/Important Terrestrial Habitats	48
3.1.10	Terrestrial Vegetation Sensitivity Assessment	50
3.1.11	Critical Habitat	52
3.1.12	No-Go Areas	53
3.1.13	Potential Development Footprints.....	53
3.2	Risks and Potential Impacts to Biodiversity.....	53
3.2.1	Summary of actions, activities, or processes that require mitigation.....	53
3.2.2	Potential Terrestrial Biodiversity Impacts (Direct)	53
3.2.3	Potential Terrestrial Biodiversity Impacts (Indirect)	54
3.2.4	Potential Terrestrial Biodiversity Impacts (Cumulative)	54
3.3	Assessment of Risks and Impacts to Biodiversity	54
3.3.1	Criteria of assigning significance to potential impacts.....	54
3.3.2	Significance Rating	55
3.3.3	Assessment of Terrestrial Biodiversity Impacts.....	56
3.3.4	Terrestrial Biodiversity Impact Reversibility	57
3.3.5	Impacts and Risks to Irreplaceable Biodiversity Resources.....	57
3.3.6	Residual Risks and Uncertainties.....	57
3.4	Findings, Outcomes and Recommendations	57
3.4.1	Summary of Findings.....	57
3.4.2	Recommendations	57
4	Management Programs	57
4.1	Site Preparation and Vegetation Clearing Plan.....	59
4.2	Rehabilitation and Landscaping Plan	59
4.3	Open Space Management/Conservation Plan	59
4.4	Maintenance Management Plan	59
5	Organizational Capacity and Competency	59
6	Emergency Preparedness and Response.....	60
7	Stakeholder Engagement	60
8	Monitoring and Review.....	60
9	Appendices	61
9.1	Appendix A: References.....	61
9.2	Appendix B: Flora and Fauna Species Lists	64
9.2.1	Flora.....	64
9.2.2	Fauna.....	67
9.3	Appendix C: Site Photographic Record.....	74
9.4	Appendix D: Biodiversity Environmental Management Plan.....	81

9.4.1	Protection of Flora and Fauna	81
9.4.2	Alien and Invasive Plan Management Plan	81
9.4.3	Fires	82
9.4.4	Soil Aspects	82
9.4.5	Dust	83
9.4.6	Infrastructural Requirements	83
9.4.7	Rehabilitation Plan	84
9.4.8	Monitoring and Reporting	86
9.4.9	Closure objectives and extent of alignment to pre-construction environment	86
9.5	Appendix E: General Impact Rating Scale	87
9.5.1	The Severity/ Beneficial Scale	87
9.5.2	Spatial and Temporal Scales	88
9.5.3	The Degree of Certainty and the Likelihood Scale	88
9.5.4	The Environmental Significance Scale	89
9.5.5	Absence of Data	90
9.6	Appendix F: Abbreviations and Definitions	91
9.6.1	Abbreviations	91
9.6.2	Glossary	92
9.7	Appendix G: Declaration, Specialist Profile and Registration	99
9.8	Appendix H: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	114

List of Figures

Figure 1: Proposed site development plan	1
Figure 2: Site Locality	2
Figure 3: Terrestrial Biodiversity Sensitivity	9
Figure 4: Plant Species Sensitivity	9
Figure 5: Animal Species Sensitivity	9
Figure 6: Aquatic Sensitivity	9
Figure 7: Vegetation of Southern Africa (National)	11
Figure 8: Sub-Tropical Ecosystem Planning (STEP, 2006)	14
Figure 9: Critical Biodiversity and Protected Areas (ECBCP, 2007)	16
Figure 10: Critical Biodiversity and Protected Areas (ECBCP, 2019)	18
Figure 11: South Africa Water Source Areas [Source: Nel, et al, 2013]	25
Figure 12: Rivers and Wetlands	26
Figure 13 Mapped Vegetation on the site.	32
Figure 14: Overview of site, with old lands, comprising typical secondary Thornveld, dominating the landscape	33
Figure 15: Typical secondary South-Eastern Coastal Thornveld with grasses, forbs, and scattered trees.	33
Figure 16: Typical near natural South-Eastern Coastal Thornveld, with buffels thicket tendencies	34
Figure 17: Typical near natural Thicket understorey	35
Figure 18: More recent cultivated lands, with indigenous grasses dominant	36
Figure 19: Drainage line with dense thicket.	37
Figure 20: Small seasonal dam (old borrow pit) at top end of drainage line	37

Figure 21: Small depression wetland on possible historical excavation on eastern boundary surrounded by ring of rocks and thicket elements.	38
Figure 22: Distribution of faunal species of conservation concern (records only for Sensitive species 5 & <i>Campanula trachelium</i>).	44
Figure 23 Overall Terrestrial Biodiversity Sensitivity.	52

List of Tables

Table 1: Summary of Regional Planning Biodiversity features.	7
Table 2: Linking CBA categories to management objectives.	18
Table 3: Description of Land Use Types and Activities.	20
Table 4: List of Protected Areas in vicinity.	24
Table 5: Summary of Key Biodiversity and Ecological Indicators.	38
Table 6: Flora Species of Conservation Concern.	42
Table 7: Fauna Species of Conservation Concern.	44
Table 8: Alien (exotic) invasive and other weed species and status.	46
Table 9: Legislation regarding invasive alien species.	46
Table 10: Potential Impacts to Terrestrial Biodiversity.	53
Table 11: Construction Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).	56
Table 12: Operational Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).	56
Table 13: Specific Mitigation Measures and Recommendations.	57

1 Introduction & Background

1.1 Background

Indwe Environmental have been appointed to undertake a basic assessment application for a proposed memorial park and private cemetery (Figure 1) within Buffalo City Metropolitan Municipality. The site is situated on farm portion 50 of farm 821 Beacon Bay, Buffalo City Metropolitan Municipality.

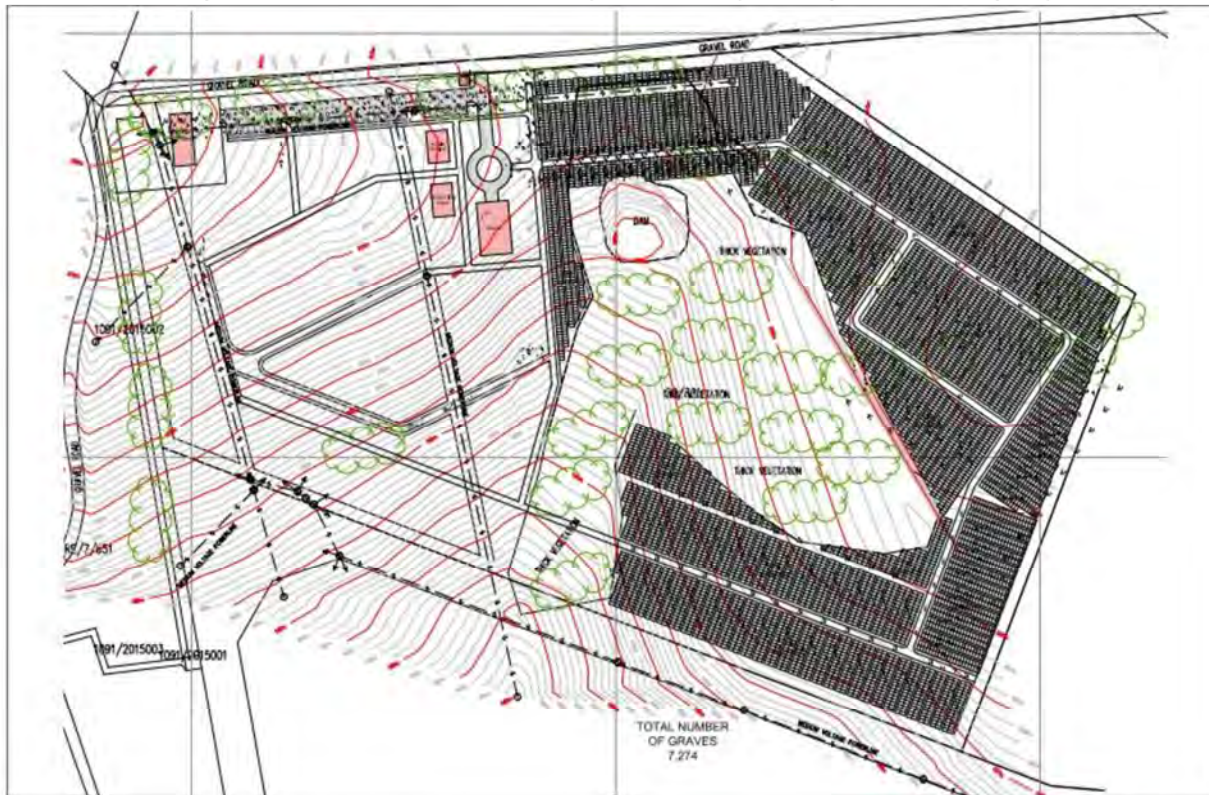


Figure 1: Proposed site development plan.

1.2 Purpose of Report

1.2.1 Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes

The report will be compiled to fulfil the requirement for a **Terrestrial Biodiversity Assessment** as per the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA (GNR 320), **as gazetted on 20 March 2020**. This report is undertaken as supporting information as part of a greater environmental application process and is compliant in terms of the requirements in the above regulations in terms of Terrestrial Biodiversity. In terms of the Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, gazetted **on 30 October 2020**, relating to requirements relating specifically to the **Terrestrial Plant and Animal (species) themes**, this report includes these requirements.

The principles that guide this process include protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources which are fundamental to sustainable development.

1.3 Project Description

1.3.1 Activity Location and Description

The subject site (Farm portion 50/821) is situated in Beacon Bay, within the Buffalo City Metropolitan Municipality. The site is a peri-urban area with some, mostly small scale, agriculture (Refer to Figure 2). The extent of the site is approximately 10.5 Ha.

Project : Beacon Bay Memorial Park

Layout - Topographic Locality Map

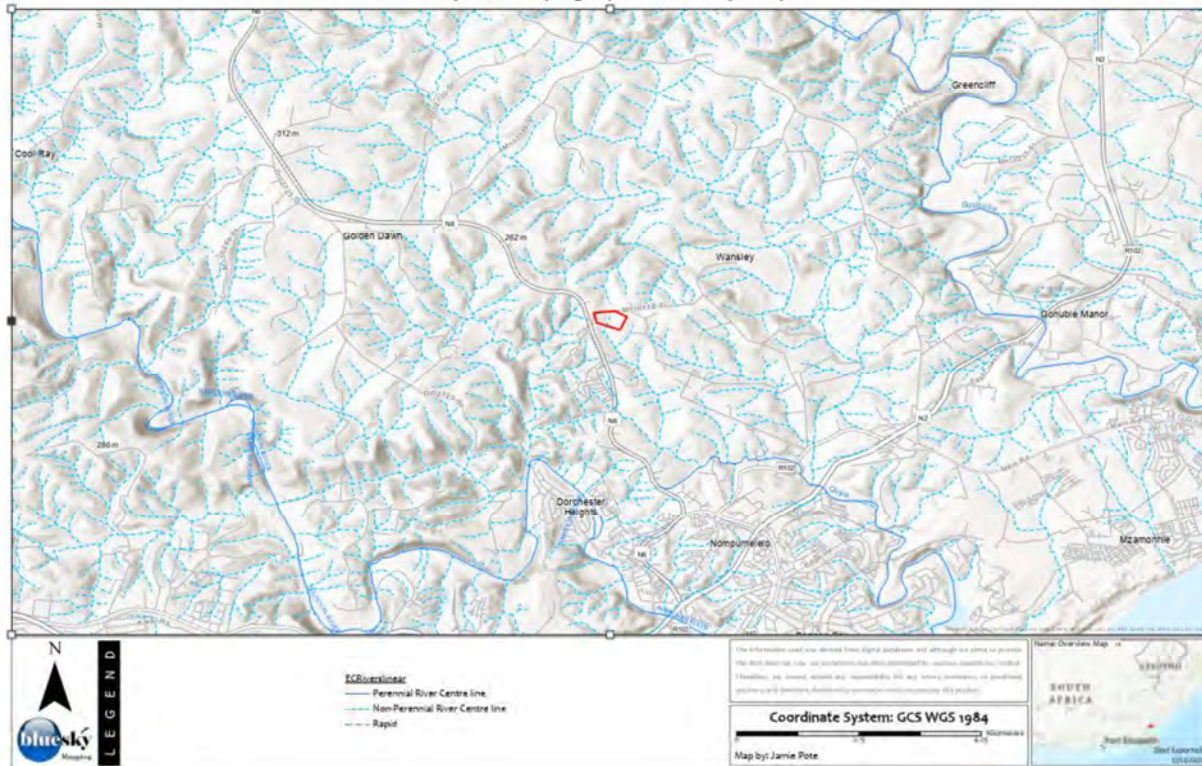


Figure 2: Site Locality.

1.3.2 Aspects of the project that could potentially have Biodiversity related Impacts

The key components of the project and their respective impacts upon the terrestrial vegetation and faunal environment are as follows:

Component	Potential Biodiversity and Ecological Impacts
Memorial Park and infrastructure	
The construction of the memorial park and associated infrastructure will require clearing of the site within the footprint of the development plan.	The terrestrial environment will permanently be impacted where vegetation clearing is required to construct the memorial park.

1.4 Methodology and Approach

The proposed methodology and approach are outlined below:

- Conduct a comprehensive desktop study and identify potential risks relating to vegetation and flora of the site and surrounding area, for a Terrestrial Biodiversity Assessment Report. This will include the relevant Regional Planning and legislated frameworks, which will also be represented in a series of associated maps.
- Conduct a detailed site visit to assess the following:

- Detailed field survey of vegetation, flora and habitats present.
- Comprehensive species list, highlighting species that are of conservation concern, threatened, Red Data species and species requiring permits for destruction/relocation in terms of NEMBA and the Provincial Nature Conservation Ordinance No. 19 of 1974.
- Detailed mapping of the various habitat units and assessment of habitat integrity, ecological sensitivity, levels of degradation and transformation, alien invasion and species of conservation concern, the outcome being a detailed sensitivity map ranked into high, medium or low classes.
- Reporting will be comprised of a preliminary summary, with identification of anticipated impacts and risks for the Scoping Report, a draft detailed Assessment Report (for public review and comment) and a Final Assessment Report for submission. The draft and final detailed reports will address the following:
 - Indicate any assumptions made and gaps in available information. Assessment of all the vegetation types and habitat units within the relevant Regional Planning Frameworks.
 - A detailed species list highlighting the various species of conservation concern categories (endemic, threatened, Red Data species and other protected species requiring permits for destruction/relocation and invasive/exotic weeds).
 - Description and assessment of the habitat units and site sensitivities ranked into high, medium or low classes based on sensitivity and conservation importance. A standard methodology has been developed based on other projects in the specific area.
 - Assessment of Impacts and Mitigation Measure, as well as specific measure that may be required for alternative development plans.
 - A comprehensive EMP for inclusion in the reports and EMP with specific management actions for construction and Operation.
 - A habitat sensitivity map will be compiled, indicating the sensitivities as described above.
 - A map indicating buffers (if required) to accommodate Regional Planning and other requirements.

This terrestrial biodiversity assessment and report has been undertaken as per the requirements of the Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).

1.4.1 Site visit

A site visit was conducted on 22 November 2021, during late spring. The site falls within a summer rainfall area and for the purposes of this report, a single site visit is deemed to be adequate, specifically due to the disturbed nature of the site and low conservation priority. The site visit was also undertaken after recent rainfall in the previous few months as well as a winter burn, which is common to the vegetation type.

1.4.2 Data sources and references

A comprehensive list of references, including data sources is provided in Section 9.1. Data sources that were utilised for this report include the following:

- National (DEA) Web Based Screening Tool – to generate the sites potential environmental sensitivity.
- National Vegetation Map 2018 (NVM, 2018), Mucina & Rutherford (2006) and National Biodiversity Assessment (NBA, 2019) – description of vegetation types, species (including endemic) and vegetation unit conservation status.
- National and Regional Legislation including Provincial Nature Conservation Ordinance (P.N.C.O). NEM:BA Threatened or Protected Species (ToPS).
- Botanical Database of Southern Africa (BODATSA) and New Plants of Southern Africa (POSA) – lists of plant species and potential species of concern found in the general area (SANBI)
- International Union for Conservation of Nature (IUCN) - Red List of Threatened Species
- Animal Demography Unit Virtual Museum (VM) – potential faunal species

- Global Biodiversity Information Facility (GBIF) – potential faunal species
- Southern African Bird Atlas Project 2 (SABAP2) – for bird species records
- National Red Books and Lists - mammals, reptiles, frogs, dragonflies & butterflies
- National Freshwater Ecosystem Priority Areas assessment (NFEPA, 2011) - important catchments
- National Protected Areas Expansion Strategy (NPAES, 2018) and South Africa Protected Area database (2020) – protected area information
- Sub-Tropical Ecosystem Planning (STEP, 2006) – bioregional plan
- Eastern Cape Biodiversity Conservation plan (ECBCP, 2007) – critical biodiversity areas
- SANBI BGIS – All other biodiversity GIS datasets
- Aerial Imagery – Google Earth, Esri, Chief Surveyor General (<http://csg.dla.gov.za>)
- Cadastral and other topographical country data - Chief Surveyor General (<http://csg.dla.gov.za>)
- Other sources include peer-reviewed journals, regional and local assessments and studies in the general location of the project and its area of influence, landscape prioritization schemes (Key Biodiversity Areas), systematic conservation planning assessments and plans (as above), and any pertinent masters and doctoral theses, among others.

1.4.3 Assumptions, Uncertainties and Gaps in Knowledge

The findings and recommendations of this report may be susceptible to the following uncertainties and limitation:

- No assessment has been made of aquatic aspects relating to any wetlands, pans and rivers/seeps and/or estuaries outside of the scope of a terrestrial biodiversity report.
- Any botanical surveys based upon a limited sampling time-period, may not reflect the actual species composition of the site due to seasonal variations in flowering times. Additionally, the composition of fire adapted vegetation may vary depending on level of maturity or time since last burn. As far as possible, site collected data has been supplemented with desktop and database-centred distribution data.

2 Policy

2.1 Company Policy

No company policy is applicable to this assessment.

2.2 Legislation Framework

In terms of NEMA EIA Regulations (07 April 2014, as amended), the following specific listing notices have bearing on this report¹:

Listing Notice 1 (GNR):

23. The development of cemeteries of 2500 square meters or more in size.

The proposed activity will require a cemetery area of greater than 2500 m², hence triggering this listed activity.

27. The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—

¹ The listed activities itemized are only those with Biodiversity relevance to this report and is not a complete list. Additional listed activities may be affected that are not related to terrestrial biodiversity.

(i) the undertaking of a linear activity; or

The proposed activity will require clearing of greater than 1 Ha of indigenous vegetation, hence triggering this listed activity.

Listing Notice 2 (GNR):

None are applicable

Listing Notice 3 (GNR):

4. The development of a road wider than 4 metres with a reserve less than 13,5 metres

(a) In Eastern Cape:

i. Outside urban areas:

(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

The internal roads may exceed 4 meters in width; however, no critical biodiversity areas are affected, only ecological support areas.

12. The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

(a) Eastern Cape

ii. Within critical biodiversity areas identified in bioregional plans.

The proposed activity will require clearing of more than 300 square metres; however, no critical biodiversity areas are affected, only ecological support areas.

14. The development of ii) infrastructure or structures with a physical footprint of 10 square meters or more where such development occurs” a) within a watercourse; c) if no development setback has been adopted, within 32 meters of a watercourse measured from the edge of a watercourse.

Within the Eastern Cape

i) Outside Urban Areas

ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

It is possible that some infrastructure of 10 m² or greater may fall within 32 meters of a dam/ wetland. The site falls within an ecological support area within the ECBCP 2019 which is a systematic biodiversity plan.

Implications:

- The proposed activity will exceed the threshold of a 2500 m² for a cemetery, hence trigger LN1, activity 23.
- The proposed activity will require clearing of greater than 1 Ha of indigenous vegetation, hence will trigger LN1, activity 27.
- The proposed activity may have infrastructure of more than 10 m² fall within 32 meters of a watercourse and fall within an ESA according to the ECBCP 2019.
- Ecological Support Areas are present, however not Critical Biodiversity Areas, hence additional listed activities will not be triggered.

Other potentially relevant legislation, which will be evaluated as required, includes the following:

- **NEMA:** Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMA's) should guide decision making throughout the project life cycle to reflect the objective of sustainable development. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the Biodiversity Act as it relates to loss of biodiversity.
- **Liability for any environmental damage, pollution, or ecological degradation:** Arising from all -related activities occurring inside or outside the area to which the permission/right/permit relates is the responsibility of the rights holder. The National Water Act and NEMA both oblige any person to take all reasonable measures to prevent pollution or degradation from occurring, continuing or reoccurring (polluter pays principle). Where a person/company fails to take such measures, a relevant authority may direct specific measures to be taken and, failing that, may carry out such measures and recover costs from the person responsible.
- **Public participation:** Public consultation and participation processes prior to granting licences or authorisations can be an effective way of ensuring that the range of ways in which the activities impact on the environment, social and economic conditions are addressed, and taken into account when the administrative discretion to grant or refuse the licence is made.
- **Constitution of Republic of South Africa (1996):** Section 24(a) of the Constitution states that everyone has the right 'to an environment that is not harmful to their health or well-being'. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
- **National Forests Act 84 of 1998 with Amendments:** Lists Protected trees, requiring permits for removal (Department of Agriculture, Forestry and Fisheries). Section (3)(a) of the National Forests Act stipulate that '*natural forests must not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits*'.
- **Eastern Cape Nature and Environmental Conservation Ordinance 19 of 1974:** Lists Protected species, requiring permits for removal (Department of Economic Development, Environmental Affairs and Tourism).
- **Water Use Authorisations: the National Water Act (No. 36 of 1998):** Requires that provision is made both in terms of water quantity and quality for 'the reserve', namely to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
- **Conservation of Agricultural Resources Act 43 of 1993:** Lists Alien invasive species requiring removal (refer to Table 9).

2.3 Systematic Planning Frameworks

A screening of Systematic Planning Framework for the region was undertaken (summarised in Table 1), that included the following features:

- Critically Endangered and Endangered Ecosystems
- Critical Biodiversity Areas
- Ecological Support Areas
- Vulnerable Ecosystems
- River, Estuarine and Wetland Freshwater Ecosystem Priority Areas (FEPAs) and buffers
- Protected Areas (and buffers) and NPAES
- Critical Habitat for listed endemic or protected species

Table 1: Summary of Regional Planning Biodiversity features.

FEATURE ²	DESCRIPTION	IMPLICATIONS/COMMENT
National Environmental Screening Tool (Terrestrial Biodiversity)	Very High Terrestrial Biodiversity High & Medium Animal Species Low Plant Species Low Aquatic Sensitivity	Ecological Support Area 2. Animal & Plant species potentially present in proximity to site (refer to species assessment section).
National Vegetation Map (NVM, 2018)	South-Eastern Coastal Thornveld	Least Concern
Regional Planning: Sub-Tropical Ecosystem Planning (STEP)	Berlin Savanna Thicket	Currently not Vulnerable (2007)
Critically Endangered and Endangered Ecosystems (NBA 2018)	None	N/A.
Vulnerable Ecosystems (NBA)	None	N/A.
Eastern Cape Biodiversity Conservation Plan (2007)	CBA 2	Specific activity within a locally extensive vegetation unit will not significantly affect ecological connectivity.
Eastern Cape Biodiversity Conservation Plan (2019)	ESA 2	Specific activity within a locally extensive vegetation unit will not significantly affect ecological connectivity, being the primary objective of ESA class.
Protected Areas (SAPAD)	None directly affected nor in close proximity.	These protected areas nor any ecological processes associated with them are affected by the proposed project.
NPAES	None directly affected nor in close proximity.	No NPAES or ecological processes within are likely affected.
Strategic Water Source Areas (SWSA)	None	Specific activity will not have any significant impact to downstream water resources.
Freshwater Ecosystem Priority Areas (FEPA's)	Situated on upper reaches of non-perennial tributary of the Qinira River, which has a Class D: Largely Modified FEPA designation.	Specific activity will not have any significant impact to nearby rivers. A minor non-perennial watercourse is present but will not be significantly altered.
Regional Hotspots & Regions of Endemism	Site is within the Maputaland-Pondoland Region and south of the Pondoland Centre.	Several endemic species are known from the wider surrounding area, however the likelihood of any being significantly affected by the proposed activity having a limited footprint are unlikely to be significant.
Important Bird Areas (IBA's)	None in vicinity	N/A
Key Biodiversity Areas (KBA's)	None	N/A

² Refer to Error! Reference source not found. to Error! Reference source not found..

FEATURE ²	DESCRIPTION	IMPLICATIONS/COMMENT
Marine/Coastal areas	None	N/A
RAMSAR sites	None	N/A
Within 32 m of Watercourse	Roads and infrastructure may cross the non-perennial drainage line	Terrestrial impact will be negligible associated with construction of any formalised crossings or other linear structures.
Within 100 m of River	No perennial rivers are present on in immediate vicinity.	N/A
Within 500 m of Wetland	Yes	Outside of functional zone, refer to separate aquatic assessment, deemed to be low sensitivity.
Forest	None directly affected, although the vegetation unit is known to have forest pockets in suitable areas.	No forest pockets nor any ecological processes associated with them are affected by the proposed project.
Surrounding Land Uses	Mostly rural with some agriculture and urban to the south.	Site is generally disturbed or surrounded by disturbed areas.
Critical Habitat for listed endemic/ protected species	No endemic or other protected species were recorded within the site boundary. Any species in the vicinity generally have a widespread distribution and the activity is unlikely to pose any significant threat to any such species or population. No specific populations of threatened species were identified within the footprint and the affected footprint is largely disturbed or comprised of secondary vegetation. There are a number of red listed species in the surrounding area and vegetation units that are known to have limited distributions, however none were recorded on the footprint (refer to Sections 3.1.8 & 3.1.11).	

Implications:

- South-Eastern Coastal Thornveld does not have an elevated conservation status.
- No other ecological elements or sensitive features (terrestrial) are likely to be directly or indirectly affected by the proposed activity.

2.3.1 National Environmental Screening Tool

The DFFE Screening Tool indicates the following:

- Terrestrial Biodiversity is *Very High* (Figure 3).
- Plant species sensitivity is *Low* (Figure 4).
- Animal Species sensitivity is *Medium & High* (Figure 5).
- Aquatic Sensitivity is *Low* (Figure 6).



Figure 3: Terrestrial Biodiversity Sensitivity.



Figure 4: Plant Species Sensitivity



Figure 5: Animal Species Sensitivity



Figure 6: Aquatic Sensitivity

Sensitivity	Feature(s) in proximity
Terrestrial Biodiversity Sensitivity	
Very High	Ecological Support Area 2.
High	None
Medium	None
Low	Present
Plant (Flora) Sensitivity	
Very High	None
High	None
Medium	None
Low	None
Animal (Fauna) Sensitivity	
Very High	None
High	<i>Campethera notata</i> (bird)
Medium	Sensitive species 5, <i>Chrysospalax trevelyani</i> (mammals), <i>Prostalia granulata</i> (insect)
Low	Present
Aquatic Sensitivity	
Very High	None
High	None
Medium	None
Low	Present

The following is deduced from the DFFE National Environmental Screening Tool:

1. Terrestrial Biodiversity Theme is Very High, with Ecological Support Area 1 indicated as being present.
2. Plant Species Theme is Low with no flora species conservation concern flagged.
3. Animal Species Theme is Medium/High with possibly species including a bird *Campethera notata*, two mammals (Sensitive Species 5 and *Chrysospalax trevelyani*) as well as an insect (*Prostalia granulata*).
4. The Aquatic Theme indicates the no sensitivities within the site (Low), although a non-perennial watercourse is present.

The site assessment will physically screen for the presence of these, and other possible species or sensitivities that are not identified in the screening tool. Not all features are directly affected, but being in proximity, the risks associated with the activity will be investigated further and addressed in the report.

2.3.2 Sustainable Development Goals

The concept of National Sustainable Development Strategy (NSDS) was proposed in 1992 in Agenda 21 (§ 8.7) where countries were called upon to integrate economic, social, and environmental objectives into one strategically focused blueprint for action at the national level. The NSDS “should be developed through the widest possible participation”. And it “should be based on a thorough assessment of the current situation and initiatives”. In the Programme for the Future Implementation of Agenda 21 adopted at the 19th Special Session of the General Assembly (23-28 June 1997), member States reaffirmed the importance of NSDS and set a target of 2002 for the formulation and elaboration of NSDS that reflect the contributions and responsibilities of all interested parties.

However, by 2002, based on national reports received from governments, only about 85 countries had developed some form of national strategies and the nature and effectiveness of these strategies varied considerably from country to country. The Johannesburg Plan of Implementation (JPOI) adopted at the 2002 World Summit on Sustainable Development (WSSD), through paragraph 162 b, recommitted member States to “take immediate steps to make progress in the formulation and elaboration of national strategies for sustainable development and to begin their implementation by 2005.”

During the preparatory process for the 2002 WSSD, the International Forum on NSDS was held in Accra, Ghana in 2001, which led to the launch of the Guidance in Preparing a National Sustainable Development Strategy. It defined National Sustainable Development Strategy (NSDS) as “a coordinated, participatory and iterative process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrative manner”. Most importantly, NSDS is a call for an institutional change. It aims at a transition from the traditional static putting-a-plan-on-paper exercise towards the establishment of an adaptive system that can continuously improve. It should be a process which “encompasses situation analysis, formulation of policies and action plans, implementation, monitoring and regular review. It is a cyclical and interactive process of planning, participation and action in which the emphasis is on managing progress towards sustainability goals rather than producing a ‘plan’ as an end product.”

Every country needs to determine, for itself, how best to approach the preparation and implementation of its national sustainable development strategy depending upon the prevailing political, historical cultural, ecological circumstances. A “blueprint” approach for national sustainable development strategies is neither possible nor desirable. The particular label applied to a national sustainable development strategy is not important, as long as the underlying principles characterizing a national sustainable development strategy are adhered to and that economic, social, and environmental objectives are balanced and integrated.

Today, when incorporating the 2030 Agenda for sustainable development and its 17 SDGs into national context, although countries do not necessarily label them as “national sustainable development strategies”, all the underlying core principles are deeply embedded in the national implementation of SDGs worldwide. As seen at the Voluntary National Reviews at the High-Level Political Forum on Sustainable Development, issues such as country ownership and strong political commitment, the integration of economic, social, and environmental objectives across sectors, territories, and generations; broad participation and effective partnerships, the development of capacity and enabling environment,

as well as the mobilization of means of implementations remain at the centre of policy debates at all levels.

Source: National Sustainable Development Strategies (NSDS): <https://sdgs.un.org/topics/national-sustainable-development-strategies>

Goal 15: Life on Land: Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss. **The approach, assessment methodology and recommendations contained within this report are directly in line with this sustainable development goal.**

2.3.3 Vegetation of Southern Africa

A single vegetation unit (Table 1, Figure 1) is primarily affected by the proposed project (Mucina & Rutherford, 2006). The site is located entirely within South-Eastern Coastal Thornveld (Least Concern). A general description of the vegetation unit is provided below (as per Mucina & Rutherford, 2006) as a reference point for the baseline vegetation composition. Surrounding vegetation units include Buffels Mesic Thicket, having a more developed woody (tree) element, and generally found on the slopes surrounding the Buffalo River.

Project : Beacon Bay Memorial Park

Layout - Vegetation and Status (National)

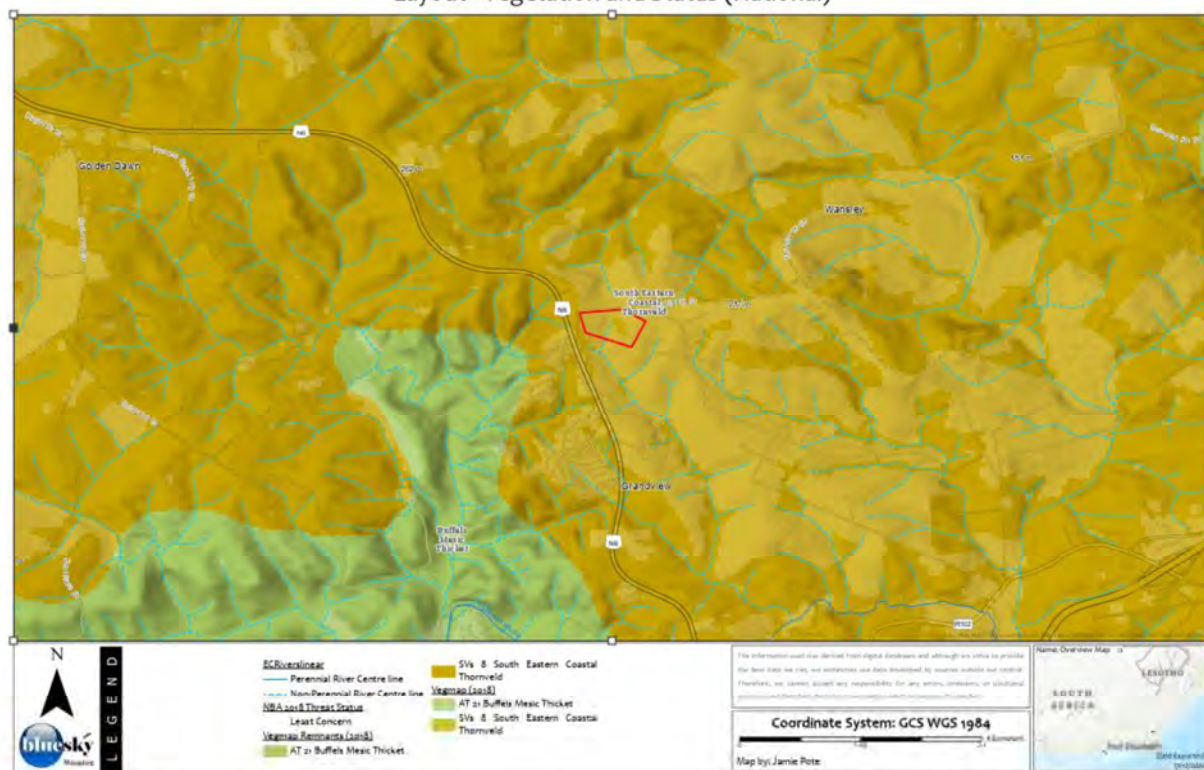


Figure 7: Vegetation of Southern Africa (National).

SVs 8 South-Eastern Coastal Thornveld

(Type history: STEP map - Berlin Savanna Thicket (43%); 2012 VEGMAP - AT 9 Albany Coastal Belt (98%))

Distribution: This vegetation type occurs in the Eastern Cape province, along the south-eastern seaboard of the Eastern Cape, from the Gamtoos River in the west to the Kei River in the east, typically within 15 - 20 km of the coast (up to 35 km in some areas).

Vegetation & Landscape Features: Occurs in gently to moderately undulating landscapes and dissected hilltop slopes close to the coast. Short grassland (*Cynodon dactylon*, *Digitaria* spp., *Eragrostis* spp.,

Themeda triandra) with scattered bush clumps, dominated by small trees and woody shrubs, and with emergent *Euphorbia triangularis* occasional. Solitary *Vachellia karoo* trees are also common.

Geology and Soils: Occurs on the Nanaga, Middleton and Balfour Formations. The main land types are Fa, Db and Ae.

Climate: Non-seasonal rainfall dominates the region, with MAP between 485 mm and 1118 mm. Frost is present approximately 3 days per year. The mean monthly maximum is 26.20 °C in February and the mean monthly minimum is 8.34 °C in July. Altitude ranges from 0 – 541 masl.

Important Taxa: (d=dominant, e=South African endemic, et=possibly endemic to a vegetation type)

Small tree: *Vachellia karroo* (d), *Brachylaena elliptica* (e), *Canthium spinosum*, *Cussonia spicata*, *Ficus sur*, *Ochna arborea*, *Sideroxylon inerme*, *Zanthoxylum capense*

Succulent herb: *Plectranthus verticillatus* (d), *Crassula pellucida* subsp. *marginalis* (e)

Succulent tree: *Euphorbia triangularis*

Geophytic herb: *Cheilanthes hirta*, *Moraea pallida*, *Oxalis smithiana*, *Sansevieria hyacinthoides*

Herb: *Chamaecrista mimosoides* (d), *Abutilon sonneratianum*, *Acalypha ecklonii* (e), *Centella asiatica*, *Commelina africana*, *Cynoglossum hispidum*, *Eriosema squarrosum*, *Lactuca inermis*, *Lobelia erinus*, *Monsonia emarginata* (e), *Phyllopodium cuneifolium* (e), *Senecio burchellii* (e), *Sonchus dregeanus*, *Strelitzia reginae*

Low shrub: *Rhynchosia ciliata* (d, e), *Carissa bispinosa*, *Chrysocoma ciliata*, *Dyschoriste setigera* (e), *Helichrysum asperum*, *Pelargonium alchemilloides*, *Phyllanthus maderaspatensis*, *Selago corymbosa* (e), *Senecio pterophorus*, *Tephrosia capensis*

Graminoid: *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Dactyloctenium australe* (d), *Digitaria natalensis* (d), *Ehrharta calycina* (d), *Eragrostis capensis* (d), *Eragrostis curvula* (d), *Eragrostis plana* (d), *Heteropogon contortus* (d), *Panicum deustum* (d), *Panicum maximum* (d), *Setaria sphacelata* (d), *Sporobolus africanus* (d), *Themeda triandra* (d), *Tristachya leucothrix* (d), *Cymbopogon marginatus*, *Ehrharta erecta*, *Elionurus muticus*, *Melica racemosa*, *Setaria megaphylla*, *Trachypogon spicatus*

Tall shrub: *Clausena anisata*, *Volkameria glabra*, *Coddia rudis*, *Croton rivularis* (e), *Diospyros villosa*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Hippobromus pauciflorus*, *Mystroxydon aethiopicum*, *Pavetta lanceolata*, *Psydrax obovata*, *Pterocelastrus tricuspidatus* (e), *Scutia myrtina*, *Searsia lucida* (e), *Tarchonanthus littoralis* (e), *Turraea obtusifolia*

Woody succulent climber: *Cynanchum viminale*

Herbaceous climber: *Rhynchosia caribaea*, *Rhynchosia totta*, *Thunbergia capensis* (e), *Pilogyne scabra*

Woody climber: *Asparagus aethiopicus*, *Capparis sepiaria* var. *citrifolia*, *Clematis brachiata*, *Rhoiacarpos capensis*, *Rhoicissus digitata*, *Rhoicissus tridentata*, *Secamone alpini*, *Tecomaria capensis*

Tall tree: *Ekebergia capensis*, *Erythrina caffra*

Conservation: Least Concern

Conservation Target: 19 %

Conserved in Addo Elephant National Park, Indalo Protected Environment

Area transformed: 39.24 %

Threat activities: Cultivation, plantations, bush encroachment, urban sprawl, altered fire regime,

Erosion: low to medium

Protection Level: Poorly protected

Remarks: The region in which this unit occurs is a mosaic of several different structural vegetation types, ranging from grasslands to forest, and is a result of post-disturbance succession gradients as well as natural variation in geology, soil patterns and distribution of water in the landscape. It is likely that the current vegetation mosaic typical of the South-Eastern Coastal Thornveld is anthropogenic and that the original (pre-settlement) vegetation was dominated by nonseasonal, dense thicket. The area of this unit was prime agricultural land which attracted early settlers who, presumably, cleared the vegetation for pastures (Hoare et al. 2006).

References: Vlok, J.H.J. and Euston-Brown, D.I.W. 2002.

Implications:

- South-Eastern Coastal Thornveld is classified as having a Least Concern status, indicating that less than 40 % has been transformed and there are no imminent threats to ecological functioning disruptions.
- The vegetation assessed on site is typical of the vegetation unit, refer to Section 3.1 for specific description.
- Several South Africa and Eastern Cape endemic species are recorded from the vegetation unit, some have localised distributions and others are widespread. Refer to Sections 3.1.8 and 9.2. None were recorded from within the site.

2.3.4 National Biodiversity Assessment

The NBA is the primary tool for monitoring and reporting on the state of biodiversity in South Africa and informs policies, strategic objectives, and activities for managing and conserving biodiversity more effectively. The NBA is especially important for informing the National Biodiversity Strategy and Action Plan (NBSAP), the National Biodiversity Framework (NBF) and the National Protected Area Expansion Strategy (NPAES), and also informs other national strategies and frameworks across a range of sectors, such as the National Spatial Development Framework, the National Water and Sanitation Master Plan and the National Biodiversity Economy Strategy. Ecosystem protection level is an indicator that tracks how well represented an ecosystem type is in the protected area network. It has been used as a headline indicator in national reporting in South Africa since 2005. It is computed by intersecting maps of ecosystem types and ecological condition with the map of protected areas. Ecosystem types are then categorised based on the proportion of the biodiversity target for each ecosystem type that is included in one or more protected areas. For terrestrial ecosystems, biodiversity targets are set for each ecosystem type using established species–area accumulation curves (ranging between 16 and 34%).

The outcome of the most recent National Biodiversity Assessment (2018) indicates that South Eastern Coastal Thornveld has a Least Concern conservation status (Table 1), which is the lowest status. This indicates that more than 60 % of the unit remains, and that ecosystem functioning is not under imminent threat by loss of natural habitat. There is a low to moderate level of utilization of this unit leading to some degradation and transformation in more accessible areas.

The site has been utilised historically for grazing and agriculture.

Implications:

- The vegetation unit is categorised as having a Least Concern Conservation Status and is not considered to be under threat (low), with more than 60 % considered to be intact. The conservation target is 23 %.
- The site is within a sparsely populated peri-urban area on the transition between an urban area to the south and rural agricultural area to the north.
- Development of the site is unlikely to significantly affect conservation of the vegetation unit.
- Conservation value at a regional level for the site is thus low.

2.3.5 Sub-Tropical Ecosystem Planning (STEP)

One Sub-Tropical Ecosystem Planning (STEP, 2006) designated vegetation unit (Figure 8) is primarily affected by the proposed activity. The site is located within the **Berlin Savanna Thicket** (Currently not Vulnerable, STEP, 2006) or **Buffels Thicket Mosaic with Savanna**. **Buffels Thicket** (Currently not Vulnerable, STEP, 2006) is known from the surrounding area, predominantly associated with major watercourses and drainage systems and elements are likely present. The site is also situated with a designated Gqunube – Amatole inland corridor, one of several mega-corridors designated in STEP with along with a coastal corridor indicates connectivity between the coast and inland areas associated with three key river valleys (Kei, Fish, etc.), which also aligns with the STEP vegetation delineation (Fish, Sundays, etc.). The STEP was one of the earliest bio regional planning initiatives that were devised, however it is generally superseded by more recent planning systems, although it does often provide important and informative ecological context.

Project : Beacon Bay Memorial Park

Layout - Sub-Tropical Ecosystem Planning

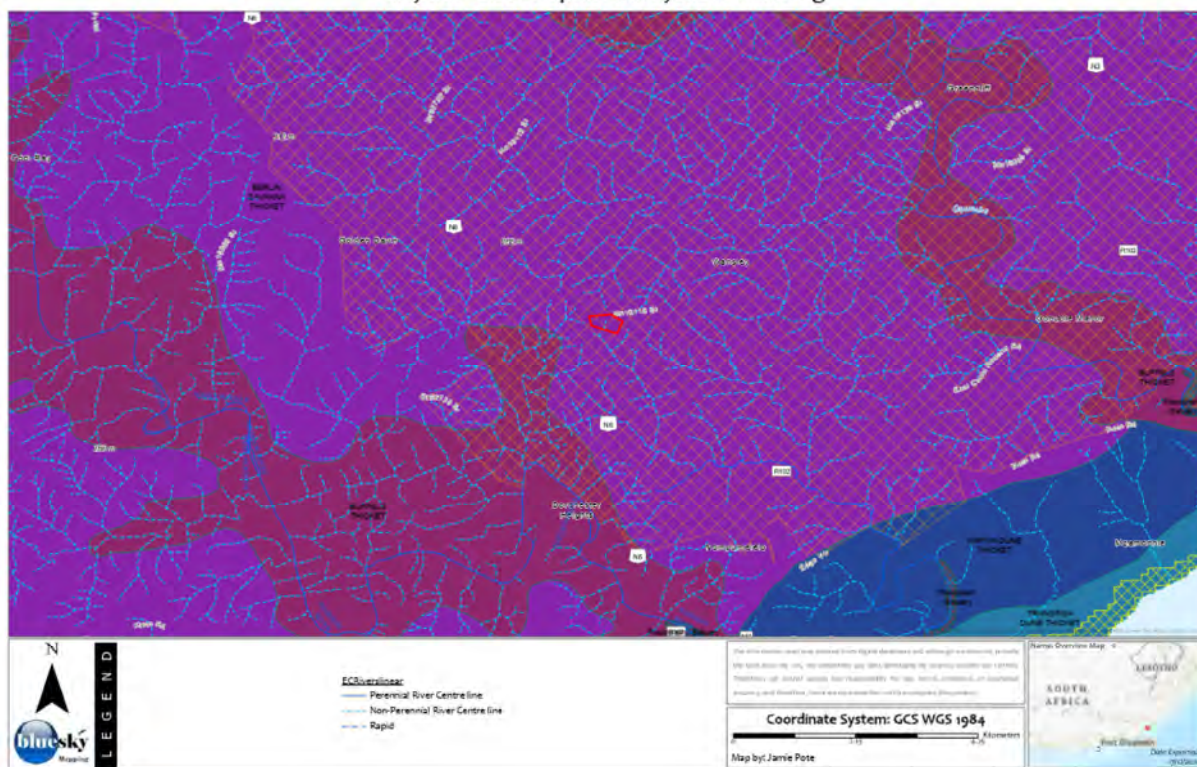


Figure 8: Sub-Tropical Ecosystem Planning (STEP, 2006).

Berlin Savanna Thicket

Thicket that occurs in the water drainage areas of the rivers between the Tyolomnqa and Haga-Haga rivers, including those of the Keiskammahoek basin, are included in the Buffels River Thicket. The Buffels River Thicket lacks an Arid Thicket unit since the local river systems do not have an arid interior zone. Many species from the sub-tropical KwaZulu-Natal vegetation (Pondoland- Tongoland flora) reach their southernmost distribution in the Buffels River Thicket, which enriches floristic diversity of the local Thicket vegetation. It shares most of these more northern species with the Kei River Thicket. The unique floristic composition of the Buffels- and Kei River Thicket units renders them easy to recognize. They do, however, differ in their structure, with those of the Buffels River Thicket having a higher tree component, often to the point where it forms a closed canopy and thus simulating a forest. In this high rainfall zone succulence is poorly developed, even in terms of the presence of *Portulacaria afra*, but *spinescens* is quite

prominent in most of the Buffels River Thicket units. Five Thicket units are recognised in the Buffels River Thicket, which is best developed on loamy and clayey soils derived from the Katberg mudstone and sandstone formation. It tends to change into true forest vegetation where outcrops of Dolerite occur, especially in high rainfall areas. The open slopes of the hills and ridges of the mid-land coastal area was probably once a neat mosaic of Grassland in which *Acacia* karoo trees occurred sporadically, in which well-defined clumps of Thicket occurred in fire-protected areas, such as steep south facing slopes and rocky ridges. Interference by man has, however, changed this vegetation largely through altered fire regimes and heavy grazing of the grass component. In most of this unit the once clearly defined grassland in which clumps of thicket occurred has been altered to a rather messy vegetation. Dense stands of early successional woody shrubs and trees (*Acacia karoo*, *Brachylaena ilicifolia*, *Buddleja saligna*, *Rhus pallens*, *Scutia myrtina*, and aliens such as *Psidium guajava*) now overtop the grass component. The grass component has largely been altered from being dominated by palatable species such as *Themeda triandra*, to a Savanna in which unpalatable tall grasses such as *Cymbopogon plurinodis*, *Cymbopogon validus* and *Hyparrhenia hirta* are abundant. At present light intensity fires regularly occur under the canopy of the local woody trees and shrubs, but it does not kill these woody species, it probably favours them and those grass species that can tolerate partially shaded conditions. *Phoenix reclinata* is typical of the Riverine vegetation along the upper tributaries of the local rivers, but most of this Riverine vegetation is, however, now overgrown with dense stands of *Acacia caffra* and *Adenopodia spicata*. These woody pioneer species were probably also favoured by the altered fire regime of the area, which creates the impression that forest and Thicket vegetation was more abundant in this unit. Small patches of forest in which *Erythrina caffra*, *Ficus thonningii* and *Rhus chirindensis* are abundant, still occur along water drainage areas within this unit and where outcrops of Dolerite occur in high rainfall areas. The only known rare species, *Brachystelma caffrum*, known to occur in this unit occurs in the Savanna vegetation.

Dynamic Ecosystem Processes of Buffels Thicket

The vegetation of this relatively high rainfall area is very dynamic. It responded so rapidly to changes in the natural disturbance regime (fire and grazing by large herbivores), that it is quite difficult to reconstruct its original condition in some areas. The Buffels River Thicket occurs in a narrow zone between the Grassland and Savanna of the open fire-prone slopes and Forests of the fire-protected Ravines. Today it merges readily with both the Forest, often to the point that it is impossible to draw a clear line between these two vegetation types, and Savanna vegetation. In the case of forests, over protection against periodic fires (as in e.g. Umtiza Reserve) enabled forest elements to displace much of the original Thicket vegetation. We would postulate that these Thicket clumps in the forest zone occurred amongst patches of Grassland and/or Savanna, which would have been maintained by large herbivores and periodic lightning fires. With the removal of these natural disturbance regimes the forest trees quickly displaced these fire-dependant elements. The somewhat spiny local endemic tree, *Umtiza listeriana*, was probably an important forest ecotone species. It may well require fire and sunlight to stimulate healthy germination of seedlings, an aspect that should be investigated. Other evidence is the occurrence of large, unhealthy-looking specimens of *Encephalartos altensteinii* in deep shade within the forest. These plants probably established many years ago in sites where they were exposed to much more sunlight. The transformation of much of the present Savanna vegetation into a weedy thicket vegetation, or bush encroachment if you like, follows a very similar pattern to those of the Albany Thicket. Here the process is, however, even more dynamic. It is probably retarded only somewhat by the regular fires which retain the grass component under the canopy of the woody trees and shrubs. Without these fires these stands of weedy thicket vegetation will probably rapidly change into sub-tropical forest vegetation. It is thus exactly the reversed process of the more eastern areas (KwaZulu-Natal), where grassland has replaced forests, with thicket as the intermediate vegetation type. It is interesting to note that there is no Arid Thicket in the area and that the Buffels River Valley Thicket occupies the inland position, which in the more western region, is reserved for the Arid Thicket. The pattern from the west towards the east is that

the occurrence Arid Thicket diminishes and that it is replaced by Valley Thicket. In the easternmost thicket of this study, the Kei River Thicket, even the Valley Thicket is so fragmented that it does not occur as a solid unit. The pattern of the initial disintegration of the Arid Thicket and thereafter those of the Valley Thicket towards the east is clearly attributable to an increase in the rainfall, especially those of annual summer rainfall. An increase in the summer rain supports a higher grass component, which in turn supports more frequent fires, especially in areas experiencing a winter drought, when the 'Bergwind' brings the fires from the Drakensberg escarpment. This not only tells us that the Arid Thicket of the western areas is nothing more than just an "aridified" version of the Valley Thicket, but also that the species typical of the Valley Thicket is unable to cope with a mean annual summer rainfall of 500 mm. At a higher summer rainfall, it is replaced by Thicket.

Implications:

- Conservation value at a regional level for the site is low.

2.3.6 Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007)

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for conserving biodiversity and maintaining ecosystem functioning. In terms of the Biodiversity Act (Act 10 of 2004), the Minister or the MEC for environmental affairs in a province may determine a geographic region as a bioregion for the purposes of the Act and publish a plan for the management of biodiversity in that region. This plan is termed a 'bioregional plan' and must contain "measures for the effective management of biodiversity" in the region.

Figure 9 indicates the ECBCP categorisation of the site and surrounding area.

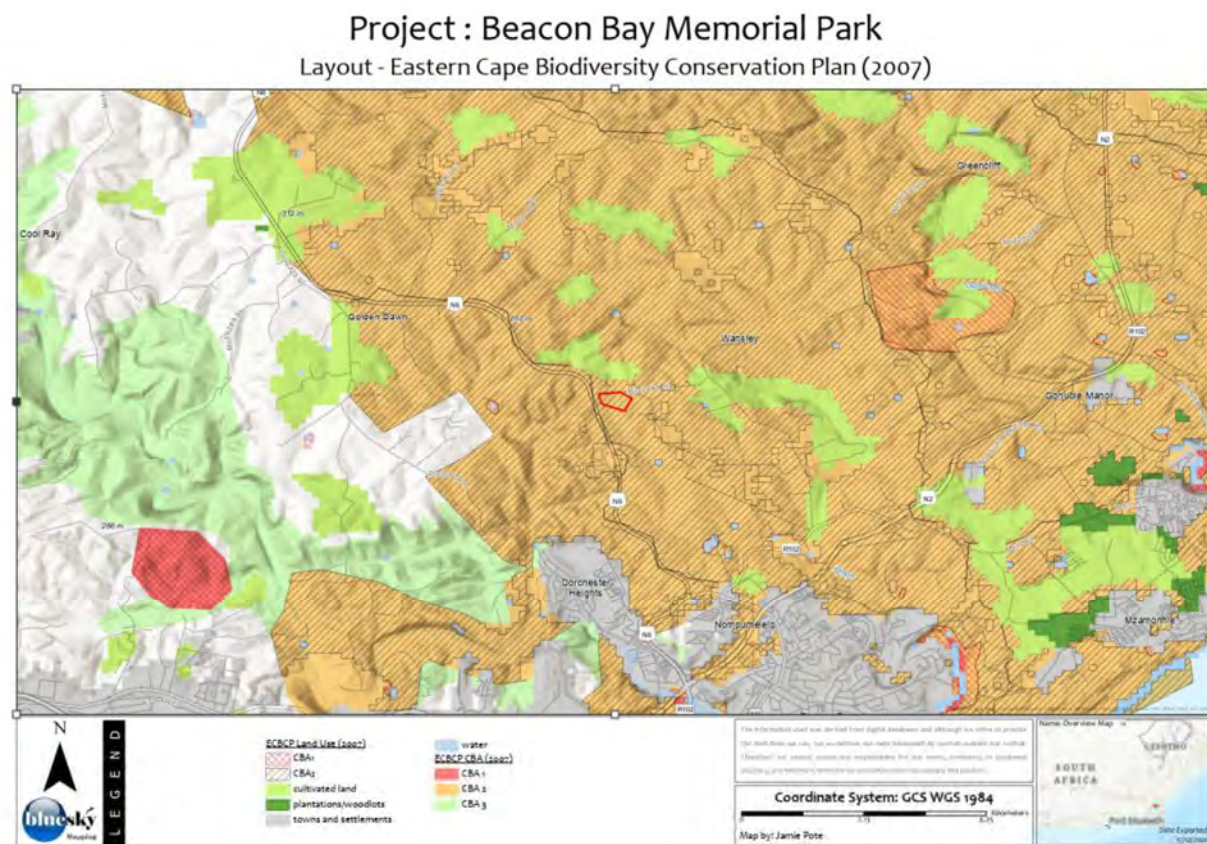


Figure 9: Critical Biodiversity and Protected Areas (ECBCP, 2007).

A bioregional plan must contain a map of CBAs, including terrestrial and aquatic features and ecological corridors. The map must show four main categories:

- Existing protected areas
- Critical Biodiversity Areas (for example, Threatened Ecosystems, Ecological Corridors, Special Habitats, Wetlands and Priority Sub-Catchments)
- Other Natural Habitat
- Areas where no natural habitat remains.

A bioregional plan must contain, amongst other things, guidelines for land-use planning and decision-making, linked to the features and categories on the map.

At the time of publication of the Eastern Cape Biodiversity Conservation plan (ECBCP) in 2007, there were several regional and national conservation planning initiatives overlapping with the province, including NSBA, DWAF Forest Conservation Planning, Wild Coast Conservation Plan, Pondoland Systematic Conservation Plan, STEP, SKEP, C.A.P.E and Grasslands Programme conservation plans, and the Maloti Drakensberg Transfrontier Project conservation plan. The aim of ECBCP was thus to integrate these existing conservation plans and to fill in the 'gaps areas', thereby providing a single, user friendly, biodiversity land-use decision support tool for the whole province. The ECBCP was not gazetted as a bioregional plan. The ECBCP Guidelines recommendations for these categorisations are as follows:

BLMC 1 (Natural Landscapes)

- Refers to areas which are critical for biodiversity persistence and ecosystem functioning, and which should be kept in as natural a condition as possible
- Includes Critically endangered vegetation types and areas essential for meeting biodiversity targets for biodiversity features
- Includes non-degraded CBA 1 areas.

Maintain biodiversity in as natural state as possible. Manage for no biodiversity loss.

BLMC 2 (Near natural landscapes):

- Includes degraded CBA 1 areas.
- Includes Endangered vegetation types; expert-mapped areas less than 25 000 ha in size, 1 km coastal buffer strip and ecological corridors identified by the ECBCP using an integrated corridor design.
- *Maintain biodiversity in near natural state with minimal loss of ecosystem integrity.*

No transformation of natural habitat should be permitted.

The site overlaps with ECBCP (2009) designated CBA 2 area. In terms of land-Use, ECBCP classified the site and immediate surrounding area at the time as natural. This has changed in the surrounding area somewhat in recent time as a result of urban expansion.

Implications:

- The proposed activity intersects within an ECBCP (2007) designated CBA 2 areas.
- Surrounding areas are generally natural, extensive with minimal fragmentation of ecological processes to the north and west of the site, but significantly fragmented to the south and east, since the site is situated more or less on the boundary between an urban and rural area.

2.3.7 Eastern Cape Biodiversity Conservation Plan (ECBCP, Ver 2, 2019)

A complete revision of the first version of the Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was undertaken in this assessment. Some of the many good reasons for this include: an updated land cover map, changes to Provincial borders, a large body of environmental and biodiversity data that has been generated over the past 10 years; and the development of approximately 29 other environmental and biodiversity plans for parts of the province that require integration. In addition, significant strides have been made with respect to defining and mapping biodiversity pattern and biodiversity processes, which have been standardised to ensure a level of consistency throughout the country (SANBI, 2017). The ECBCP (2019) will replace the ECBCP (2007) in its entirety.

The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) was developed in line with the principles and methods gazetted in the National Environmental Management: Biodiversity Act No 291 of 2009, "Guideline regarding the determination of Bioregions and the Preparation of and publication of Bioregional Plans". The management objectives required to achieve the desired state, as described by the ECBCP (2019) are indicated in Table 2 for the site, as depicted in Figure 10.

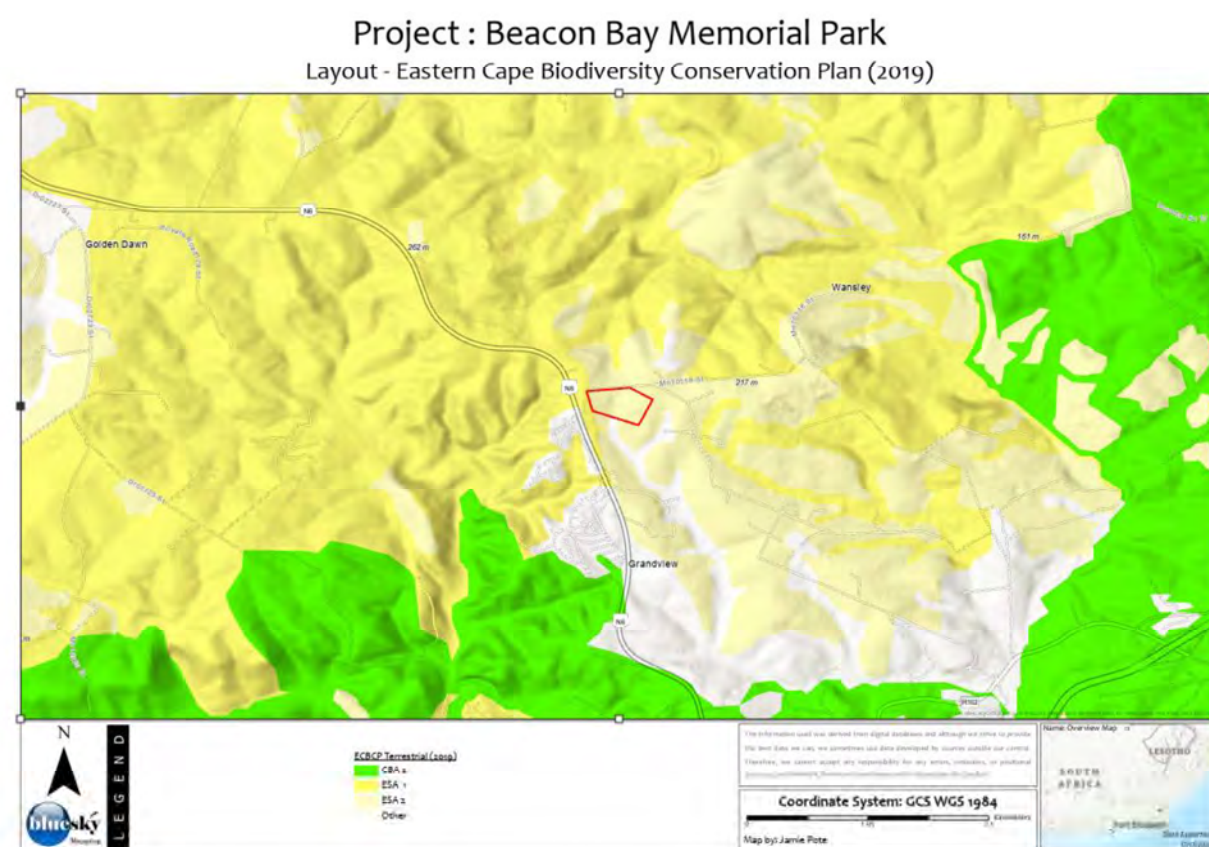


Figure 10: Critical Biodiversity and Protected Areas (ECBCP, 2019).

Table 2: Linking CBA categories to management objectives.

CBA Map Category	Desired State	Land management objective
Protected Areas	Natural	Protected Areas are managed through Protected Area Management Plans and are therefore not managed through the ECBCP (2019).
Critical Biodiversity Area 1	Natural	Maintain in a natural state (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA 1, the following objectives must apply:

CBA Map Category	Desired State	Land management objective
		- Ecosystem and species must remain intact and undisturbed; - Since these areas demonstrate high irreplaceability, if disturbed or lost, biodiversity targets will not be met; - Important: these biodiversity features are at, or beyond, their limits of acceptable change. If land use activities are unavoidable in these areas and depending on expert opinion of the condition of the site, a Biodiversity Offset must be designed and implemented.
Critical Biodiversity Area 2	Natural	Maintain in natural (or near-natural state if this is the current condition of the site) that secures the retention of biodiversity pattern and ecological processes: For areas classified as CBA 2, the following objectives must apply: - Ecosystem and species must remain intact and undisturbed. There is some flexibility in the landscape to achieve biodiversity targets in these areas. It must be noted that the loss of a CBA 2 area may elevate other CBA 2 areas to a CBA 1 category. - These biodiversity features are at risk of reaching their limits of acceptable change. If land use activities are unavoidable in these areas, and depending on the condition of the site, set-aside areas must be designed in the layout and implemented. If site specific data confirms that biodiversity is significant, unique and/or highly threatened or that a Critically Endangered or Endangered species is present, Biodiversity Offsets must be implemented.
Ecological Support Area 1	Functional	Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained. For areas classified as ESA 1, the following objectives apply: - These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience. - These systems may vary in condition and maintaining function is the main objective, therefore: - Ecosystems still in natural, near natural state should be maintained. - Ecosystems that are moderately disturbed/degraded should be restored.
Ecological Support Area 2	Functional	Maintain current land use with no intensification. For areas classified as ESA 2, the following objectives apply: - These areas have already been subjected to severe and/or irreversible modification - These areas are not required to meet biodiversity targets, but they may still perform some function with respect to connectivity, ecosystem service delivery and climate change resilience - Objective is to maintain remaining function, therefore: - Areas should not undergo any further deterioration in ecological function. - Opportunities to change land use practices to improve ecological function (i.e. cultivation agriculture to livestock grazing agriculture) are desirable in ESA2 areas.
Other Natural Areas and No Natural Habitat Remaining	Production	No desired state or management objective is provided for ONA or NNR.

Description of land use types and activities

A range of various land use types and activities associated with the Eastern Cape are described below. These have been derived from SPLUMA land use categories, municipal zoning scheme definitions and

predominant land uses, and practices present in the Eastern Cape. Each category has been expressly linked to corresponding SPLUMA land use category for the purposes of facilitating the integration of the CBA map land use guidelines into other spatial planning products such as Spatial Development Frameworks. These land uses are described in more detail in Table 3 below.

Table 3: Description of Land Use Types and Activities.

Environmental Conservation Environmental Conservation is where land uses are primarily involved with conservation activities. These include: • Conservation management activities in formal protected areas and informal conservation areas managed for biodiversity (wildlife conservation and recreational/educational tourism); • Low-intensity eco-tourism activities (such as hiking trails). Subject to appropriate controls, planning and management, these land use activities can be accommodated in CBAs and ESAs. It is the preferred land use in CBAs and ESAs. This land use zone corresponds to the SPLUMA scheduled land use purpose 'conservation'. This land use activity provides for the following: • Protection of the natural environment and natural processes for their cultural, historic, scientific, scenic, biodiversity, habitat or economic. Sustainable delivery of ecosystem services to the community.
Tourism The Tourism and Accommodation land use covers broad range of tourist and recreational facility types, inclusive of tourism, recreation and accommodation facilities. Tourism and Accommodation is divided into two sub-categories depending on the level of intensity of development and types of activities involved: Low impact tourism, recreation and accommodation This includes low impact facilities that include camp sites and "rondavels" or traditional homestead structures, hiking trails, ablutions, gift/coffee shops, cultural centres. Sustainable rural tourism, rural businesses and communities that provide for the rural recreational and leisure needs of urban and rural dwellers, could be allowed in CBAs and ESAs provided that the development is in keeping with the management objective of the CBA or ESA and is subject to the appropriate biodiversity-related controls being in place. The SPLUMA land use purpose for this activity would be 'Residential', but would have an equivalent classification in a municipal zoning scheme of 'Low density Special/Resort Zone'. High-impact tourism facilities This includes developments such as lodges, hotels, large resorts, golf courses and estates. High-impact tourism and accommodation facilities should only be considered in ESA 2 or ONA's. In all cases, the current state of ESA 2 areas must be maintained (e.g. pineapple field converted to golf-course would maintain connectivity in the landscape). The location of infrastructure must be placed outside of natural areas (CBAs and ESAs), must be clustered and be located adjacent to existing urban development. The SPLUMA land use purpose for this activity would be 'Residential', but would have an equivalent classification in a municipal zoning scheme of 'Special/Resort Zone'.
Municipal commonage The municipal commonage areas provide for the implementation of the Municipal Commonage Policy of the National Government and the relevant municipality, and to promote and facilitate local agri-economic development. This land use corresponds to the SPLUMA scheduled land use purpose 'agriculture' and is often used for extensive unmanaged grazing, which is not compatible with land management objectives of CBAs, but may (under management) be permitted in ESAs. Commonage is typically covered by natural vegetation. These areas therefore have the potential to contribute towards biodiversity conservation if managed appropriately and may be instrumental for retaining ecological connectivity across landscapes.
Rural residential The rural residential land use type includes a range of residential and recreational activities. It is divided into two sub-types described below. The SPLUMA land use purpose would be 'Residential' but may be associated with a municipal zoning scheme equivalent of 'low density/special/resort'. Low density rural housing and eco-estates This land use type is associated with low density residential and eco-estate development. Low density is defined here as covering 0.2% (please see text box below for clarification) or less of a property. It makes provision for rural housing development such as low-density, lifestyle estates, multi-ownership of reserves, eco-estates (but excluding golf estates). Land uses in this zone can be compatible in CBAs and ESAs, although impacts should be carefully assessed and managed.

NOTE: It is important to clarify how the 0.2% was derived. Several zoning schemes throughout South Africa enforce a land use policy on agricultural land which restricts the development of dwelling units on agricultural land. The number of units typically permitted is 1 per 10 ha. This has been used as the basis for what can be considered rural development. For the purposes of the ECBCP (2019) land use guidelines this policy (1 dwelling unit per 10 ha) was adapted and converted to an area-based unit. This was done by determining a reasonable area of influence of a single rural dwelling unit (200 m² including household gardens). This area was then multiplied by the number of units permitted in terms of the policy to be developed on 100 ha in a rural area (e.g. 10 units in 100 ha) in order to determine the development footprint on 100 ha. The ECBCP (2019) therefore defines rural housing and eco-estates as development footprints that cover 200 m² per 10 ha or 0.2 ha per 100 ha or 2 ha per 1000 ha, irrespective of the number of units.

Traditional/Communal and Low-medium density rural development

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

The following conditions should be observed for all rural development applications:

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

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

High density urban residential development

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

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

Other urban influences

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

Agriculture

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

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

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

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

Extensive Game and Livestock Farming

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

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

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

Intensive Game Breeding

Game breeding involves the subdivision of grazing veld into small camps (less than 100 ha) using fencing that does not allow free movement of naturally occurring wildlife (e.g. small mammals, reptiles, etc.).

Game breeding involves supplemental feeding of animals allowing stocking rates in excess of recommended carrying capacities and is considered a form of feedlot production. The forms of fencing used create impenetrable barriers to wildlife movement in the landscape.

Game breeding should not be permitted in CBAs or ESAs as is not considered compatible with the land management objectives for these categories.

Feedlots and agri-processing

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

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

Cultivation

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

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

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

Open Space

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

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

Low, high and general industry

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

Transport Services

This land use accommodates transportation service functions and land uses such as airports, railway stations, petro-ports and truck stops, bus and taxi ranks and other transport depots. These activities correspond to the SPLUMA scheduled 'Transport' land use purpose.

The permitted land uses in this category are not compatible with CBAs and most ESAs.

Roads and railways

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

Other utilities

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

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

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

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

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

Water projects and power stations

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

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

In both cases, infrastructure located within CBAs must be accompanied by biodiversity offset design and implementation.

Waterworks and Wastewater Treatment Works (WWTW)

This category includes installations serving rural and urban areas including water and wastewater treatment and includes associated reticulation infrastructure e.g., pump stations and pipelines. Water and WWTW's should not be located in CBAs or ESAs. WWTW's may have significant impacts on water quality, therefore discharge of effluent into Aquatic CBA 1 rivers should not be considered.

Renewable Energy

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

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

Solar PV facilities are area-hungry activities which typically require considerable landscaping and the clearance of indigenous vegetation. Even if vegetation is left intact, a change in sunlight regime may alter the natural species composition. This activity is, therefore, not appropriate in CBAs or ESA 1. In some cases, it may be acceptable to utilise ESA 2, provided that connectivity is maintained in the development design.

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

Quarrying and Mining

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

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

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

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

The following additional conditions should be observed:

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

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

Implications:

- Elements of the proposed activity will intersect with ECBCP (2019) designated ESA 2 areas.
- The proposed activity is not within the recommended management recommendations; however, ecological function and ecosystem services will not be significantly affected by the proposed activity in light of the extensive intact vegetation surrounding the site as well as the proposed activity being within areas that were previously transformed, while retaining the untransformed areas.

2.3.8 Other Biodiversity Sector Plans

The site is outside of the planning domain of any other Biodiversity Sector Plans. A revision of the ECBCP is in progress but has at the time of this report not yet been gazetted and the information is not yet available. Should the plan be officially released before the final submission of this application, a revision of the findings of this report may be required. However, it is noted that the historical use of the site and the secondary nature of the vegetation within will not be changed by any revised regional plan, hence the overall findings and recommendations of this report are unlikely to change substantially.

2.3.9 Protected areas

The South Africa Protected Areas Database (SAPAD) database, a comprehensive database of various protected area categories, is updated on a quarterly basis, and provides a comprehensive source of all national and private nature reserves, world heritage sites and other formal legally protected conservation areas situated within South Africa (Table 4). The Quenera and Nahoon Nature Reserves are closest, situated 6 and 6.5 km to the south-east. Other protected areas in the vicinity exceed 10 km from the site.

Table 4: List of Protected Areas in vicinity

NAME	DISTANCE
Quenera Nature Reserve	6 km SE
Nahoon Nature Reserve	6.5 km S
Umtiza, Grey Dell and Fort Grey Forest Nature Reserves	12 km SW
Kweleru Nature Reserve	12 km E

When projects are located in legally protected and internationally recognized areas, clients should ensure that project activities are consistent with any national land use, resource use, and management criteria (including Protected Area Management Plans, National Biodiversity Strategy and Action Plans (NBSAP's), or similar documents).

Neither these protected areas nor any ecological processes associated with them are likely to be affected by the proposed project. No RAMSAR sites are affected or situated within the Local municipal area and no Marine Protected Areas are directly affected.

Implications:

- The activity will have no direct, indirect or cumulative impact on any protected environment.

2.3.10 Strategic Water Source Areas

Strategic water source areas (Figure 11) are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy. Strategic water source areas are those that supply substantial downstream economies and urban centres. These water source areas are vital to the national economy.

Strategic water source areas can be regarded as natural "water factories", supporting growth and development needs that are often far away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support. Appropriate management of these areas, which often occupy only a small fraction of the land surface area, can greatly support downstream sustainability of water quality and quantity.

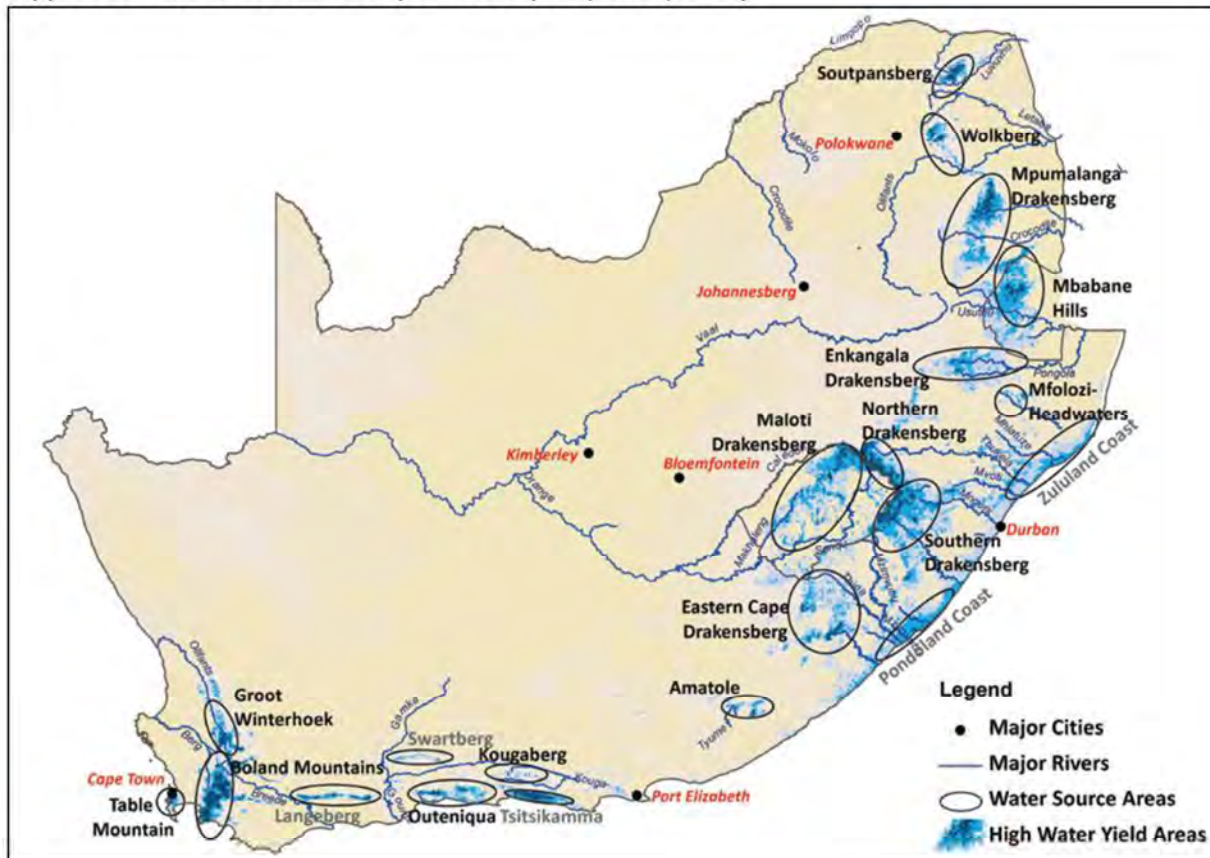


Figure 11: South Africa Water Source Areas [Source: Nel, et al, 2013]

In South Africa, such management is particularly important for enhancing downstream water quality and quantity. Not only are the country's surface water resources extremely limited – South Africa is considered to be one of the driest countries (per capita), with 98 per cent of its surface water already developed – but the country also has a growing water quality problem.

Overloading with nutrients and other pollutants from urban, agricultural and industrial waste has resulted in many dams shifting to an algae-dominated, or eutrophic, state. Sixty-five per cent of the country's dams are now estimated to be eutrophic or borderline eutrophic, with most of these algal blooms containing cyanobacteria (blue-green algae) that is toxic to human health. This renders water of high quality unavailable if not treated, which coupled with failing water infrastructure, represents a major challenge to water security in the near future. Water managers are inevitably faced with finding new and innovative

ways of improving both water quality and quantity to meet the increasing water demands of the country. Managing strategic water source areas is one way to meet this challenge.

The site is not situated within a Strategic Water Source Area and the specific activity is unlikely to have any downstream impact on any Strategic Water Source area, as it will not alter water flows.

Implications:

- There is unlikely to be any significant impacts to any critical water supply to downstream economies and urban centres as a result of development of this site, which is small in size and will not significantly affect water flow or catchment runoff.

2.3.11 Freshwater Ecosystem Priority Areas

The National Freshwater Ecosystem Priority Areas (NFEPA) project responds to the high levels of threat prevalent in river, wetland and estuary ecosystems of South Africa. It provides strategic spatial priorities for conserving the country's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or 'FEPAs'.

Biodiversity targets set minimum, quantitative requirements for biodiversity conservation. They reflect scientific best judgement and will need to be refined as knowledge evolves.

Project : Beacon Bay Memorial Park

Layout - Rivers and Wetlands

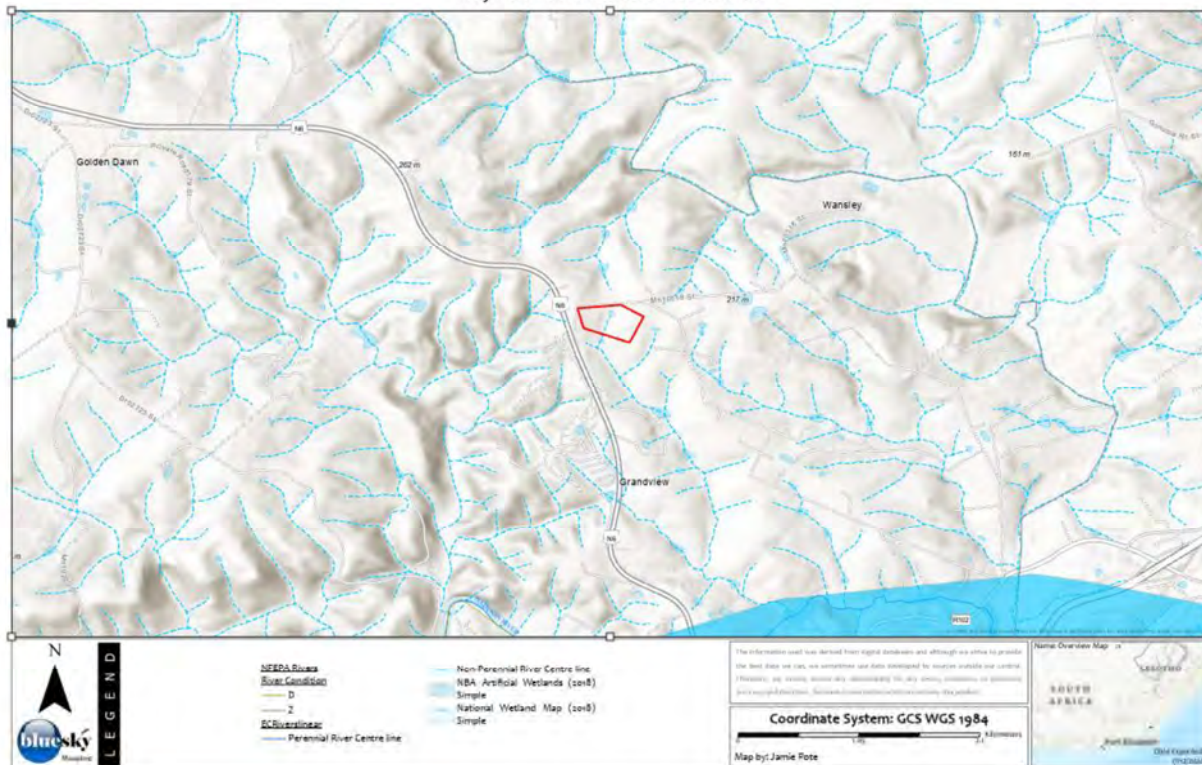


Figure 12: Rivers and Wetlands

Quantitative biodiversity targets were set for fish species, river ecosystem types, wetland ecosystem types, priority estuaries, wetland clusters and free-flowing rivers:

1. Threatened and near-threatened freshwater fish species – all populations (100%) of considered to be critically endangered or endangered species, and at least ten populations of species that are in the International Union for Conservation of Nature (IUCN) vulnerable or near threatened categories and some populations of conservation concern (e.g. very restricted distributions in South Africa)
2. River ecosystem types – 20% of total length per type
3. Wetland ecosystem types – 20% of total area per type
4. Wetland clusters – 20% of total area per wetland vegetation group
5. Free-flowing rivers – 20% of total length per ecoregion group
6. Priority estuaries – 100% of all priority estuaries, which already took into account biodiversity targets of 20% for estuary ecosystem types and habitat, 50% of the populations of threatened species; 40% of the populations of exploited estuarine species; 30% of the populations of all other estuarine species.

Terrestrial and aquatic resources are interdependent, with one affecting the other. For example, to ensure the healthy functioning of rivers, wetlands and estuaries, it is essential to protect mountain catchment areas where the water originates, and to safeguard riverside vegetation because these plants prevent soil erosion, sedimentation and water pollution (Vromans et al., 2012).

The health of a river ecosystem is largely dependent on the presence of natural vegetation or “riparian habitat” along its banks, including good vegetative cover within the surrounding landscape (catchment area). Riparian bank vegetation filters pollutants, helps maintain water temperatures, supplies organic matter (“food”) in support of aquatic life (fish, insects etc.) and acts as a buffer to adjacent land-uses. The roots of the riparian plants also reduce the effects of floods, by binding riverbanks and thus preventing erosion. Furthermore, bank storage is increased by slowing run off during floods. For these reasons, it is essential that new developments are separated from a river and its “riparian habitat” by a buffer area.

Concerning terrestrial fauna and flora components associated with Freshwater Ecosystem Priority Areas, the site is not in close proximity to any aquatic features or aquatic functional zones. The site is drained by a non-perennial tributary of the Qinira River, which has a NFEPA Class D: Largely Modified designation and is situated over 1 km to south of the site. It is unlikely to be affected significantly because of the development of the site.

Implications:

- The site is situated over 1 km from a NFEPA Class-D River. A non-perennial watercourse drains the site, which ultimately flows into the Qinira River, however there is likely to be minimal direct or indirect impact of a terrestrial nature (i.e. riparian), with implementation of adequate stormwater management structures and retention of the recommended buffers around the watercourse.

2.3.12 Regional Hotspots and Centres of Endemism

The site is situated within the Maputaland-Pondoland region and is located inland of the Pondoland Centre of Endemism. The Pondoland centre is associated with the Msikaba Formation Sandstone found in a coastal band between Port St Johns and Port Shepstone.

The location of the proposed activity in proximity to but outside of the Pondoland centre of Endemism suggests that the screening for possible endemic species should be undertaken. Additional screening of endemic species has thus been undertaken and is provided in Section 3.1.8. No endemic species, or species having a limited distribution range were found within the site, which is confirmed to have undergone periodic disturbances of an agricultural nature (i.e. ploughing and tunnels).

Implications:

- Several endemic species could possibly occur within the wider area, but none of these were found within the site footprint. A residual risk will be present, although all reasonable attempts have been made to locate any such species.
- Due to the level of disturbance that has already occurred at the site (i.e., historical cultivation), it is unlikely that any species of concern will persist.

2.3.13 Key Biodiversity Areas

Important Bird Areas

Important Bird and Biodiversity Areas (IBA's) are sites of international significance for the conservation of the world's birds and other biodiversity. They also provide essential benefits to people, such as food, materials, water, climate regulation and flood attenuation, as well as opportunities for recreation and spiritual fulfilment. By conserving IBA's, we look after all the ecosystem goods and services they provide, which means in effect that we support a meaningful component of the South African economy (such as water management and agriculture). Since the late 1970s, more than 12 000 IBA's have been identified in virtually all of the world's countries and territories, both on land and at sea. In 1998, 122 South African IBA's were identified and listed in Barnes (1998). This inventory was revised to 112 IBA's in 2015. IBA's have also had considerable and increasing relevance when responses have been developed to several wider environmental issues, such as habitat loss, ecosystem degradation, climate change and the sustainable use of resources. The core aims of the IBA Programme are:

- To identify, monitor and conserve the sites and habitats that support South Africa's priority bird species.
- To develop a network of partners, from grassroots to national level, who collaborate to conserve IBA's.
- To gather new data regularly and monitor IBA's in order to track status and trends across the network and so that up-to-date information can be passed on to decision-makers, enabling them to take appropriate conservation action.
- To confirm periodically that existing IBA's continue to meet the selection criteria and to identify other critical sites that may qualify for recognition as IBA's as new information becomes available.
- To build capacity in the IBA Programme by sourcing funding, and to acquire and develop appropriate skills in staff and volunteers so that these objectives can be implemented at a regional scale.

The extension of the IBA approach to several other wildlife groups has led to the identification of Important Plant Areas, Prime Butterfly Areas, Important Mammal Areas and Key Biodiversity Areas for Freshwater Biodiversity. South Africa is also the first mega diverse country to practically test the Key Biodiversity Areas (KBA's) standards across a full range of species groups and ecosystems but is not yet published.

The site is not in proximity to any designated IBA's.

Implications:

- The proposed activity is unlikely to have any impact on any designated IBA.

2.4 Vegetation and Ecological Processes and Corridors

2.4.1 Critical Biodiversity Areas

Given that the objective of CBAs is to identify biodiversity priority areas which should be maintained in a natural to near natural state, development within these areas is not encouraged. The following issues need to be considered when considering development within a CBA:

- Are there alternative areas within the site but outside of the CBA that could be developed?
- Does the project undermine the overall ecological functioning of the broad CBA area?
- Can mitigation measures reduce the impact of the development on ecological processes?

Implications:

- The land use of the immediate area is classed as natural.
- The site is within an area designated as CBA 2 and can be considered to be natural and intact with some disturbance.

2.4.2 Ecosystem Processes

Distinct ecological processes are generally associated with surface geology and soils, climate, topography, drainage systems, and the make-up of the remaining native vegetation. These features could be missed or only partly incorporated into land use plans unless they are specifically identified and targeted. Ideally, areas maintaining adaptive diversification (e.g. environmental gradients) or containing historically isolated populations should be identified and protected. The spatial aspect of ecological processes also needs to be determined and such insights incorporated in conservation planning. Finally, connectivity within these areas should be ensured to maintain species migration and gene flow. However, the spatial components of processes have rarely been considered in conservation planning – an approach that is also especially useful for development planning in biodiversity hotspots. Three types of ecological processes are discussed below.

Implications:

- The site is within an ECBCP (2019) designated ecological support area that is situated on the north side of the greater East London urban area. The limited size of the site and proposed activity is unlikely to have any significant impact on broader ecosystem processes.

2.4.3 Ecosystem Services

“Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fibre; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services, recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling”. (Millennium Ecosystem Assessment (MEA), 2005)

Terrestrial (or land) ecosystems provide valuable ecosystem services that contribute to human well-being. They can provide³:

- buffers against natural hazards such as fire and floods^(e)
- carbon sequestration (storage), important for reducing the impacts of climate change^(e)

³ Within the study area, terrestrial ecosystem services are marked ^(e).

- regulation of water supply^(e)
- grazing for wild animals and livestock^(e)
- natural spaces for recreation & tourism^(e)
- the air we breathe^(e)
- spiritual, ritual and ceremonies^(e)
- horticultural & wildflower industries
- natural heritage^(e)
- food, timber, fibre and medicinal plants^(e)

Rivers are central to human welfare and economic development. They provide:

- water for agricultural, industrial and domestic uses^(e)
- flood attenuation and regulation^(e)
- food and medicinal plants^(e)
- transport and/or purification of biodegradable wastes^(e)
- tourism, recreational and cultural use^(e)
- enhanced property values

Estuaries, together with an associated buffer of natural vegetation, perform several valuable functions, especially in relation to:

- subsistence fishing
- commercial fisheries (as they provide a refuge for commercial fishes when they are young)
- wildlife habitat e.g. nursery and refuge (providing habitat for amphibians, birds, fish and mammals for all or portions of their life cycles)
- tourism, recreational, cultural use and craft materials
- enhanced property values

Ecological corridors provide valuable ecosystem services that are often impossible or very costly to replicate or offset. For example, they:

- support the migration (movement) and long-term survival of plant and animal species and their ecological processes (e.g. fire, pollination, seed dispersal), in response to global climate change
- are important areas for storing carbon to reduce the impacts of global climate change
- are important areas for regulating water supply (e.g. filtering and storing drinking water, keeping excess nutrients out of wetlands and rivers, ensuring a high-water yield from mountain catchments)
- supply good quality water from mountain catchment areas, both surface and groundwater.
- the supply of water quality and quantity is not only for human consumption but for ensuring the survival of downstream estuaries, wetlands (vleis) and streams (which in turn provide us with other ecosystem services).
- are of important scenic value, contributing to tourism and the 'sense of place'.^(e)
- Coastal & marine areas
- Subsistence & commercial fishing (food)
- Medicinal & Cosmetic resources e.g. kelp & microscopic plants for the feed, food, cosmetics, & pharmaceutical industries.
- Mining (sand and heavy mineral)
- Recreational value (sport and fishing)
- Retail value (market-value of housing)^(e)

Net Primary production^(e): This critical ecological process involves the process of photosynthesis – which translates into the amount of carbon plants can fix on an annual basis. This is important for each LM within the district as the amount of carbon fixed translates directly into the amount of forage produced

and thus made available for grazing. Consequently, livestock management directly impacts upon forage production as overgrazing reduces the vegetations' ability to maintain this ecosystem process. This ecological process is especially significant for the ORT, as the main land use comprises of livestock grazing. Therefore, this factor has a direct bearing on both the amount of food available for livestock, and the amount of plant material available regarding reducing runoff in wetland areas.

Water production: In more arid areas, many municipalities and towns rely on groundwater or local water resources to supply to town with drinking water. Thus, the higher rainfall areas are key recharge zones for these groundwater resources. Consequently, land use management of these catchment areas are critical for the maintenance of the quality and quantity of water sourced from each area. For example, water courses and wetlands that have been cleared for agricultural purposes, or overgrazed, will not only cause soil erosion, but most importantly cause increased water runoff, thus reducing the amount of water that feeds back into the water table for consumption. Groundwater is also a critical resource for agriculture and food production.

Species movement corridors and climatic refuges: Global climate change is undoubtedly a threat in the coming decades. A key action to mitigate its effects is the maintenance of species' ability to migrate to new locations as the climatic conditions which they require move across the landscape. These corridor and refuge migration strategies occur on both a micro and macro level. On the macro scale corridors provide for species movement at landscape scales. This entails the ability of fauna and flora to undertake large scale movements towards areas which continue to provide the conditions required by a species for growth and reproduction. Movements could entail migrations of up to hundreds of kilometres, and corridors of mostly natural or near natural vegetation across the landscape are needed to permit this to occur. Climatic refuges can be localized areas that have moderated climates – such as mountain kloofs and south facing slopes. These areas provide cooler habitats where species under threat from changing climates can colonise or species and vegetation not widely found in surrounding area.

Within the site, the most important ecosystem services are the limited provision of habitat for faunal species (foraging) and possibly cultural use (possible medicinal bark harvesting was noted) and livestock grazing, as well as limited potential for cultivation. There is already a significant change to ecosystem services from predevelopment conditions because of surrounding development and historical agricultural use of the site.

Implications:

- The contribution of the site to any ecosystem services of an ecological or biodiversity nature is low to moderate.
- The proposed activity will not significantly affect ecosystem services as described above.

2.4.4 Ecological Support Areas

These include supporting zones required to prevent the degradation of Critical Biodiversity Areas and Protected Areas. An ESA may be an ecological process area that connects and therefore sustains Critical Biodiversity Areas or a terrestrial feature. The ESA'S are not well defined in the ECBCP (refer to Section 2.3.8). ESA's are generally extensions to the CBA area incorporating small areas that are perhaps no longer natural, or are comprised of secondary vegetation, generally following the drainage line ecological corridors within the wider surrounding landscape that will improve connectivity.

Implications:

- The site is within an ECBCP (2019) designated ecological support area that is situated on the north side of the greater East London urban area. The limited size of the site and proposed activity is unlikely to have any significant impact on broader ecosystem processes.

3 Biodiversity Risk Identification and Assessment

3.1 Baseline Biodiversity Description

3.1.1 Site Locality

The subject property is situated east of the N6 north of Grand View in Beacon Bay, Buffalo City Municipality on portion 50 of farm 821. The site is approximately 10.5 Ha in extent.

3.1.2 Topography and Drainage

The site falls within a hilly to gently undulating area incised by a network of minor non-perennial drainage lines which feed more incised rivers towards the coast.

3.1.3 Terrestrial Landscape Features (Habitat)

Overview

The project area is generally characterised by gently undulating hills and slopes with a short savanna grassland (thornveld) with scattered trees on the gentler slopes and hilltops and a denser thicket in fire protected areas which include dolerite outcrops and along watercourses. The thornveld vegetation, where present is largely secondary, since it would have been favoured historically for agriculture, including crops and pastures as well as being cleared for grazing.

Project : Beacon Bay Memorial Park

Layout - Vegetation Sensitivity



Figure 13 Mapped Vegetation on the site.

Within the site, as indicated in Figure 13, both the secondary savanna (Thornveld) vegetation and denser thicket is present. The thornveld is entirely secondary, based on site observations and historical aerial

photographs, with contour lines still visible in the landscape even after approximately 15 years of regeneration.



Figure 14: Overview of site, with old lands, comprising typical secondary Thornveld, dominating the landscape



Figure 15: Typical secondary South-Eastern Coastal Thornveld with grasses, forbs, and scattered trees.

The thornveld (Figure 14 & Figure 15), which are all old lands and constituting 7.5 Ha, are comprised of a grassland with a well-represented forb component and scattered trees. Thornveld grasses include *Digitaria natalensis*, *Cynodon dactylon*, *Dactyloctenium australe*, *Brachiaria serrata*, *Cymbopogon marginatus*, *Ehrharta calycina*, *Ehrharta erecta*, *Eragrostis capensis*, *Eragrostis curvula*, *Eragrostis plana*, *Setaria sphacelata*, *Sporobolus africanus*, *Themeda triandra*, *Tristachya leucothrix* and *Heteropogon contortus*. Herbs and Shrubs within the Thornveld include *Chamaecrista mimosoides*, *Cheilanthes hirta*,

Chrysocoma ciliata, *Monsonia emarginata* and *Pelargonium alchemilloides*, with trees predominantly being *Vachellia karroo* but also with *Diospyros villosa*, *Canthium spinosum*, *Carissa bispinosa*, *Coddia rudis*, *Grewia occidentalis* and *Gymnosporia buxifolia* common. This thornveld is prone to frequent fire, which to some extent prevents it from attaining a denser thicket form. The trees appear to be resistant to fire after a certain size class is reached.

The thicket (Figure 16 & Figure 17) is comprised of a large clump located centrally within the site, a small patch on the western boundary and a band running centrally through the site surrounding a drainage line. This thicket constitutes 2.0 Ha of the site and is associated with a rockier area, with scattered patches of dolerite boulders, that is not only fire protected but also probably not suited to cultivation, hence it has been retained. A narrow band of thicket is also present along the western and northern fenceline boundary (0.5 Ha) which is likely mostly secondary, as is evident by a few larger trees, that are most likely remnants that were not cleared when the site was originally cultivated but has desertified with younger growth evident. The thicket along the watercourse is somewhat disturbed, having moderate alien invasion, predominantly ruderal weeds with the occasional wattle tree or tree clump. The main thicket clump is also comprised of a mix of older large trees, but with notable young growth, indicating it has likely densified in recent times and has likely been disturbed in the past. The understorey is typical of thicket, having low ground cover with herbaceous and graminoid components, moderately dense young growth and clumps of larger trees.



Figure 16: Typical near natural South-Eastern Coastal Thornveld, with buffels thicket tendencies.



Figure 17: Typical near natural Thicket understory.

The Thicket vegetation is comprised of multi-storey layers with the trees *Hippobromus pauciflorus*, *Brachylaena ilicifolia* and *Cussonia spicata* common and often emergent, with several other trees and shrubs including *Erythrina caffra*, *Allophylus decipiens*, *Apodytes dimidiata*, *Canthium spinosum*, *Capparis sepiaria*, *Carissa bispinosa*, *Clausena anisata*, *Coddia rudis*, *Grewia occidentalis*, *Gymnosporia buxifolia*, *Harpephyllum caffrum*, *Mystroxydon aethiopicum*, *Olea europaea* subsp. *africana*, *Pterocelastrus tricuspidatus*, *Scutia myrtina*, *Searsia lucida*, *Euclea natalensis* and *Zanthoxylum capense* generally forming the thicket canopy. *Sideroxylon inerme* is present but not common. Understorey is comprised of a mix of species including herbs, shrubs, grasses and climbers including *Cynanchum viminalis*, *Dietes iridioides*, *Rhoiacarpos capensis*, *Rhoicissus digitata*, *Rhoicissus tomentosa*, *Sansevieria hyacinthoides*, *Panicum deustum* and *Strelitzia reginae*. Single or several emergent trees are sometimes present in isolated patches where microclimate allows, giving an appearance of being forest like, however without overlapping crowns.

Also present within the site are two small more recently cultivated patches of 0.3 Ha (Figure 18) comprised of mainly grasses and some forbs and two small dams, 0.2 Ha in total (Figure 19 & Figure 20), that have been formed from historical excavations (borrow pits).

The above vegetation provides habitat for diverse but limited suite of animal species with a limited suite of different microhabitats. The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the localised impact associated with the site footprint would in general be of low to very low significance with implementation of several mitigation measures.



Figure 18: More recent cultivated lands, with indigenous grasses dominant.

3.1.4 Aquatic Habitat

Aquatic systems do not function in isolation and in terms of ecological processes, the aquatic systems are very closely linked to the terrestrial system. Perennial, nonperennial watercourses and wetlands are present in the wider area. A minor non-perennial watercourse traverses the site in a southerly direction and is surrounded by thicket with weed infestation including ruderal weed species and occasional wattle tree. The watercourse is poorly defined without having any distinct riparian vegetation, being enclosed by surrounding thicket. Refer to separate aquatic assessment report. At the top end of the drainage line is a small dam (artificial wetland), which was likely a historical excavation, possibly a borrow pit for gravel. The small dam will provide some seasonal wetland habitat for semi aquatic vegetation and fauna including bulrush (*Typha capensis*), which forms a small reedbed that would potentially provide seasonal nesting site for a few weavers (birds).



Figure 19: Drainage line with dense thicket.



Figure 20: Small seasonal dam (old borrow pit) at top end of drainage line.



Figure 21: Small depression wetland on possible historical excavation on eastern boundary surrounded by ring of rocks and thicket elements.

3.1.5 Present Ecological State

Table 5 provides a comprehensive description and assessment of biodiversity and ecological indicators for the site. In summary, the following general observations can be noted regarding the site:

- The Thornveld vegetation on site is secondary vegetation that has colonised historical cultivated lands.
- Remnant solid thicket is present, although it has likely been disturbed to historically, with large trees and younger growth evident.
- Alien invasion is presently low with occasional shrubs, herbs, and the occasional tree, including Bugweed, Lantana and Wattle.

Table 5: Summary of Key Biodiversity and Ecological Indicators

ASPECT	DESCRIPTION
LANDSCAPE AND COMMUNITY DESCRIPTION	
Aspect, Slope, Topography	Undulating hilly landscape
Substrate	Moderate to shallow rocky soils
Vegetation units	Bushveld/Thicket
Total Ground Cover (%)	> 80 %
Tree Height (m) – Median (alien species)	5 - 10 m
Tree Cover (%) Aerial	< 20 %
Shrub Cover (%)	> 20 %
Herbaceous Cover (%)	> 50 %
Grass Cover (%)	< 10 %
Bare soil/rock (%) and disturbed	
TERRESTRIAL LANDSCAPE FEATURES	

ASPECT	DESCRIPTION
Forest	No Forest is present, although emergent trees within patches of thicket can give appearance of being forest-like but without overlapping canopy.
Thicket	Vegetation is described as Bushveld but has thicket similarities, however fire is an important ecological driver, which is absent in thicket.
Grassland	Thornveld has a definite grassland element, including old lands which have temporary grassland characteristics in initial stages of successional rehabilitation, followed by trees.
Fynbos/Grassy Fynbos	No Fynbos elements are present
Riparian	Riparian vegetation is limited to aquatic habitat including the dams and along the watercourse.
Wetland	Wetland habitat is present on site, in the form of small dams from historical excavation (borrow pits).
Estuaries	No estuaries are present
Dunes/Coastal	No coastal/dune habitat is present
Rocky Outcrop Habitat	No notable rocky outcrop habitat is present, other than a few dolerite rock piles, which may provide a faunal refuge.
Fauna Nesting Sites	None observed, trees within the thicket pockets are likely to provide seasonal nesting sites for various small bird species.
Fauna Feeding Grounds	The Thornveld is likely to provide suitable habitat for a range of faunal species.
Ecotones	Ecotones are present but limited to interface between thornveld and solid thicket
Ecological Corridors	Thicket corridors along watercourses are likely important corridors.
Evolutionary Processes	None of significance within terrestrial environment
Transformed (housing)	Minimal, a residential area is present on the west and farmland to the north, east and south.
Transformed (other)	None
Degraded (modified)	The Thornveld vegetation, comprising 75 % of the site, was historically cultivated lands.
Secondary vegetation	
DISTURBANCES, CURRENT LAND USES AND SOURCES OF DEGRADATION	
Human disturbances	Human disturbance is high because of historical cultivation.
Habitat fragmentation	Fragmentation is moderate in the surrounding area comprising a mosaic of agricultural lands, settlements, and intact vegetation.
Invasive Alien Plants	Present in disturbed areas, primarily widespread weedy species such as Lantana and Bugweed with the occasional wattle or pine tree.
Other degradation	Rubble and other rubbish is present.
Remaining intact habitat:	Intact habitat is extensive in the surrounding landscape and within the site (thicket).
Grazing (livestock)	Surrounding area and the site is used for livestock grazing.
Hunting	Likely present in surrounding rural landscape
Conservation (passive)	General the area does contribute to passive conservation, having low population density and mosaic of intact and transformed vegetation. Not considered to be of significant importance locally or regionally.
Recreational (sport)	None
Other	None
PATTERNS OF BIODIVERSITY	
Flora	Flora diversity is low to moderate due to the presence of a single vegetation type, although the thicket, thornveld and dolerite rocky areas do provide a range of habitats.
Fauna	Fauna diversity is low to moderate.

ASPECT	DESCRIPTION
Species of Conservation Concern	A few species are potentially found in the region and vegetation units, none of significance were recorded within the site, other than several widespread but protected species.
ECOLOGICAL PROCESSES	
Gene dispersal barriers	Roads, settlements, agriculture, moderate to low fragmentation
Gene dispersal corridors	Extensive river valleys likely provide corridors for movement of a suite of fauna
Aeolian (dune) processes	None
Climatic gradients	Climatic gradients are absent.
Rivers and Drainage Lines (Riparian Vegetation)	Vegetated drainage lines will provide ecological corridors in proximity to and within the site.
Refuges (outcrops/islands)	Rocky and other refuges are present are not prominent within the site, other than a few rocky piles, some of which may be man-made (because of rock clearing during historical preparation for ploughing).
Fire	Thornveld vegetation is generally susceptible to fire, which is considered an important ecological driver. Although evident from a recent fire on site, it is apparent that the larger Thornveld tree are fire tolerant, but it is likely that excessive fire would kill off juveniles and favour a grassland vegetation, while exclusion of fire would most likely ultimately allow the regeneration of a solid thicket. Once established, a solid mature thicket would likely be less prone to fire.
Ecotones/Tension zones	Ecotones are not well developed because of the single vegetation unit, although interface between solid thicket and open thornveld will provide such habitat.
Erosion	Erosion is low within the site
ECOLOGICAL SERVICES	
Carbon storage	Thornveld is considered a moderate carbon accumulator, Thicket a moderate to high carbon accumulator.
Provisioning Services	Livestock grazing: Grazing is prevalent in the area with moderate grazing capacity. Timber (Building materials): Extensive woodlands likely used. Fuelwood: Extensive woodlands likely used. Food: None known Fibre: None known Medicinal plants: Various species in the surrounding area have medicinal properties and are most likely harvested informally.
Other (ornamentals)	None known
CONSERVATION IMPORTANCE	
Current Distribution (extent)	Vegetation unit has a widespread regional distribution covering an extensive area outside of the site footprint. More than 60 % is considered to be still intact.
Red Listed Species and other Species of Conservation Concern	A few species are potentially found in the region and vegetation units, none of significance were recorded within the site, other than several widespread but protected species.
Habitat for SSC	Several species of conservation concern are known from the general area, as well as the vegetation unit that is present. The site is likely to provide habitat viable potential for any of the mostly mobile faunal species as well as several flora species, although not considered to be significant.

ASPECT	DESCRIPTION
Relative Conservation importance	The site has a low overall significance regionally as the vegetation has a locally widespread distribution.
OTHER SENSITIVITIES	
Conservation importance	Low
Topography	Flat to undulating hills
Wetlands	No natural wetlands, several farm dams on site or in vicinity.
Rehabilitation potential	Rehabilitation potential is moderate to high for Thornveld, Low to moderate for thicket (depending on the level of disturbance).
Community structure	Community structure is relatively complex with a range of growth forms being present within thicket but significantly less complex in Thornveld.

3.1.6 Flora

Several endemic and range restricted species are known from the surrounding area. None were recorded, nor likely to be present. Note, there is a residual very-low possibility that these species could be present, and cannot be discounted without extensive seasonal sampling, which is generally outside the scope of such an assessment, unless a specific risk is identified. Due to the localised nature of the impact, as well as the level of degradation of the site, the risk of a species suffering any significant loss is very low.

No flora search and rescue procedure are likely to be required.

3.1.7 Fauna

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

Mammals

No large or medium sized mammals are likely to be found on the site, other than occasional visits from surrounding area or moving through the site. Should they be present during construction or operation of the cemetery, they will be mobile species that would move away from disturbance and with intact habitat available in the immediate surrounds would unlikely be negatively affected by the development. Sensitive species is not likely to be present other than as a transient visitor.

Small mammals within the habitat are generally also mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. A latent risk of mortality due to vehicular activity is thus possible. The risk of species of conservation concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity and a faunal search and rescue is not deemed to be required. The Giant Golden Mole may be present; however, there was no evidence of significant mole activity on the site during the site visit. Should it be present it is unlikely it would be significantly affected by the proposed activity (cemetery).

Avifauna and Bats

The affected area generally has a low human presence, so there has unlikely been significant displacement of birds. Extensive intact habitat is present in the wider area and the overall impacts of the development on birds is therefore likely to be of low to moderate significance, as they will easily relocate. The Knysna Woodpecker may be an occasional visitor of the thicket and surrounding Thornveld but is unlikely to be significantly affected as the Thicket will be retained and will not be disconnected from the surrounding landscape. The proposed activity is unlikely to pose any significant risk to bats.

Reptiles

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

Amphibians

Several common and widespread species are likely to be associated with the seasonal dams. No amphibians of conservation concern are likely to be present that will be significantly affected.

Invertebrates

Invertebrate species noted to have an elevated conservation status are unlikely to be present within the site. The Bladder grasshopper as flagged in the National Screening Tool, may be present, however the proposed activity (cemetery) is unlikely to pose any significant risk, in addition similar habitat is quite widespread in the area and the area that has been earmarked for development is secondary vegetation.

3.1.8 Species of Conservation Concern occurring in the region

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

Red Listed, Endemic and Protected Flora

The site falls within the general distribution range of several endemic species and other species with a highly localised distribution, some of which are Critically Endangered, Endangered, Vulnerable or Rare. Some of these species are also only from a single or a few populations. As per Table 6, no Endangered or Critically Endangered flora species were confirmed to be present nor are known to be present in the affected area. The National environmental Screening Tool also does not flag any flora species. Listed species (Table 6) were flagged from various data sources for the region, having an elevated status and/or being protected in terms of any applicable legislation. All were cross-checked for distribution overlay and were actively screened for presence/absence on site. Some species may be endemic, but distribution range has been checked and where they are widespread of not having an elevated status, they have not been short-listed. Sensitive species names have not been included, as per reporting protocol requirements.

Table 6: Flora Species of Conservation Concern.

SCIENTIFIC NAME	FAMILY	STATUS ⁴	COMMENT/PRESENCE
<i>Metarungia galpinii</i>	Acanthaceae	End, EN	Low shrub, BMT
<i>Cassipourea flanaganii</i>	Rhizophoraceae	End, EN, NFA	Geophytic herb, BMT, Not recorded
<i>Thunbergia capensis</i>	Acanthaceae	End, LC	Tall shrub, SECT

⁴ **NEST** – National Environmental Screening Tool (Very High, High, Medium, Low); **End** – Endemic; **ToPS** – Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (**LC**), Near Threatened (**NT**), Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**); **CITIES** – Conservation for International trade in Endangered Species.

⁵ **BMT** – Buffets Mesic Thicket; **SECT** – South-Eastern Coastal Thornveld.

SCIENTIFIC NAME	FAMILY	STATUS ¹	COMMENT/PRESENCE
<i>Searsia lucida</i>	Anacardiaceae	End, LC	Succulent tree, SECT
<i>Brachylaena elliptica</i>	Asteraceae	End, LC	Tree, SECT
<i>Senecio burchellii</i>	Asteraceae	End, LC	Tall Shrub, SECT
<i>Tarchonanthus littoralis</i>	Asteraceae	End, LC	Tall shrub, SECT
<i>Buxus macowanii</i>	Buxaceae	End, LC	Small Tree, BMT
<i>Pterocelastrus tricuspidatus</i>	Celastraceae	End, LC	Small tree, SECT
<i>Crassula pellucida</i>	Crassulaceae	End, LC	Graminoid, SECT
<i>Diospyros simii</i>	Ebenaceae	End, LC	Graminoid, BMT
<i>Acalypha ecklonii</i>	Euphorbiaceae	End, LC	Herb, SECT
<i>Croton rivularis</i>	Euphorbiaceae	End, LC	Graminoid, SECT
<i>Rhynchosia ciliata</i>	Fabaceae	End, LC	Small tree, SECT
<i>Monsonia emarginata</i>	Geraniaceae	End, LC	Low shrub, SECT
<i>Phyllopodium cuneifolium</i>	Scrophulariaceae	End, LC	Small tree, SECT
<i>Selago corymbosa</i>	Scrophulariaceae	End, LC	Tall Shrub, SECT, Present in Thornveld
<i>Justicia bolusii</i>	Acanthaceae	End, Rare	Low shrub, BMT
<i>Encephalartos altensteinii</i>	Zamiaceae	End, VU, PNCO	Herb, BMT, Not recorded
<i>Aloidendron barberae</i>	Asphodelaceae	LC, PNCO	Herb, BMT
<i>Strelitzia reginae</i>	Strelitziaceae	LC, PNCO	Tall shrub, SECT, Present in thicket
<i>Sideroxylon inerme</i>	Sapotaceae	NFA, LC	Tall shrub, SECT, BMT
<i>Albuca bracteata</i>	Hyacinthaceae	PNCO, LC	Geophytic herb, BMT
<i>Dietes iridioides</i>	Iridaceae	PNCO, LC	Graminoid, BMT, Present, common in thicket
<i>Moraea pallida</i>	Iridaceae	PNCO, LC	Low shrub, SECT
<i>Habenaria arenaria</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Mystacidium capense</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Mystacidium venosum</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Polystachya ottoniana</i>	Orchidaceae	PNCO, LC	Woody Succulent Climber, LC, PNCO
<i>Polystachya pubescens</i>	Orchidaceae	PNCO, LC	Woody succulent climber, LC, PNCO
<i>Angraecum pusillum</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Bonatea speciosa</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Dendrobium sp.</i>	Orchidaceae	PNCO, LC	Woody climber,
<i>Eulophia speciosa</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Encephalartos villosus</i>	Zamiaceae	PNCO, LC	Herb, BMT, Not recorded

Red Listed and Protected Fauna

The site falls within the general distribution range of a few faunal species as indicated in Table 7 below. Since the project footprint is surrounded by extensive outlying areas of natural habitat, any disturbance or displacement associated with increased activity or habitat destruction as a direct result of the activity is unlikely to pose a significant negative impact to faunal species. None of the flagged species were noted during the site visit. Of the fauna flagged in the screening tool, Sensitive species 5 and the Knysna Woodpecker may be transient visitors but would unlikely be significantly affected if they were occasional visitors as they are both mobile and since the site is relatively small it is unlikely to provide important habitat for these species where the surrounding area has extensive more suitable and less disturbed habitat. Both species have a Vulnerable IUCN status, but the distribution range and suitable habitat is significantly broader than the site (Figure 22) and thus the impact of the development of the site is likely

to be negligible. The Giant Golden Mole does have a local but widespread distribution and the development footprint, being largely previously cultivated contributes a negligible percentage of its distribution range. Furthermore, since the cemetery is will be developed over an extended period the risk to any Golden Moles, should they be present is unlikely to be significant as extensive suitable habitat surrounds the site. The Bladder Grasshopper (*Prostalia granulata*) is currently known from three localities, across South Africa (Eastern Cape, KZN & Mpumalanga), one of which overlaps with the site. Available records are limited to specimens from 1873 (Eastern Cape) and 1916 (KZN). The likelihood of a healthy population being present on the site is limited by the fact that the site has been significantly transformed historically, whereas potential suitable habitat is extensive in the surrounding area.

Project : Beacon Bay Memorial Park

Layout - Species Distribution Map

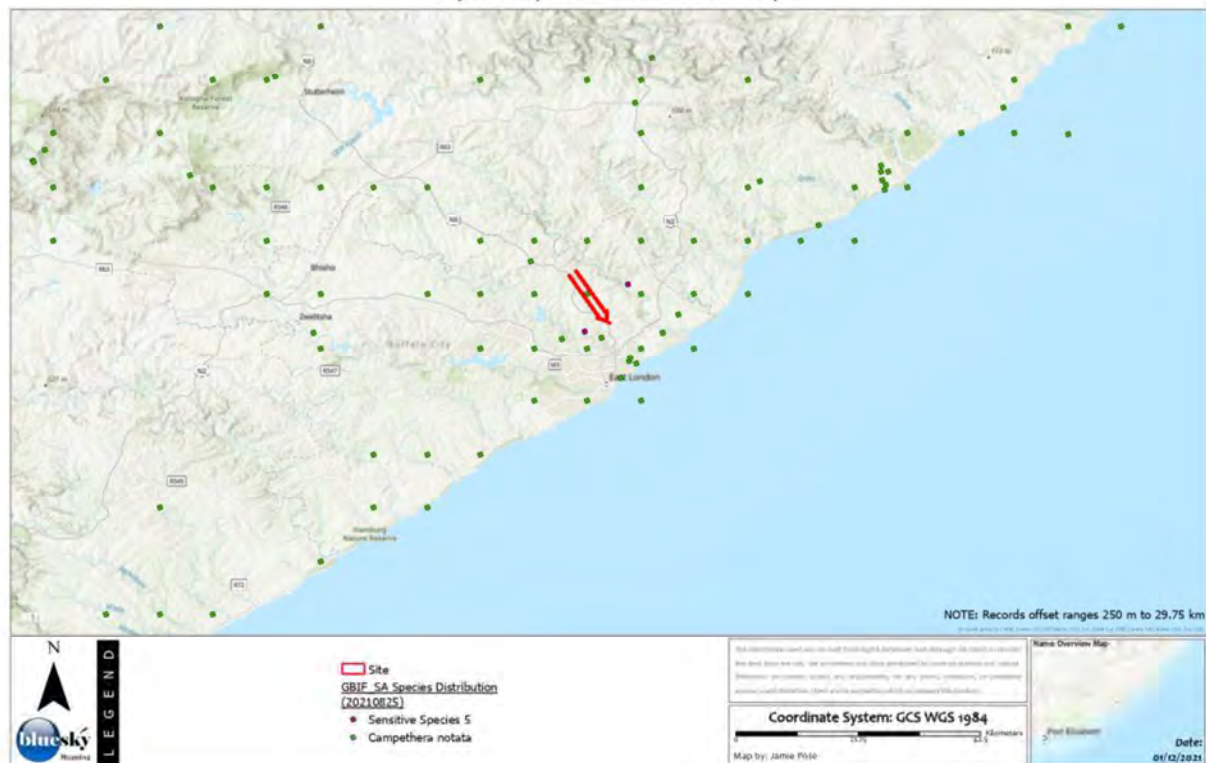


Figure 22: Distribution of faunal species of conservation concern (records only for Sensitive species 5 & *Campethera notata*).

Table 7: Fauna Species of Conservation Concern.

SCIENTIFIC NAME	COMMON NAME	STATUS ⁶	COMMENT/PRESENCE
MAMMALS			
<i>Chrysospalax trevelyani</i>	Giant Golden Mole	NEST (M), EN [B2ab (i,ii,iii,iv,v)]	EC, KZN, Port Alfred to Port Shepstone and inland to Queenstown/Elliot, Forest, Grassland. No mole activity recorded, may be a transient visitor.
<i>Dendrohyrax arboreus</i>	Southern Tree Hyrax	EN (2016)	Not recorded, unlikely but may be a transient visitor.

⁶ PNCO - Provincial Nature Conservation Ordinance (1974); NEST – National Environmental Screening Tool (Very High, High, Medium, Low); ToPS – Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (LC), Near Threatened (NT), Critically Endangered (CR), Endangered (EN), Vulnerable (VU); CITIUS - Conservation for International trade in Endangered Species.

SCIENTIFIC NAME	COMMON NAME	STATUS ^a	COMMENT/PRESENCE
<i>Miniopterus schreibersii</i>	Schreibers's Long-fingered Bat	NT	Not recorded, unlikely but may be a transient visitor.
<i>Poecilogale albinucha</i>	African Striped Weasel	NT (2016)	Not recorded, unlikely but may be a transient visitor.
Sensitive species 5		NEST (M), VU [B2ab (ii,iii,v); C2a(i)]	Mossel Bay to Richards Bay & inland to Queenstown & Vryheid, Angola; Cameroon; CAR; Congo; DRC; Equatorial Guinea; Gabon; Kenya; Malawi; Mozambique; Nigeria; South Sudan; Tanzania; Uganda; Zambia; Zimbabwe, Forest. Unlikely, but may be a transient visitor.
BIRDS			
<i>Campethera notata</i>	Knysna Woodpecker	NEST (H), SA: NT, Intl: VU	Forest, Savanna, Shrubland, Grassland, WC, EC, KZN, Coastal from Hermanus to Port Shepstone & inland to Graaf Reinett. Likely a transient visitor.
<i>Morus capensis</i>	Cape Gannet	Intl: VU; SA: VU	Unlikely, marine
<i>Phalacrocorax capensis</i>	Cape Cormorant	Intl: EN; SA: EN	Unlikely, marine
<i>Stephanoaetus coronatus</i>	African Crowned (Crowned) Eagle	Intl: NT; SA: VU	Unlikely, may be a transient visitor
REPTILES			
<i>Macrelaps microlepidotus</i>	Natal Black Snake	NT (2014)	Unlikely, may be a transient visitor
AMPHIBIANS			
None of concern			
INVERTEBRATES			
LEPIDOPTERA (BUTTERFLIES)			
<i>Cymothoe alcimeda clarki</i>	Battling glider	VU (2013)	Unlikely, may be a transient visitor.
INVERTEBRATES			
<i>Prostalia granulata</i>	Bladder grasshopper	NEST (M), EN [B2ab (iii,v)]	EC, KZN, MP, Forest, Grassland. Not recorded.
SCORPIONS			
<i>Opisthacanthus validus</i>		ToPS	May be present
<i>Uroplectes formosus</i>		ToPS	May be present
SPIDERS			
<i>Harpactira guttata</i>	Baboon Spider	ToPS	May be present
<i>Harpactira tigrina</i>	Baboon Spider	ToPS	May be present

Alien Invasive Species

On 18 September 2020, the Minister of Environmental Affairs published the Alien and Invasive Species Regulations ("the Regulations") which came into effect on the 18 October 2020 in a bid to curb the negative effects of IAPs. The Regulations call on landowners and sellers of land alike to assist the Department of Environmental Affairs to conserve our indigenous fauna and flora and to foster sustainable use of our land. Non-adherence to the Regulations by a land owner or a seller of land can result in a criminal offence punishable by a fine of up to R 5 million (R 10 million in case of a second offence) and/or a period of imprisonment of up to 10 years.

Category 1a and 1b listed invasive species must be controlled and eradicated. Category 2 plants may only be grown if a permit is obtained, and the property owner ensures that the invasive species do not spread beyond his or her property. The growing of Category 3 species is subject to various exemptions and

prohibitions. Some invasive plants are categorised differently in different provinces. For example: the Spanish Broom plant is categorised as a category 1b (harmful) invasive plant in Eastern Cape and Western Cape, but it is a category 3 (less harmful) invasive plant in the other seven provinces.

Invasive alien plants have a significant negative impact on the environment by causing direct habitat destruction, increasing the risk and intensity of wildfires, and reducing surface and sub-surface water. Landowners are under legal obligation to control alien plants occurring on their properties. Alien Invasive Plants require removal according to the Conservation of Agricultural Resources Act 43 of 1983 (CARA) and the National Environmental Management: Biodiversity Act (10 of 2004; NEMBA): Alien and Invasive Species Lists (GN R598 and GN R599 of 2014). Alien control programs are long-term management projects and a clearing plan, which includes follow up actions for rehabilitation of the cleared area, is essential. This will save time, money and significant effort. Collective management and planning with neighbours allow for more cost-effective clearing and maintenance considering aliens seeds as easily dispersed across boundaries by wind or water courses. All clearing actions should be monitored and documented to keep track of which areas are due for follow-up clearing. A general rule of thumb is to first target lightly infested areas before tackling densely invaded areas and prioritize sensitive areas such as riverbanks and wetlands. Alien grasses are among the worst invaders in lowland ecosystems adjacent to farms but are often the most difficult to detect and control.

Several exotic invasive and other weed species were noted within the site, although they are present in low numbers. A few large *Acacia mearnsii* (Black Wattle) trees are present, as well as *Lantana* (*Lantana camara/rugosa*) and a few other ruderal weed species. A weed management programme, as part of the construction contract including an after-care period will be required. A list of species is included in Table 8. Some species listed are not within the site but may be introduced during construction from the adjacent area.

Table 8: Alien (exotic) invasive and other weed species and status.

SCIENTIFIC NAME	COMMON NAME	FAMILY	STATUS ⁷	PRESENCE
<i>Acacia mearnsii</i>	Black Wattle	Fabaceae	CARA 2	Present
<i>Argemone mexicana</i>	Mexican Poppy	Asteraceae	CARA 1b	Present
<i>Cirsium vulgare</i>	Scotch Thistle	Asteraceae	CARA 1b	Present
<i>Datura spp.</i>	Thorn Apple	Solanaceae	CARA 1b	Present
<i>Lantana camara</i>	Lantana/ Tickberry	Verbenaceae	CARA 1b	Present
<i>Pennisetum clandestinum</i>	Kikuyu	Poaceae	CARA 1b	Present
<i>Psidium guajava</i>	Guava	Myrtaceae	CARA 3	Present
<i>Senna didymobotrya</i>	Peanut butter cassia	Fabaceae	CARA 1b	
<i>Solanum mauritianum</i>	Bugweed	Solanaceae	CARA 1b	Present
<i>Solanum sisymbriifolium</i>	Wild tomato	Solanaceae	CARA 1b	Present
<i>Verbena bonariensis</i>	Verbena	Verbenaceae	CARA 1b	Present

Eradication protocol

The act required the removal of these species, being the responsibility of the landowner, as described in Table 9 and below.

Table 9: Legislation regarding invasive alien species.

The National Environmental Management Act: Alien and Invasive Species Act (18 September 2020) stipulates the following:

6. Control measures

⁷ CARA - Conservation of Agricultural Resources Act (1993); National List of Invasive Species in Terms Sections 70(1), 71(3) and 71A (2016). Refer to Section 2.2 & Table 9 for detailed procedures and requirements.

- (1) In order to achieve the objects of this Act the Minister may prescribe control measures which shall be complied with by land users to whom they apply.
- (2) Such control measures may relate to –
 - (1) the control of weeds and invader plants.
- (3) A control measure may –
 - (a) contain a prohibition or an obligation with regard to any matter referred to in subsection (2).
- (5) Any land user who refuses or fails to comply with any control measure which is binding on him, shall be guilty of an offence.

In this regard, Government Notice R. 598 - National Environmental Management: Biodiversity Act (10/2004): Alien and Invasive Species Regulations, 2014 (Gazette number 37885), dated August 2014, further stipulates the following:

CHAPTER 2: CATEGORIES OF LISTED INVASIVE SPECIES

2. Category 1a: Listed Invasive Species

- (1) Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combatted or eradicated.
 - (2) A person in control of a Category 1a Listed Invasive Species must-
 - (a) comply with the provisions of section 73(2) of the Act.
 - (b) immediately take steps to combat or eradicate listed invasive species in compliance with sections 75(1), (2) and (3) of the Act; and
 - (c) allow an authorised official from the Department to enter onto land to monitor, assist with or implement the combatting or eradication of the listed invasive species.
- If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such programme.

3. Category 1b: Listed Invasive Species

- (1) Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled.
- (2) A person in control of a Category 1 b Listed Invasive Species must control the listed invasive species in compliance with sections 75(1), (2) and (3) of the Act.
- (3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
- (4) A person contemplated in sub-regulation (2) must allow an authorised official from the Department to enter onto the land to monitor, assist with or implement the control of the listed invasive species, or compliance with the Invasive Species Management Programme contemplated in section 75(4) of the Act.

4. Category 2: Listed Invasive Species

- (1) Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be.
- (2) Unless otherwise indicated in the Notice, no person may carry out a restricted activity in respect of a Category 2 Listed Invasive Species without a permit.
- (3) A landowner on whose land a Category 2 Listed Invasive Species occurs or person in possession of a permit, must ensure that the specimens of the species do not spread outside of the land or the area specified in the Notice or permit.
- (4) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.
- (5) Unless otherwise specified in the Notice, any species listed as a Category 2 Listed Invasive Species that occurs outside the specified area contemplated in sub-regulation (1), must, for purposes of these regulations, be considered to be a Category 1 b Listed Invasive Species and must be managed according to Regulation 3.
- (6) Notwithstanding the specific exemptions relating to existing plantations in respect of Listed Invasive Plant Species published in Government Gazette No. 37886, Notice 599 of 1 August 2014 (as amended), any person or organ of state must ensure that the specimens of such Listed Invasive Plant Species do not spread outside of the land over which they have control.

5. Category 3: Listed Invasive Species

(1) Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

(2) Any plant species identified as a Category 3 Listed Invasive Species that occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.

(3) If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such programme.

CHAPTER 7: ISSUING, AMENDMENT AND CANCELLATION OF PERMITS

29. Sale or transfer of alien and listed invasive species

(1) If a permit-holder sells a specimen of an alien or listed invasive species, or sells the property on which a specimen of an alien or listed invasive species is under the permit-holder's control, the new owner of such specimen or such property must apply for a permit in terms of Chapter 7 of the Act.

(2) The new permit-holder contemplated in sub-regulation (1) will be subject to the same conditions as the permit-holder who has sold the specimen of an alien or listed invasive species, or the property on which a specimen of an alien or listed invasive species occurs, unless specific circumstances require all such permit conditions to be revised, in which case full reasons must be giving in writing by the issuing authority.

(3) The seller of any immovable property must, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed invasive species on that property.

CHAPTER 9: COMPLIANCE AND ENFORCEMENT

35. Offences and penalties

(1) Any offence committed in terms of section 101 of the Act shall, upon conviction, carry the penalties referred to in section 102 of the Act.

(2) Any person who contravenes or fails to comply with a provision of these regulations is guilty of an offence and is liable, on conviction, to-

(a) a fine not exceeding five million rand, and in the case of a second or subsequent conviction, to a fine not exceeding R 10 million; or

(b) imprisonment for a period not exceeding 10 years; or

(c) to both such fine and imprisonment.

The seller of any immovable property must also, prior to the conclusion of the relevant sale agreement, notify the purchaser of that property in writing of the presence of listed IAPs on the property. Property sales agreements dated 1 October 2014 and onwards, should also incorporate a clause in terms of which the purchaser acknowledges that he has acquainted himself with the extent and the nature of the property he is buying and that he accepts the property as such, including the vegetation on the property.

Specific eradication and management procedures must be stipulated in the EMP as to the methods to be implemented to remove and control the various alien invasive species as they tend to require species specific techniques. A management plan should be incorporated into the EMP and a detailed action plan compiled and implemented by the ECO. All removed trees must either be removed from site or disposed of at a registered waste disposal facility. Alternatively, the plant material can be mulched using a woodchipper on site. And seed-bearing material is to be disposed of at a registered landfill.

3.1.9 Critical/Important Terrestrial Habitats

Special Habitats include areas that are rare within a region, or which support important species, ecosystems or ecological processes. Species of Conservation Concern refers to red data species and important habitats include the locations where these species are known to occur. Red data species are plant, animal or other organisms (e.g. reptiles, insects etc) that have been assessed and classified

according to their potential for extinction in the near future. All known species are listed in the Red Data Book and classified as Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened or Least Concern. Red Data species are those species classified as Extinct, Critically Endangered, Endangered or Vulnerable. Some of the red data species are listed within the NEMBA Threatened or Protected Species (TOPS), and some are protected by provincial ordinances. Critical habitats include those areas that are known locations for such Red data species that are under threat of extinction.

The Eastern Cape Biodiversity Conservation plan (ECBCP) does not identify specific Important Critical or Important Terrestrial Habitats; however, the following are generally considered to be important habitats, none of which are present within the site.

Rocky Outcrops

Rocky outcrops can provide habitat for geophytic species as well as several faunal groups, that often have limited distributions.

Outcrops are present in the form of dolerite boulders, which tend to be concentrated in areas that are not suited to the proposed use, including within thicket areas.

Wetland habitat

Wetlands are special habitats as they provide a refuge for birds and other organism, such as frogs and insects. They are important hydrological process areas that are linked to ground or surface water flows. Natural wetlands are all considered to be Critical Biodiversity Areas. Wetlands are protected by the National Water Act and the Conservation of Agricultural Resources Act. No wetland habitat has been identified, but this aspect is to be dealt with in a separate aquatic assessment (Refer to separate aquatic specialist assessment). Where observational comments in this report contradict any made in aquatic assessment report, the aquatic specialist will supersede those made in this report. None are deemed to have any significant flora, and any fauna is unlikely to be affected by the proposed activity.

Wetlands or Estuaries are protected by various pieces of legislation, such as:

- The National Water Act (NWA) 36 of 1998, which stipulates that reserve determination studies need to be undertaken to identify the ecological reserve requirements of a wetland.
- The NEMA in terms of principle (r) and the listed activities (Section 24).
- The Conservation of Agricultural Resources Act (CARA) 43 of 1983; in which no activities are allowed within the flood area or within 10 meters horizontally outside the flood area.
- The Integrated Coastal Management Act (ICMA) 24 of 2008 requires the preparation of Estuary Management Plans by municipalities, unless managed by another Authority e.g. SANParks.

Wetland habitat is present in the form of dams, which will be retained.

Priority Estuaries

No Estuaries are affected by the proposed activity.

Forest

South-Eastern Coastal Thornveld (or Berlin Savanna Thicket) is a successional vegetation type that is known to become forest or forest-like in patches where conditions permit (usually fire protected dolerite hills or incised river valleys) with emergent trees that however lack overlapping crowns, hence would not be classified as forest. Such forest pockets are generally known to be extraordinarily rich in plant species and are of high conservation worthiness and provide a suite of goods and services of cultural importance. They are protected by the National Forest Act. Forest pockets do grow in the wider surrounding area, but these are generally not close to the site. Although forest (tree) elements can be identified in the remnant

patch of centrally thicket within the site, which will be avoided, no forest will be affected directly or indirectly affected.

Fynbos

No Fynbos grows in the OR Tambo Municipality.

Colonies or Populations of Threatened or Protected Species

No colonies of threatened fauna or flora species are recorded that are directly or indirectly or indirectly affected.

Implications:

- No critical or important terrestrial habitats that would be affected directly or indirectly affected by the proposed activity were identified.

3.1.10 Terrestrial Vegetation Sensitivity Assessment

An overall Biodiversity Sensitivity assessment, incorporating key vegetation and ecological indicators (summarised in Table 5) was undertaken and includes the following key criteria:

- relative levels of *intactness* i.t.o. overall loss of indigenous vegetation cover.
- presence, diversity and abundance of *species of conservation concern* (weighted in favour of local endemic species).
- extent of *invasion* (severity and overall ecological impact), as well as the degree to which successful rehabilitation could take place.
- overall degradation incorporating above factors.
- relative importance of the vegetation communities relative to regional conservation status - indicated as vulnerability of the area because of loss.

Intactness

Three basic classes are differentiated as follows:

- **Low:** > 75 % of original vegetation has been removed or lost; and/or no species of conservation concern present that are critically endangered, endangered or endemic with highly localised distribution.
- **Moderate:** 25 - 75 % of original vegetation has been removed/lost; and or presence of species of conservation concern but not having high conservation status or high levels of endemism or highly localised distributions.
- **High:** < 25 % of original vegetation has been removed or lost; and or presence of species with a highly endemism and or high conservation status (endangered or critically endangered).

Intactness for the site is generally *High*.

Alien Invasion

Three classes are differentiated as follows:

- **Low:** no or few scattered individuals.
- **Moderate:** individual clumps of invasives present but cover less than 50% of original area.
- **High:** dense, impenetrable stands of invasives present, or cover > 50 % of area with substantial loss functioning. Rehabilitation will most likely require specialised techniques over an extended period (> 5 years).

Alien invasion for the site is generally *Low*.

Degradation

Overall Degradation is determined from the above alien invasion and intactness scores, according to the following matrix:

INTACTNESS	INVASION		
	LOW	MODERATE	HIGH
High	Pristine	Near Pristine	Moderately Degraded
Moderate	Near Pristine	Moderately Degraded	Severely Degraded
Low	Moderately Degraded	Severely Degraded	Transformed

Degradation for the site is generally High in the transformed areas (old lands) and Moderate to Low in the near natural areas (remnant thicket pockets).

Overall Sensitivity score

Overall Biodiversity Sensitivity of the vegetation within the site is calculated according to the following matrix which combines degradation and overall conservation status of the vegetation units of the site.

DEGRADATION	CONSERVATION STATUS			
	LEAST THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED
Severely degraded/ Transformed	Very Low	Low	Moderate	Moderate - High
Moderately degraded	Low	Moderate	High	High
Ecologically Pristine or near Pristine	Moderate	Moderate - High	High	Very High (No-Go area)

Refer to Figure 23 for overall sensitivity map.

In summary:

- Areas scoring an overall VERY LOW & LOW sensitivity include the portions of the site that are completely transformed or severely degraded, that have a low conservation status, or where there is very dense alien infestation. Loss of these areas will not significantly compromise the current conservation status of the vegetation unit at a regional level, nor is its loss likely to compromise the ecological functioning of surrounding areas. Low sensitivity areas would be limited to the agricultural lands, including both old lands and more recently cultivated areas.
- Areas scoring an overall MODERATE sensitivity include the portions of natural vegetation that is mostly intact, but not having specific biodiversity related issues of significance or where proposed activity will have limited overall impact and recovery will be good with minimal intervention. Moderate sensitivity areas include remnant pockets of natural vegetation.
- Areas scoring an overall HIGH sensitivity include those areas deemed to have a sensitivity, including being within intact Critical Biodiversity Areas and connectivity corridors, or are deemed critical habitat for fauna and/or flora species that are considered to be under threat. High sensitivity terrestrial areas on site include wetland features only, since they will provide habitat for various aquatic faunal species as well as temporary water source for other animals that may traverse the site occasionally. These consist of man-made dams.
- Areas scoring an overall VERY HIGH sensitivity (No-Go Areas) include areas having a Critically Endangered or Endangered conservation status, or that are irreplaceable in terms of Critical Biodiversity Areas or are critical habitat (refer to Section 3.1.11) for any faunal species that is endangered or critically endangered. No Very High sensitivity terrestrial areas are identified within the site.

Project : Beacon Bay Memorial Park

Layout - Vegetation Sensitivity



Figure 23 Overall Terrestrial Biodiversity Sensitivity.

3.1.11 Critical Habitat

The following Critical Habitat features have been identified within the site:

1. Criterion 1: Habitat for Critically Endangered (CR) and/or Endangered (EN) species
 - No Endangered or Critically Endangered Flora species were recorded. Several species known from general area were screened to confirm that most likely localities do not overlap with the site.
2. Criterion 2: Habitat for Endemic or restricted-range species
 - Several range restricted flora species are potentially present in the surrounding area and vegetation types; however, none were confirmed to be present and likelihood of presence is low to moderate. Several species known from general area, as screened by various tools and databases, were screened to confirm that most likely localities do not overlap with the site.
3. Criterion 3: Habitat for Migratory or congregatory species
 - No such terrestrial habitat will be directly or indirectly affected.
4. Criterion 4: Habitat for Highly threatened and/or unique ecosystems
 - No such terrestrial habitat will be directly or indirectly affected.
5. Criterion 5: Habitat for Key evolutionary processes
 - No such terrestrial habitat will be directly or indirectly affected.

3.1.12 No-Go Areas

The remnant thicket vegetation around the watercourse and the thicket pocket situated centrally within the site are recommended no-go areas, as well as a small depression wetland in the north-eastern corner.

3.1.13 Potential Development Footprints

The low sensitivity areas of the site are considered to be developable.

3.2 Risks and Potential Impacts to Biodiversity

3.2.1 Summary of actions, activities, or processes that require mitigation

The main impacts likely to result from the proposed activity include the following:

1. Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
2. Loss of flora species of conservation concern during pre-construction site clearing activities. Numerous species of conservation concern are potentially present within the affected area, which could be destroyed during site preparation.
3. Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.
4. Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
5. Disturbances to ecological processes. Activity may result in disturbances to ecological processes.
6. Aquatic and Riparian processes. Diversion and increased velocity of surface water flows – Changes to the hydrological regime and increased potential for erosion. Impact of changes to water quality. Loss of riparian vegetation / aquatic habitat. Loss of species of conservation concern.
7. Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species.
8. Loss of faunal SSC due to construction activities: Activities associated with bush clearing and ploughing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

3.2.2 Potential Terrestrial Biodiversity Impacts (Direct)

Table 10: Potential Impacts to Terrestrial Biodiversity

IMPACT	Nature of Impact
Vegetation	Permanent or temporary loss of indigenous vegetation cover because of site clearing. Site clearing before construction will result in the blanket clearing of vegetation within the affected footprint.
Flora Species	Loss of flora species of conservation concern during pre-construction site clearing activities. Several species of concern are known from surrounding areas, which could be destroyed during site preparation.
Alien Invasive Species	Susceptibility of post construction disturbed areas to invasion by exotic and alien invasive species and removal of exotic and alien invasive species during construction. Post construction disturbed areas having no vegetation cover are often susceptible to invasion by weedy and alien species, which can not only become invasive but also prevent natural flora from becoming established.
Erosion	Susceptibility of some areas to erosion because of construction related disturbances. Removal of vegetation cover and soil disturbance may result in some areas being susceptible to soil erosion after completion of the activity.

IMPACT	Nature of Impact
Ecological Processes	Disturbances to ecological processes: Activity may result in disturbances to ecological processes.
Aquatic and Riparian processes	Aquatic and Riparian processes: None present/affected
Faunal Habitat	Loss of Faunal Habitat: Activity will result in the loss of habitat for faunal species.
Faunal Processes	Impacts to faunal processes because of the activity
Faunal Species	Loss of faunal SSC due to construction activities: Activities associated with bush clearing, killing of perceived dangerous fauna, may lead to increased mortalities among faunal species.

3.2.3 Potential Terrestrial Biodiversity Impacts (Indirect)

No significant additional ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines and railways, which can impact on biodiversity and ecosystem services are expected.

3.2.4 Potential Terrestrial Biodiversity Impacts (Cumulative)

No cumulative impacts are expected because of the development of the site providing recommendation and mitigation measures are adhered to, due to the limited disturbance area.

3.3 Assessment of Risks and Impacts to Biodiversity

3.3.1 Criteria of assigning significance to potential impacts

The following methodology is to be applied in the specialist studies for the assessment of potential impacts.

CRITERIA	EXPLANATION
Nature of impact	Review the type of effect that a proposed activity will have on the environment and should include "what will be affected and how?"
Extent	Indicate whether the impact will be: • (S) local and limited to the immediate area of development (the site). • (L) limited to within 5 km of the development: or • (R) whether the impact may be realized regionally, nationally or even internationally.
Duration	Review the lifetime of the impact, as being: • (V) very short term (0 - 1 years), • (S) short term (1 - 5 years), • (M) medium (5 - 15 years), • (L) long term (>15 years but where the impacts will cease after the operation of the site), or • (P) permanent.
Intensity	Establish whether the impact is destructive or innocuous and should be described as either: • (L) low (where no environmental functions and processes are affected) • (M) medium (where the environment continues to function but in a modified manner) or • (H) high (where environmental functions and processes are altered such that they temporarily or permanently cease), including loss of critical endangered ecosystem and or critically endangered species (population).
Probability	Consider the likelihood of the impact occurring and should be described as: • (I) improbable (low likelihood)

CRITERIA	EXPLANATION
	• (P) <i>probable</i> (distinct possibility) • (H) <i>highly probable</i> (most likely) or • (D) <i>definite</i> (impact will occur regardless of prevention measures).
Status of the impact	Description as to whether the impact will be positive (a benefit), negative (a cost), or neutral.
Degree of confidence	The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as high, medium or low.
Significance	• (VL) <i>Very Low</i>: Considered to be negligible • (L) <i>Low</i>: Where the impact will not have an influence on the decision or require to be significantly accommodated in the project design • (M) <i>Medium</i>: Where it could have an influence on the environment which will require modification of the project design or alternative mitigation. • (H) <i>High</i>: Where it could have a 'no-go' implication for the project unless mitigation or re-design is practically achievable. • (VH) <i>Very High</i>: Confirmed No-Go area, no mitigation feasible, redesign and avoidance are required, where activity will have a significant permanent and irreversible impact on a critically endangered ecosystem or species population.

3.3.2 Significance Rating

INTENSITY		DURATION				
		PERMANENT	LONG TERM	MEDIUM TERM	SHORT TERM	VERY SHORT TERM
HIGH INTENSITY						
EXTENT	National	Very High	Very High	High	High	Medium
	Regional	Very High ⁸	High	High	High	Medium
	Local	High	High	Medium	Medium	Medium
	Site specific	Medium	Medium	Medium	Medium	Medium
MEDIUM INTENSITY						
EXTENT	National	High	High	High	Medium	Medium
	Regional	High	High	High	Medium	Medium
	Local	Medium	Medium	Medium	Medium	Medium
	Site specific	Medium	Medium	Medium	Medium	Low
LOW INTENSITY						
EXTENT	National	Medium	Medium	Medium	Medium	Medium
	Regional	Medium	Medium	Medium	Medium	Low
	Local	Medium	Medium	Medium	Low	Very Low
	Site specific	Low	Low	Low	Very Low	Very Low

Furthermore, the following must be considered:

1. Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
2. All impacts should be evaluated for both the construction, operation and decommissioning phases of the project, where relevant.
3. The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.

⁸ Considered a regional impact if activity will result in significant permanent and irreversible loss to a critically endangered species population or ecosystem (vegetation type)

4. Management actions: Where negative impacts are identified, specialists must specify practical mitigation objectives (i.e. ways of avoiding or reducing negative impacts). Where no mitigation is feasible, this should be stated, and the reasons given. Where positive impacts are identified, management actions to enhance the benefit must also be recommended.

3.3.3 Assessment of Terrestrial Biodiversity Impacts

Construction and operations can result in a range of negative impacts on terrestrial, marine and other aquatic ecosystems if not effectively managed. Table 10 describes impacts that may potentially occur in the site (as per DEDEAT guidelines) as well indicating the relevant EMP section. The predicted significance of these during the construction phase are summarised in Table 11 and during the operational phase are summarised in Table 12.

Table 11: Construction Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).

Nature of impact	Extent	Duration	Intensity	Probability	Status of the impact	Degree of confidence	Significance (before)	Significance (after)
Vegetation	S	S	L	D	-ve	H	M	L
Flora Species	S	S	L	P	-ve	M	M	L
Alien Invasive Species	S	M	L	H	-ve	H	M	L
Erosion	S	M	L	P	-ve	M	M	L
Ecological Processes	S	S	L	P	-ve	H	M	L
Aquatic & Riparian Processes	S	V	L	P	-ve	M	M	L
Faunal Habitat	S	S	M	P	-ve	M	M	L
Faunal Processes	S	V	L	P	-ve	H	M	L
Faunal Species	S	S	M	P	-ve	M	M	L

Table 12: Operational Phase Assessment (Refer to Sections 3.3.1 & 3.3.2 for methodology).

Nature of impact	Extent	Duration	Intensity	Probability	Status of the impact	Degree of confidence	Significance (before)	Significance (after)
Vegetation	S	S	L	D	-ve	H	M	L
Flora Species	S	S	L	P	-ve	M	M	L
Alien Invasive Species	S	M	L	H	-ve	H	M	L
Erosion	S	M	L	P	-ve	M	M	L
Ecological Processes	S	S	L	P	-ve	H	M	L
Aquatic & Riparian Processes	S	V	L	P	-ve	M	M	L
Faunal Habitat	S	S	M	P	-ve	M	M	L
Faunal Processes	S	V	L	P	-ve	H	M	L
Faunal Species	S	S	M	P	-ve	M	M	L

- All impacts are assessed to be of **medium** significance before mitigation and can be reduced to **low** with the implementation of the recommended mitigation measures.

3.3.4 Terrestrial Biodiversity Impact Reversibility

In general, most direct impacts will have a moderate to high reversibility in the Thornveld habitat, as well as transformed or degraded areas, except where hardening of surfaces or substantial removal of topsoil occurs. Reversibility will be low to moderate in the intact thicket.

3.3.5 Impacts and Risks to Irreplaceable Biodiversity Resources

- The site may have occasional visits from other transient bird or other faunal species known from the broader area, although it is unlikely that the proposed memorial park project would provide a direct impact of significance nor indirect because of loss of habitat. It may however result in some displacement faunal species during construction and continuing into operation.
- Risks to Irreplaceable Biodiversity Resources are low to moderate.

3.3.6 Residual Risks and Uncertainties

No significant additional ancillary linear infrastructure, such as roads, conveyors, power lines, pipelines and railways, which can impact on biodiversity and ecosystem services are expected.

3.4 Findings, Outcomes and Recommendations

3.4.1 Summary of Findings

- Very Low and Low sensitivity areas include areas transformed including old lands and more recent lands.
- Moderate sensitivity areas include intact thicket vegetation pockets that have not undergone significant transformation.
- High sensitivity areas include the wetland or aquatic features as they are likely to provide habitat to various aquatic species wither occasionally or more permanently, such as amphibians where a portion of their lifecycle would be dependent on a water source.
- No Very High sensitivity areas are identified.
- No-go areas – the intact thicket pockets are recommended as no-go areas.
- Cumulative impacts because of the development of the site, are negligible, providing recommendation and mitigation measures are adhered to, due to the limited disturbance area.

3.4.2 Recommendations

- It is the conclusion of this terrestrial biodiversity assessment that the proposed activity can be undertaken within acceptable terrestrial biodiversity impact limits.
- It is recommended that the moderate and high sensitivity areas are not developed but retained in their natural state as open space.
- The implementation of the management actions relating to flora and fauna as well as post construction rehabilitation will minimise biodiversity impacts.

4 Management Programs

Table 13 lists specific mitigation measures that must be implemented and adhered to. These must be considered to be conditions of authorisation.

Table 13: Specific Mitigation Measures and Recommendations

IMPACT	MITIGATION MEASURES
Vegetation	• Blanket clearing of vegetation must be limited to the site. No clearing outside of footprint to take place.

IMPACT	MITIGATION MEASURES
	- Topsoil must be striped and stockpiled separately during site preparation and replaced on completion where revegetation will take place. - Any site camps and laydown areas requiring clearing must be located within already disturbed areas away from watercourses.
Flora Species	- A flora search and rescue is unlikely to be required. - A single PNCO protected species was recorded, respective permit will be required for destruction.
Alien Invasive Species	- Alien trees must be removed from the site as per CARA/NEMBA requirements. - A suitable weed management strategy to be implemented in construction and operation phases. - After clearing and construction is completed, an appropriate cover may be required, should natural re-establishment of grasses not take place in a timely manner along road verges. This will also minimise dust.
Erosion	- Suitable measures must be implemented in areas that are susceptible to erosion. Areas must be rehabilitated, and a suitable cover crop planted once construction is completed. - Topsoil must be stripped and stockpiled separately and replaced on completion. - If natural vegetation re-establishment does not occur, a suitable grass must be applied.
Ecological Processes	Blanket clearing of vegetation must be limited to the development footprint, and the area to be cleared must be demarcated before any clearing commences.
Aquatic and Riparian processes	None
Faunal Habitat	- Blanket clearing of vegetation must be limited to the footprint. - It is important that clearing activities are kept to the minimum and take place in a phased manner, where applicable. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
Faunal Processes	- The habitats and microhabitats present on the project site are not unique and are widespread in the general area, hence the local impact associated with the footprint would be of low significance if mitigation measures are adhered to. - Small mammals within the habitat on and around the affected area are generally mobile and likely to be transient to the area. They will most likely vacate the area once construction commences. As with all construction sites there is a latent risk that there will be some accidental mortalities. Specific measures are made to reduce this risk. The risk of species of conservation concern is low, and it is unlikely that there will be any impact to populations of such species because of the activity. - Reptiles such as lizards are less mobile compared to mammals, and some mortalities could arise. It is recommended that a faunal search and rescue be conducted before construction commences, although experience has shown that there could still be some mortalities as these

IMPACT	MITIGATION MEASURES
	species are mobile and may thus move onto site once construction is underway. A retile handler should be on call for such circumstances. Should any amphibian migrations occur between wetland areas during construction, appropriate measures (including temporarily suspending works in the affected area) should be implemented.
Faunal Species	- A faunal search and rescue is unlikely to be required. - No animals are to be harmed or killed during the course of operations. - Workers are NOT allowed to snare any faunal species.

4.1 Site Preparation and Vegetation Clearing Plan

The following flora relocation plan is recommended for inclusion in the EMP and Flora removal permit applications:

- No flora and fauna relocation is anticipated.

4.2 Rehabilitation and Landscaping Plan

- On completion of construction, the surface of any work areas, especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The disturbed areas can be seeded with suitable grasses and local indigenous seed mix, if deemed to be required, however, vegetation is likely to re-establish without input.
- Excavations may not be used for the dumping of construction wastes.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations and must be disposed of appropriately.
- Final rehabilitation must comply with the requirements mentioned in the Rehabilitation Plan.

4.3 Open Space Management/Conservation Plan

None are applicable for this project.

4.4 Maintenance Management Plan

Ongoing maintenance is likely to be required in the long-term, which could include re-excavation of portions of services for maintenance/replacement of defective components and leak repair. All measures of this report, including the EMP should be adhered for any maintenance requirements. Any excavated areas must be stabilised and rehabilitated as per the measures indicated in this report.

5 Organizational Capacity and Competency

Successful Implementation will be in part be dependent on the organisational capacity and competency of the applicant and any implementing agents. The following aspects are likely to pose risk to the successful mitigation of the project:

- Budget constraints – budget allocated for environmental management tends to be inadequate for construction projects.
- Organisational Structure – implementing agents may or may not have adequate capacity and competency to ensure appropriate and adequate environmental management.

6 Emergency Preparedness and Response

Emergency Preparedness Plan must be included in the EMPr and should address specific measures relating to the following emergency risks:

- Fire management and response
- Spill management and incident response
- Waste management and incident response
- Response to emergency site shutdown, including labour and protest actions.

7 Stakeholder Engagement

Possible Stakeholders relating to Biodiversity could include the following key groups:

- Neighbouring Property Owners
- Local Regional and National Conservation Authorities

No Stakeholder Engagement was conducted specifically by the Specialist. Stakeholder Engagement will be undertaken by the EAP as part of the environment application public participatory process. Any comments raised relating to Biodiversity will be addressed by the specialist in the final report.

8 Monitoring and Review

Key monitoring activities should include the following:

1. Pre-construction
 - a) Ensure flora permits are in place timeously (PNCO only) – allow at least 1 or 2 months before commencement.
 - b) Environmental Awareness and training (EAT) – Ensure all labour are informed and plant operators are aware of risks, issues, do's and don'ts and no-go areas.
2. Bush clearing
 - a) Ensure working plant has no oil or hydraulic leaks
 - b) Check delineated footprints area not exceeded
3. Construction
 - a) Regular checks on trenches for trapped animals and possible drowning risks
 - b) Regular checks of fences for snares
4. Rehabilitation
 - a) Check quality of topsoil and weed free
 - b) Check for weed regrowth and manage timeously (before seed is set)
5. Operation monitoring
 - a) Weed management on ongoing basis
 - b) Erosion to be addressed on ongoing basis

9 Appendices

9.1 Appendix A: References

General Reference Sources

- Acocks, J. P. H. 1988. *Veld Types of South Africa*. Memoirs of the Botanical Survey of South Africa, No 57. Botanical Research Institute, Department of Agriculture and Water Supply, South Africa.
- Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. 2014. Edited by Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander & Marienne S. de Villiers. SANBI, Pretoria.
- Bates, M.F., Branch, W.R., Bauer, A.M., Burger, M., Marais, J., Alexander, G.J. & Marienne S. de Villiers. (Eds). 2014. *Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland*. SANBI, Pretoria.
- Berliner D. & Desmet P. 2007. *Eastern Cape Biodiversity Conservation Plan: Technical Report*. Department of Water Affairs and Forestry Project No 2005-012, Pretoria. 1 August 2007
- Bromilow, C. 2001. *Problem Plants of South Africa*. A Guide to the Identification and Control of More than 300 Invasive Plants and Other Weeds. Briza Publications. Pp 258
- Child M.F., Roxburgh L., Do Linh San E., Raimondo D., Davies-Mostert H.T. 2016. *The Red List of Mammals of South Africa, Swaziland and Lesotho*. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.
- Council for Scientific and Industrial Research. NFEPA river FEPAs 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA rivers 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetland clusters 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Council for Scientific and Industrial Research. NFEPA wetlands vegetation 2011 [vector geospatial dataset] 2011. Available from the Biodiversity GIS website, downloaded on 20 July 2020.
- Cowling, R.M., Richardson, D.M. & Pierce, S.M. 1997. *Vegetation of Southern Africa*. Cambridge University Press.
- Esler, K.J., Milton, S.J. & Dean, W.R.J. 2006. *Karoo Veld: Ecology and Management*. Briza Publications.
- Fitzpatrick Institute of African Ornithology (2020). MammalMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=MammalMAP> on 2020-07-20
- Fitzpatrick Institute of African Ornithology (2020). OrchidMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=OrchidMAP> on 2020-07-20
- Fitzpatrick Institute of African Ornithology (2020). PHOWN Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=PHOWN> on 2020-07-20
- FitzPatrick Institute of African Ornithology (2020). ScorpionMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=ScorpionMAP> on 2020-07-20
- Fitzpatrick Institute of African Ornithology (2020). SpiderMAP Virtual Museum. Accessed at <http://vmus.adu.org.za/?vm=SpiderMAP> on 2020-07-20
- Fuggle, R. F. & Rabie, M. A. 2003. *Environmental Management in South Africa*. Juta & Co, Johannesburg.
- Germishuizen, G. & Meyer, N.L. (eds). 2003. *Plants of southern Africa: An annotated checklist*. Strelitzia, 14. Pretoria: National Botanical Institute.
- Golding, J. (Ed.) 2002. *Southern African Plant Red Data Lists*. Southern African Botanical Diversity Network Report No 14.
- Henderson, L. 2001. *Alien Weeds and Invasive Plants*. Plant Protection Research Institute Handbook No 12. Agricultural Research Council. Pp 300.

- Hilton-Taylor, C. 1996. *Red Data List of Southern African Plants*. National Botanical Institute.
- Hockey PAR, Dean WRJ and Ryan PG 2005. *Roberts - Birds of southern Africa*, VIIth ed. The Trustees of the John Voelcker Bird Book Fund, Cape Town.
- International Finance Corporation. 2012. *Performance Standards on Environmental and Social Sustainability*.
- Köpke, D. 1988. *The Climate of the Eastern Cape*. In: Bruton, M. N., and Gess, F. W. (Eds). *Towards and Environmental Plan for the Eastern Cape*. Conference proceedings from Rhodes University. Grocott and Sherry, Grahamstown.
- Low, A.B. & Rebelo, A.G. 1998. *Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: Department of Environmental Affairs and Tourism.
- Marnewick MD, Retief EF, Theron NT, Wright DR, Anderson TA. 2015. *Important Bird and Biodiversity Areas of South Africa*. Johannesburg: BirdLife South Africa.
- Mecenero, S., Ball, J.B., Edge, D.A., Hamer, M.L., Hening, G.A., Krüger, M., Pringle, R.L., Terblanche, R.F. & Williams, M.C. (Eds). 2013. *Conservation assessment of butterflies of South Africa, Lesotho and Swaziland: Red List and atlas*. Safronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (Eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Minter LR, Burger M, Harrison JA, Braack HH, Bishop PJ & Kloepfer D (eds). 2004. *Atlas and Red Data book of the frogs of South Africa, Lesotho and Swaziland*. SI/MAB Series no. 9. Smithsonian Institution, Washington, D.C.
- Mucina, L. & Rutherford, M.C. (Eds). 2006. *The vegetation of South Africa, Lesotho and Swaziland*, in *Strelitzia* 19. South African National Biodiversity Institute, Pretoria.
- Myers, N., Mittermeir, R.A., Mittermeir, C.G., De Fonseca, G.A.B. & Kent, J. 2000. *Biodiversity hotspots for conservation priorities*. *Nature*, 403: 853–858.
- Nel, J., Colvin, C., Le Maitre, D., Smith, J., Haines, I. 2013. *Defining South Africa's Water Source Areas*. WWF South Africa & Council for Scientific & Industrial Research (CSIR).
- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., van Deventer, H., Funke, N., Swart, E.R., Smith-Ado, L.B., Mbona, N., Downsborough, L. & Nienaber, S. 2011. *Technical Report for the National Freshwater Ecosystem Priority Areas project*. Report to the Water Research Commission, WRC Report No. 1801/2/11. ISBN 978-1-4312-0149-5.
- Pienaar, K. 2000. *The South African What Flower is That?* Struik Publishers (Pty) Ltd. Cape Town.
- Powrie, L.W. 2013. A database of biodiversity taxon names in South Africa for copy-and-paste into reports or documents. South African National Biodiversity Institute, Cape Town. Obtained from SANBI on 20 July 2020.
- Powrie, L.W. 2013. A list of South African biodiversity terms and common names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org on 20 July 2020.
- Powrie, L.W. 2013. A list of South African botanical names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org 18 July 2020.
- Powrie, L.W. 2013. A list of South African physical feature names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org on 20 July 2020.
- Powrie, L.W. 2013. A list of South African zoological and other (including fungi and lichen) names for spell checking. South African National Biodiversity Institute, Cape Town. Downloaded from www.sanbi.org on 20 July 2020.
- Rouget, M., Reyers, B., Jonas, Z., Desmet, P., Driver, A., Maze, K., Egoh, B. & Cowling, R.M. 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 1: Terrestrial Component*. Pretoria: South African National Biodiversity Institute.
- Skowno, A.L., Raimondo, D.C., Poole, C.J., Fizzotti, B. & Slingsby, J.A. (Eds.). 2019. *South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm*. South African National Biodiversity Institute, Pretoria. <http://hdl.handle.net/20>.

- South African National Biodiversity Institute (SANBI). 2019. *National Biodiversity Assessment 2018: The status of South Africa's ecosystems and biodiversity. Synthesis Report*. South African National Biodiversity Institute, an entity of the Department of Environment, Forestry and Fisheries, Pretoria. pp. 1–214.
- Stirton, C. H. 1987. *Plant Invaders: Beautiful, but Dangerous*. The Department of Nature and Environmental Conservation of the Cape Province Administration. Galvin and Sales, Cape Town.
- Taylor, M.R., Peacock, F., and Wanless, R.M. 2015. *Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*.
- Taylor, P.B., Navarro, R.A., Wren-Sargent, M., Harrison, J.A. & Kieswetter, S.L. 1999. *Coordinated waterbird Counts in South Africa, 1992-1997*. Avian Demography Unit, Cape Town.
- Turpie, J.K., Wilson, G. & Van Niekerk, L. 2012. *National Biodiversity Assessment 2011: National Estuary Biodiversity Plan for South Africa*. Anchor Environmental Consulting, Cape Town. Report produced for the Council for Scientific and Industrial Research and the South African National Biodiversity Institute.
- UN Natural Value Initiative. 2009. *The Ecosystem Services Benchmark*, 2009.
- Van Wyk, A.E. & Smith, G.F. 2001. *Regions of Floristic Endemism: A Review with Emphasis on Succulents*, Umdaus Press.
- Weather Bureau. 1988. *Climate of South Africa – Climate statistics up to 1984 (WB40)*. Government Printer, Pretoria.
- Young, D.J., Harrison, J.A., Navarro, R.A., Anderson, M.A., & Colahan, B.D. (Eds). 2003. *Big birds on farms: Mazda CAR Report 1993-2001*. Avian Demography Unit: Cape Town.

Web Databases

- Animal Demographic Unit: <http://vmus.adu.org.za>
- Conservation International: <http://www.biodiversityhotspots.org>
- Global Biodiversity Information Facility (GBIF): <http://gbif.org>
- International Union for Conservation of Nature (IUCN) Redlist: <http://iucnredlist.org>
- Millennium Ecosystem Assessment (MEA). 2005: <https://www.millenniumassessment.org>
- Plants of Southern Africa: <http://newposa.sanbi.org>
- South African National Biodiversity Institute (SANBI) Redlist: <http://redlist.sanbi.org>
- South African Bird Atlas Project: <http://sabap2.birdmap.africa>
- United Nations Environment Programme (UNEP), *A to Z Areas of Biodiversity Importance*: <http://www.biodiversitya-z.org>
- United Nations Environment Programme (UNEP), *World Database on Protected Areas, Protected Planet*: <http://www.protectedplanet.net>
- World Resources Institute (WRI): <https://www.wri.org>

9.2 Appendix B: Flora and Fauna Species Lists

9.2.1 Flora

Marked species were flagged from various database sources as occurring in the region and having an elevated status. All were cross checked for distribution overlay and were actively screened for presence/absence on site.

SCIENTIFIC NAME	FAMILY	STATUS ⁹	COMMENT/PRESENCE
<i>Abutilon sonneratianum</i>	Malvaceae	LC	Geophytic herb, SECT
<i>Acalypha ecklonii</i>	Euphorbiaceae	End, LC	Herb, SECT
<i>Adenopodia spicata</i>	Fabaceae	LC	Herb, BMT
<i>Albuca bracteata</i>	Hyacinthaceae	PNCO, LC	Geophytic herb, BMT
<i>Allophylus decipiens</i>	Sapindaceae	LC	Tree, BMT
<i>Aloidendron barberae</i>	Asphodelaceae	LC, PNCO	Herb, BMT
<i>Angraecum pusillum</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Apodytes dimidiata</i>	Icacinales	LC	Tree, BMT
<i>Asparagus aethiopicus</i>	Asparagaceae	LC	Shrub, SECT
<i>Bonatea speciosa</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Brachiaria serrata</i>	Poaceae	LC	Graminoid, SECT
<i>Brachylaena elliptica</i>	Asteraceae	End, LC	Tree, SECT
<i>Brachylaena ilicifolia</i>	Asteraceae	LC	Tree, BMT
<i>Buxus macowanii</i>	Buxaceae	End, LC	Small Tree, BMT
<i>Canthium spinosum</i>	Rubiaceae	LC	Geophytic Herb, SECT
<i>Capparis sepiaria</i>	Capparaceae	LC	Geophytic herb, SECT
<i>Carissa bispinosa</i>	Apocynaceae	LC	Geophytic herb, SECT
<i>Cassipourea flanaganii</i>	Rhizophoraceae	End, EN, NFA	Geophytic herb, BMT, Not recorded
<i>Centella asiatica</i>	Apiaceae	LC	Geophytic herb, SECT, Present
<i>Chamaecrista mimosoides</i>	Fabaceae	LC	Graminoid, SECT
<i>Cheilanthes hirta</i>	Pteridaceae	LC	Graminoid, SECT, Present
<i>Chrysocoma ciliata</i>	Asteraceae	LC	Graminoid, SECT, Present
<i>Clausena anisata</i>	Rutaceae	LC	Graminoid, SECT, Present
<i>Clematis brachiata</i>	Ranunculaceae	LC	Graminoid, SECT
<i>Coddia rudis</i>	Rubiaceae	LC	Graminoid, SECT, Present
<i>Commelina africana</i>	Commelinaceae	LC	Graminoid, SECT, Present
<i>Crassula pellucida</i>	Crassulaceae	End, LC	Graminoid, SECT
<i>Croton rivularis</i>	Euphorbiaceae	End, LC	Graminoid, SECT
<i>Cussonia spicata</i>	Araliaceae	LC	Graminoid, SECT, BMT, Present
<i>Cymbopogon marginatus</i>	Poaceae	LC	Graminoid, SECT
<i>Cynanchum viminalis</i>	Apocynaceae	LC	Graminoid, SECT
<i>Cynodon dactylon</i>	Poaceae	LC	Graminoid, SECT, Present

⁹ **NEST** – National Environmental Screening Tool (Very High, High, Medium, Low); **End** – Endemic; **ToPS** – Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (**LC**), Near Threatened (**NT**), Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**); **CITIES** - Conservation for International trade in Endangered Species.

¹⁰ **BMT** – Buffets Mesic Thicket; **SECT** – South-Eastern Coastal Thornveld.

SCIENTIFIC NAME	FAMILY	STATUS ⁹	COMMENT/PRESENCE ¹⁰
<i>Cynoglossum hispidum</i>	Boraginaceae	LC	Graminoid, SECT
<i>Dactyloctenium australe</i>	Poaceae	LC	Graminoid, SECT, Present
<i>Dendrobium</i> sp.	Orchidaceae	PNCO, LC	Woody climber,
<i>Dietes iridioides</i>	Iridaceae	PNCO, LC	Graminoid, BMT, Present, common in thicket
<i>Digitaria natalensis</i>	Poaceae	LC	Graminoid, SECT, Present
<i>Diospyros simii</i>	Ebenaceae	End, LC	Graminoid, BMT
<i>Diospyros villosa</i>	Ebenaceae	LC	Graminoid, SECT, BMT, Present in Thicket & Thornveld
<i>Dracaena alectriformis</i>	Ruscaceae	LC	Graminoid, BMT
<i>Dyschoriste setigera</i>	Acanthaceae	LC	Graminoid, SECT
<i>Ehrharta calycina</i>	Poaceae	LC	Herb, SECT
<i>Ehrharta erecta</i>	Poaceae	LC	Herb, SECT
<i>Ekebergia capensis</i>	Meliaceae	LC	Herb, SECT
<i>Elionurus muticus</i>	Poaceae	LC	Herb, SECT
<i>Encephalartos altensteinii</i>	Zamiaceae	End, VU, PNCO, CITIES	Herb, BMT, Not recorded
<i>Encephalartos villosus</i>	Zamiaceae	PNCO, LC, CITIES	Herb, BMT, Not recorded
<i>Eragrostis capensis</i>	Poaceae	LC	Herb, SECT
<i>Eragrostis curvula</i>	Poaceae	LC	Herb, SECT
<i>Eragrostis plana</i>	Poaceae	LC	Herb, SECT
<i>Eriosema squarrosum</i>	Fabaceae	LC	Herb, SECT
<i>Erythrina caffra</i>	Fabaceae	LC	Herb, SECT, BMT, Present
<i>Euclea natalensis</i>	Ebenaceae	LC	Herb, BMT
<i>Eulophia speciosa</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Euphorbia grandidens</i>	Euphorbiaceae	LC	Herb, BMT
<i>Euphorbia triangularis</i>	Euphorbiaceae	LC	Herb, SECT, BMT
<i>Ficus sur</i>	Moraceae	LC	Herb, SECT
<i>Grewia occidentalis</i>	Malvaceae	LC	Herb, SECT, BMT, Present
<i>Gymnosporia buxifolia</i>	Celastraceae	LC	Herbaceous climber, SECT
<i>Habenaria arenaria</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Harpephyllum caffrum</i>	Anacardiaceae	LC	Herbaceous climber, BMT, Present, common
<i>Helichrysum asperum</i>	Asteraceae	LC	Herbaceous climber, SECT
<i>Heteropogon contortus</i>	Poaceae	LC	Herbaceous climber, SECT
<i>Hippobromus pauciflorus</i>	Sapindaceae	LC	Low Shrub, SECT
<i>Justicia bolusii</i>	Acanthaceae	End, Rare	Low shrub, BMT
<i>Justicia petiolaris</i> subsp. <i>bowiei</i>	Acanthaceae	LC	Low shrub, BMT
<i>Lactuca inermis</i>	Asteraceae	LC	Low shrub, SECT
<i>Lobelia erinus</i>	Lobeliaceae	LC	Low shrub, SECT
<i>Melica racemosa</i>	Poaceae	LC	Low shrub, SECT
<i>Metarungia galpinii</i>	Acanthaceae	End, EN	Low shrub, BMT
<i>Monsonia emarginata</i>	Geraniaceae	End, LC	Low shrub, SECT
<i>Moraea pallida</i>	Iridaceae	PNCO, LC	Low shrub, SECT
<i>Mystacidium capense</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO

SCIENTIFIC NAME	FAMILY	STATUS ⁹	COMMENT/PRESENCE ¹⁰
<i>Mystacidium venosum</i>	Orchidaceae	PNCO, LC	Woody climber, LC, PNCO
<i>Mystroxydon aethiopicum</i>	Celastraceae	LC	Low shrub, SECT
<i>Ochna arborea</i>	Ochnaceae	LC	Low shrub, SECT
<i>Olea europaea</i> subsp. <i>africana</i>	Oleaceae	LC	Small tree, BMT
<i>Oxalis smithiana</i>	Oxalidaceae	LC	Small tree, SECT
<i>Panicum deustum</i>	Poaceae	LC	Small tree, SECT
<i>Panicum maximum</i>	Poaceae	LC	Small tree, SECT
<i>Pavetta lanceolata</i>	Rubiaceae	LC	Small tree, SECT
<i>Pelargonium alchemilloides</i>	Geraniaceae	LC	Small tree, SECT
<i>Phyllanthus maderaspatensis</i>	Phyllanthaceae	LC	Small tree, SECT
<i>Phyllopodium cuneifolium</i>	Scrophulariaceae	End, LC	Small tree, SECT
<i>Pilogyne scabra</i>	Cucurbitaceae	LC	Small tree, SECT
<i>Plectranthus verticillatus</i>	Lamiaceae	LC	Small tree, SECT
<i>Polystachya ottoniana</i>	Orchidaceae	PNCO, LC	Woody Succulent Climber, LC, PNCO
<i>Polystachya pubescens</i>	Orchidaceae	PNCO, LC	Woody succulent climber, LC, PNCO
<i>Psyrax obovata</i>	Rubiaceae	LC	Small tree, SECT
<i>Ptaeroxylon obliquum</i>	Rutaceae	LC	Small tree, BMT
<i>Pterocelastrus tricuspidatus</i>	Celastraceae	End, LC	Small tree, SECT
<i>Rhoiacarpos capensis</i>	Santalaceae	LC	Small tree, SECT
<i>Rhoicissus digitata</i>	Vitaceae	LC	Small tree, SECT
<i>Rhoicissus tomentosa</i>	Vitaceae	LC	Small tree, BMT
<i>Rhoicissus tridentata</i>	Vitaceae	LC	Small tree, SECT
<i>Rhynchosia caribaea</i>	Fabaceae	LC	Small tree, SECT
<i>Rhynchosia ciliata</i>	Fabaceae	End, LC	Small tree, SECT
<i>Rhynchosia totta</i>	Fabaceae	LC	Succulent herb, SECT
<i>Sansevieria hyacinthoides</i>	Ruscaceae	LC	Succulent herb, SECT
<i>Schotia latifolia</i>	Fabaceae	LC	Succulent tree, BMT
<i>Scutia myrtina</i>	Rhamnaceae	LC	Succulent tree, SECT, BMT, Present in Thicket & Thornveld
<i>Searsia lucida</i>	Anacardiaceae	End, LC	Succulent tree, SECT
<i>Secamone alpini</i>	Apocynaceae	LC	Tall Shrub, SECT
<i>Selago corymbosa</i>	Scrophulariaceae	End, LC	Tall Shrub, SECT, Present in Thornveld
<i>Senecio burchellii</i>	Asteraceae	End, LC	Tall Shrub, SECT
<i>Senecio pterophorus</i>	Asteraceae	LC	Tall Shrub, SECT, Present in Thornveld
<i>Senegalia caffra</i>	Fabaceae	LC	Tall shrub, BMT
<i>Setaria megaphylla</i>	Poaceae	LC	Tall shrub, SECT
<i>Setaria sphacelata</i>	Poaceae	LC	Tall shrub, SECT, Present in Thornveld
<i>Sideroxylon inerme</i>	Sapotaceae	NFA, LC	Tall shrub, SECT, BMT
<i>Sonchus dregeanus</i>	Poaceae	LC	Tall shrub, SECT
<i>Sporobolus africanus</i>	Poaceae	LC	Tall shrub, SECT
<i>Strelitzia reginae</i>	Strelitziaceae	LC, PNCO	Tall shrub, SECT, Present in thicket
<i>Tarchonanthus littoralis</i>	Asteraceae	End, LC	Tall shrub, SECT
<i>Tecomaria capensis</i>	Bignoniaceae	LC	Tall shrub, SECT

SCIENTIFIC NAME	FAMILY	STATUS ⁹	COMMENT/PRESENCE ¹⁰
<i>Tephrosia capensis</i>	Fabaceae	LC	Tall shrub, SECT
<i>Themeda triandra</i>	Poaceae	LC	Tall shrub, SECT, Present
<i>Thunbergia capensis</i>	Acanthaceae	End, LC	Tall shrub, SECT
<i>Trachypogon spicatus</i>	Poaceae	LC	Tall shrub, SECT
<i>Tristachya leucothrix</i>	Poaceae	LC	Tall shrub, SECT
<i>Turraea obtusifolia</i>	Meliaceae	LC	Tall shrub, SECT
<i>Vachellia karroo</i>	Fabaceae	LC	Tall shrub, SECT, Present, common in Thornveld
<i>Volkameria glabra</i>	Lamiaceae	LC	Tall tree, SECT
<i>Zanthoxylum capense</i>	Rutaceae	LC	Tall tree, SECT, BMT, Present

9.2.2 Fauna

SCIENTIFIC NAME	COMMON NAME	STATUS ¹¹	COMMENT/PRESENCE
MAMMALS			
<i>Canis mesomelas</i>	Black-backed Jackal	LC (2016)	May be transient visitor
<i>Caracal caracal</i>	Caracal	LC (2016)	May be transient visitor
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC (2016)	May be transient visitor
<i>Chrysospalax trevelyani</i>	Giant Golden Mole	NEST (M), EN [B2ab (i,ii,iii,iv,v)]	EC, KZN, Port Alfred to Port Shepstone and inland to Queenstown/Elliot, Forest, Grassland. No mole activity recorded, may be a transient visitor.
<i>Cryptomys hottentotus</i>	Southern African Mole-rat	LC (2016)	May be transient visitor
<i>Dendrohyrax arboreus</i>	Southern Tree Hyrax	EN (2016)	Not recorded, unlikely but may be a transient visitor.
<i>Epomophorus wahlbergi</i>	Wahlberg's Epauletted Fruit Bat	LC (2016)	May be transient visitor
<i>Felis silvestris</i>	Wildcat	LC (2016)	May be transient visitor
<i>Genetta genetta</i>	Common Genet	LC (2016)	May be transient visitor
<i>Graphiurus (Graphiurus) murinus</i>	Forest African Dormouse	LC	May be transient visitor
<i>Mastomys natalensis</i>	Natal Mastomys	LC (2016)	May be transient visitor
<i>Mellivora capensis</i>	Honey Badger	LC (2016)	May be transient visitor
<i>Miniopterus natalensis</i>	Natal Long-fingered Bat	LC (2016)	May be transient visitor
<i>Miniopterus schreibersii</i>	Schreibers's Long-fingered Bat	NT	Not recorded, unlikely but may be a transient visitor.
<i>Myotis tricolor</i>	Temminck's Myotis	LC (2016)	
<i>Poecilogale albinucha</i>	African Striped Weasel	NT (2016)	Not recorded, unlikely but may be a transient visitor.
<i>Rousettus (Rousettus) aegyptiacus</i>	Egyptian Rousette	LC	May be transient visitor

¹¹ **PNCO** - Provincial Nature Conservation Ordinance (1974); **NEST** - National Environmental Screening Tool (Very High, High, Medium, Low); **ToPS** - Threatened or Protected Species [NEM:BA]; IUCN: Least Concern (**LC**), Near Threatened (**NT**), Critically Endangered (**CR**), Endangered (**EN**), Vulnerable (**VU**); **CITIES** - Conservation for International trade in Endangered Species.

SCIENTIFIC NAME	COMMON NAME	STATUS ¹¹	COMMENT/PRESENCE
Sensitive species 5		NEST (M), VU [B2ab (ii,iii,v); C2a(i)]	Mossel Bay to Richards Bay & inland to Queenstown & Vryheid, Angola; Cameroon; CAR; Congo; DRC; Equatorial Guinea; Gabon; Kenya; Malawi; Mozambique; Nigeria; South Sudan; Tanzania; Uganda; Zambia; Zimbabwe, Forest. Unlikely, but may be a transient visitor.
<i>Thryonomys swinderianus</i>	Greater Cane Rat	LC (2016)	May be transient visitor
BIRDS			
<i>Batis capensis</i>	Cape Batis		May be transient visitor
<i>Campethera abingoni</i>	Golden-tailed Woodpecker		May be transient visitor
<i>Campethera notata</i>	Knysna Woodpecker	NEST (H), SA: NT, Intl: VU	Forest, Savanna, Shrubland, Grassland, WC, EC, KZN, Coastal from Hermanus to Port Shepstone & inland to Graaf Reinett. Likely a transient visitor.
<i>Cercotrichas (Erythropgyia) signata</i>	Brown Scrub-Robin		May be transient visitor
<i>Chrysococcyx klaas</i>	Klaas's Cuckoo		May be transient visitor
<i>Colius striatus</i>	Speckled Mousebird		May be transient visitor
<i>Cossypha caffra</i>	Cape Robin-chat		May be transient visitor
<i>Cossypha natalensis</i>	Red-capped (Natal) Robin-Chat		May be transient visitor
<i>Cuculus clamosus</i>	Black Cuckoo		May be transient visitor
<i>Dendropicos griseocephalus</i>	Olive Woodpecker		May be transient visitor
<i>Dryoscopus cubla</i>	Black-backed (Southern) Puffback		May be transient visitor
<i>Indicator minor</i>	Lesser Honeyguide		May be transient visitor
<i>Lagonosticta rubricata</i>	African (Blue-billed) Firefinch		May be transient visitor
<i>Lamprotornis coruscus</i>	Black-bellied Starling		May be transient visitor
<i>Lonchura cucullata</i>	Bronze Mannikin		May be transient visitor
<i>Morus capensis</i>	Cape Gannet	Intl: VU; SA: VU	Unlikely, marine
<i>Motacilla capensis</i>	Cape Wagtail		May be transient visitor
<i>Muscicapa caerulea</i>	Ashy Flycatcher (Alseonax)		May be transient visitor
<i>Nectarinia [Cinnyris] veronii</i>	Grey (Mouse-coloured) Sunbird		May be transient visitor
<i>Numida meleagris</i>	Helmeted Guinea fowl		May be transient visitor
<i>Phalacrocorax capensis</i>	Cape Cormorant	Intl: EN; SA: EN	Unlikely, marine
<i>Phyllastrephus terrestris</i>	Terrestrial Brownbul (Bulbul)		May be transient visitor
<i>Ploceus cucullatus</i>	Village (Spotted-backed) Weaver		May be transient visitor
<i>Ploceus ocularis</i>	Spectacled Weaver		May be transient visitor
<i>Ploceus subaureus</i>	Yellow (African Golden) Weaver		May be transient visitor

SCIENTIFIC NAME	COMMON NAME	STATUS ¹	COMMENT/PRESENCE
<i>Pogoniulus pusillus</i>	Red-fronted Tinkerbird		May be transient visitor
<i>Prinia subflava</i>	Tawny-flanked Prinia		May be transient visitor
<i>Pternistis afer</i>	Red-necked Spurfowl (Francolin)		May be transient visitor
<i>Pycnonotus tricolor</i>	Dark-capped (Black-eyed) Bulbul		May be transient visitor
<i>Quelea erythrops</i>	Red-headed Quelea		May be transient visitor
<i>Sarothrura elegans</i>	Buff-spotted Flufftail		May be transient visitor
<i>Serinus mozambicus</i>	Yellow-fronted (eyed) Canary		May be transient visitor
<i>Stephanoaetus coronatus</i>	African Crowned (Crowned) Eagle	Intl: NT; SA: VU	Unlikely, may be a transient visitor
<i>Sterna bergii</i>	Swift (Great Crested) Tern		Unlikely
<i>Sterna hirundo</i>	Common Tern		Unlikely
<i>Streptopelia semitorquata</i>	Red-eyed Dove		May be transient visitor
<i>Streptopelia senegalensis</i>	Laughing (Palm) Dove		May be transient visitor
<i>Tauraco corythaix</i>	Knysna Turaco (split)		May be transient visitor
<i>Terpsiphone viridis</i>	African Paradise-Flycatcher		May be transient visitor
<i>Turtur tympanistria</i>	Tambourine Dove		May be transient visitor
<i>Vidua macroura</i>	Pin-tailed Whydah		May be transient visitor
REPTILES			
<i>Acontias orientalis</i>	Eastern Legless Skink	LC (2014)	May be transient visitor
<i>Acontias plumbeus</i>	Giant Legless Skink	LC (2014)	May be transient visitor
<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	LC (2014)	May be transient visitor
<i>Agama atra</i>	Southern Rock Agama	LC (2014)	May be transient visitor
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC (2014)	May be transient visitor
<i>Bitis arietans arietans</i>	Puff Adder	LC (2014)	May be transient visitor
<i>Bradypodion ventrale</i>	Eastern Cape Dwarf Chameleon	LC (2014)	May be transient visitor
<i>Causus rhombeatus</i>	Rhombic Night Adder	LC (2014)	May be transient visitor
<i>Chamaesaura anguina anguina</i>	Cape Grass Lizard	LC (2014)	May be transient visitor
<i>Cordylus cordylus</i>	Cape Girdled Lizard	LC (2014)	May be transient visitor
<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	LC (2014)	May be transient visitor
<i>Dasypeltis inornata</i>	Southern Brown Egg-eater	LC (2014)	May be transient visitor
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC (2014)	May be transient visitor
<i>Dispholidus typus typus</i>	Boomslang	LC (2014)	May be transient visitor
<i>Duberria lutrix lutrix</i>	South African Slug-eater	LC (2014)	May be transient visitor
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC (2014)	May be transient visitor
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	LC (2014)	May be transient visitor
<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake	LC (2014)	May be transient visitor

SCIENTIFIC NAME	COMMON NAME	STATUS ¹	COMMENT/PRESENCE
<i>Hydrophis platurus</i>	Yellow-bellied Sea Snake	LC (2014)	May be transient visitor
<i>Lamprophis aurora</i>	Aurora House Snake	LC (2014)	May be transient visitor
<i>Lycodonomorphus laevis</i>	Dusky-bellied Water Snake	LC (2014)	May be transient visitor
<i>Lycodonomorphus rufulus</i>	Brown Water Snake	LC (2014)	May be transient visitor
<i>Lycophidion capense capense</i>	Cape Wolf Snake	LC (2014)	May be transient visitor
<i>Lygodactylus capensis</i>	Common Dwarf Gecko	LC (2014)	May be transient visitor
<i>Macrelaps microlepidotus</i>	Natal Black Snake	NT (2014)	Unlikely, may be a transient visitor
<i>Nucras lalandii</i>	Delalande's Sandveld Lizard	LC (2014)	May be transient visitor
<i>Pachydactylus maculatus</i>	Spotted Gecko	LC (2014)	May be transient visitor
<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated	May be present in dams
<i>Philothamnus occidentalis</i>	Western Natal Green Snake	LC (2014)	May be transient visitor
<i>Philothamnus semivariegatus</i>	Spotted Bush Snake	LC (2014)	May be transient visitor
<i>Psammophis crucifer</i>	Cross-marked Grass Snake	LC (2014)	May be transient visitor
<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	LC (2014)	May be transient visitor
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC (2014)	May be transient visitor
<i>Trachylepis capensis</i>	Cape Skink	LC (2014)	May be transient visitor
<i>Trachylepis homalocephala</i>	Red-sided Skink	LC (2014)	May be transient visitor
<i>Trachylepis varia sensu stricto</i>	Common Variable Skink		May be transient visitor
<i>Varanus niloticus</i>	Water Monitor	LC (2014)	May be transient visitor
AMPHIBIANS			
<i>Amietia delalandii</i>	Delalande's River Frog	LC (2017)	May be transient visitor
<i>Cacosternum boettgeri</i>	Common Caco	LC (2013)	May be transient visitor
<i>Cacosternum nanum</i>	Bronze Caco	LC (2013)	May be transient visitor
<i>Hyperolius marmoratus</i>	Painted Reed Frog	LC (2013)	May be transient visitor
<i>Hyperolius semidiscus</i>	Yellowstriped Reed Frog	LC	May be transient visitor
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	May be transient visitor
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC (2013)	May be transient visitor
<i>Ptychadena oxyrhynchus</i>	Sharphosed Grass Frog	LC	May be transient visitor
<i>Ptychadena porosissima</i>	Striped Grass Frog	LC	May be transient visitor
<i>Sclerophrys capensis</i>	Raucous Toad	LC	May be transient visitor
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC (2016)	May be transient visitor
<i>Semnodactylus wealii</i>	Rattling Frog	LC	May be transient visitor
<i>Strongylopus fasciatus</i>	Striped Stream Frog	LC	May be transient visitor
<i>Xenopus laevis</i>	Common Platanna	LC	May be transient visitor
INVERTEBRATES			
LEPIDOPTERA (BUTTERFLIES)			
<i>Acleros mackenii mackenii</i>	Macken's dart	LC (2013)	May be transient visitor
<i>Acraea acara acara</i>	Acara acraea	LC (2013)	May be transient visitor
<i>Acraea aganice aganice</i>	Dark wanderer	LC (2013)	May be transient visitor

SCIENTIFIC NAME	COMMON NAME	STATUS ¹	COMMENT/PRESENCE
<i>Acraea horta</i>	Garden acraea	LC (2013)	May be transient visitor
<i>Acraea natalica</i>	Black-based acraea	LC (2013)	May be transient visitor
<i>Aloeides caffrariae</i>	Border russet	LC (2013)	May be transient visitor
<i>Amauris albimaculata albimaculata</i>	Layman	LC (2013)	May be transient visitor
<i>Amauris echeria echeria</i>	Chief	LC (2013)	May be transient visitor
<i>Anthene amarah amarah</i>	Black-striped ciliate blue	LC (2013)	May be transient visitor
<i>Anthene definita definita</i>	Steel-blue-ciliate blue	LC (2013)	May be transient visitor
<i>Artitropa erinnys erinnys</i>	Bush night-fighter	LC (2013)	May be transient visitor
<i>Azanus natalensis</i>	Natal babul blue	LC (2013)	May be transient visitor
<i>Belenois creona severina</i>	African caper white	LC (2013)	May be transient visitor
<i>Belenois gidica abyssinica</i>	African veined white	LC (2013)	May be transient visitor
<i>Belenois zochalia zochalia</i>	Forest caper white	LC (2013)	May be transient visitor
<i>Bicyclus safitza safitza</i>	Black-haired bush brown	LC (2013)	May be transient visitor
<i>Borbo fatuellus fatuellus</i>	Long-horned swift	LC (2013)	May be transient visitor
<i>Byblia anvatara acheloia</i>	African joker	LC (2013)	May be transient visitor
<i>Cacyreus lingeus</i>	Bush bronze	LC (2013)	May be transient visitor
<i>Cacyreus marshalli</i>	Common geranium bronze	LC (2013)	May be transient visitor
<i>Callioratis abraxas</i>	Dimorphic tiger	LC (LC)	May be transient visitor
<i>Cassionympha cassius</i>	Rainforest dull brown	LC (2013)	May be transient visitor
<i>Catacroptera cloanthe cloanthe</i>	Pirate	LC (2013)	May be transient visitor
<i>Catopsilia florella</i>	African migrant	LC (2013)	May be transient visitor
<i>Charaxes brutus natalensis</i>	White-barred charaxes	LC (2013)	May be transient visitor
<i>Charaxes candiope</i>	Green-veined charaxes	LC (2013)	May be transient visitor
<i>Charaxes cithaeron cithaeron</i>	Blue-spotted charaxes	LC (2013)	May be transient visitor
<i>Charaxes karkloof karkloof</i>	Karkloof charaxes	LC (2013)	May be transient visitor
<i>Charaxes varanes varanes</i>	Pearl charaxes	LC (2013)	May be transient visitor
<i>Chrysoritis natalensis</i>	Natal opal	LC (2013)	May be transient visitor
<i>Cigaritis natalensis</i>	Natal silverline	LC (2013)	May be transient visitor
<i>Coeliades pisistratus</i>	Two-pip policeman	LC (2013)	May be transient visitor
<i>Colias electo electo</i>	African clouded yellow	LC (2013)	May be transient visitor
<i>Colotis euippe omphale</i>	Southern round-winged orange tip	LC (LC)	May be transient visitor
<i>Cymothoe alcimeda clarki</i>	Battling glider	VU (2013)	Unlikely, may be a transient visitor.
<i>Danaus chrysippus orientis</i>	African plain tiger	LC (2013)	May be transient visitor
<i>Deudorix antalus</i>	Brown playboy	LC (2013)	May be transient visitor
<i>Dira clytus eurina</i>	Cape autumn widow	LC (2013)	May be transient visitor
<i>Dixeia charina charina</i>	African ant-heap white	LC (2013)	May be transient visitor
<i>Dixeia pigea</i>	Small ant-heap white	LC (2013)	May be transient visitor
<i>Durbania amakosa amakosa</i>	Amakoza rocksitter	LC (2013)	May be transient visitor

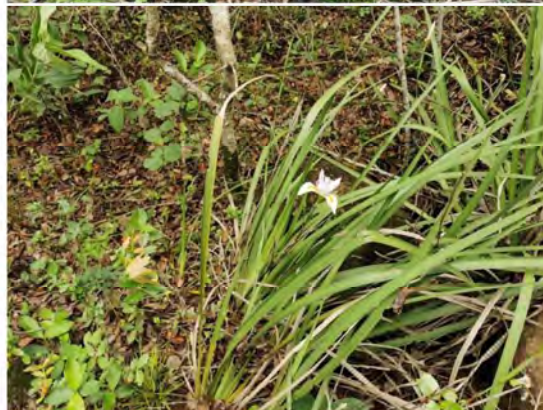
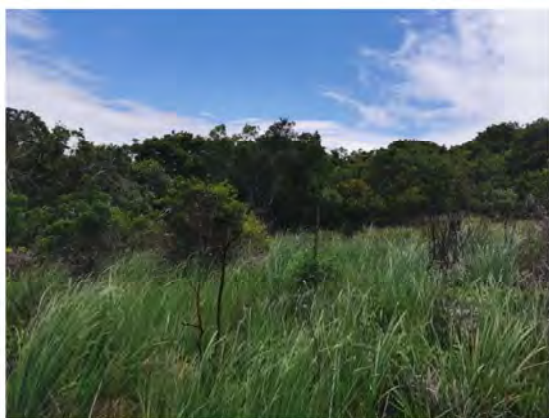
SCIENTIFIC NAME	COMMON NAME	STATUS ¹	COMMENT/PRESENCE
<i>Eagris nottoana knysna</i>	Rufous-winged elfin	LC (2013)	May be transient visitor
<i>Eicochrysops messapus messapus</i>	Cupreous ash blue	LC (2013)	May be transient visitor
<i>Eronia cleodora</i>	Vine-leaf vagrant	LC (2013)	May be transient visitor
<i>Eurema brigitta brigitta</i>	Broad-bordered grass yellow	LC (2013)	May be transient visitor
<i>Eurema desjardinsii regularis</i>	Angled grass yellow	LC (2013)	May be transient visitor
<i>Eurytela dryope angulata</i>	Golden piper	LC (2013)	May be transient visitor
<i>Eurytela hiarbas angustata</i>	Pied piper	LC (2013)	May be transient visitor
<i>Gomalia elma elma</i>	Green-marbled skipper	LC (2013)	May be transient visitor
<i>Graphium leonidas leonidas</i>	Veined swordtail	LC (2013)	May be transient visitor
<i>Hypolimnas misippus</i>	Common diadem	LC (2013)	May be transient visitor
<i>Hypolycaena philippus philippus</i>	Purple-brown hairstreak	LC (2013)	May be transient visitor
<i>Iolais aemulus</i>	Short-barred sapphire	LC (2013)	May be transient visitor
<i>Iolais sidus</i>	Red-line sapphire	LC (2013)	May be transient visitor
<i>Iolais silas</i>	Southern sapphire	LC (2013)	May be transient visitor
<i>Junonia hierta cebrene</i>	Yellow pansy	LC (2013)	May be transient visitor
<i>Junonia oenone oenone</i>	Dark blue pansy	LC (2013)	May be transient visitor
<i>Junonia orithya madagascariensis</i>	African blue pansy	LC (2013)	May be transient visitor
<i>Kedestes macomo</i>	Macomo ranger	LC (2013)	May be transient visitor
<i>Lachnocnema bibulus</i>	Common woolly legs	LC (2013)	May be transient visitor
<i>Lampides boeticus</i>	Pea blue	LC (2013)	May be transient visitor
<i>Leptomyrina gorgias gorgias</i>	Lilac-based black-eye	LC (2013)	May be transient visitor
<i>Leptomyrina hirundo</i>	Tailed black-eye	LC (2013)	May be transient visitor
<i>Leptomyrina lara</i>	Cape black-eye	LC (2013)	May be transient visitor
<i>Leptosia alcesta inalcesta</i>	African wood white	LC (2013)	May be transient visitor
<i>Leptotes pirithous pirithous</i>	Common zebra blue	LC (2013)	May be transient visitor
<i>Libythea labdaca laius</i>	African snout	LC (2013)	May be transient visitor
<i>Metisella metis paris</i>	Gold-spotted sylph	LC (2013)	May be transient visitor
<i>Moltena fiara</i>	Strelitzia night-fighter	LC (2013)	May be transient visitor
<i>Mylothris agathina agathina</i>	Eastern dotted border	LC (2013)	May be transient visitor
<i>Mylothris rueppellii haemus</i>	Twin dotted border	LC (2013)	May be transient visitor
<i>Mylothris trimenia</i>	Sulphur dotted border	LC (2013)	May be transient visitor
<i>Myrina dermaptera dermaptera</i>	Lesser fig tree blue	LC (2013)	May be transient visitor
<i>Nepheronia buquetii buquetii</i>	Buquet's vagrant	LC (2013)	May be transient visitor
<i>Neptis saclava marpessa</i>	Spotted sailer	LC (2013)	May be transient visitor
<i>Netrobalane canopus</i>	Buff-tipped skipper	LC (2013)	May be transient visitor
<i>Papilio dardanus cenea</i>	Mocker swallowtail	LC (2013)	May be transient visitor
<i>Papilio demodocus demodocus</i>	Citrus swallowtail	LC (2013)	May be transient visitor
<i>Papilio nireus lyaeus</i>	Narrow green-banded swallowtail	LC (2013)	May be transient visitor

SCIENTIFIC NAME	COMMON NAME	STATUS ¹	COMMENT/PRESENCE
<i>Paraethe dendrophilus dendrophilus</i>	Bush beauty	LC (2013)	May be transient visitor
<i>Pardopsis punctatissima</i>	Polka dot	LC (2013)	May be transient visitor
<i>Pelopidas mathias</i>	Black-branded swift	LC (2013)	May be transient visitor
<i>Phalanta eurytis eurytis</i>	Forest leopard	LC (2013)	May be transient visitor
<i>Phalanta phalantha aethiopica</i>	African leopard	LC (2013)	May be transient visitor
<i>Precis archesia archesia</i>	Garden inspector	LC (2013)	May be transient visitor
<i>Precis octavia sesamus</i>	Southern gaudy commodore	LC (2013)	May be transient visitor
<i>Pseudacraea boisduvalii trimenii</i>	Boisduval's false acraea	LC (2013)	May be transient visitor
<i>Pseudonympha magus</i>	Silver-bottom brown	LC (2013)	May be transient visitor
<i>Sarangesa motozi</i>	Forest elfin	LC (2013)	May be transient visitor
<i>Sevenia natalensis</i>	Bronze tree nymph	LC (2013)	May be transient visitor
<i>Spialia dromus</i>	Forest sandman	LC (2013)	May be transient visitor
<i>Spialia spio</i>	Mountain sandman	LC (2013)	May be transient visitor
<i>Tagiades flesus</i>	Clouded flat	LC (2013)	May be transient visitor
<i>Telchinia cabira</i>	Yellow-banded telchinia	LC (2013)	May be transient visitor
<i>Telchinia encedon encedon</i>	White-barred telchinia	LC (2013)	May be transient visitor
<i>Telchinia esebria</i>	Dusky telchinia	LC (2013)	May be transient visitor
<i>Telchinia serena</i>	Dancing telchinia	LC (2013)	May be transient visitor
<i>Vanessa cardui</i>	Painted lady	LC (2013)	May be transient visitor
<i>Vanessa hippomene hippomene</i>	Southern short-tailed admiral	LC (2013)	May be transient visitor
<i>Zizeeria knysna knysna</i>	African grass blue	LC (2013)	May be transient visitor
<i>Zophopetes dysmephila</i>	Palm-tree night-fighter	LC (2013)	May be transient visitor
INVERTEBRATES			
<i>Prostalia granulata</i>	Bladder grasshopper	NEST (M), EN [B2ab (iii,v)]	EC, KZN, MP, Forest, Grassland. Not recorded.
SCORPIONS			
<i>Opisthacanthus validus</i>		ToPS	May be present
<i>Uroplectes formosus</i>		ToPS	May be present
SPIDERS			
<i>Brachionopus robustus</i>			May be transient visitor
<i>Caerostris</i> sp.	Bark spiders		May be transient visitor
<i>Harpactira guttata</i>	Baboon Spider	ToPS	May be present
<i>Harpactira tigrina</i>	Baboon Spider	ToPS	May be present
<i>Lepthercus ratttrayi</i>			May be transient visitor
<i>Olios correvoni</i>	Common green olios		May be transient visitor
<i>Oxytate</i> sp.	Crab spiders		May be transient visitor
<i>Peucetia</i> sp.	Green lynx spiders		May be transient visitor
<i>Steatoda</i> sp.	Comb-footed or cobweb spiders		May be transient visitor
<i>Thomisus daradioides</i>	Two spotted crab spider		May be transient visitor

9.3 Appendix C: Site Photographic Record















9.4 Appendix D: Biodiversity Environmental Management Plan

Specific measures relating to management of Biodiversity Impacts that must be included in the project Environmental Management Programme (EMPr). This Environmental Management Plan (EMP) contains guidelines, operating procedures and rehabilitation control requirements, which will be binding on the holder of the environmental authorisation after approval of the EMP. The impacts identified and listed in 3.3 will be managed / controlled as set out under mitigating measures (3.3) and as detailed in this section for the more significant impacts during the operational phase.

9.4.1 Protection of Flora and Fauna

The following actions must be implemented at construction phase.

- Search and rescue operations for Species of Conservation Concern *must* be undertaken before the commencement of site clearing activities.
- Indigenous vegetation encountered on the sites that are to be conserved and left intact.
- It is important that clearing activities are kept to the minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation *should* be temporarily stored during operations and to be used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species. All flora and fauna remain the property of the landowner and *must* not be disturbed, upset or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heated as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared but only by the expressed written permission of the ECO.
- Rehabilitation of vegetation of the site *must* be done as described in the Rehabilitation Plans.

Flora search and Rescue

The following flora relocation plan is recommended:

- Once the final layout has been determined the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required and once species of conservation concern have been relocated for that area.
- Once site clearing is to commence, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a protected area.

9.4.2 Alien and Invasive Plant Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.

- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase.
- Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas. Removal of alien plants are to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilization or mulching, it must be seed free.
- After clearing is completed, an appropriate cover crop may be required, should natural re-establishment of grasses not take place in a timely manner.

9.4.3 Fires

- The Contractor must ensure that an emergency preparedness plan is in place in order to fight accidental fires or veld fires, should they occur. The adjacent landowners/users/managers should also be informed or otherwise involved.
- Enclosed areas for food preparation should be provided and the Contractor must strictly prohibit the use of open fires for cooking and heating purposes.
- The use of branches of trees and shrubs for fire-making must be strictly prohibited.
- The Contractor should take all reasonable and active steps to avoid increasing the risk of fire through their activities on-site. No fires may be lit except at places approved by the ECO.
- The Contractor must ensure that the basic fire-fighting equipment is to the satisfaction of the Local Emergency Services.
- The Contractor must supply all living quarters, site offices, kitchen areas, workshop areas, materials, stores and any other relevant areas with tested and approved fire-fighting equipment.
- Fires and “hot work” must be restricted to demarcated areas.
- A braai facility may be considered at the discretion of the Contractor and in consultation with the ECO. The area must be away from flammable stores. All events must be under management’s supervision and a fire extinguisher will be immediately available. “Low-smoke” fuels must be used (e.g. charcoal) and smoke control regulations, if applicable, must be considered.
- The Contractor must take precautions when working with welding or grinding equipment near potential sources of combustion. Such precautions include having a suitable, tested and approved fire extinguisher immediately at hand and the use of welding curtains.

9.4.4 Soil Aspects

- Sufficient topsoil must be stored for later use during decommissioning, particularly from outcrop areas.
- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the site footprint outside the 1:50 flood level within demarcated areas.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The application of a suitable grass seed/runner mix will facilitate this and reduce the minimise weeds.

9.4.5 Dust

- To manage complaints relation to impacts on the nearby communities, a dust register *will* be developed.
- If required, water spray vehicles *will* be used to control wind cause by strong winds during activities on the works.
- No over-watering of the site or road surfaces.
- Wind screens *should* be used to reduce wind and dust in open areas.

9.4.6 Infrastructural Requirements

Topsoil

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur.
- All available topsoil shall be removed after consultation with the Regional Manager prior to commencement of any operations.
- The removed topsoil shall be stored on high ground within the footprint outside the 1:50 flood level within demarcated areas (Appendix 1)
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- The stockpiled topsoil shall be protected from being blown away or being eroded. The use of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth.

Stormwater and Erosion Control

- Stormwater Management Plans *must* be developed for the site and should include the following:
 - The management of stormwater during construction.
 - The installation of stormwater and erosion control infrastructure.
 - The management of infrastructure after completion of construction.
- Temporary drainage works may be required to prevent stormwater to prevent silt laden surface water from draining into river systems in proximity to the site. Stormwater *must* be prevented from entering or running off site.
- To ensure that site is not subjected to excessive erosion and capable of drainage runoff with minimum risk of scour, their slopes *should* be profiled at a maximum 1:3 gradient.
- Diversion channels *should* be constructed ahead of the open cuts, and above emplacement areas and stockpiles to intercept clean runoff and divert it around disturbed areas into the natural drainage system downstream of the site.
- Rehabilitation is necessary to control erosion and sedimentation of all eroded areas (where works will take place).
- Existing vegetation *must* be retained as far as possible to minimise erosion problems.
- It is importation that the rehabilitation of site is planned and completed in such a way that the runoff water will not cause erosion.
- Visual inspections *will* be done on a regular basis with regard to the stability of water control structure, erosion and siltation.
- Sediment-laden runoff from cleared areas *must* be prevented from entering rivers and streams.
- No river or surface water may be affected by silt emanating from the site.

Site Office / Camp Sites

- No site offices or camp sites will be constructed on the site under current operating conditions, existing structures will be used.

Operating Procedures in the Site

- Construction shall only take place within the approved demarcated site.

- Construction may be limited to the areas indicated by the Regional Manager on assessment of the application.
- The holder of the environmental authorisation shall ensure that operations take place only in the demarcated areas as described in this report.
- Watering to minimise the effect of dust generation should be carried out as frequently as necessary. Noise should also be kept within reason.
- No workers will be allowed to damage or collect any indigenous plant or snare any animal.
- Grass and vegetation of the immediate environment or adapted grass / vegetation will be re-established on completion of construction activities, where applicable.
- No firewood to be collected on site and the lighting of fires must be prohibited.
- Cognisance is to be taken of the potential for endangered species occurring in the area.

Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previously stored topsoil shall be returned to its original depth over the area.
- The area shall be fertilised if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.

Rehabilitation of Processing and Excavation Areas

- On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.
- The area shall be fertilised if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This *shall* be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity, be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This *must* be done in conjunction with the ECO.
- Final rehabilitation *must* comply with the requirements mention in the Rehabilitation Plan.

9.4.7 Rehabilitation Plan

Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimize adverse environmental impacts associated with the activity whilst maximizing the future utilization of the property. Significant aspects to be borne in mind in this regard is, revegetation of undeveloped footprint and stability and environmental risk. The depression and immediate area of the working must also be free of alien vegetation. Additional broad rehabilitation strategies / objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within prescribed framework established in the EMP.
- All infrastructure, equipment, plant and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble and tyres, will be removed entirely from the site and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.

Topsoil and Subsoil Replacement

Topsoil and subsoil will be stripped and stockpiled separately and only used in rehabilitation work towards the end of the operation. This is in contrast to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.

Stripped overburden will be backfilled into the worked-out areas where needed. Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth. The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished. Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view. Stockpiles should ideally be stored for no longer than a year.

The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away. The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

Revegetation

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilize the soil surface. The following grass seed that is commonly available and suitable.

Botanical name	Common name	Approx seed mixture /Ha
<i>Cynodon dactylon</i>	Kweek	12 kg/ Ha
<i>Eragrostis curvula</i>	Weeping Love Grass	6 kg/ Ha
<i>Eragrostis tef</i>	Teff	2 kg/ Ha
<i>Digitaria eriantha</i>	Smuts Grass	4 kg/ Ha
Other indigenous veld grasses can be added to the seed mix		± 4 kg/Ha

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site
- Stabilise disturbed soil and rock faces
- Minimize surface erosion and consequent siltation of natural water course located on site
- Control wind-blown dust problems
- Enhance the physical properties of the soil
- Re-establish nutrient cycling
- Re-establish a stable ecological system

Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

Drainage and Erosion Control

To control the drainage and erosion at site the following procedures will be adopted:

- Areas where construction is completed should be rehabilitated immediately.

- Areas to be disturbed in future activities will be kept as small as possible (i.e. conducting the operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation
- Existing vegetation will be retained as far as possible to minimize erosion problems.

Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas

9.4.8 Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained.

To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

9.4.9 Closure objectives and extent of alignment to pre-construction environment

Closure Objectives

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.

9.5 Appendix E: General Impact Rating Scale

To ensure a direct comparison between various specialist studies, six standard rating scales are defined and used to assess and quantify the identified impacts. This is necessary since impacts have several parameters that need to be assessed.

These scales are:

1. The Severity/ Benefit Scale, which assesses the importance of the impact from a purely technical perspective.
2. The Spatial Impact Scale, which assesses the extent or magnitude of the impact (the area that will be affected by the impact).
3. The Temporal Impact Scale, which assesses how long the impact will be felt. Some impacts are of a short duration, whereas others are permanent.
4. The Degree of Certainty Scale, which provides a measure of how confident the author feels about their prediction.
5. The Likelihood Scale, which provides an indication of the risk or chance of an impact taking place.
6. The Environmental Significance Scale, which assesses the importance of the impact in the overall context of the affected system or party.

To ensure integration of social and ecological impacts, to facilitate specialist assessment of impact significance, and to reduce reliance on value judgments, the severity of the impact within the scientific field in which it takes place (e.g. vegetation, fauna etc.) was assessed first. Thereafter, each impact was assessed within the context of time and space, and the probability of the impact occurring was quantified using the degree of certainty scale.

The impact was then assessed in the context of the whole environment to establish the “environmental significance” of the impact to the flora and vegetation.

The scales are described in detail below.

9.5.1 The Severity/ Beneficial Scale

The severity scale was used to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on an affected system (for ecological impacts) or an affected party. This methodology attempts to remove any value judgments from the assessment, although it relies on the professional judgment of the specialist.

NEGATIVE IMPACT	POSITIVE IMPACT
Very severe An irreversible and permanent change to the affected system(s) which cannot be mitigated. For example, change in topography resulting from a quarry.	Very Beneficiary A permanent and very substantial benefit to the affected system(s) with no alternative to achieve this benefit.
Severe Long-term impacts on the affected system(s) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial A long-term impact and substantial benefit to the affected system(s). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
Moderately severe Medium- to long-term impact on the affected system(s) that could be mitigated.	Moderately beneficial A medium- to long-term impact of real benefit to the affected system(s) Other ways of optimising are equally difficult, expensive and time

NEGATIVE IMPACT	POSITIVE IMPACT
	consuming (or a combination of these), as achieving them in this way.
Slight Medium- to short term impacts on the affected system(s) Mitigation is very easy, cheap, less time consuming or not necessary.	Slightly beneficial A short- to medium-term impact and negligible benefit to the affected system(s) Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect The system(s) is not affected by the proposed development.	Do not know/Cannot know In certain cases, it may not be possible to determine the severity of the impact.

The severity of impacts can be evaluated with and without mitigation order to demonstrate how serious the impact is when nothing is done about it. For beneficial impacts, optimisation means anything that can enhance the benefits. However, mitigation or optimisation must be practical, technically feasible and economically viable.

9.5.2 Spatial and Temporal Scales

Two additional factors were considered when assessing the impacts, namely the relationship of the impact to Spatial and Temporal Scales.

The *spatial scale* (shown in italics) defines the impact at the following scales.

SPATIAL SCALE	EXPLANATION
Localised	at a localised scale (i.e. few hectares in extent). The specific area to which this scale refers is defined for the impact to which it refers.
Study Area	the site, some effects to surrounding area (~10 km)
District	the site, some effects to wider surrounding area (~100 km)
Regional	the site, some effects to surrounding area (+250 km)
National	Impacts will affect at a country level
International	Impacts extend beyond country boundary

The *temporal scale* (shown in italics) defines the impact at the following scales.

TEMPORAL SCALE	EXPLANATION
Short Term	Less than 5 years. Many construction phase impacts will be of a short duration
Medium Term	Between 5 and 20 years
Long Term	Between 20 and 40 years, and from a human perspective essentially permanent.
Permanent	Over 40 years and resulting in a permanent and lasting change.

9.5.3 The Degree of Certainty and the Likelihood Scale

It is also for each specialist to state the degree of certainty or the confidence attached to their prediction of significance. For this reason, a 'degree of certainty' scale (shown in bold) must be used.

DEGREE	DESCRIPTION
Definite:	More than 90% sure of fact. To use this one will need to substantial supportive data.
Probable:	Between 70% and 90% sure of fact.
Possible:	Between 40% and 70% sure of fact.
Unsure:	Less than 40% sure of fact.

The risk or likelihood (shown in normal font) of impacts being manifested differs. There is no doubt that some impacts would occur, but certain other (usually secondary data) impacts are not as likely and may or may not result. Although these impacts maybe severe, the likelihood of them occurring may affect their overall significance and must therefore be considered. It is therefore necessary for the author to state his estimate of the likelihood of an impact occurring, using the following likelihood scale:

DEGREE	DESCRIPTION
Very unlikely	The chance of these impacts occurring is extremely slim, e.g. natural forces destroying a dam wall.
Unlikely	The risk of these impacts occurring is slight.
May occur	The risk of these impacts is more likely, although it is not definite.
Very Likely	Slight chance that this impact will not occur.
Definite	There is no chance that this impact will not occur.

9.5.4 The Environmental Significance Scale

The environmental significance scale is an attempt to evaluate the significance of an impact, the severity or benefit of which has already been assessed. This evaluation needs to be assessed in the relevant context, as an impact can either be ecological or social, or both. Since the severity of impacts with and without mitigation will already have been assessed, significance was only evaluated after mitigation. In many cases, this mitigation will take place, as it has been incorporated into project design. A six-point significance scale is applied as follows:

SIGNIFICANCE	DESCRIPTION
Very High (6)	Impacts considered to have a major and permanent change to natural environment and are rate as VERY HIGH, usually resulting to severe or very severe/ beneficial to highly beneficial effects.
High (5)	Long term change and are rated as HIGH resulting to severe or moderately severe effects/ beneficial to moderately beneficial.
Moderate (4)	Medium to long-term effects. Impacts are rated as MODERATE with moderately severe or moderately beneficial effects.
Low (3)	Medium to short term effects. Impacts are rated as MODERATE resulting in moderately severe or moderately beneficial effects.
Insignificant (2)	Short term effects are present. Impacts are rated as SLIGHT resulting in SLIGHTLY BENEFICIAL effects. Residual effects are present but are of no consequence.
No Significance (1)	No primary or secondary effects, resulting in NO SIGNIFICANT impact.
Do not Know (0)	Not possible to determine the significance of impacts

9.5.5 Absence of Data

In certain instances, an assessment must be produced in the absence of all the relevant and necessary data, due to paucity or lack of scientific information on the study area. It is more important to identify all the likely environmental impacts than to precisely evaluate the more obvious impacts. It is important to be on the conservative side in reporting likely environmental impacts. Because assessing impacts with a lack of data is more dependent on scientific judgment, the rating on the certainty scale cannot be too high. It is for these reasons that a degree of certainty scale has been provided, as well as the categories DON'T KNOW or CAN'T KNOW.

9.6 Appendix F: Abbreviations and Definitions

9.6.1 Abbreviations

CARA	Conservation of Agricultural Resources Act, Act 43 of 1983
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs (now DEFF, see below)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DEFF	The Department of Environmental Affairs was renamed the Department of Environment, Forestry and Fisheries (DEFF) in June 2019, incorporating the forestry and fisheries functions from the previous Department of Agriculture, Forestry and Fisheries.
DEMC	Desired Ecological Management Class
DWS	Department of Water Affairs and Sanitation
DWAF	Department of Water Affairs and Forestry (former department name)
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMC	Ecological Management Class
EMP	Environmental Management Plan
EMPr	Environmental Management Programme report
ER	Environmental Representative
ESS	Ecosystem Services
IAP's	Interested and Affected Parties
IEM	Integrated Environmental Management
LM	Local Municipality
masl	meters above sea level
NBA	National Biodiversity Assessment
NEMA	National Environmental Management Act, Act 107 of 1998
NFA	National Forests Act
NEM:BA	National Environmental Management: Biodiversity Act 10 of 2004
NFA	National Forest Act, Act 84 of 1998
PEMC	Present Ecological Management Class
PES	Present Ecological State
PNCO	Provincial Nature and Environment Conservation Ordinance (No. 19 of 1974).
RDL	Red Data List
RHS	Right Hand Side
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
SoER	State of the Environment Report
SCC	Species of Conservation Concern
ToPS	Threatened or Protected Species
ToR	Terms of Reference
+ve	Positive
-ve	Negative

9.6.2 Glossary

Alien Invasive Species (AIS)	An alien species whose introduction and/or spread threaten biological diversity (Convention on Biological Diversity). Note: “Alien invasive species” is considered to be equivalent to “invasive alien species”. An alien species which becomes established in natural or semi-natural ecosystems or habitat, is an agent of change, and threatens native biological diversity (<i>IUCN</i>).
Best Environmental Practice	The application of the most appropriate combination of environmental control measures and strategies (Stockholm Convention).
Best Management Practice	Established techniques or methodologies that, through experience and research, have proven to lead to a desired result (BBOP).
Biodiversity	Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.
Biodiversity Offset	Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure and ecosystem function and people’s use and cultural values associated with biodiversity (BBOP).
Bioremediation	The use of organisms such as plants or microorganisms to aid in removing hazardous substances from an area. Any process that uses microorganisms, fungi, green plants, or their enzymes to return the natural environment altered by contaminants to its original condition.
Boundary	Landscape patches have a boundary between them which can be defined or fuzzy (Sanderson and Harris, 2000). The zone composed of the edges of adjacent ecosystems is the boundary.
Connectivity	The measure of how connected or spatially continuous a corridor, network, or matrix is. For example, a forested landscape (the matrix) with fewer gaps in forest cover (open patches) will have higher connectivity.
Corridors	Have important functions as strips of a landscape differing from adjacent land on both sides. Habitat, ecosystems or undeveloped areas that physically connect habitat patches. Smaller, intervening patches of surviving habitat can also serve as “steppingstones” that link fragmented ecosystems by ensuring that certain ecological processes are maintained within and between groups of habitat fragments.
Critically Endangered (CR)	A category on the IUCN Red List of Threatened Species which indicates a taxon is considered to be facing an extremely high risk of extinction in the wild (<i>IUCN</i>).
Cultural Ecosystem Services	The non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including, e.g. knowledge systems, social relations, and aesthetic values (Millennium Ecosystem Assessment).
Cumulative Impacts	The total impact arising from the project (under the control of the developer), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated. The project’s impact is therefore one part of the total cumulative impact on the environment. The analysis of a project’s incremental impacts combined with the effects of other projects can often give a

Data Deficient (DD)	more accurate understanding of the likely results of the project's presence than just considering its impacts in isolation (BBOP). A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat(IUCN).
Degraded Habitat/Land	Land that has been impacted upon by human activities (including introduction of invasive alien plants, light to moderate overgrazing, accelerated soil erosion, dumping of waste), but still retains a degree of its original structure and species composition (although some species loss would have occurred) and where ecological processes still occur (albeit in an altered way). Degraded land is capable of being restored to a near-natural state with appropriate ecological management.
Disturbance	An event that significantly alters the pattern of variation in the structure or function of a system, while fragmentation is the breaking up of a habitat, ecosystem, or land-use type into smaller parcels. Disturbance is generally considered a natural process.
Ecological Processes	Ecological processes typically only function well where natural vegetation remains, and where the remaining vegetation is well-connected with other nearby patches of natural vegetation. Loss and fragmentation of natural habitat severely threatens the integrity of ecological processes. Where basic processes are intact, ecosystems are likely to recover more easily from disturbances or inappropriate actions if the actions themselves are not permanent. Conversely, the more interference there has been with basic processes, the greater the severity (and longevity) of effects. Natural processes are complex and interdependent, and it is not possible to predict all the consequences of loss of biodiversity or ecosystem integrity. When a region's natural or historic level of diversity and integrity is maintained, higher levels of system productivity are supported in the long run and the overall effects of disturbances may be dampened.
Ecosystem Status	Ecosystem status of terrestrial ecosystems is based on the degree of habitat loss that has occurred in each ecosystem, relative to two thresholds: one for maintaining healthy ecosystem functioning, and one for conserving the majority of species associated with the ecosystem. As natural habitat is lost in an ecosystem, its functioning is increasingly compromised, leading eventually to the collapse of the ecosystem and to loss of species associated with that ecosystem (Millennium Ecosystem Assessment).
Ecosystem Services	A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Supporting Ecosystem services are those that are necessary for the maintenance of all other ecosystem services. Some examples include biomass production, production of atmospheric oxygen, soil formation and retention, nutrient cycling, water cycling, and provisioning of habitat.
Ecosystem	All the organisms of a habitat, such as a lake or forest, together with the physical environment in which they live. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.
Ecotone	The transitional zone between two communities. Ecotones can arise naturally, such as a lakeshore, or can be human created, such as a cleared agricultural field from a forest. The ecotonal community retains characteristics of each bordering community and often contains species not found in the adjacent communities. Classic examples of ecotones include fencerows; forest to marshlands transitions;

	forest to grassland transitions; or land-water interfaces such as riparian zones in forests. Characteristics of ecotones include vegetational sharpness, physiognomic change, and occurrence of a spatial community mosaic, many exotic species, ecotonal species, spatial mass effect, and species richness higher or lower than either side of the ecotone.
Edge	The portion of an ecosystem near its perimeter, where influences of the adjacent patches can cause an environmental difference between the interior of the patch and its edge. This edge effect includes a distinctive species composition or abundance in the outer part of the landscape patch. For example, when a landscape is a mosaic of perceptibly different types, such as a forest adjacent to a grassland, the edge is the location where the two types adjoin. In a continuous landscape, such as a forest giving way to open woodland, the exact edge location is fuzzy and is sometimes determined by a local gradient exceeding a threshold, as an example, the point where the tree cover falls below thirty-five percent.
Emergent Tree	Trees that grow above the top of the canopy
Endangered (En)	Endangered terrestrial ecosystems have lost significant amounts (more than 60 % lost) of their original natural habitat, so their functioning is compromised. A taxon (species) is Endangered when the best available evidence indicates that it meets any of the criteria for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild (IUCN).
Endemic	A plant or animal species, or a vegetation type, which is naturally restricted to a defined region or limited geographical area. Many endemic species have widespread distributions and are common and thus are not considered to be under any threat. They are however noted to be unique to a region, which can include South Africa, a specific province or a bioregion, vegetation type, or a localised area. In cases where it is highly localised or known only from a few or a few localities, and is under threat, it may be red listed either in terms of the South Africa Threatened Species Programme, NEMBA Threatened or Protected Species (ToPS) or the IUCN Red List of Threatened Species.
Environment	The external circumstances, conditions and objects that affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Exotic	Non-indigenous; introduced from elsewhere, may also be a weed or alien invasive species. Exotic species may be invasive or non-invasive.
Ecological Structure	The composition, or configuration, and the proportion of different patches across the landscape. Relates to species diversity, the greater the diversity, the more complex the structure. A description of the organisms and physical features of environment including nutrients and climatic conditions.
Ecological Function	How each of the elements in the landscape interacts based on its life cycle events [Producers, Consumers, Decomposers Transformers]. Includes the capacity of natural processes and components to provide goods and services that satisfy human needs, either directly or indirectly.
Ecological Pattern	The contents and internal order of the landscape, or its spatial (and temporal) components. May be homogenous or heterogenous. Result from the ecological processes that produce them.
Ecological Process	Includes <i>Physical processes</i> [Climate (precipitation, insolation), hydrology, geomorphology]; <i>Biological processes</i> [Photosynthesis, respiration, reproduction]; <i>Ecological processes</i> [Competition, predator-prey interactions, environmental gradients, life histories]
Fragmentation (Habitat Fragmentation)	The 'breaking apart' of continuous habitat into distinct pieces. Causes land transformation, an important current process in landscapes as more and more development occurs.

Habitat Banking	A market where credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time (IIEP).
Habitat	The home of a plant or animal species. Generally, those features of an area inhabited by animal or plant which are essential to its survival.
IFC PS6	International Finance Corporation Performance Standard 6 – A standard guiding biodiversity conservation and sustainable management of living natural resources for projects financed by the International Finance Corporation (IFC)
Indicator	Information based on measured data used to represent an attribute, characteristic, or property of a system.
Indicator species	A species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem. They reflect the quality and changes in environmental conditions as well as aspects of community composition.
Indigenous	Native; occurring naturally in a defined area.
Indigenous Species (Native species)	A species that has been observed in the form of a naturally occurring and self-sustaining population in historical times (<i>Bern Convention 1979</i>). A species or lower taxon living within its natural range (past or present) including the area which it can reach and occupy using its natural dispersal systems (<i>modified after the Convention on Biological Diversity</i>)
Indirect Impact	Impacts triggered in response to the presence of a project, rather than being directly caused by the project's own operations (BBOP)
Intact Habitat / Vegetation	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Intrinsic Value	The inherent worth of something, independent of its value to anyone or anything else.
Keystone Species	Species whose influence on ecosystem function and diversity are disproportionate to their numerical abundance. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web.
Landscape	An area of land that contains a mosaic of ecosystems, including human-dominated ecosystems (Millennium Ecosystem Assessment).
Landscape Approach	Dealing with large-scale processes in an integrated and multidisciplinary manner, combining natural resources management with environmental and livelihood considerations (FAO).
Landscape connectivity	The degree to which the landscape facilitates or impedes movement among resource patches.
Least threatened / Least Concern (LC)	These ecosystems have lost only a small proportion (more than 80 % remains) of their original natural habitat, and are largely intact (although they may be degraded to varying degrees, for example by invasive alien species, overgrazing, or overharvesting from the wild). A taxon (species) is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category (IUCN).
Matrix	The “background ecological system” of a landscape with a high degree of connectivity.
Natural Forest (Indigenous Forest)	The definition of “natural forest” in the National Forests Act of 1998 (NFA) Section 2(1)(xx) is as follows: ‘A natural forest means a group of indigenous trees

	• whose crowns are largely contiguous • or which have been declared by the Minister to be a natural forest under section 7(2) This definition should be read in conjunction with Section 2(1)(x) which states that 'Forest' includes: • A natural forest, a woodland, and a plantation • The forest-produce in it; and • The ecosystems which it makes up. The legal definition must be supported by a technical definition, as demonstrated by a court case in the Umzimkulu magisterial district, relating to the illegal felling of Yellowwood (<i>Podocarpus latifolius</i>) and other species in the Gonqogonqo forest. From scientific definitions (also see Appendix B) we can define natural forest as: • A generally multi-layered vegetation unit • Dominated by trees that are largely evergreen or semi-deciduous • The combined tree strata have overlapping crowns, and crown cover is >75% • Grasses in the herbaceous stratum (if present) are generally rare • Fire does not normally play a major role in forest function and dynamics except at the fringes • The species of all plant growth forms must be typical of natural forest (check for indicator species) • The forest must be one of the national forest types
Near Threatened (NT)	A taxon (species) is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN).
Patch	A term fundamental to landscape ecology, is defined as a relatively homogeneous area that differs from its surroundings. Patches are the basic unit of the landscape that change and fluctuate, a process called patch dynamics. Patches have a definite shape and spatial configuration and can be described compositionally by internal variables such as number of trees, number of tree species, height of trees, or other similar measurements.
Protected Area	A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
Range restricted species	Species with a geographically restricted area of distribution. Note: Within the IFC PS6, restricted range refers to a limited extent of occurrence (EOO): • For terrestrial vertebrates and plants, restricted-range species are defined as those species that have an EOO less than 50,000 square kilometres (km²).
Refugia	A location which supports an isolated or relict population of a once more widespread species. This isolation can be due to climatic changes, geography, or human activities such as deforestation and overhunting.
Resilience	The capacity of a natural system to recover from disturbance (OECD).
Rehabilitation	Measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and/or minimised. Rehabilitation emphasizes the reparation of ecosystem processes, productivity and services, whereas the goals of restoration also include the re-establishment of the pre-existing biotic integrity in terms of species composition and community structure (BBOP).
Restoration	The process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. An ecosystem has recovered when it contains sufficient

Riparian	biotic and abiotic resources to continue its development without further assistance or subsidy. It would sustain itself structurally and functionally, demonstrate resilience to normal ranges of environmental stress and disturbance, and interact with contiguous ecosystems in terms of biotic and abiotic flows and cultural interactions (IFC). Pertaining to, situated on or associated with the banks of a watercourse, usually a river or stream.
River Corridors	River corridors perform several ecological functions such as modulating stream flow, storing water, removing harmful materials from water, and providing habitat for aquatic and terrestrial plants and animals. These corridors also have vegetation and soil characteristics distinctly different from surrounding uplands and support higher levels of species diversity, species densities, and rates of biological productivity than most other landscape elements. Rivers provide for migration and exchange between inland and coastal biotas.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED).
Terrestrial Threatened Species	Occurring on, or inhabiting, land. Umbrella term for any species categorised as Critically Endangered, Endangered or Vulnerable by the IUCN Red List of Threatened Species (IUCN). Any species that is likely to become extinct within the foreseeable future throughout all or part of its range and whose survival is unlikely if the factors causing numerical decline or habitat degradation continue to operate (EU).
Traditional Ecological Knowledge	Knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry (CBD).
Transformation	In ecology, transformation refers to adverse changes to biodiversity, typically habitats or ecosystems, through processes such as cultivation, forestry, drainage of wetlands, urban development or invasion by alien plants or animals. Transformation results in habitat fragmentation – the breaking up of a continuous habitat, ecosystem, or land-use type into smaller fragments.
Transformed Habitat/Land	Land that has been significantly impacted upon as a result of human interferences/disturbances (such as cultivation, urban development, mining, landscaping, severe overgrazing), and where the original structure, species composition and functioning of ecological processes have been irreversibly altered. Transformed habitats are not capable of being restored to their original states.
Tributary	A small stream or river flowing into a larger one.
Untransformed Habitat/Land	Land that has not been significantly impacted upon by man's activities. These are ecosystems that are in a near-pristine condition in terms of structure, species composition and functioning of ecological processes.
Vulnerable (Vu)	Vulnerable terrestrial ecosystems have lost some (more than 60 % remains) of their original natural habitat and their functioning will be compromised if they continue to lose natural habitat. A taxon (species) is Vulnerable when the best available evidence indicates that it meets any of the criteria for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild (IUCN)..
Watercourse	Natural or man-made channel through or along which water may flow.

	A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows. and a reference to a watercourse includes, where relevant, its bed and banks;
Weed	An indigenous or non-indigenous plant that grows and reproduces aggressively, usually a ruderal pioneer of disturbed areas. Weeds may be unwanted because they are unsightly, or they limit the growth of other plants by blocking light or using up nutrients from the soil. They can also harbour and spread plant pathogens. Weeds are generally known to proliferate through the production of large quantities of seed.
Wetlands	A collective term used to describe lands that are sometimes or always covered by shallow water or have saturated soils, and where plants adapted for life in wet conditions usually grow.
Catchment	In relation to a watercourse or watercourses or part of a watercourse, means the area from which any rainfall will drain into the watercourse or watercourses or part of a watercourse, through surface flow to a common point or common points.
Estuary	a partially or fully enclosed body of water - (a) which is open to the sea permanently or periodically; and (b) within which the sea water can be diluted, to an extent that is measurable, with fresh water drained from land.
Instream habitat	Includes the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse;
Riparian Habitat	Includes 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 land areas.

9.7 Appendix G: Declaration, Specialist Profile and Registration



DETAILS OF SPECIALIST AND DECLARATION OF INTEREST IN TERMS OF REGULATIONS 12 AND 13 OF THE AMENDMENTS TO THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS, 2014 AS AMENDED.

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amendments to the Environmental Impact Assessment Regulations, 2014. This form is valid as of 6 January 2021.

PROJECT TITLE

Terrestrial Biodiversity Assessment for proposed Beacon Bay Memorial Park on portion 50 of farm 821

SPECIALIST	Mr Jamie Pote		
Contact person:	Mr Jamie Pote		
Postal address:	Postnet Suite 57, Private Bag X13130, Humewood		
Postal code:	6013	Cell:	
Telephone:		Fax:	-
E-mail:	jamiepote@live.co.za		
Professional affiliation(s) (if any)	SACNASP (115233), IAIAsa (5045)		
Project Consultant:	Indwe Environmental Consulting CC		
Contact person:	Ms M Hugo		
Postal address:	2 Ayr Place, Bonnie Doon, East London		
Postal code:	5241	Cell:	
Telephone:	043 721 1538	Fax:	
E-mail:	megan@indwecon.co.za		

Version 2 January 15 2021

4.2 THE SPECIALIST

I, **Mr Jamie Pote**, declare that –

General declaration:

- I act as the independent Specialist in this application
- 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 assessment, including knowledge of the applicable Acts, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the regulations when preparing the application and any report relating to the application;
- 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;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence and is punishable in terms of section 24F of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Amendments to Environmental Impact Assessment Regulations, 2014 as amended my appointment.
- ~~I have a vested interest in the proposed activity proceeding, such vested interest being:~~



Signature of the specialist:

N/A

Name of company:

24/11/2021

Date:


Finnors
CST
Rm VAN AAST

Signature of the Commissioner of Oaths:

2021-11-24

Date:

CST

Designation:



Annexure 1
CV and Professional Registration



Jamie Pote

SENIOR ECOLOGIST AND ENVIRONMENTAL
SCIENTIST

CONTACT

-  (+27) 76 888 9890
-  jamiepote@live.co.za
-  Port Elizabeth, South Africa
-  [Linkedin.com](https://www.linkedin.com/in/jamiepote)
-  Jamiepote
-  [Bluesky-SA](#)

EDUCATION

Bachelor of Science
Rhodes University
2001 (Botany & Environmental Science)

Bachelor of Science (Honours)
Rhodes University
2002 (Botany)

Professional Natural Scientist
SACNASP
2016

SERVICES

Terrestrial Biodiversity/Ecological Assessments
Environmental & Ecological Risk-Assessments
Bioremediation, Restoration & Rehabilitation Plans
Environmental Management Plans & Programmes
GIS Mapping & Analysis & Web maps
Alien Invasive Management (Terrestrial)
Environmental Auditing & Monitoring (ECO)
Flora Search & Rescue & Relocation
Independent Environmental & Ecological review
Permit and License applications
Environmental & Mining Applications

ABOUT ME

16 years broad professional experience in Biodiversity, Ecological and Vegetation Assessments on over 220 projects in southern, western and central Africa. Senior Environmental Consultant and EAP on over 50 projects in the mining, infrastructure, housing and agricultural sectors. Environmental monitoring and auditing on over 50 civil infrastructure and construction projects. Have managed all aspects of projects from inception through to implementation. GIS mapping and analytics.

EXPERIENCE AND CLIENTS

Key Sectors

- Wind, Solar Energy Facilities
- Infrastructure and Housing
- Agriculture and Forestry
- Mining and Industrial

Key Projects

- Over 220 independent Biodiversity/Ecological Assessments throughout southern, western and central Africa.
- Mining applications and construction auditing on over 40 projects and more than 300 gravel borrow pits for the Eastern Cape Department of Roads and Public Works, Department of Transport and the South African National Roads Agency (SANRAL) throughout the Eastern Cape.
- South-End Precinct Mixed Use Development for Mandela Bay Development Agency - Environmental application, Ecological assessments and Construction monitoring.
- Coega Development Corporation IDZ projects – Ecological assessments, Flora search & rescue and Construction monitoring.
- Environmental applications, construction monitoring and auditing for a wide range of projects, including infrastructure and housing for various clients including the Department of Transport and SANRAL.
- Various agricultural expansion and infrastructure projects.
- Various wind and solar energy and associated infrastructure projects.
- Numerous infrastructure projects including electrical, water and roads.
- Various Environmental Management and Rehabilitation Plans.



herewith certifies that
Jamie Robert Claude Pote
Registration Number: 115233
is a registered scientist

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

Effective **20 July 2016**

Expires **31 March 2021**



A handwritten signature in black ink, appearing to read 'Botha'.

Chairperson

A handwritten signature in black ink, appearing to read 'R. Pote'.

Chief Executive Officer



To verify this certificate scan this code

MR JAMIE POTE BSC (HONS) PR.SCI.NAT.

PROJECT EXPERIENCE**PERFORMANCE STANDARD BIODIVERSITY AND CRITICAL HABITAT ASSESSMENTS**

- Critical Habitat & Biodiversity Assessment - Roggeveld Wind Energy Project 2020
- Biodiversity Assessment for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo 2008

WIND FARM AND PHOTOVOLTAIC INFRASTRUCTURE PROJECTS

- Ecological Assessment for Windcurrent Wind Farm, Eastern Cape 2012
- Ecological Assessment for Universal Windfarm, NMB 2011
- Ecological Assessment for Inca Energy Windfarm, Northern Cape 2011
- Ecological Assessment for Broadlands Photovoltaic Farm, Eastern Cape 2011
- Botanical Assessment for Electrawinds Windfarm Coega, NMB 2010
- Botanical Assessment and Open Space Management Plan for Mainstream WEF Phase 2, Eastern Cape 2010

SPECIALISED ECOLOGICAL REPORTS

- Rehabilitation Plan for Hitgeheim Farm (Farm 960), Sunland, Eastern Cape 2017
- Green Star Rating Ecological Assessment for SANRAL office, Bay West City, NMBM 2015
- Section 24G Assessment and Rehabilitation Plan for Bingo Farm, Eastern Cape 2014
- Mapping and Ecological services for Congo Agriculture, Republic of Congo 2013
- Rehabilitation Plan for Nieu Bethesda, Eastern Cape 2011
- Mapping of pipeline for Kenton Water Board, Eastern Cape 2010
- Rehabilitation Plan for N2 Upgrade - Coega to Colchester, NMB 2010
- Representative for landowner group for Seaview burial Park, NMB 2010
- Botanical Sensitivity Analysis for LSDF, Greenbushes-Hunters Retreat, NMB 2008
- Forestry Rehabilitation Assessment Report for Amahlathi Forest Rehabilitation, Eastern Cape 2007
- Botanical & Riparian Assessment for Orange River Weirs-Boegoeberg, Douglas Dam and Sendelingsdrif, Northern Cape 2006
- Botanical Assessment for State of the Environment Report for Chris Hani District Municipality SoER, Eastern Cape 2003

GENERAL INFRASTRUCTURE DEVELOPMENT PROJECTS

- Ecological Assessment for Vermaak Boerdery Hydro Turbine (Cookhouse), Eastern Cape 2020
- Ecological Assessment for Amalinda crossing, BCM, Eastern Cape 2019
- Ecological Assessment for Cookhouse Bridge rehabilitation and temporary deviation, Eastern Cape 2019
- Ecological Assessment for Nelson Mandela University Access Road, NMB 2019
- Botanical Assessment for Zachtevelei Dam (Lady Grey), Eastern Cape 2017
- Botanical Assessment for Gcebula River bridge (Peddie), Eastern Cape 2017
- Botanical Assessment for Kouga Dam wall upgrade, Eastern Cape 2012
- Botanical Assessment for Jansenville Cemetery, Eastern Cape 2009
- Botanical Assessment for Radar Mast construction for South African Weather Service – BCM & NMB 2008
- Botanical Assessment and GIS mapping for golf course realignment for East London Golf Course, BCM, Eastern Cape 2007
- Botanical Assessment for PE Airport Extension, NMB 2006
- Botanical Assessment for Kidd's Beach Desalination Plant, BCM, Eastern Cape 2006

ROAD AND RAILWAY INFRASTRUCTURE PROJECTS

- Ecological Assessment for CDC IDZ Mn Terminal, conveyor and railway line, NMB 2013

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

• Ecological Assessment Review for Penhoek Road widening, Eastern Cape	2012
• Ecological Assessment for R61 road widening, Eastern Cape	2012
• Botanical Assessment for Chelsea RD - Walker Drive Ext., NMB	2010
• Botanical Assessment for Motherwell - Blue Water Bay Road, NMB	2010
• Ecological Assessment for Port St John Road, Eastern Cape	2010
• Botanical Basic Assessment for Bholani Village Rd, Port St Johns, Eastern Cape	2009
• Botanical Report, EMP and Rehab Plan for Coega-Colchester N2 Upgrade, NMB	2009
• Botanical Assessment for Manganese Conveyor Screening Report, NMB	2008
• Ecological Assessment for Road Layout for Whiskey Creek- Kenton, Eastern Cape	2006

MINING PROJECTS

• Ecological Assessment for Bochum Borrow Pits, Limpopo	2013
• Ecological Assessment and Mining and Rehabilitation Plan for Greater Soutpansberg Mining Project, Limpopo (3 proposed Mines)	2013
• Ecological Assessment for Thulwe Road Borrow Pits, Limpopo	2013
• Ecological Assessment and Mining and Rehabilitation Plan for Baghana Mining, Ghana	2010
• Botanical Assessment for Zwartbosch Quarry, Eastern Cape	2008
• Botanical description & map production for Quarry - Rudman Quarry, Eastern Cape	2008
• Botanical Basic Assessment, Rehab Plan & Maps for Borrow Pit - Rocklands/Patensie, Eastern Cape	2008
• Botanical Assessment & Maps for Sandman Sand Gravel Mine, Eastern Cape	2008
• Botanical Assessment & GIS maps for Shamwari Borrow Pit, Eastern Cape	2008
• Detailed Botanical Assessment, EMP and Rehab Plan for Kalukundi Copper/Cobalt Mine, Democratic Republic of Congo	2008
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit Humansdorp/Oyster Bay, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Cala, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Camdeboo, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Somerset East, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Nkonkobe, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Ndlambe, Eastern Cape	2008
• Botanical Assessment, Rehab Plan & Maps for AWRM - Blue Crane Route, Eastern Cape	2008
• Botanical Assessment, EMP and Rehabilitation Plan for AWRM - Cathcart, Eastern Cape	2008
• Botanical Assessment, GIS maps and Rehab Plan for Mthatha Prospecting, Eastern Cape	2008
• Regional Botanical Map for mining prospecting permit, Welkom	2008
• Botanical Assessment for Scoping Report and Detailed Botanical Assessment and Rehab Plan for Elitheni Coal Mine, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Oyster Bay, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Bathurst/GHT, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Jeffreys Bay, Eastern Cape	2007
• Botanical Assessment, Rehab Plan & Maps for Borrow Pit - Storms river/Kareedouw, Eastern Cape	2007
• Biophysical Assessment for Humansdorp Quarry, Eastern Cape	2006
• Botanical Assessment, Rehab Plan & Maps for Quarry-Cathcart & Somerset East, Eastern Cape	2006
• Botanical Assessment, Rehab Plan & Maps for Quarry - Despatch Quarry, NMB	2006
• GIS Mapping & Botanical Assessment and Rehab Plan for Quarry - JBay Crushers, Eastern Cape	2006
• Botanical Assessment, EMP and Rehabilitation Plan for Polokwane Silicon Smelter, Limpopo	2006
• Application for Mining Permit for Bruce Howarth Quarry, Eastern Cape	2006

POWERLINE INFRASTRUCTURE PROJECTS

• Ecological Assessment: Dieprivier-Karreedouw 132kV Powerline realignment, Kouga LM	2016
• Eskom Ecological Walkdown: Dieprivier-Karreedouw 132 kV Powerline, Kouga LM	2016
• Eskom Solar one Ecological Walkdown: Nieuwehoop 400 kV powerline	2015
• Rehabilitation Plan and Auditing for Grassridge-Poseidon Powerline Rehab, Eastern Cape	2013
• Ecological Assessment for Dieprivier Karreedouw 132kV Powerline, Eastern Cape	2012

20/07/16

1 | Page

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

• Flora and Fauna search and Rescue plan for Van Stadens Windfarm Powerline, NMB	2012
• Botanical Assessment for Dedisa-Grassridge Powerline, Eastern Cape	2010
• Ecological Assessment for Grahamstown-Kowie Powerline, Eastern Cape	2010
• Species of Special Concern Mapping Transmission Line for San Souci to Nivens Drift 132kV powerline, NMB	2009
• Botanical Assessment for Eskom Powerline - Albany-Kowie, Eastern Cape	2009
• Botanical Assessment for Eskom 132 kV Dedisa Grassridge Power line-Coega, NMB	2006
• Botanical Assessment for Eskom Power line – Tyalara-Wilo, Eastern Cape	2006
• Botanical Assessment for Steynsburg - Teebus 132 kV powerline, Eastern Cape	2004

PIPELINE INFRASTRUCTURE PROJECTS

• Terrestrial Biodiversity Assessment for Thornhill Phase 2 Sanitation Link, Ndlambe, Eastern Cape	2020
• Botanical Assessment for Ngqamakhwe Regional Water Supply Scheme (Phase 3)	2018
• Ecological Assessment for Butterworth Emergency Bulk Water Supply Scheme	2017
• Ecological Assessment for Karringmelkspruit Emergency Bulk Water Supply (Lady Grey)	2017
• Ecological Assessment for Wanhoop-Willowmore Bulk Water Supply, Eastern Cape	2016
• Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 4)	2013
• Ecological Assessment for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)	2013
• Detailed Ecological Assessment for Suikerbos Pipeline, Gauteng	2012
• Basic Botanical Assessment for Wanhoop farm pipeline, Eastern Cape	2010
• Basic Botanical Assessment for Chatty Sewer, NMB	2010
• Species of Special Concern Mapping for Seaview Pipeline, NMB	2009
• Species of Special Concern Mapping for Chelsea Bulk Water Pipeline, NMB	2009
• Map Production for Russell Rd Stormwater, NMB	2008
• Basic Botanical Assessment for Albany Pipeline, Eastern Cape	2008
• Environmental Risk Assessment for Elands River pipeline, Eastern Cape	2007
• Detailed Botanical Assessment for Motherwell Pipeline, NMB	2007
• Detailed Botanical Assessment, GIS maps for Erasmuskloof Pipeline, Eastern Cape	2007
• Botanical & Floristic Report for Hankey pipeline, Eastern Cape	2006
• Detailed Botanical Assessment for Port Alfred water pipeline, Eastern Cape	2004

HOUSING DEVELOPMENT PROJECTS

• Terrestrial Biodiversity Assessment for Erf 1820 Mthatha, KSDM, Eastern Cape	2020
• Ecological Assessment for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Ecological Assessment for erf 14, Kabega, Port Elizabeth	2017
• Ecological Assessment for Fairwest Rental Housing, Port Elizabeth	2017
• Ecological Assessment for Hankey Housing, Kouga District Municipality	2015
• Ecological Assessment for Lebowakgoma Housing, Limpopo	2013
• Ecological Assessment for Giyani Development, Limpopo	2013
• Ecological Assessment for Palmietfontein Development, Limpopo	2013
• Ecological Assessment for Seshogo Development, Limpopo	2013
• Botanical Assessment for Sheerness Road, BCM, Eastern Cape	2013
• Ecological Assessment for Ethembeni Housing, NMB	2012
• Ecological Assessment for Pelana Housing, Limpopo	2012
• Flora Search and Rescue Plan for Kwanobuhle Housing, Western Cape	2011
• Botanical Assessment for The Craggs 288/03, Western Cape	2010
• Ecological Assessment Revision Report for Fairview Housing, NMB	2010
• Botanical Assessment, EMP and Open Space Management Plan for Hornlee Housing Development, Western Cape	2010
• Botanical Assessment for Little Ladywood, Western Cape	2010
• Botanical Assessment and Open Space Management Plan for Motherwell NU31, NMB	2010
• Botanical Assessment and Open Space Management Plan for Plett 443/07, Western Cape	2010

20/07/16

2 | Page

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

• Botanical Assessment for Willow Tree Farm, NMB	2010
• Botanical Assessment for Kouga RDP Housing, Eastern Cape	2009
• Botanical Assessment for Fairview Erf 1226 (Wonderwonings), NMB	2009
• Species List Compilation for Zeekoerivier Humansdorp, Eastern Cape	2009
• Botanical Assessment for Woodlands Golf Estate (Farm 858), BCM, Eastern Cape	2009
• Botanical Assessment for Plettenberg Bay - 438/4, Western Cape	2009
• Vegetation Assessment for Kwanokuthula RDP housing project, Western Cape	2008
• Site screening assessment for Greenbushes Site screening, NMB	2008
• Botanical Assessment for Fairfax development, Eastern Cape	2008
• Botanical Assessment for Plettenberg Bay Brakkloof 50&51, Western Cape	2008
• Botanical Assessment, GIS mapping for Theescombe Erf 325, NMB	2008
• Site Screening for Mount Road, NMB	2008
• Botanical Assessment for Greenbushes Farm 40 Swinburne 404, NMB	2008
• Botanical Assessment for Greenbushes 130, NMB	2008
• Botanical Assessment for Greenbushes Kuyga no. 10, NMB	2008
• Botanical Assessment for Plettenberg Bay - 438/24, Western Cape	2007
• Botanical Assessment for Plettenberg Bay - Olive Hills 438/7, Western Cape	2007
• Botanical Assessment for Gonubie Portion 809/9, BCM, Eastern Cape	2006
• Botanical Assessment for Glengariff Farm 723, BCM, Eastern Cape	2006
• Botanical Assessment for Gonubie Portion 809/10, BCM, Eastern Cape	2006
• Botanical Assessment for Gonubie Portion 809/4 & 5, BCM, Eastern Cape	2006
• Botanical Assessment for Plettenberg bay - Ladywood 438/1&3, Western Cape	2006
• Botanical Assessment and Rehab Plan for Winterstrand Desalination Plant, BCM	2006
• Botanical Assessment for Bosch Hoogte, NMB	2006
• Botanical Assessment for Plettenberg bay Farm 444/38, Western Cape	2006
• Botanical Assessment for Plettenberg Bay - 444/27, Western Cape	2006
• Botanical Assessment for Leisure Homes, BCM, Eastern Cape	2006
• Botanical Basic Assessment for Trailees Wetland Assessment, Eastern Cape	2005
• Botanical Assessment and Rehab Plan for Arlington Racecourse - PE, NMB	2005
• Botanical Assessment for Smart Stone, NMB	2005
• Botanical Assessment for Peninsular Farm (Port Alfred), Eastern Cape	2005
• Botanical Assessment for Mount Pleasant - Bathurst, Eastern Cape	2005
• Botanical Assessment and RoD amendments for Colchester Erven 1617 & 1618 (Riverside), NMB	2005
• Basic Botanical Assessment for Parsonslei 3/4, Eastern Cape	2005
• Botanical Assessment for Bridgemead – Malabar PE, NMB	2004

AGRICULTURAL PROJECTS

• Ecological Assessment for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
• Ecological Assessment for Doornkraal Pivot (Hankey), Eastern Cape	2014
• Ecological Assessment for Citrus expansion on Farm 960, Patensie	2014
• Ecological Assessment for Tzaneen Chicken Farm, Limpopo	2013
• Botanical Assessment and Open Space Management Plan for Kudukloof, NMB	2010
• Botanical Assessment and Open Space Management Plan for Landros Veeplaats, NMB	2010
• Botanical Assessment and Flora Relocation Plan for Wildemans Plaas, NMB	2006

GOLF ESTATE AND RESORT DEVELOPMENT PROJECTS

• Species List& Comments Report for Kidds Beach Golf Course, BCM, Eastern Cape	2009
• Botanical Assessment for Plettenberg Bay -Farm 288/03, Western Cape	2009
• Botanical Assessment for Rockcliff Golf Course, BCM, Eastern Cape	2008
• Botanical Assessment for Rockcliff Resort Development, BCM, Eastern Cape	2007
• Botanical Assessment, EMP and Rehabilitation Plan for Tiffende! Ski Resort, Eastern Cape	2006

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

MIXED USE DEVELOPMENT PROJECTS

• Ecological Assessment for South-End Precinct Mixed Use Development, Nelson Mandela Bay	2018
• Botanical Assessment, EMP and Open Space Management Plan for Bay West City, NMB	2010
• Botanical Assessment, GIS maps, Open Space and Rehab Plans for Fairview Erf 1082, NMB	2009
• Botanical Assessment and GIS maps for Utopia Estate PE, NMB	2008
• Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB	2007
• Botanical Assessment and GIS mapping for Madiba Bay Leisure Park, NMB	2007
• Botanical Basic Assessment for Cuyler Manor (Farm 320), Uitenhage, NMB	2007

BUSINESS AND INDUSTRIAL DEVELOPMENT PROJECTS

• Ecological Assessment for Parsonsvei Erf 984 & 1134 Parsonsvei, NMB	2020
• Ecological Assessment for Walmer Erf 11667 - Bidfood Warehousing Development, NMB	2020
• Ecological Assessment for Portion 87 of the Farm Little Chelsea No 10, NMB	2020
• Ecological Assessment for Bay West City ENGEN Service Station, NMB	2015
• Ecological Assessment for Green Star grading for SANRAL, NMB	2014
• Ecological Assessment for OTGC Tank Farm, NMB	2012
• Botanical Assessment and Open Space Management Plan for Petro SA Refinery, Coega IDZ, NMB	2010
• Botanical Assessment for Bluewater Bay Erf 805, NMB	2009
• Ecological Assessment for Bay West City, NMB	2007
• Botanical Assessment for Kenton Petrol Station, Eastern Cape	2005
• Botanical Assessment and RoD amendments for Colchester Petrol Station, NMB	2005

ECO-ESTATE DEVELOPMENT PROJECTS

• Botanical Re-Assessment of Swanlake Eco Estate, Aston Bay, Eastern Cape	2018
• Detailed Botanical Assessment and Open Space Management Plan for Olive Hills, Western Cape	2010
• Botanical Assessment and EMP for Zwartbosch Road, Eastern Cape	2010
• Botanical Assessment - Poultry Farm for Coega Kammaskloof Farm 191, NMB	2008
• Botanical Assessment - Housing development for Coega Ridge, NMB	2008
• Botanical Assessment, Rehabilitation Plan, EMP and GIS maps for Amanzi Estate, NMB,	2008
• Botanical Assessment for Roydon Game farm, Queenstown, Eastern Cape	2007
• Botanical Assessment for Winterstrand Estate (Farm 1008), BCM, Eastern Cape	2007
• Botanical Assessment for Homeleigh Farm 820, BCM, Eastern Cape	2007
• Botanical Basic Assessment, Rehab Plan & Maps for Candlewood, Tsitsikamma, Western Cape	2007
• Botanical Assessment, EMP and Rehab Plan for Carpe Diem Eco development, Eastern Cape	2007
• Botanical Assessment, EMP and Rehabilitation Plan for Seaview Eco-estate, NMB	2006
• Botanical Assessment for Kidd's Beach portion 1076, BCM, Eastern Cape	2006
• Botanical Assessment for Palm Springs, Kidds Beach East London, BCM, Eastern Cape	2006
• Botanical Assessment for Nahoon Farm 29082, BCM, Eastern Cape	2006
• Botanical Assessment for Rosehill Farm, Eastern Cape	2005
• Botanical Assessment for Resolution Game Farm, Eastern Cape	2005
• Botanical Assessment for Gonubie Portion 809/11, BCM, Eastern Cape	2005
• Botanical Assessment for Kidd's Beach portion 1075, BCM, Eastern Cape	2005

FLORA AND FAUNA RELOCATION PLANS, PERMITS AND IMPLEMENTATION

• Flora Search and Rescue for Nelson Mandela University Phase 2 & 3 Residences, Eastern Cape	2020
• Flora Search and Rescue for Fairwest Housing Estate, Nelson Mandela Bay, Eastern Cape	2019
• Flora Search and Rescue for Utopia Estate, Nelson Mandela Bay, Eastern Cape	2019
• Flora Search and Rescue for Citrus expansion on Boschkraal Citrus Farm, Sunland, Eastern Cape	2018
• Flora Search and Rescue for Wanhoop pipeline, Willowmore, Eastern Cape	2018
• Flora Search and Rescue for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017

20/07/16

4 | Page

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 5)	2016
• Flora Search and Rescue for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2016
• Flora Search and Rescue for Steytlerville Bulk Water Supply & WTW, Eastern Cape (Phase 4)	2015
• Flora and Fauna Search and Rescue for Riversbend Citrus Farm, NMB	2014
• Flora and Fauna Search and Rescue for Mainstream Windfarm, Eastern Cape	2013
• Flora Search and Rescue for Steytlerville Bulk Water Supply, Eastern Cape (Phase 1, 2 & 3)	2013
• Flora and Fauna Search and Rescue for OTGC Tank Farm, Coega IDZ, NMB	2013
• Flora and Fauna Search and Rescue for Jeffries Bay School, Eastern Cape	2013
• Flora Search and Rescue Plan for Red Cap Wind Farm, Eastern Cape	2012
• Flora Relocation for Disco Poultry Farm, NMB	2010
• Flora Relocation for Mainstream Windfarm, Eastern Cape	2010

ENVIRONMENTAL MANAGEMENT PLANS

• Final Environmental Management Programme (EMPr) and Maintenance Management Plan for South End Precinct Mixed Use Zone, Nelson Mandela Bay Municipality	2020
• Final Environmental Management Programme (EMPr) for Coega Land-Based Aquaculture Development Zone (ADZ), Coega Industrial Development Zone (IDZ), Nelson Mandela Bay Municipality	2019
• Basic Botanical Assessment for Kromensee EMP (Jeffries Bay), Eastern Cape	2010
• Wetland Management Plan for NMB Portnet, NMB	2010
• Baseline Botanical Study, Vegetation mapping and EMP for Local Nature Reserve for Plettenberg Bay Lookout LNA, Western Cape	2009
• Biodiversity & Ecological Processes for Bathurst-Commonage, Eastern Cape	2006
• EMP for Kromensee EMP (Jeffries Bay), Eastern Cape	2006
• Floral Survey for Mbotyi Conservation Assessment, Eastern Cape	2005
• Identifying and Assessment on Aquatic Weeds for Pumba Private Game Reserve, Eastern Cape	2005

ENVIRONMENTAL MANAGEMENT, AUDITING, COMPLIANCE AND MONITORING PROJECTS

• ECO for DRPW IRM Road Maintenance projects, Baviaans LM	2019
• ECO for DRPW IRM Road Maintenance projects, Senqu LM	2019
• ECO for DRPW IRM Road Maintenance projects, Kouga/Koukamma LM	2019
• ECO for DRPW IRM Road Maintenance projects, Sakhisizwe/Engcobo LM	2019
• ECO for DRPW IRM Road Maintenance projects, Elundini LM	2019
• ECO for DRPW IRM Road Maintenance projects, Emalahleni/Intsika Yethu LM	2019
• ECO for Construction of Fairwest Village Housing Project	2019
• ECO for Construction of Utopia Estate	2019
• ECO for Construction of NMU West End Student Residences Phases 1 & 3	2019
• ECO for DRPW IRM Road Maintenance projects, Raymond Mahlaba LM	2018
• ECO for DRPW IRM Road Maintenance projects, Inkwanca (Enoch Mgijima) LM	2018
• ECO for Citrus expansion on Farm 960, Patensie (AIN du Preez Boerdery)	2017
• ECO for Citrus expansion on Hitgeheim Farm (Farm 960), Sunland, Eastern Cape	2017
• DEO for improvement of national route R67 section 5 from Whittlesea (km 0.00) to Swart Kei river (km 15.40) – Murray & Roberts	2017
• ECO for SANRAL RRP Road Maintenance projects, Mbizana LM	2017
• ECO and Botanical Specialist for the special maintenance of national route R61 Section 2 from Elinus Farm (km 42.2) to N10 (km 85.0) (SANRAL)	2016
• Environmental Control Officer (ECO): Construction of NSRI Slipway - Port Elizabeth Harbour	2016
• ECO for SANRAL RRP Road Maintenance projects, Mbashe LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Nkonkobe LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Mbizana LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Senqu LM	2016
• ECO for SANRAL RRP Road Maintenance projects, Elundini LM	2016

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

• ECO and Environmental Management for closure of Bushmans River Landfill site	2016
• ECO for DRPW IRM Road Maintenance projects, Amahlathi Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Makana/Ndlambe Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Mbashe/Mqume Municipality	2015
• ECO for DRPW IRM Road Maintenance projects, Port St Johns, Mbizana, Ingquza Hill LM's	2015
• ECO for Riversbend Citrus Farm, NMB	2014
• ECO for Alfred Nzo DM Road resurfacing - DR08071, DR08649, DR08092, DR08418, DR08452, DR08015, DR08085, DR08639 & DR08073, Eastern Cape - MSBA	2014
• ECO Audits for Koukamma Flood Damage Road Repairs – Hatch Goba	2014
• EMP and ECO for Utopia Estate, NMB	2013
• Final EMP submission for Seaview Garden Estate, NMB	2012
• ECO audits for NMB Road surfacing, NMB (multiple contacts)	2011
• EMP submission and ECO for Seaview Garden Estate, NMB	2010
• ECO for Mainstream Windfarm wind monitoring mast installation, Eastern Cape	2010
• EMP and ECO for Sinati Golf Estate EMP, BCM, Eastern Cape	2009
• Flora Relocation Plan and Permit application for Wildemans Plaas, NMB	2006

BASIC ASSESSMENT APPLICATION PROJECTS (DEDEAT)

• Basic Assessment Application for Parsonsvei Erf 984 & 1134 Parsonsvei	2020
• Basic Assessment Application for Vermaak Boerdery Hydro Turbine (Cookhouse)	2020
• Basic Assessment Application for Walmer Erf 11667 Bidfood Warehousing Development	2020
• Basic Assessment Application for Portion 87 of the Farm Little Chelsea No 10	2020
• Basic Assessment Application for Nelson Mandela University Access Road, NMB	2019
• Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay	2019
• Basic Assessment Application for Cookhouse Bridge rehabilitation and temporary deviation	2019
• Basic Assessment Application for Erf 14 Kabega, NMBM	2017
• Basic Assessment Application for Hankey Housing, Kouga District Municipality	2017
• Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay	2017
• Basic Assessment Application for Citrus expansion on Hitgeheim Farm, Sunland, Eastern Cape	2015
• Basic Assessment Application for Hankey Housing, Kouga District Municipality	2015
• Basic Assessment Application for Citrus expansion on farm 960, Patensie (AIN du Preez Boerdery)	2014
• Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay 2018	

ENVIRONMENTAL SCREENING PROJECTS

• Environmental Screening Report for Proposed Life Hospital parking expansion, NMB	2019
• Environmental Screening Report for Erf 984 & 1134 development, Parsonsvei, NMB	2019
• Environmental Screening Report for proposed Khayaletu School, Buffalo City	2018
• Environmental Screening Report for Proposed Housing Development of Erf 8700, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Housing Development of Erf 14, Kabega Park, NMB	2017
• Environmental Screening Report for Proposed Fairwest Social Housing project, Fairview, NMB	2016
• Environmental Screening Report for Development of Little Chelsea No 25, NMB	2016
• Terrestrial Vegetation Risk Assessment for proposed Skietnek Citrus Farm development (Kirkwood)	2015
• Preliminary Environmental Risk Assessment: NSRI Slipway Port Elizabeth	2015
• Environmental Screening Report for Proposed Development of a Dwelling on Erf 899, Theescombe	2015
• Environmental Screening Report for Proposed Development on Erf 559, Walmer, Port Elizabeth	2015
• Environmental Screening Report for Proposed Housing Scheme Development of Erf 8709, Wells Estate	2015
• Environmental Screening Report for Development of Portion 10 of Little Chelsea No 87, NMB	2015

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

MINING PERMIT/ENVIRONMENTAL MANAGEMENT PROGRAMME APPLICATIONS (DMR)

• Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)	2019
• Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape – (SANRAL)	2018
• Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL)	2017
• Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Inkwanca (Enoch Mgiijima) LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW)	2017
• Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL)	2016
• Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW)	2016
• Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW)	2016
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (Tarkastad) (DRPW)	2015
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - Intsika Yethu and Emalahleni (DRPW)	2015
• Mining BAR/EMP's for Joe Gqabi DM Borrow Pits - Senqu (DRPW)	2015
• Mining BAR/EMP's for Makana/Ndlambe LM Borrow Pits - Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Amahlathi LM Borrow Pits - Amatole (DRPW)	2015
• Mining BAR/EMP's for Mbashe/Mqume LM Borrow Pits - Amatole (DRPW)	2015
• Mining BAR/EMP's for Sundays River Valley LM Borrow Pits - Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Kouga LM Borrow Pits - Sarah Baartman (DRPW)	2015
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - MR00716 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR02581 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08041, DR08247, DR08248 & DR08504 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08599, DR08601 & DR08570 (DRPW)	2014
• Mining BAR/EMP's for Chris Hani DM Borrow Pits - DR08235, DR08551 & DR08038 (DRPW)	2014
• Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08092, DR08093 & DR08649 (DRPW)	2014
• Mining BAR/EMP's for Alfred Nzo DM Borrow Pits - DR08090, DR08412, DR08425, DR08129, DR08109, DR08106, DR08104 & DR08099 - Matatiele (DRPW)	

SECTION 24G APPLICATIONS

• 12 000 ML Dam constructed on farm 960, Patensie (MGM Trust)	2015
• Illegal clearing of 20 Ha of lands on Hitgeheim Farm, Sunland, Eastern Cape	2015

GIS AND IT DEVELOPMENT

• Development of iAuditor Environmental Audit templates (DRPW audits)	2014
• Landsat Image classification and analysis (Congo Agriculture)	2010
• Development of GIS databases and mapping tools for Manifold GIS software	2008

Mr Jamie Pote BSc (Hons) PR. Sci. Nat.

CONFERENCES AND PUBLICATIONS

- Pote, J., Shackleton, C.M., Cocks, M. & Lubke, R. 2006. Fuelwood harvesting and selection in Valley Thicket, South Africa. *Journal of Arid Environments*, 67: 270-287.
- Pote, J., Cocks, M., Dold, T., Lubke, R.A. and Shackleton, C. 2004. The homegarden cultivation of indigenous medicinal plants in the Eastern Cape. *Indigenous Plant Use Forum*, 5 - 8 July 2004, Augsburg Agricultural School, Clanwilliam, Western Cape.
- Pote, J. & Lubke, R.A. 2003. The selection of indigenous species suitable for use as fuelwood and building materials as a replacement of invasive species that are currently used by the under-privileged in the Grahamstown commonage. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch. Poster presentation.
- Pote, J. & Lubke, R.A. 2003. The screening of indigenous pioneer species for use as a substitute cover crop for rehabilitation after removal of woody alien species by WfW in the grassy fynbos biome in the Eastern Cape. *Working for Water Inaugural Research Symposium* 19 - 21 August 2003, Kirstenbosch, South Africa.

OTHER RESEARCH EXPERIENCE

- Resource assessment of bark stripped trees in indigenous forests in Weza/Kokstad area (June 2000; Dr C. Geldenhuys & Mr. M. Kaplin).
- Working for Water research project for indigenous trees for woodlots (December 2000/January 2001; Prof R.A. Lubke, Rhodes University).
- Project coordinator and leader of the REFYN project – A BP conservation gold award: Conservation and Restoration of Grassy-Fynbos. A multidisciplinary project focusing on management, restoration and public awareness/education (2001 – 2002).
- Conservation Project Management Training Workshops: Royal Geographical Society, London 2001 – Fieldwork Techniques, Habitat Assessment, Biological Surveys, Project Planning, Public Relations and Communications, Risk Assessment, Conservation Education
- Selection and availability of wood in Crossroads village, Eastern Cape, South Africa. Honours Research Project 2002. Supervisors: Prof. R.A. Lubke & Prof. C. Shackleton.
- Floral Morphology, Pollination and Reproduction in Cyphia (LOBELIACEAE). Honours Research Project 2002. Supervisor: Mr. P. Phillipson.
- Forestry resource assessment of bark-stripped species in Amatola District (December 2002; Prof R.A. Lubke).
- Homegarden Cultivation of Medicinal Plants in the Amathole area. Postgraduate Research Project (2003-2005; Prof R.A. Lubke, Prof C.M. Shackleton and Ms C.M., Cocks).

9.8 Appendix H1: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity

SCOPE

This protocol (*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 national environmental management act, 1998, when applying for environmental authorisation (GN 320, 20 March 2020).*) provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring environmental authorisation. This protocol replaces the requirements of Appendix 6 of the Environmental Impact Assessment Regulation¹².

The assessment and minimum reporting requirements of this protocol are associated with a level of environmental sensitivity identified by the national web based environmental screening tool (<https://screening.environment.gov.za/screeningtool>). The requirements for terrestrial biodiversity are for landscapes or sites which support various levels of biodiversity. The relevant terrestrial biodiversity data in the screening tool has been provided by the South African National Biodiversity Institute¹³.

SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

Prior to commencing with a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool must be confirmed by undertaking a site sensitivity verification.

2.1. The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.

2.2. The site sensitivity verification must be undertaken through the use of:

- (a) a desk top analysis, using satellite imagery,
- (b) a preliminary on-site inspection; and
- (c) any other available and relevant information.

2.3. The outcome of the site sensitivity verification must be recorded in the form of a report that:

- (a) confirms or disputes the current use of the land and environmental sensitivity as identified by the screening tool;
- (b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
- (c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

SPECIALIST ASSESSMENT AND MINIMUM REPORT CONTENT REQUIREMENTS

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1	General Information	-
1.1	An applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment.	✓

¹² The Environmental Impact Assessment Regulations, as promulgated in terms of Section 24 (5) of the National Environmental Management Act, 1998 (Act 107 of 1998).

¹³ The biodiversity dataset has been provided by the South African National Biodiversity Institute.

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
1.2	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being ' low sensitivity ' for terrestrial biodiversity, must submit a <u>Terrestrial Biodiversity Compliance Statement</u> .	✗
1.3	However, where the information gathered from the site sensitivity verification differs from the designation of ' very high ' terrestrial biodiversity sensitivity on the screening tool and it is found to be of a ' low ' sensitivity, then a <u>Terrestrial Biodiversity Compliance Statement</u> must be submitted.	✗
1.4	Similarly, where the information gathered from the site sensitivity verification differs from that identified as having a ' low ' terrestrial biodiversity sensitivity on the screening tool, a <u>Terrestrial Biodiversity Specialist Assessment</u> must be conducted.	✗
1.5	If any part of the proposed development footprint falls within an area of ' very high ' sensitivity, the assessment and reporting requirements prescribed for the ' very high ' sensitivity apply to the entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and the land in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any area that will be disturbed.	✓
VERY HIGH SENSITIVITY RATING for terrestrial biodiversity features		
2	Terrestrial 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 terrestrial biodiversity.	Section 9.7
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	✓
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 ecological drivers or processes of the system and how the proposed development with impact these;	Section 0
2.3.2	ecological functioning and ecological processes (e.g. fire, migration, pollination, etc.) that operate within the preferred site;	Section 0
2.3.3	the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	Section 0
2.3.4	the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments);	Section 3.1.3
2.3.5	a description of terrestrial biodiversity and ecosystems on the preferred site, including:	Section 3.1
(a)	main vegetation types;	Section 3.1.3
(b)	threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;	Section 3.1
(c)	ecological connectivity, habitat fragmentation, ecological processes and fine-scale habitats; and	Section 0
(d)	species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;	Section 3.1
2.3.6	the assessment must identify any alternative development footprints within the preferred site which would be of 'low' sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	Section 3.1.3

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
2.3.7	the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	✓
2.3.7.1	terrestrial critical biodiversity areas (CBAs) , including:	
(a)	the reasons why an area has been identified as a CBA;	Section 2.3.6
(b)	an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;	Section 2.3.6
(c)	the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to remaining extent of the ecosystem type(s);	Section 2.3.6
(d)	the impact on ecosystem threat status;	Section 2.3.4
(e)	the impact on explicit subtypes in the vegetation;	Section 3.1.3
(f)	the impact on overall species and ecosystem diversity of the site; and	Section 3.1.8
(g)	the impact on any changes to threat status of populations of species of conservation concern in the CBA;	Section 3.1.8
2.3.7.2	terrestrial ecological support areas (ESAs) , including:	
(a)	the impact on the ecological processes that operate within or across the site;	Section 2.3.5 Section 2.3.6
(b)	the extent the proposed development will impact on the functionality of the ESA; and	Section 2.3.5 Section 2.3.6
(c)	loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;	Section 2.3.5 Section 2.3.6
2.3.7.3	protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including	✓
(a)	an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;	Section 2.3.8
2.3.7.4	priority areas for protected area expansion , including-	✓
(a)	the way in which the proposed development will compromise or contribute to the expansion of the protected area network;	Section 2.3.8
2.3.7.5	Strategic Water Source Areas (SWSAs) including:	✓
(a)	the impact(s) on the terrestrial habitat of SWSA; and	Section 2.3.10
(b)	the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses),	Section 2.3.10
2.3.7.6	FEPA sub catchments , including-	✓
(a)	the impacts of the proposed development on habitat condition and species in the FEPA sub catchment;	Section 2.3.11
2.3.7.7	indigenous forests , including:	(if applicable)
(a)	impact on the ecological integrity of the forest and	Section 3.1.3
(b)	percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.	Section 3.1.3
2.4	The findings of the assessment must be written up in a Terrestrial Biodiversity Specialist Assessment Report	✓
3	Terrestrial Biodiversity Specialist Assessment Report	✓
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	✓
3.1.1	contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Section 9.7
3.1.2	a signed statement of independence by the specialist;	Section 9.7

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
3.1.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment,	Section 1.4.1
3.1.4	description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modeling used, where relevant;	Section 1.4
3.1.5	a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 1.4.3
3.1.6	a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 3.1.12
3.1.7	additional environmental impacts expected from the proposed development;	Section 3.2
3.1.8	any direct, indirect and cumulative impacts of the proposed development;	Section 3.2
3.1.9	the degree to which impacts, and risks can be mitigated;	Section 3.3.3 Table 11
3.1.10	the degree to which the impacts and risks can be reversed;	Section 0
3.1.11	the degree to which the impacts and risks can cause loss of irreplaceable resources;	Section 3.3.5
3.1.12	proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr),	Section 4 Section 9.3
3.1.13	a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a 'low' terrestrial biodiversity sensitivity and that were not considered appropriate,	✗
3.1.14	a substantiated statement based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development if it should receive approval a not; and	Section 3.4.2
3.1.15	any conditions to which this statement is subjected.	Section 3.4.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	EAP
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	EAP
LOW SENSITIVITY RATING – for terrestrial biodiversity features		
4	Terrestrial Biodiversity Compliance Statement	✓
4.1	The compliance statement must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences.	Section 9.7
4.2	The compliance statement must:	✓
4.2.1	be applicable to the preferred site and proposed development footprint;	✓
4.2.2	confirm that the site is of 'low' sensitivity for terrestrial biodiversity; and	Section 3.1.10
4.2.3	indicate whether or not the proposed development will have any impact on the biodiversity feature.	Section 3.2.1
4.3	The compliance statement must contain, as a minimum, the following information:	✓
4.3.1	the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Section 9.7
4.3.2	a signed statement of independence by the specialist;	Section 9.7
4.3.3	a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 1.4.1
4.3.4	a baseline profile description of biodiversity and ecosystems of the site;	Section 3.1

TABLE 1:	ASSESSMENT AND REPORTING OF IMPACTS ON TERRESTRIAL BIODIVERSITY	REPORT REFERENCE
4.3.5	the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modeling used, where relevant;	Section 3.1.10
4.3.6	in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures propped, the land can be returned to the current state within two years of completion of the construction phase;	
4.3.7	where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	Section 4 Section 8
4.3.8	a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	Section 1.4.3
4.3.9	any conditions to which this statement is subjected.	EAP
4.4	A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	EAP

PAGE INTENTIONALLY LEFT BLANK

END