



PALAEONTOLOGICAL DESKTOP  
ASSESSMENT FOR THE PROPOSED  
RESIDENTIAL DEVELOPMENT ON  
ERVEN 597, 598, AND 599 STANFORD,  
WESTERN CAPE PROVINCE

21 April 2026

COMPILED FOR: Cape Cultural Landscapes Pty Ltd



## Declaration of Independence

I, Elize Butler, declare that –

General declaration:

- I act as the independent palaeontological 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 favorable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological 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 section 38 of the NHRA 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 provide the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected a palaeontological specialist in terms of the Act and the constitutions of my affiliated professional bodies; and
- I realize that a false declaration is an offense in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.



#### Disclosure of Vested Interest

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 Regulations.

PALAEONTOLOGICAL CONSULTANT:

Banzai Environmental (Pty) Ltd

CONTACT PERSON:

Elize Butler

Tel: +27 844478759

Email: info@banzai-group.com

SIGNATURE:



This Palaeontological impact assessment report has been compiled considering the National Environmental Management Act 1998 (NEMA) and Environmental Impact Regulations 2014 as amended, requirements for specialist reports, Appendix 6, as indicated in the table below.

**Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended).**

| <b>Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017</b>                                                                            | <b>The relevant section in the report</b>                                           | <b>Comment where not applicable.</b> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|
| 1.(1) (a) (i) Details of the specialist who prepared the report                                                                                        | Page ii and Section 2 of Report – Contact details and company and <b>Appendix 1</b> | -                                    |
| (ii) The expertise of that person to compile a specialist report including a curriculum vita                                                           | Section 2 – refer to <b>Appendix 1</b>                                              | -                                    |
| (b) A declaration that the person is independent in a form as may be specified by the competent authority                                              | Page ii of the report                                                               | -                                    |
| (c) An indication of the scope of, and the purpose for which, the report was prepared                                                                  | Section 4 – Methods and ToR                                                         | -                                    |
| (cA) An indication of the quality and age of base data used for the specialist report                                                                  | Section 5.1 – Geological and Palaeontological history                               | -                                    |
| (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;                    | Section 6                                                                           | -                                    |
| (d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment                           | Executive Summary, Section 87                                                       | Desktop Assessment                   |
| (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used | Section 4 Approach and Methodology                                                  | -                                    |



**Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended).**

| <b>Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017</b>                                                                                                                                                                  | <b>The relevant section in the report</b>           | <b>Comment where not applicable.</b> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------------------------|
| (f) details of an assessment of the specifically identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives; | Executive Summary, Section 7                        |                                      |
| (g) An identification of any areas to be avoided, including buffers                                                                                                                                                                          | Executive Summary, Section 7                        |                                      |
| (h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;                                                 | Section 5 – Geological and Palaeontological history |                                      |
| (i) A description of any assumptions made and any uncertainties or gaps in knowledge;                                                                                                                                                        | Section 4.1 – Assumptions and Limitation            | -                                    |
| (j) A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment                                                                  | Executive Summary, Section 7                        |                                      |
| (k) Any mitigation measures for inclusion in the EMPr                                                                                                                                                                                        | Section 9                                           |                                      |
| (l) Any conditions for inclusion in the environmental authorisation                                                                                                                                                                          | Executive Summary, Section 7                        |                                      |
| (m) Any monitoring requirements for inclusion in the EMPr or environmental authorisation                                                                                                                                                     | Executive Summary, Section 8 & 9                    |                                      |
| (n)(i) A reasoned opinion as to whether the proposed activity, activities or portions thereof should be authorised and                                                                                                                       | Executive Summary, Section 7                        |                                      |



**Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended).**

| <b>Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017</b>                                                                                                                                                              | <b>The relevant section in the report</b>  | <b>Comment where not applicable.</b>                                                                                                                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (n)(iA) A reasoned opinion regarding the acceptability of the proposed activity or activities; and                                                                                                                                       |                                            |                                                                                                                                                                 |
| (n)(ii) If the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan | Executive Summary, Section 7               | -                                                                                                                                                               |
| (o) A description of any consultation process that was undertaken during the course of carrying out the study                                                                                                                            | N/A                                        | Not applicable. A public consultation process was handled as part of the Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) process. |
| (p) A summary and copies of any comments that were received during any consultation process                                                                                                                                              | N/A                                        | Not applicable. To date, no comments regarding heritage resources that require input from a specialist have been raised.                                        |
| (q) Any other information requested by the competent authority.                                                                                                                                                                          | N/A                                        | Not applicable.                                                                                                                                                 |
| (2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.                                | Section 3 compliance with SAHRA guidelines |                                                                                                                                                                 |



## **EXECUTIVE SUMMARY**

Banzai Environmental was commissioned to conduct the Palaeontological Desktop Assessment (PDA) for the proposed Walker Bay Estate residential development on Erven 597, 598 and 599, Stanford, Western Cape Province. The development comprises of a consolidation of three erven (14.1034 ha in extent) and construction of 73 residential units, private open spaces, and internal access roads. In accordance with the National Environmental Management Act 107 of 1998 (NEMA) and Section 38 of the National Heritage Resources Act (NHRA, Act 25 of 1999), this assessment evaluates potential impacts on palaeontological heritage. Heritage Western Cape (HWC) issued a formal requirement for a Heritage Impact Assessment, including this Desktop PIA, following assessment on 12 May 2025 (HWC Case No. HWC25042505EJV0505).

The study area is entirely underlain by Middle Devonian sedimentary rocks of the Ceres Subgroup, Bokkeveld Group, Cape Supergroup (approximately 393-383 million years old), comprising grey-green shale, siltstone, and fine-grained sandstone deposited in a marine shelf environment. These sediments contain diverse fossil assemblages representing the Malvinokaffric Realm fauna, including bivalves, brachiopods, crinoids, trilobites, and trace fossils (Theron, 1972; Cooper, 1982; Almond and Pether, 2008). The SAHRIS PalaeoSensitivity Map and DFFE Screening Tool classify the Ceres Subgroup as having Very High palaeontological sensitivity.

A site visit on 17 April 2025 by the Environmental Assessment Practitioner (EAP) identified the complete transformation through agricultural and residential activities, with established vineyards, lawns, internal roads, and infrastructure dominating the landscape. No natural vegetation or exposed bedrock is present. The Very High Palaeontological Sensitivity allocated to the proposed site typically requires a field-based assessment; however, the complete site transformation renders a field investigation impractical. Satellite imagery review (Google Earth, April 2026) confirms that site conditions have remained unchanged since the April 2025 site visit, with continued agricultural and residential land use and no new ground disturbance or exposure of fresh bedrock. The desktop assessment methodology and conclusions remain valid and current. This assessment was therefore conducted at desktop level using published geological maps, palaeontological literature, SAHRIS and DFFE databases. Despite surficial disturbance, the underlying Ceres Subgroup holds inherent Very High Palaeontological Sensitivity, and excavations exceeding 1.5-2 meters depth may encounter significant fossil material.

The construction phase of the proposed development has been assigned a Very High negative impact rating on palaeontological heritage prior to mitigation, which reduces to Medium with the implementation of appropriate mitigation measures. The operational phase is not expected to result in any significant impacts on palaeontological resources, as no further ground disturbance is anticipated once



construction is complete. Cumulative impacts of the development are considered Low both pre- and post-mitigation and fall within acceptable limits. The No-Go Alternative, which considers maintaining the status quo, would have a Neutral impact on palaeontological heritage. The primary risk to fossil heritage occurs during the construction phase, specifically during excavations that penetrate beyond the disturbed surface layers into the underlying fossiliferous Ceres Subgroup sediments.

From a palaeontological heritage perspective, the proposed Walker Bay Estate residential development on Erven 597, 598 and 599, Stanford, is considered **Acceptable and may proceed**, subject to strict compliance with non-negotiable mitigation conditions. These conditions include the mandatory implementation of the Chance Find Protocol detailed in Section 9 of this report; the appointment of a qualified, independent Environmental Control Officer (ECO); the integration of all mitigation measures into the Environmental Management Programme (EMPr); comprehensive site induction training for all construction personnel on fossil recognition and reporting procedures; active monitoring of all excavations exceeding 1.5 meters depth or encountering fresh bedrock; immediate work stoppage within a 10-meter radius if fossils are discovered; notification to Heritage Western Cape within 24 hours of any fossil discovery; and full compliance with Section 35 of the NHRA and all HWC requirements under Case No. HWC25042505EJV0505.

Should fossils be discovered during construction, all work must cease immediately within a 10-meter radius of the find. The discovery must be protected from damage, and the site and fossil find must be photographed from multiple angles with a scale indicator, and GPS coordinates recorded. Heritage Western Cape must be notified within 24 hours via the Case Officer, Emily-Jane Vowles (email: [emily.vowles@westerncape.gov.za](mailto:emily.vowles@westerncape.gov.za); telephone: 021 483 9685), providing the photographs and location details. Alternatively, SAHRA may be contacted (email: [info@sahra.org.za](mailto:info@sahra.org.za); telephone: 021 462 4502). Following notification, Heritage Western Cape will coordinate appropriate mitigation measures, which may include the recording and collection of fossil material by a qualified palaeontologist. Any specialist appointed to recover fossil material must first obtain the necessary fossil collection permit from SAHRA before commencing work. All recovered fossil material must be deposited in an accredited repository such as a museum or university collection, and all fieldwork and reporting must comply with SAHRA's minimum standards for palaeontological impact assessments.

The acceptability of this development from a palaeontological heritage perspective is entirely dependent on the strict implementation of the mitigation measures outlined in this report. While the surface of the development site has been heavily transformed and currently presents no visible palaeontological resources, excavations during construction will penetrate into the underlying Ceres Subgroup sediments, which retain Very High fossil potential. The implementation of a Chance Find Protocol, combined with trained personnel, qualified ECO oversight, and immediate heritage authority notification procedures, will



reduce the potential for unmitigated damage to significant palaeontological resources from Very High to Medium. All mitigation measures, monitoring requirements, and response protocols must be incorporated into the project's Environmental Management Programme (EMPr) and construction contracts to ensure compliance throughout the construction phase.

Subject to the strict implementation of the mitigation measures and non-negotiable conditions outlined in this assessment, the proposed Walker Bay Estate residential development is considered acceptable from a palaeontological heritage perspective and may proceed. All recommendations must be integrated into the Environmental Management Programme for the proposed Walker Bay Estate residential development on Erven 597, 598 and 599 , Stanford, in the Western Cape Province and communicated clearly to all personnel involved in construction activities.



## TABLE OF CONTENT

|          |                                                                                 |           |
|----------|---------------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>INTRODUCTION .....</b>                                                       | <b>1</b>  |
| 1.1      | SCOPE OF THE STUDY .....                                                        | 1         |
| 1.2      | LOCATION.....                                                                   | 1         |
| <b>2</b> | <b>QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR .....</b>                        | <b>5</b>  |
| <b>3</b> | <b>LEGISLATION.....</b>                                                         | <b>5</b>  |
| 3.1      | SUPPORTING LEGISLATION AND REGULATIONS .....                                    | 6         |
| 3.2      | HERITAGE SCREENING – DFFE NATIONAL WEB-BASED ENVIRONMENTAL SCREENING TOOL ..... | 6         |
| 3.3      | SECTION 38: HERITAGE IMPACT ASSESSMENTS .....                                   | 7         |
| 3.4      | INTEGRATION WITH ENVIRONMENTAL ASSESSMENT .....                                 | 8         |
| <b>4</b> | <b>METHODS AND TERMS OF REFERENCE.....</b>                                      | <b>8</b>  |
| 4.1      | ASSUMPTIONS AND LIMITATIONS.....                                                | 10        |
| <b>5</b> | <b>RECEIVING ENVIRONMENT .....</b>                                              | <b>10</b> |
| 5.1      | GEOLOGICAL AND PALAEONTOLOGICAL HISTORY.....                                    | 11        |
| 5.2      | SITE CONDITIONS AND ASSESSMENT SCOPE.....                                       | 17        |
| 5.3      | DESKTOP ASSESSMENT JUSTIFICATION.....                                           | 17        |
| 5.4      | INHERENT PALAEONTOLOGICAL RISK .....                                            | 18        |
| <b>6</b> | <b>ASSESSMENT METHODOLOGY .....</b>                                             | <b>19</b> |
| 6.1      | IMPACT ASSESSMENT METHODOLOGY .....                                             | 19        |
| <b>7</b> | <b>CONCLUSION AND SUMMARY.....</b>                                              | <b>23</b> |
| <b>8</b> | <b>MITIGATION AND EMPR REQUEMENTS.....</b>                                      | <b>25</b> |
| 8.2      | LEGISLATION.....                                                                | 25        |
| 8.3      | CHANCE FIND PROCEDURE .....                                                     | 26        |
| <b>9</b> | <b>PALAEONTOLOGICAL CHANCE FIND PROTOCOL .....</b>                              | <b>28</b> |
| 9.1      | PURPOSE AND APPLICABILITY.....                                                  | 28        |
| 9.2      | LEGISLATIVE CONTEXT .....                                                       | 28        |
| 9.3      | FOSSIL IDENTIFICATION GUIDANCE.....                                             | 28        |
| 9.4      | IMMEDIATE ACTIONS UPON DISCOVERY .....                                          | 29        |
| 9.5      | NOTIFICATION PROCEDURES.....                                                    | 29        |



|                                             |           |
|---------------------------------------------|-----------|
| 9.6 WORK STOPPAGE AND SITE PROTECTION ..... | 29        |
| 9.7 HERITAGE WESTERN CAPE ASSESSMENT .....  | 30        |
| 9.8 TRAINING AND AWARENESS .....            | 30        |
| 9.9 ECO RESPONSIBILITIES.....               | 30        |
| 9.10 DOCUMENTATION.....                     | 31        |
| 9.11 POSITIVE OUTCOMES.....                 | 31        |
| <b>10 BIBLIOGRAPHY.....</b>                 | <b>31</b> |

## LIST OF FIGURES

|                                                                                                                                                                                                                                                                                                                                                            |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Figure 1: Regional Locality of the Walker Bay Estate residential development on Erven 597, 598 and 599 , Stanford, Western Cape Province. ....</b>                                                                                                                                                                                                      | <b>3</b>  |
| <b>Figure 2: Development site of the Walker Bay Estate residential development on Erven 597, 598 and 599 , Stanford, Western Cape Province.. ....</b>                                                                                                                                                                                                      | <b>4</b>  |
| <b>Figure 3: Site conditions observed during the EAP site visit on 17 April 2025, showing complete transformation characterized by established vineyards, irrigated lawns, and internal access roads. No natural vegetation or exposed bedrock is present. Satellite imagery verification (April 2026) confirms these conditions remain unchanged.....</b> | <b>11</b> |
| <b>Figure 4: The 1:250 000 Worcester 3319 Geological Map (Council for Geoscience, Pretoria) indicates that the study area is entirely underlain by the Middle Devonian sedimentary rocks of the Ceres Subgroup (Dc) of the Bokkeveld Group, Cape Supergroup.....</b>                                                                                       | <b>14</b> |
| <b>Figure 5: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website) indicates a Very High (red), Palaeontological Sensitivity while portions of the site is also underlain by a Low (blue) Palaeontological Sensitivity.....</b>                                                                              | <b>15</b> |
| <b>Figure 6: Palaeontological Sensitivity generated by the DFFE National Environmental Web-Based Screening Report indicates that the study area has a Very High (deep red) Palaeontological sensitivity. ....</b>                                                                                                                                          | <b>16</b> |



## LIST OF TABLES

|                                                                                                                              |           |
|------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Table 1: Checklist for Specialist studies in conformance with Appendix 6 of the EIA Regulations of 2014 (as amended).</b> | <b>iv</b> |
| <b>Table 2: GN 320 Reporting Requirements</b>                                                                                | <b>6</b>  |
| <b>Table 3: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).</b>         | <b>16</b> |
| <b>Table 4: The rating system</b>                                                                                            | <b>19</b> |
| <b>Table 5: Summary of Impacts</b>                                                                                           | <b>22</b> |

## APPENDIX 1: CURRICULUM VITAE



## LIST OF ABBREVIATIONS

|        |                                                       |
|--------|-------------------------------------------------------|
| BA     | Basic Assessment                                      |
| CA     | National Competent Authority                          |
| DEA    | Department of Environmental Affairs                   |
| DFFE   | Department of Forestry, Fisheries and the Environment |
| EA     | Environmental Authorization                           |
| ECO    | Environmental Control Officer                         |
| EIA    | Environmental Impact Assessment                       |
| EMPr   | Environmental Management Programme                    |
| ESO    | Environmental Site Officer                            |
| GIS    | Geographic information system                         |
| HIA    | Heritage Impact Assessment                            |
| Ma     | Millions of years ago                                 |
| NEMA   | National Environmental Management Act                 |
| NHRA   | National Heritage Resources Act                       |
| PIA    | Palaeontological Impact Assessment                    |
| PSSA   | Palaeontological Society of South Africa              |
| S&EIA  | Scoping & Environmental Impact Assessment             |
| SAHRA  | South African Heritage Resources Agency               |
| SAHRIS | South African Heritage Resources Information System   |
| ToR    | Terms of Reference                                    |

## GLOSSARY OF TERMS

### Fossil

A fossil is the preserved remains or traces of an organism that lived in the distant past, typically millions of years ago. Fossils may include mineralized skeletal structures, shells, or other durable components of ancient flora and fauna, as well as impressions, moulds, and casts formed in sedimentary rock as a result of the decomposition of the organism's remains. These preserved remnants offer significant insights into the evolutionary processes and biodiversity of past species, thereby enabling scientists to investigate and comprehend.

### Heritage



That which is inherited and forms part of the National Estate (historical places, objects, fossils as defined by the National Heritage Resources Act No 25 of 1999).

## **Heritage resources**

This means any place or object of cultural significance and can include (but not limited to) as stated under Section 3 of the NHRA,

- places, buildings, structures, and equipment of cultural significance.
- places to which oral traditions are attached or which are associated with living heritage.
- historical settlements and townscapes.
- landscapes and natural features of cultural significance.
- geological sites of scientific or cultural importance.
- archaeological and palaeontological sites.
- graves and burial grounds, and
- sites of significance relating to the history of slavery in South Africa.

## **Palaeontology**

Any fossilised remains or fossil trace of animals or plants which lived in the geological past (other than fossil fuels or fossiliferous rock intended for industrial use) and any site which comprises of fossilised remains or traces of past life.

The term palaeontology derives from the modern Latin palaeontologia, which in turn originates from the Greek words palaios (παλαιός), meaning “ancient,” and ontos (ὄντος), meaning “being” or “creature,” combined with the suffix -logia, meaning “study of.” The literal translation is therefore “the study of ancient beings.” In English usage, the British and South African spelling is palaeontology, while the American spelling omits the a after the p, rendering paleontology. In this report the English and South African spelling of Palaeontology will be used.



## **1 INTRODUCTION**

Erven 597, 598, and 599, Walker Bay Estate, Stanford, are proposed to be consolidated and developed as a 73-unit residential estate covering 14.1034 hectares within the Overstrand Urban Edge, Overstrand Local Municipality, Western Cape Province.

In terms of Section 38(1) of the National Heritage Resources Act (NHRA, Act 25 of 1999), a Notification of Intent to Develop was submitted to Heritage Western Cape (HWC). Following assessment on 12 May 2025 (Case No. HWC25042505EJV0505), HWC determined that the proposed development may impact heritage resources and requires a Heritage Impact Assessment (HIA) in terms of Section 38(3) of the NHRA.

HWC specifically requires the HIA to include:

- Desktop Palaeontological Impact Assessment (this report)
- Townscape Assessment
- Visual Impact Assessment

This Palaeontological Desktop Assessment (PDA) has been prepared by Banzai Environmental (Pty) Ltd to fulfil the palaeontological component of the HIA. The assessment aims to identify palaeontological sensitivity, evaluate potential impacts on fossil heritage, and recommend appropriate mitigation measures in accordance with SAHRA minimum standards and HWC requirements.

The study area is located in Stanford, Overstrand Local Municipality, Western Cape Province. Refer to Figure 1 (Regional Locality) and Figure 2 (Site Locality) for spatial context.

### **1.1 Scope of the Study**

The aim of the study is to identify palaeontological sites/sensitivity that may occur in the proposed project area. The PDA aims to inform the Environmental Impact Assessment (EIA) to assist the developer in managing the discovered heritage resources in a responsible manner, in order to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act (Act 25 of 1999) as amended (NHRA).

### **1.2 Location**

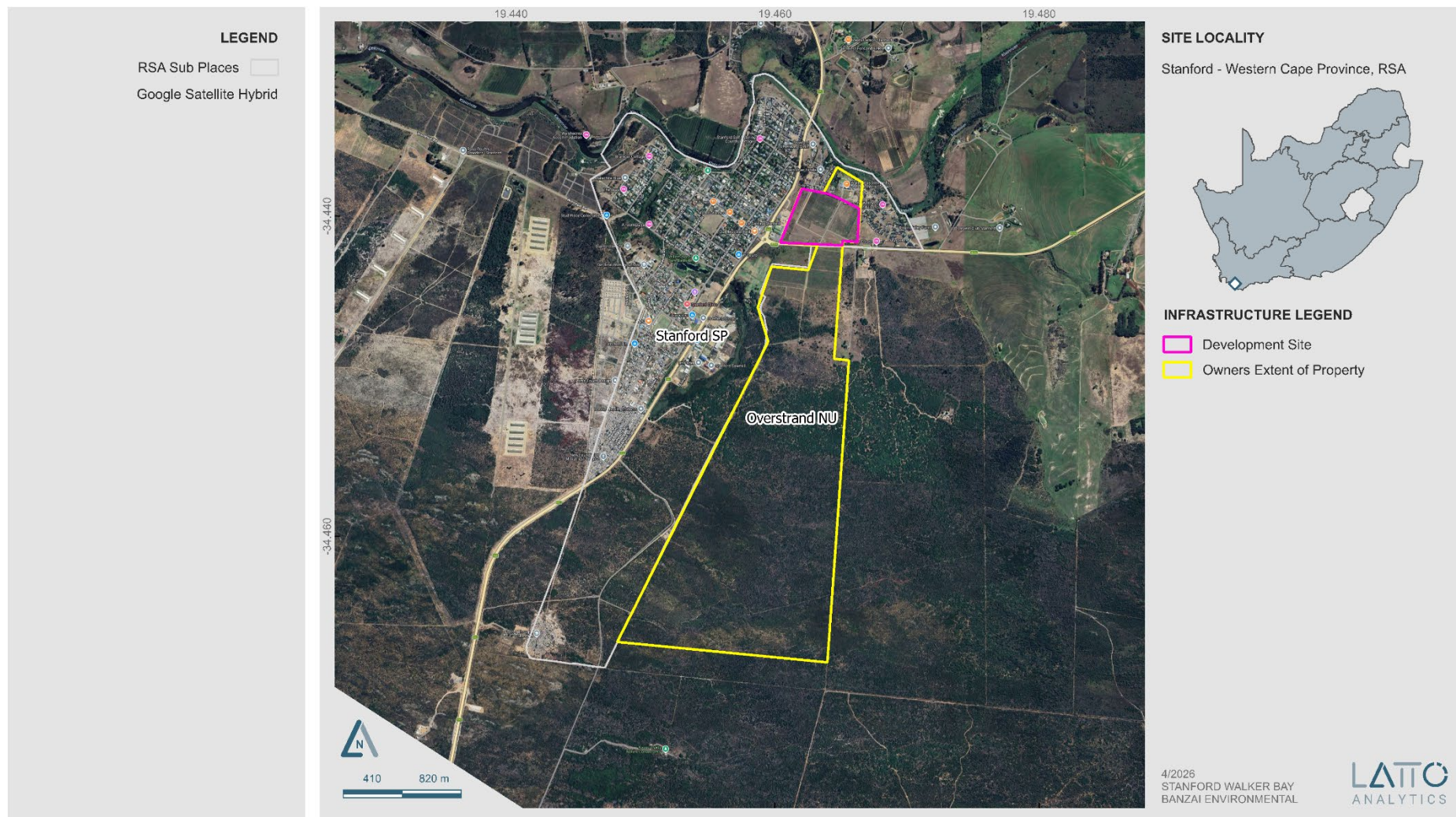
The study area is located in Stanford, a historic village situated approximately:

- 15 km northeast of Gansbaai
- 20 km southeast of Hermanus



- 170 km southeast of Cape Town

The site falls within the Overstrand Local Municipality (previously Stanford Municipality prior to municipal demarcation), Overberg District Municipality, Western Cape Province.



**Figure 1: Regional Locality of the Walker Bay Estate residential development on Erven 597, 598 and 599, Stanford, Western Cape Province.**



**Figure 2: Development site of the Walker Bay Estate residential development on Erven 597, 598 and 599, Stanford, Western Cape Province..**





## 2 QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

Please refer to Appendix 1 (Specialist CV).

This study has been conducted by Mrs. Elize Butler of Banzai Environmental (Pty) Ltd. She has conducted approximately 900 palaeontological impact assessments (PIA) for developments in the Free State, KwaZulu-Natal, Eastern and Northern Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa and has been working in Palaeontology for more than thirty years. She has experience in locating, collecting, and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

## 3 LEGISLATION

South Africa's cultural and palaeontological heritage is protected by a comprehensive legal framework designed to facilitate the systematic identification, assessment, and management of heritage resources. The National Heritage Resources Act (NHRA, Act 25 of 1999) serves as the cornerstone of this framework, defining heritage resources as components of the national estate, encompassing cultural, historical, archaeological, palaeontological, and geological elements of significance.

Section 3 of the NHRA explicitly includes *"all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological materials, meteorites, and rare geological specimens."*

Palaeontological heritage, recognized as a non-renewable resource, is specifically protected under Section 35, which prohibits any person from disturbing, destroying, damaging, excavating, altering, or removing any fossil material without a valid permit issued by SAHRA or the relevant Provincial Heritage Resources Authority (PHRA). All fossil specimens must be collected by qualified specialists and deposited in an approved repository in accordance with SAHRA's minimum standards.

The NHRA establishes a three-tier cooperative governance model that reflects South Africa's constitutional framework for collaborative governance. At the national level, the South African Heritage Resources Agency (SAHRA) provides policy direction and oversight, while Provincial Heritage Resources Authorities (PHRAs) implement heritage management at the provincial level. This decentralized system ensures efficient identification, protection, conservation, and presentation of heritage resources for the benefit of present and future generations.



### 3.1 Supporting Legislation and Regulations

Heritage and palaeontological management are integrated into South Africa's broader environmental governance framework through the National Environmental Management Act (NEMA, Act 107 of 1998) and the Environmental Impact Assessment (EIA) Regulations (GN 982 of 2014, as amended by GN 326 of 2017). Section 23(2)(b) of NEMA explicitly requires integrated environmental management to *"identify, predict, and evaluate actual and potential impacts on the environment, socio-economic conditions, and cultural heritage."*

Government Notice 320 (GN 320, Government Gazette 43110, 20 March 2020) establishes standardized protocols for conducting initial site sensitivity verification where specific assessment procedures are not otherwise defined. GN 320 mandates the following requirements:

- Desktop analysis using satellite imagery and spatial databases
- Preliminary on-site inspection by a qualified specialist
- Verification of current and historical land use patterns
- Submission of supporting documentation (e.g., site photographs, GPS coordinates)
- Professional confirmation or refutation of indicated environmental sensitivity
- Evidence-based motivation for assessment findings

**Table 2** below summarizes these regulatory requirements and indicates where they have been addressed within this assessment.

**Table 2: GN 320 Reporting Requirements**

| GN 320                                              | Relevant section in report      | Where not applicable in this report |
|-----------------------------------------------------|---------------------------------|-------------------------------------|
| 2.2(a) Desktop analysis using satellite imagery     | Section 1                       | –                                   |
| 2.2(b) Preliminary on-site inspection               | Executive Summary and Section 7 | –                                   |
| 2.3(a) Confirm or dispute environmental sensitivity | Executive Summary and Section 7 | –                                   |
| 2.3(b) Motivation and evidence                      | Executive Summary and Section 7 | –                                   |

### 3.2 Heritage Screening – DFFE National Web-based Environmental Screening Tool



A heritage screening was performed utilising the DFFE National Web-based Environmental Screening Tool, as mandated by GN 982. The April 2025 standards state that thematic layers for cultural, archaeological, and palaeontological resources encompass only a finite number of documented sites, which may be extensively dispersed and perhaps located at any development site. The directives specify: A Heritage Impact Assessment is required for all developments, irrespective of the sensitivity indicated on the archaeological and cultural heritage theme layers. A Palaeontological Impact Assessment is required for all developments according to the SAHRIS PalaeoSensitivity Map, regardless of the indicated sensitivity.

According to the heritage screening report, the Palaeontological Sensitivity of the proposed development area is Very High, indicating that a detailed Palaeontological Impact Assessment is required with a Chance Find Protocol.

| Development Type             | Threshold               | Examples                                                              |
|------------------------------|-------------------------|-----------------------------------------------------------------------|
| Linear developments          | > 300 meters in length  | Roads, pipelines, power lines, canals, conveyor belts                 |
| Bridges & similar structures | > 50 meters in length   | Road bridges, pedestrian bridges, aqueducts                           |
| Area-based developments      | > 5,000 m <sup>2</sup>  | Residential estates, industrial facilities, commercial centers        |
| Multi-property developments  | ≥ 3 properties          | Subdivisions, consolidations, township establishments                 |
| Rezoning applications        | > 10,000 m <sup>2</sup> | Land use changes, agricultural to urban conversions                   |
| Any development impacting    | N/A                     | Declared heritage sites, protected areas, or known heritage resources |

### 3.3 Section 38: Heritage Impact Assessments

The following development types automatically trigger Section 38 requirements:

Upon activation of the project, SAHRA or the pertinent PHRA must be informed, and the HIA is required to:

Identify and delineate heritage resources within the impacted region; Evaluate importance and possible effects; Evaluate viable alternatives; Propose suitable mitigation and management strategies.



### 3.4 Integration with Environmental Assessment

Section 38(8) of the NHRA enables the integration of heritage assessments with NEMA EIA processes, thereby eliminating duplication and ensuring efficient, coordinated environmental management. Palaeontological Impact Assessments (PIAs) may be conducted as a specialized component of the Heritage Impact Assessment (HIA) within the broader Environmental Impact Assessment (EIA) framework. This integrated approach ensures the timely identification, protection, and management of fossil heritage throughout the development planning process.

Where development does not require environmental authorization under NEMA but triggers Section 38(1) of the NHRA, SAHRA or the relevant PHRA serves as the authorizing authority and may require a comprehensive HIA, including public participation and stakeholder consultation where applicable.

## 4 METHODS AND TERMS OF REFERENCE

This PDA assesses the development's potential impact on the fossil heritage. This Palaeontological Assessment is part of the HIA Report. The PIA's goals are to: 1) identify the palaeontological significance of the rock formations in the footprint; 2) evaluate the palaeontological magnitude of the formations; 3) clarify the impact on fossil heritage; and 4) make recommendations for how the developer might protect and minimize potential harm to fossil heritage, according to the "SAHRA APM Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports".

Calculations of the palaeontological state of each rock segment and the potential impact of development on fossil history take into account the palaeontological status of the rocks, the type of development, and the amount of bedrock removed.

The Provisional DFFE Screening Tool, the SAHRIS Palaeosensitivity map, all Palaeontological Impact Assessment reports for the same area, Google Earth images, topographical and geological maps, as well as academic articles about specimens from the development area and Assemblage Zones, are all used to create scoping reports.

When the development footprint has a moderate to high palaeontological sensitivity, a field-based assessment is necessary. A desktop or field assessment of the exposed rock is used to evaluate the significance of the proposed development's impact, and recommendations for more research or mitigation are made. Excavations for the project often only take place during the building phase, changing the terrain and destroying or permanently encasing fossils at or below the ground surface. Then, access to Fossil Heritage will no longer be available for academic study.



When doing a site investigation, a palaeontologist examines the local development as well as the quantity and variety of fossils found there. This can be demonstrated by looking at representative fossiliferous rock exposures (most igneous and metamorphic rocks are not fossiliferous, whereas sedimentary rocks contain fossil heritage). Examined rock exposures frequently contain a sizeable portion of the stratigraphic unit, which is primarily made up of recently exposed (unweathered) rock. These exposures may be man-made (such as quarries, open building excavations, even railway and road cuttings) or natural (such as cliffs, and dongas as well as rocky outcrops along stream or river banks). It is usual practice for palaeontologists to record well-preserved fossils (GPS, and stratigraphic data) during field assessment examinations.

Although mitigation is often done prior to construction, it may take place if potentially fossiliferous bedrock is revealed. Fossil collection and documentation are examples of mitigation. A permit from SAHRA must be obtained before beginning any fossil excavation, and the material must be stored at an authorized facility. When mitigation is properly used, it is possible to have a positive impact by raising awareness of the palaeontological past of the area.

By physically evaluating bedrock outcrops to determine their lithology and fossil richness and crisscrossing the development footprint, one can assess an area's fossil potential. Because the presence of fossils at the surface is so unexpected, an average sample size of the region is investigated. To be clear, however, the lack of fossils in a development footprint does not automatically suggest that there is no palaeontologically important material present on the site (on or below the ground surface).

The terms of reference of a PIA are as follows:

**General Requirements:**

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended;
- Adherence to all applicable best practice recommendations, appropriate legislation and authority requirements;
- Submit a comprehensive overview of all appropriate legislation, guidelines;
- Describe of the proposed project and provide information regarding the developer and consultant who commissioned the study;
- Describe location of the proposed development and provide geological and topographical maps
- Provide palaeontological and geological history of the affected area;
- Identify sensitive areas to be avoided (providing shapefiles/kmls) in the proposed development;



- Evaluate the significance of the planned development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:
  - Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity.
  - Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity.
  - Cumulative impacts are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities.
- Fair assessment of alternatives (infrastructure alternatives have been provided);
- Recommend mitigation measures to minimise the impact of the proposed development; and
- Detail the implications of specialist findings for the proposed development (such as permits, licenses etc).

#### 4.1 Assumptions and Limitations

The geology of the area is the focal point of geological maps, and the sheet explanations of the Geological Maps were not intended to focus on palaeontological heritage. Many inaccessible areas of South Africa have never been examined by palaeontologists, and data is typically dependent solely on aerial pictures. Locality and geological information in museums and university databases is out of date, and data acquired in the past is not always adequately documented.

Comparable Assemblage Zones in other places are also used to provide information on the existence of fossils in areas that have not before been recorded. When similar Assemblage Zones and geological formations are used for Desktop studies, it is commonly assumed that exposed fossil exists within the footprint.

### 5 RECEIVING ENVIRONMENT

The study area is situated within the **Agulhas Plain**, a low-lying coastal region with gently undulating terrain at elevations between 5 and 50 meters above sea level, draining toward the Klein River system (Mucina and Rutherford, 2006; Day, 1981). The site falls within the **Overberg Dune Strandveld** vegetation type (FS10), part of the globally significant Fynbos Biome, characterized by low shrubland dominated by Asteraceae, Ericaceae, and Proteaceae on sandy soils (Mucina and Rutherford, 2006; Cowling *et al.*, 2003). This vegetation type is classified as **Critically Endangered** with less than 10% remaining in natural condition due to agricultural development, urban expansion, and alien plant invasions (Driver *et al.*, 2012;



Rouget *et al.*, 2003). The underlying geology comprises sedimentary rocks of the Table Mountain Group, which have palaeontological significance (Compton, 2004).



**Figure 3: Site conditions observed during the EAP site visit on 17 April 2025, showing complete transformation characterized by established vineyards, irrigated lawns, and internal access roads. No natural vegetation or exposed bedrock is present. Satellite imagery verification (April 2026) confirms these conditions remain unchanged.**

## 5.1 Geological and Palaeontological History

The geology of study area is presented on the 1:250,000 scale Worcester 3319 Geological Map (Council for Geoscience, Pretoria). The projected development area is entirely situated on sedimentary rocks of the Ceres Subgroup (Dc), Bokkeveld Group, Cape Supergroup (**Figure 4**). The Cape Supergroup, which records maritime transgression over the southern edge of Gondwana, is a thick sequence of mostly siliciclastic sedimentary rocks that were deposited in the Cape Basin from the Devonian to Carboniferous eras (~416-299 Ma) (Thamm and Johnson, 2006; Shone, 2006). The Bokkeveld Group, situated above the Table Mountain Group, consists of a succession predominantly composed of marine mudrock, deposited in shallow to deep marine shelf settings during the Early to Middle Devonian (~407-383 Ma) (Theron *et al.*, 1991; Thamm and Johnson, 2006). The Ceres Subgroup comprises mostly grey to greenish-grey shale, siltstone, and some fine-grained sandstone, formed in outer shelf to slope settings under dysoxic to anoxic bottom-water conditions (Theron, 1972; Rust, 1967). These fine-grained argillaceous sediments were derived from suspension in low-energy marine environments, with intermittent storm-induced turbidite deposits indicated by thin sandstone interbeds (Theron *et al.*, 1991; Shone, 2006). The Ceres Subgroup in the Worcester-Ceres area often has a thickness between 800 and 1,200 meters, indicative of prolonged subsidence and sediment deposition in the Cape Basin during the Middle Devonian (Thamm and Johnson, 2006).



The Ceres Subgroup is palaeontologically significant as it contains diverse marine invertebrate fossil assemblages representing the Malvinokaffric Realm fauna, a cool-water, high-latitude assemblage characteristic of the southern Gondwanan continental shelf during the Devonian (Theron, 1972; Cooper, 1982; Boucot, 1999).

Fossils documented from the Ceres Subgroup and equivalent Bokkeveld Group formations include abundant and diverse brachiopods from multiple orders: Orthida (*Schizophoria*, *Isorthis*), *Strophomenida* (*Australocoelia*, *Leptaena*), *Rhynchonellida* (*Uncinulus*), *Spiriferida* (*Howellella*, *Acrospirife*), and *Pentamerida* (*Pleurothyrella*) (Theron, 1972; Cooper, 1982). Bivalve fossils include representatives of Palaeotaxodonta (*Nuculites*, *Yoldia*), *Pteriomorphia* (*Aviculopecten*, *Leptodesma*), and other primitive taxa (Theron, 1972; Almond and Pether, 2008). Trilobite remains are moderately common and include members of the families Phacopidae (Phacops), Homalonotidae (Dipleura), Calymenidae (Calymene), and Proetidae (Proetus) (Cooper, 1982; Lieberman and Kloc, 1997). Crinoid fossils occur primarily as disarticulated columnals (stem segments) and brachials (arm plates), with rarely preserved calyces, representing both cladid and camerata forms typical of Devonian marine shelf environments (Theron, 1972; Webster and Webster, 2014).

Additional invertebrate fossils include gastropods (*Loxonema*, *Platyceras*, rare cephalopods including orthoconic nautiloids (*Orthoceras*), bryozoans, tentaculitids (*Styliolina*, *Tentaculites*), ostracods, and rare coral fragments (Theron, 1972; Cooper, 1982; Almond and Pether, 2008). Trace fossils (ichnofossils) are diverse and abundant, including *Zoophycos* (spiral feeding burrows), Chondrites (branching burrow systems), *Skolithos* (vertical dwelling burrows), *Cruziana* (trilobite crawling traces), and various grazing traces (Braddy and Almond, 1999; Caster and Brooks, 1989). Plant fossils are rare but include carbonized plant debris, compressed algal remains, possible early vascular plant fragments, and palynomorphs (fossil spores and pollen) from palynological studies (Anderson and Anderson, 1985). Rare vertebrate remains including placoderm and acanthodian fragments have been reported from Bokkeveld Group deposits elsewhere, though vertebrate fossils are uncommon in the Ceres Subgroup (Long, 1995; Gess and Coates, 2015).

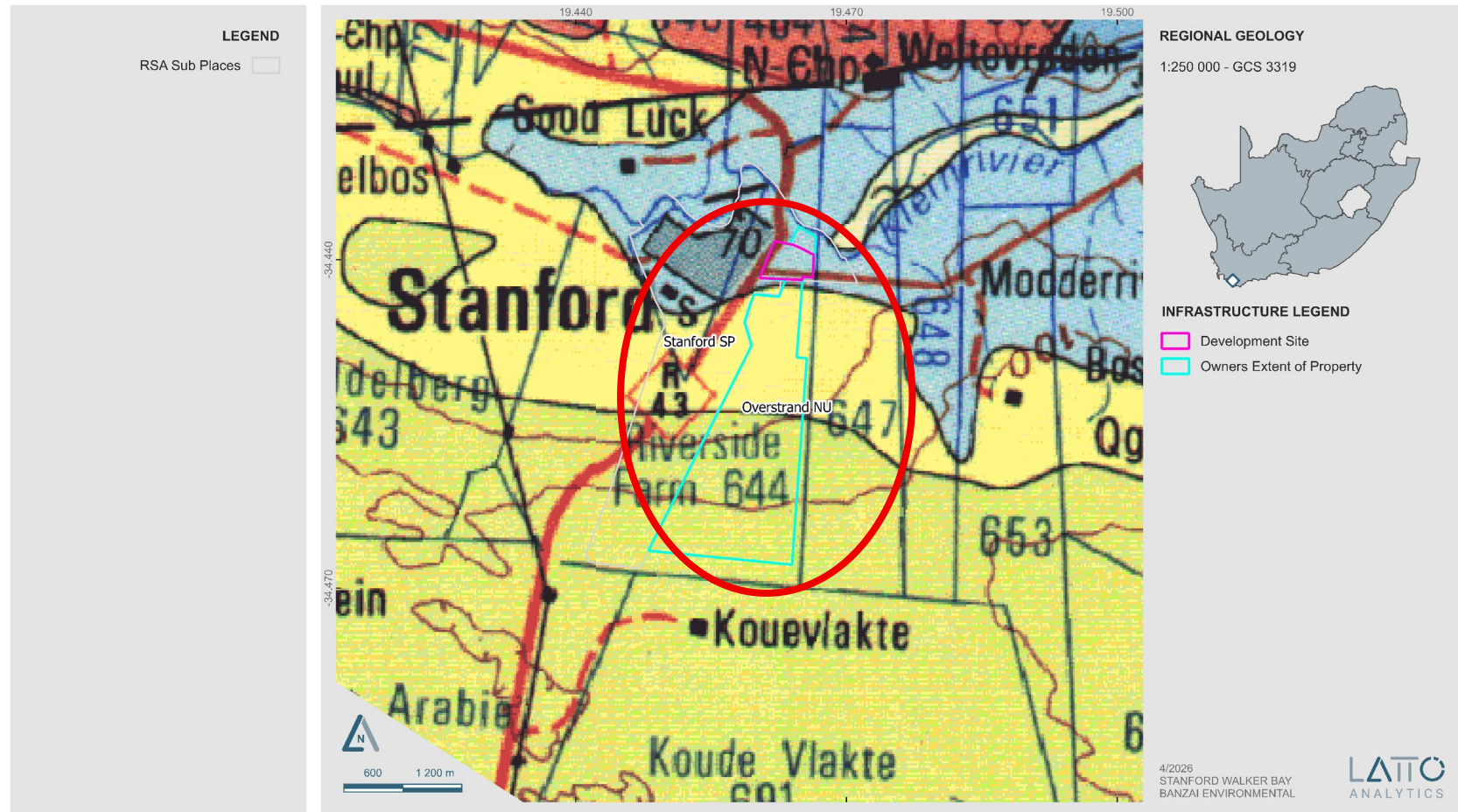
Fossils in the Ceres Subgroup are preserved in various forms, including articulated shells (especially brachiopods in life position), disarticulated shell beds (storm-concentrated accumulations), internal and external moulds (impressions following shell dissolution), steinkerns (internal casts), and carbonized remains (flattened organic material preserved as carbon films) (Theron, 1972; Cooper, 1982; Almond and Pether, 2008). Intact, well-preserved specimens are comparatively few and possess significant scientific worth, although fragmented material is more common (Cooper, 1982). Fossiliferous horizons often appear as distinct shell layers, varying in thickness from a few centimetres to several meters, indicative of storm concentration episodes alternating between primarily fossil-deficient mudstone stages (Theron, 1972).



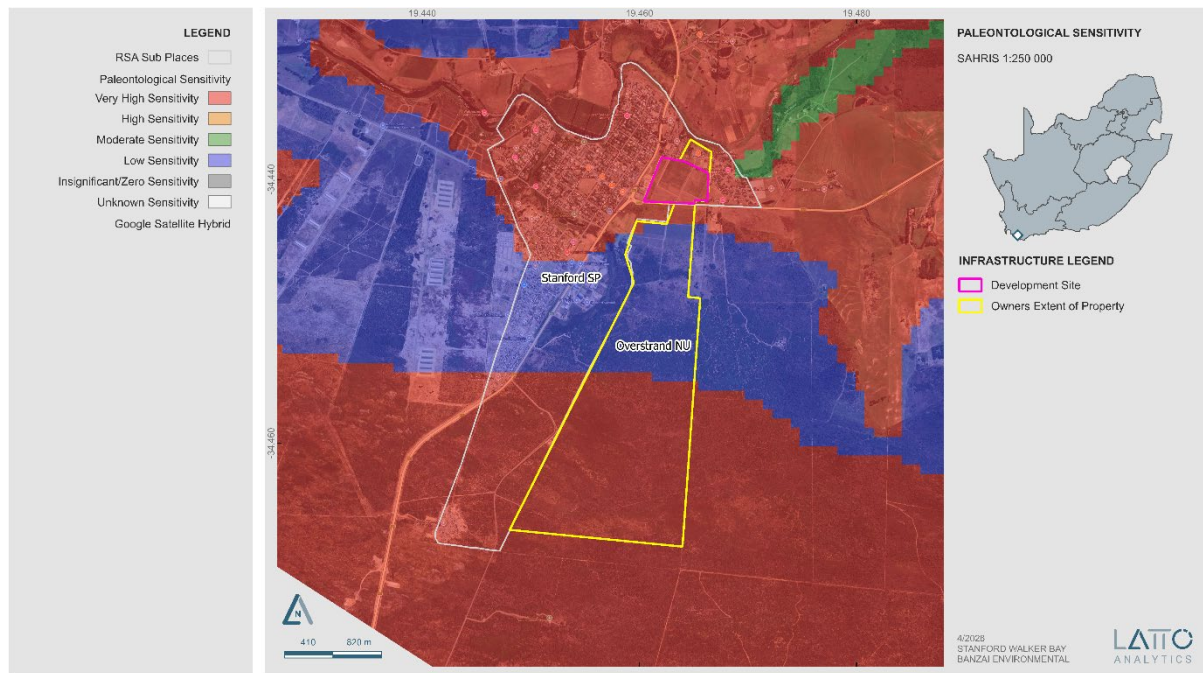
The SAHRIS PalaeoSensitivity Map (Almond et al., 2013) categorizes the Ceres Subgroup as exhibiting Very High palaeontological sensitivity (**Figure 5, Table 3**), indicating the presence of scientifically significant marine invertebrate fossils throughout this unit in the southwestern Cape. The DFFE National Web-based Environmental Screening Tool corroborates this classification, indicating Very High palaeontological sensitivity for the research region (**Figure 6**). The occurrence of fossils is sometimes unanticipated at individual sites, as fossil-bearing layers may be laterally discontinuous and covered by soil or damaged rock (Almond and Pether, 2008).

Excavations related to the projected development-comprising foundation excavations, road cuts, drainage infrastructure, and utility trenching-may reveal previously concealed fossil-bearing strata (Almond, 2018). Considering the Very High palaeontological sensitivity of the underlying Ceres Subgroup, and in compliance with SAHRA minimum standards and Heritage Western Cape requirements (HWC Case No. HWC25042505EJV0505), this assessment proposes for the implementation of suitable mitigation measures, including a Chance Find Protocol, to ensure that any significant fossil heritage uncovered during construction is identified, documented, and managed in accordance with Section 35 of the National Heritage Resources Act (Act 25 of 1999).

A site visit was conducted by the Environmental Assessment Practitioner (EAP) on 17 April 2025. The site is extensively transformed, characterized by established vineyards, irrigated lawns, and internal access roads, with no natural vegetation or exposed bedrock present. All surficial areas have been disturbed through agricultural and landscaping activities. Satellite imagery review (Google Earth, April 2026) confirms that site conditions have remained unchanged since the April 2025 site visit, with continued agricultural and residential land use and no new ground disturbance or exposure of fresh bedrock. This assessment has been conducted at desktop level. Due to the complete site transformation and absence of accessible rock exposures, no dedicated field-based palaeontological investigation is recommended. However, due to the Very High inherent sensitivity of the underlying Ceres Subgroup bedrock, a Chance Find Protocol must be implemented to manage any fossil heritage encountered during excavation into fresh bedrock beneath the disturbed soil layer (see Section 7 and 8).



**Figure 4: The 1:250 000 Worcester 3319 Geological Map (Council for Geoscience, Pretoria) indicates that the study area is entirely underlain by the Middle Devonian sedimentary rocks of the Ceres Subgroup (Dc) of the Bokkeveld Group, Cape Supergroup.**



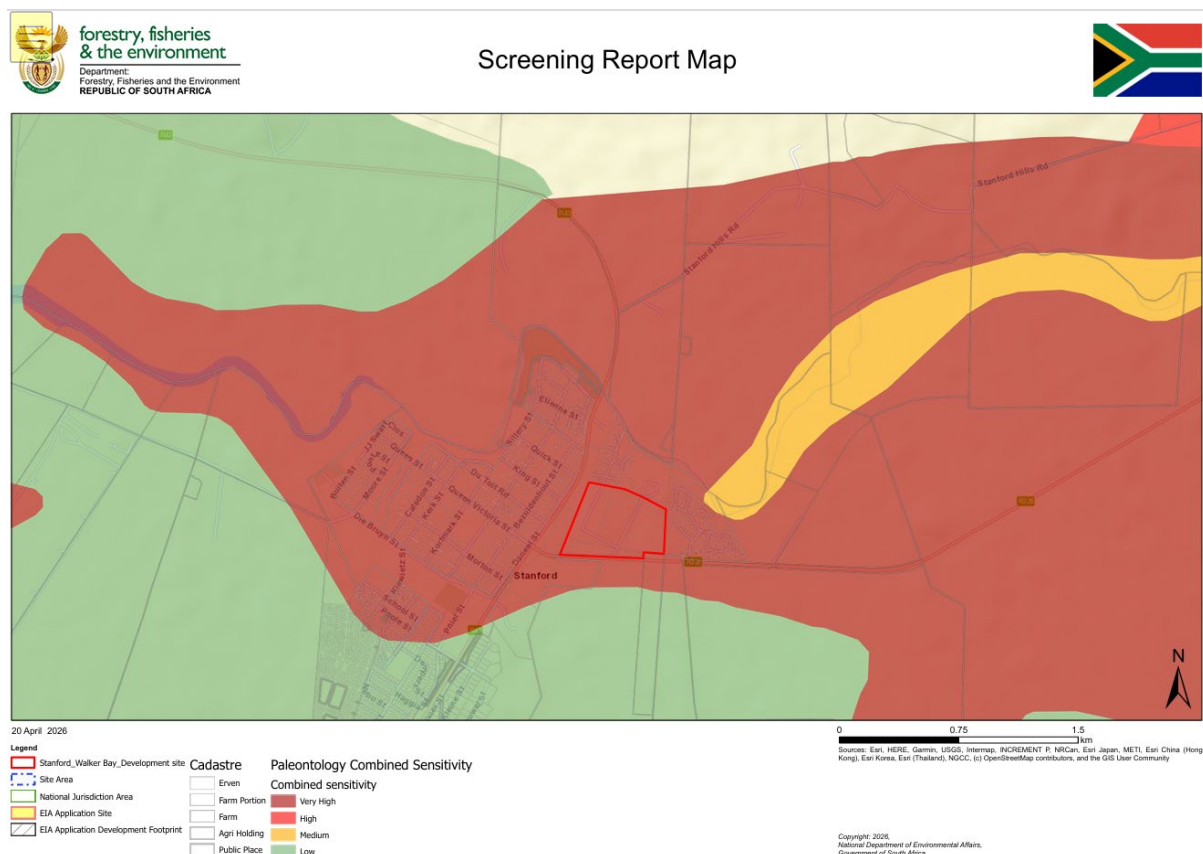
**Figure 5: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website) indicates a Very High (red), Palaeontological Sensitivity while portions of the site is also underlain by a Low (blue) Palaeontological Sensitivity.**

The SAHRIS PalaeoSensitivity Map indicates that the study area has Very High palaeontological sensitivity (red) (Figure 5, Table 3) (Almond et al., 2013). This classification is corroborated by the DFFE National Web-based Environmental Screening Tool, which confirms Very High palaeontological sensitivity for the proposed development footprint (Figure 6). This sensitivity rating reflects the documented occurrence of scientifically significant Devonian marine fossil assemblages within the Ceres Subgroup sediments underlying the site (Theron, 1972; Cooper, 1982; Almond and Pether, 2008).



**Table 3: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website).**

| Colour        | Sensitivity        | Required Action                                                                                                                     |
|---------------|--------------------|-------------------------------------------------------------------------------------------------------------------------------------|
| RED           | VERY HIGH          | Field assessment and protocol for finds is required                                                                                 |
| ORANGE/YELLOW | HIGH               | Desktop study is required and based on the outcome of the desktop study; a field assessment is likely                               |
| GREEN         | MODERATE           | Desktop study is required                                                                                                           |
| BLUE          | LOW                | No palaeontological studies are required however a protocol for finds is required                                                   |
| GREY          | INSIGNIFICANT/ZERO | No palaeontological studies are required                                                                                            |
| WHITE/CLEAR   | UNKNOWN            | These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map. |



**Figure 6: Palaeontological Sensitivity generated by the DFFE National Environmental Web-Based Screening Report indicates that the study area has a Very High (deep red) Palaeontological sensitivity.**



## 5.2 Site Conditions and Assessment Scope

A site visit was conducted by the Environmental Assessment Practitioner (EAP) on 17 April 2025 to assess current land use and surface conditions within the proposed development footprint. The assessment revealed that the property has been extensively transformed through historical and ongoing agricultural and residential land use, with no remnant natural areas or accessible geological exposures. The development footprint is entirely characterized by:

- Established commercial vineyards with deep root disturbance (typically 0.5-1.5 meters depth)
- Irrigated lawn areas with modified and imported soil profiles
- Tarred and gravel internal access roads
- Residential and agricultural infrastructure (buildings, storage facilities, equipment)
- Complete absence of natural vegetation or indigenous plant cover
- No exposed bedrock outcrops or undisturbed geological surfaces

All surficial areas have been subject to extensive historical disturbance including deep ploughing (0.5-1.5 meters depth), soil importation and modification, trenching for irrigation and services infrastructure, road construction, and building-related excavation and compaction.

This Palaeontological Desktop Assessment was commissioned following Heritage Western Cape's formal requirement issued on 12 May 2025 (HWC Case No. HWC25042505EJV0505). Verification of current site conditions was conducted using high-resolution satellite imagery (Google Earth Pro, accessed April 2026), which confirms that the development footprint has remained in its transformed state since the April 2025 site visit. No changes to land use, no new excavations, and no exposure of fresh bedrock or geological outcrops have occurred in the intervening period. This verification validates that the April 2025 site observations remain current and that the desktop assessment methodology is appropriate given the unchanged site conditions and complete absence of accessible geological exposures.

## 5.3 Desktop Assessment Justification

While the Very High palaeontological sensitivity classification would typically necessitate a field-based Palaeontological Impact Assessment (Phase 1 PIA), the complete transformation of the site surface renders such a field investigation impractical and unlikely to yield meaningful additional information. No natural rock exposures, fossil-bearing outcrops, or undisturbed geological profiles are accessible for examination. Consequently, this assessment has been conducted at desktop level, utilizing:



SAHRIS PalaeoSensitivity Map and fossil occurrence database

- DFFE National Web-based Environmental Screening Tool
- Published geological maps (1:250,000 Worcester 3319 sheet)
- Published palaeontological literature and fossil records (see Bibliography)
- Regional geological and palaeontological context
- Site transformation assessment based on EAP site observations (17 April 2025)
- Satellite imagery verification (Google Earth, April 2026)

This desktop approach is consistent with SAHRA minimum standards, which recognize that field assessment is not warranted where complete site transformation precludes meaningful geological observation, provided that appropriate mitigation measures (Chance Find Protocol) are implemented to manage any fossil heritage encountered during excavation into fresh bedrock beneath the disturbed surface layer.

#### **5.4 Inherent Palaeontological Risk**

It is important to note that surficial disturbance does not eliminate the underlying palaeontological sensitivity of the bedrock substrate. The Ceres Subgroup sediments beneath the disturbed soil and agricultural layers retain their inherent Very High palaeontological sensitivity and fossil-bearing potential. Any excavations that penetrate beyond the previously disturbed soil horizons into fresh, unweathered bedrock (typically at depths exceeding 1.5-2 meters, depending on historical disturbance depth) have the potential to encounter significant fossil material, including marine invertebrate shells, trace fossils, and other palaeontological resources.

Therefore, despite the desktop-only nature of this assessment and the complete surface transformation confirmed by both site observation (April 2025) and satellite verification (April 2026), comprehensive mitigation measures remain essential and are detailed in Section 7 (Mitigation and EMP<sub>r</sub> Requirements) and Section 8 (Palaeontological Chance Find Protocol).



## 6 ASSESSMENT METHODOLOGY

### 6.1 Impact Assessment Methodology

The impact assessment and mitigation, identifies and evaluates the significance of potential impacts according to the assessment criteria. The impact assessment methodology will furthermore describe the factors involved in assessing the significance of impacts and the standard rating scale that has been defined. Notably, the scale is defined since impacts have a number of parameters that need to be assessed.

Nevertheless, the nature of impact on the environment is also important in understanding the interaction between a planned project activity and the receiving environment. Table below outlines the type or nature of impact as well as its definition

**Table 4: The rating system**

| NATURE                                                                                                                          |                            |                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The Nature of the Impact is the possible destruction of fossil heritage                                                         |                            |                                                                                                                                                                                                                                                                                                                                                     |
| GEOGRAPHICAL EXTENT                                                                                                             |                            |                                                                                                                                                                                                                                                                                                                                                     |
| This is defined as the area over which the impact will be experienced.                                                          |                            |                                                                                                                                                                                                                                                                                                                                                     |
| 1                                                                                                                               | Site                       | The impact will only affect the site.                                                                                                                                                                                                                                                                                                               |
| 2                                                                                                                               | Local/district             | Will affect the local area or district.                                                                                                                                                                                                                                                                                                             |
| 3                                                                                                                               | Province/region            | Will affect the entire province or region.                                                                                                                                                                                                                                                                                                          |
| 4                                                                                                                               | International and National | Will affect the entire country.                                                                                                                                                                                                                                                                                                                     |
| PROBABILITY                                                                                                                     |                            |                                                                                                                                                                                                                                                                                                                                                     |
| This describes the chance of occurrence of an impact.                                                                           |                            |                                                                                                                                                                                                                                                                                                                                                     |
| 1                                                                                                                               | Unlikely                   | The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).                                                                                                                                                                                                                                                         |
| 2                                                                                                                               | Possible                   | The impact may occur (Between a 25% to 50% chance of occurrence).                                                                                                                                                                                                                                                                                   |
| 3                                                                                                                               | Probable                   | The impact will likely occur (Between a 50% to 75% chance of occurrence).                                                                                                                                                                                                                                                                           |
| 4                                                                                                                               | Definite                   | Impact will certainly occur (Greater than a 75% chance of occurrence).                                                                                                                                                                                                                                                                              |
| DURATION                                                                                                                        |                            |                                                                                                                                                                                                                                                                                                                                                     |
| This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity. |                            |                                                                                                                                                                                                                                                                                                                                                     |
| 1                                                                                                                               | Short term                 | The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years). |



|                                                                                                                     |                           |                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2                                                                                                                   | Medium term               | The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).                                                                                                                                                                                              |
| 3                                                                                                                   | Long term                 | The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).                                                                                                                                                                    |
| 4                                                                                                                   | Permanent                 | The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.                                                                                                                                                                         |
| <b>INTENSITY/ MAGNITUDE</b>                                                                                         |                           |                                                                                                                                                                                                                                                                                                                                                                          |
| Describes the severity of an impact.                                                                                |                           |                                                                                                                                                                                                                                                                                                                                                                          |
| 1                                                                                                                   | Low                       | Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.                                                                                                                                                                                                                                                               |
| 2                                                                                                                   | Medium                    | Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).                                                                                                                                                           |
| 3                                                                                                                   | High                      | Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.                                                                                                                               |
| 4                                                                                                                   | Very high                 | Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation. |
| <b>REVERSIBILITY</b>                                                                                                |                           |                                                                                                                                                                                                                                                                                                                                                                          |
| This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity. |                           |                                                                                                                                                                                                                                                                                                                                                                          |
| 1                                                                                                                   | Completely reversible     | The impact is reversible with implementation of minor mitigation measures.                                                                                                                                                                                                                                                                                               |
| 2                                                                                                                   | Partly reversible         | The impact is partly reversible but more intense mitigation measures are required.                                                                                                                                                                                                                                                                                       |
| 3                                                                                                                   | Barely reversible         | The impact is unlikely to be reversed even with intense mitigation measures.                                                                                                                                                                                                                                                                                             |
| 4                                                                                                                   | Irreversible              | The impact is irreversible, and no mitigation measures exist.                                                                                                                                                                                                                                                                                                            |
| <b>IRREPLACEABLE LOSS OF RESOURCES</b>                                                                              |                           |                                                                                                                                                                                                                                                                                                                                                                          |
| This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.         |                           |                                                                                                                                                                                                                                                                                                                                                                          |
| 1                                                                                                                   | No loss of resource       | The impact will not result in the loss of any resources.                                                                                                                                                                                                                                                                                                                 |
| 2                                                                                                                   | Marginal loss of resource | The impact will result in marginal loss of resources.                                                                                                                                                                                                                                                                                                                    |



|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                               |                                                                                                                                                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Significant loss of resources | The impact will result in significant loss of resources.                                                                                                             |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Complete loss of resources    | The impact is result in a complete loss of all resources.                                                                                                            |
| <b>CUMULATIVE EFFECT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                               |                                                                                                                                                                      |
| This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.                                                                                                                                                                                                                                                                                                                                                                                                          |                               |                                                                                                                                                                      |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Negligible cumulative impact  | The impact would result in negligible to no cumulative effects.                                                                                                      |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Low cumulative impact         | The impact would result in insignificant cumulative effects.                                                                                                         |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Medium cumulative impact      | The impact would result in minor cumulative effects.                                                                                                                 |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | High cumulative impact        | The impact would result in significant cumulative effects                                                                                                            |
| <b>SIGNIFICANCE</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                               |                                                                                                                                                                      |
| Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula:<br><b>(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity = X.</b><br>The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating. |                               |                                                                                                                                                                      |
| Points                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Impact significance rating    | Description                                                                                                                                                          |
| 6 to 28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Negative low impact           | The anticipated impact will have negligible negative effects and will require little to no mitigation.                                                               |
| 6 to 28                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Positive low impact           | The anticipated impact will have minor positive effects.                                                                                                             |
| 29 to 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Negative medium impact        | The anticipated impact will have moderate negative effects and will require moderate mitigation measures.                                                            |
| 29 to 50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Positive medium impact        | The anticipated impact will have moderate positive effects.                                                                                                          |
| 51 to 73                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Negative high impact          | The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.                      |
| 51 to 73                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Positive high impact          | The anticipated impact will have significant positive effects.                                                                                                       |
| 74 to 96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Negative very high impact     | The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws". |
| 74 to 96                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Positive very high impact     | The anticipated impact will have highly significant positive                                                                                                         |



**Table 5: Summary of Impacts**

| PALAEONTOLOGICAL   |                                                                                                                   |         |          |                           |                     |                        |                       |      |
|--------------------|-------------------------------------------------------------------------------------------------------------------|---------|----------|---------------------------|---------------------|------------------------|-----------------------|------|
| NATURE             | LOSS OF FOSSIL HERITAGE BY DESTRUCTION, MOVEMENT OR SEALING IN OF FOSSIL HERITAGE IN OR BELOW THE EARTH'S SURFACE |         |          |                           |                     |                        |                       |      |
|                    | SITE(S):                                                                                                          |         |          |                           |                     |                        |                       |      |
| DEVELOPMENT PHASE  | DEVELOPMENT IMPACT                                                                                                |         |          | IMPACT RATING             |                     | RECOMMENDED MITIGATION | IS IMPACT ACCEPTABLE? |      |
|                    | CRITERIA                                                                                                          | *B<br>M | **A<br>M | BEFORE<br>MITIGATION      | AFTER<br>MITIGATION |                        | *BM                   | **AM |
| PLANNING PHASE     | Extent                                                                                                            |         |          | No Impact                 | No Impact           |                        |                       |      |
|                    | Probability                                                                                                       |         |          |                           |                     |                        |                       |      |
|                    | Reversibility                                                                                                     |         |          |                           |                     |                        |                       |      |
|                    | Irreplaceability                                                                                                  |         |          |                           |                     |                        |                       |      |
|                    | Duration                                                                                                          |         |          |                           |                     |                        |                       |      |
|                    | Cumulative Effect                                                                                                 |         |          |                           |                     |                        |                       |      |
|                    | Magnitude                                                                                                         |         |          |                           |                     |                        |                       |      |
|                    | Impact Significance                                                                                               |         |          |                           |                     |                        |                       |      |
| CONSTRUCTION PHASE | Extent                                                                                                            | 1       | 1        | Negative Very High impact | Negative low impact | NONE                   | NO                    | YES  |
|                    | Probability                                                                                                       | 4       | 1        |                           |                     |                        |                       |      |
|                    | Reversibility                                                                                                     | 4       | 4        |                           |                     |                        |                       |      |
|                    | Irreplaceability                                                                                                  | 4       | 4        |                           |                     |                        |                       |      |
|                    | Duration                                                                                                          | 4       | 4        |                           |                     |                        |                       |      |
|                    | Cumulative Effect                                                                                                 | 2       | 1        |                           |                     |                        |                       |      |
|                    | Magnitude                                                                                                         | 3       | 2        |                           |                     |                        |                       |      |
|                    | Impact Significance                                                                                               | 57      | 36       |                           |                     |                        |                       |      |
| OPERATIONAL PHASE  | Extent                                                                                                            |         |          | No Impact                 | No Impact           |                        |                       |      |
|                    | Probability                                                                                                       |         |          |                           |                     |                        |                       |      |
|                    | Reversibility                                                                                                     |         |          |                           |                     |                        |                       |      |



|                       |                     |  |  |           |           |  |  |  |
|-----------------------|---------------------|--|--|-----------|-----------|--|--|--|
|                       | Irreplaceability    |  |  |           |           |  |  |  |
|                       | Duration            |  |  |           |           |  |  |  |
|                       | Cumulative Effect   |  |  |           |           |  |  |  |
|                       | Magnitude           |  |  |           |           |  |  |  |
|                       | Impact Significance |  |  |           |           |  |  |  |
| DECOMMISSIONING PHASE | Extent              |  |  | No Impact | No Impact |  |  |  |
|                       | Probability         |  |  |           |           |  |  |  |
|                       | Reversibility       |  |  |           |           |  |  |  |
|                       | Irreplaceability    |  |  |           |           |  |  |  |
|                       | Duration            |  |  |           |           |  |  |  |
|                       | Cumulative Effect   |  |  |           |           |  |  |  |
|                       | Magnitude           |  |  |           |           |  |  |  |
|                       | Impact Significance |  |  |           |           |  |  |  |

## 7 CONCLUSION AND SUMMARY

The study area is entirely underlain by Middle Devonian sedimentary rocks of the Ceres Subgroup, Bokkeveld Group, Cape Supergroup (approximately 393-383 million years old), comprising grey-green shale, siltstone, and fine-grained sandstone deposited in a marine shelf environment. These sediments contain diverse fossil assemblages representing the Malvinokaffric Realm fauna, including bivalves, brachiopods, crinoids, trilobites, and trace fossils (Theron, 1972; Cooper, 1982; Almond and Pether, 2008). The SAHRIS PalaeoSensitivity Map and DFFE Screening Tool classify the Ceres Subgroup as having Very High palaeontological sensitivity.

A site visit on 17 April 2025 by the EAP identified the complete transformation through agricultural and residential activities, with established vineyards, lawns, internal roads, and infrastructure dominating the landscape. No natural vegetation or exposed bedrock is present. The Very High Palaeontological Sensitivity allocated to the proposed site typically requires a field-based assessment, however, the complete site transformation renders a field investigation impractical. Satellite imagery review (Google Earth, April 2026) confirms that site conditions have remained unchanged since the April 2025 site visit, with continued agricultural and residential land use and no new ground disturbance or exposure of fresh bedrock. The desktop assessment methodology and conclusions remain valid and current. This



assessment was therefore conducted at desktop level using published geological maps, palaeontological literature, SAHRIS and DFFE databases. Despite surficial disturbance, the underlying Ceres Subgroup holds inherent Very High Palaeontological Sensitivity, and excavations exceeding 1.5-2 meters depth may encounter significant fossil material.

The construction phase of the proposed development has been assigned a Very High negative impact rating on palaeontological heritage prior to mitigation, which reduces to Medium with the implementation of appropriate mitigation measures. The operational phase is not expected to result in any significant impacts on palaeontological resources, as no further ground disturbance is anticipated once construction is complete. Cumulative impacts of the development are considered Low both pre- and post-mitigation and fall within acceptable limits. The No-Go Alternative, which considers maintaining the status quo, would have a Neutral impact on palaeontological heritage. The primary risk to fossil heritage occurs during the construction phase, specifically during excavations that penetrate beyond the disturbed surface layers into the underlying fossiliferous Ceres Subgroup sediments.

From a palaeontological heritage perspective, the proposed Walker Bay Estate residential development on Erven 597, 598, 599, , Stanford, is considered **Acceptable and may proceed**, subject to strict compliance with non-negotiable mitigation conditions. These conditions include the mandatory implementation of the Chance Find Protocol detailed in Section 9 of this report; the appointment of a qualified, independent Environmental Control Officer (ECO); the integration of all mitigation measures into the Environmental Management Programme (EMPr); comprehensive site induction training for all construction personnel on fossil recognition and reporting procedures; active monitoring of all excavations exceeding 1.5 meters depth or encountering fresh bedrock; immediate work stoppage within a 10-meter radius if fossils are discovered; notification to Heritage Western Cape within 24 hours of any fossil discovery; and full compliance with Section 35 of the NHRA and all HWC requirements under Case No. HWC25042505EJV0505.

Should fossils be discovered during construction, all work must cease immediately within a 10-meter radius of the find. The discovery must be protected from damage, and the site and fossil find must be photographed from multiple angles with a scale indicator, and GPS coordinates recorded. Heritage Western Cape must be notified within 24 hours via the Case Officer, Emily-Jane Vowles (email: emily.vowles@westerncape.gov.za; telephone: 021 483 9685), providing the photographs and location details. Alternatively, SAHRA may be contacted (email: info@sahra.org.za; telephone: 021 462 4502). Following notification, Heritage Western Cape will coordinate appropriate mitigation measures, which may include the recording and collection of fossil material by a qualified palaeontologist. Any specialist appointed to recover fossil material must first obtain the necessary fossil collection permit from SAHRA before commencing work. All recovered fossil material must be deposited in an accredited repository such as a museum or university collection, and all fieldwork and reporting must comply with SAHRA's minimum standards for palaeontological impact assessments.



The acceptability of this development from a palaeontological heritage perspective is entirely dependent on the strict implementation of the mitigation measures outlined in this report. While the surface of the development site has been heavily transformed and currently presents no visible palaeontological resources, excavations during construction will penetrate into the underlying Ceres Subgroup sediments, which retain Very High fossil potential. The implementation of a Chance Find Protocol, combined with trained personnel, qualified ECO oversight, and immediate heritage authority notification procedures, will reduce the potential for unmitigated damage to significant palaeontological resources from Very High to Medium. All mitigation measures, monitoring requirements, and response protocols must be incorporated into the project's Environmental Management Programme (EMPr) and construction contracts to ensure compliance throughout the construction phase.

Subject to the strict implementation of the mitigation measures and non-negotiable conditions outlined in this assessment, the proposed Walker Bay Estate residential development is considered acceptable from a palaeontological heritage perspective and may proceed. All recommendations must be integrated into the Environmental Management Programme for the proposed Walker Bay Estate residential development on Erven 597, 598, 599, Stanford, in the Western Cape Province and communicated clearly to all personnel involved in construction activities.

## **8 MITIGATION AND EMPr REQUIREMENTS**

A fossil is the naturally preserved remains (or traces) of plants or animals embedded in rock. These plants and animals lived in the geologic past, millions of years ago. Fossils are extremely rare and irreplaceable. By studying fossils, it is possible to determine the environmental conditions that existed in a specific geographical area millions of years ago.

This informational document is intended for workmen and foremen on construction sites. It describes the actions to be taken when mining or construction activities accidentally uncover fossil material. It is the responsibility of the ECO or site manager, with the guidance of the ECO, of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ECO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol to ensure the conservation of fossil material.

The following procedure will only be followed if fossils are uncovered during excavation.

### **8.2 Legislation**



Cultural Heritage in South Africa (includes all heritage resources) is protected by the **NHRA**. According to Section 3 of the Act, all Heritage resources include *"all objects recovered from the soil or waters of South Africa, including archaeological and Palaeontological objects and material, meteorites and rare geological specimens"*.

Palaeontological heritage is unique and non-renewable and is protected by the NHRA and is the property of the State. It is thus the responsibility of the State to manage and conserve fossils on behalf of the citizens of South Africa. Palaeontological resources may not be excavated, broken, moved, or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority, as per section 35 of the NHRA.

### 8. 3 Chance Find Procedure

A Chance Find is made during any construction, excavation, or earthworks activity, the person responsible for the discovery must immediately stop working, and all work that could impact the finding must cease in the immediate vicinity of the find (minimum 10-meter radius). The person who made the find must immediately report the discovery to his or her direct supervisor, who in turn must report the find to the project manager and the Environmental Control Officer (ECO) or Environmental Site Officer (ESO). The ECO must report the find to Heritage Western Cape (HWC) within 24 hours so that appropriate mitigation (recording and collection by a qualified palaeontologist) can be arranged. Heritage Western Cape can be contacted at 3 Dorp Street, Cape Town, 8001 (Tel: 021 483 9685; Email: [info@hwc.org.za](mailto:info@hwc.org.za); HWC Case No. HWC25042505EJV0505; Case Officer: Emily-Jane Vowles, [emily.vowles@westerncape.gov.za](mailto:emily.vowles@westerncape.gov.za)). Alternatively, the South African Heritage Resources Agency (SAHRA) may be contacted at 111 Harrington Street, Cape Town, 8000 (Tel: 021 462 4502; Email: [info@sahra.org.za](mailto:info@sahra.org.za); Website: [www.sahra.org.za](http://www.sahra.org.za)).

The information submitted to the Heritage Agency must include high-quality, in-focus photographs of the find from multiple angles accompanied by a scale (coin, ruler, or measuring tape), GPS coordinates, and photographs of the vertical section (stratigraphic context) where the fossil was found. A preliminary report must be submitted to Heritage Western Cape within 24 hours of the find and must include the following information: date and time of the discovery; detailed description of the discovery and its context; description of the fossil including its depth and position within the excavation; GPS coordinates; name of the person who made the discovery; and the activity being undertaken when the fossil was encountered. The more photographs provided, the better, as they assist the heritage authority in determining the significance of the find and appropriate mitigation response.

Upon receipt of the preliminary report, Heritage Western Cape will review the information and inform the ECO whether a rescue excavation or rescue collection by a qualified palaeontologist is necessary, or whether the find is of insufficient significance to warrant further action. The ECO will communicate

BANZAI ENVIRONMENTAL (PTY) LTD.  
Reg No. 2015/332235/07



Heritage Western Cape's decision and any requirements for rescue excavation or collection to the ECO or site manager. If mitigation is required, Heritage Western Cape will appoint a qualified palaeontologist to conduct the necessary fieldwork, typically within 2 to 5 working days of notification. The developer is responsible for all costs associated with specialist assessment, fossil collection, curation, and reporting.

While awaiting Heritage Western Cape's response and any required specialist assessment, the site must be secured to protect it from further damage, unauthorized access, theft, or weathering. No attempt should be made to remove fossil material from its original position unless absolutely necessary for site protection purposes. Exposed fossil finds must be stabilized and covered with plastic sheeting or protected by sandbags to prevent deterioration. Heritage Western Cape will provide guidance on the most suitable method of protection for the specific find. In the event that a fossil cannot be adequately stabilized in situ and is at immediate risk of damage or loss, the ECO may, with extreme care, collect the fossil material for temporary safekeeping. Fossil finds collected under emergency circumstances must be wrapped carefully in tissue paper and stored in an appropriate container, ensuring that all associated fossil material is removed from the site and kept together with clear labeling indicating the exact location, depth, and context of the find.

If Heritage Western Cape determines that mitigation is required, the appointed palaeontologist will obtain the necessary fossil collection permit from SAHRA before commencing fieldwork. The specialist will conduct systematic excavation, documentation, and collection of fossil material in accordance with professional standards and SAHRA minimum requirements for palaeontological assessments. All collected fossil material will be professionally prepared (if necessary), catalogued, and deposited in an approved repository such as an accredited museum or university collection, where it will be curated in perpetuity for scientific research and public education. The palaeontologist will prepare a mitigation report documenting the discovery, collection methodology, specimens recovered, and repository details, which will be submitted to Heritage Western Cape for record purposes.

Once Heritage Western Cape has reviewed the mitigation report (if applicable) and issued written authorization or clearance, the developer may resume construction activities in the affected area. No work may recommence in the area of the fossil discovery until such written clearance has been received from Heritage Western Cape. Work may continue in other areas of the site that are not affected by the discovery, subject to ECO approval and provided that appropriate buffer zones are maintained around the fossil discovery site.

It is the responsibility of the ECO or site manager, with appropriate training and guidance, to ensure that all construction personnel, foremen, contractors, and subcontractors are trained in the procedures to follow when a fossil is accidentally uncovered. This training must form part of the mandatory site induction program for all personnel working on the site. In the absence of the ECO, a designated member of the site management team must be appointed to be responsible for the proper implementation of this



Chance Find Protocol to ensure the conservation of fossil material and compliance with the National Heritage Resources Act. All personnel must be made aware that fossil heritage is protected by law under Section 35 of the NHRA, and that unauthorized disturbance, damage, or removal of fossils is a criminal offense punishable by fines, imprisonment, or both.

## **9 PALAEONTOLOGICAL CHANCE FIND PROTOCOL**

WALKER BAY ESTATE RESIDENTIAL DEVELOPMENT

ERVEN 597, 598, 599, STANFORD, WESTERN CAPE PROVINCE

HWC CASE NO. HWC25042505EJV0505

### **9.1 Purpose and Applicability**

In the event that fossil materials are found during construction related to the residential development Walker Bay Estate, this Chance Find Protocol specifies the steps that must be taken. The protocol is required because of the extremely high palaeontological sensitivity of the underlying Ceres Subgroup sediments, as designated by both SAHRIS and the DFFE Screening Tool. This protocol includes all development phases, including site preparation, excavation, foundation building for 93 residential units, installation of road and drainage infrastructure, utilities trenching, landscaping, and post-construction operations. The procedure is obligatory for the developer, Environmental Assessment Practitioner, Environmental Control Officer (ECO), Project Manager, all contractors and subcontractors, construction people, and operations staff.

### **9.2 Legislative Context**

This protocol is fulfilled in accordance with Section 35 of the National Heritage Resources Act (NHRA, Act 25 of 1999), which protects all fossil material and prohibits disturbance, destruction, or removal without a valid permit from SAHRA or the relevant Provincial Heritage Resources Authority. This protocol responds to Heritage Western Cape requirements under HWC Case No. HWC25042505EJV0505. Unauthorized damage or removal of fossil material constitutes a criminal offense punishable by fines, imprisonment, suspension of environmental authorization, and project delays. Compliance is a legal requirement, not optional.

### **9.3 Fossil Identification Guidance**

Personnel should watch for marine shells including brachiopods (clam-like, symmetrical, ribbed, white-grey-brown coloured, few millimetres to 10+ centimetres), bivalves (oyster-like, often fragmented), and gastropods (snail-like, spiral). Trilobites appear as segmented oval "bugs" with three lobes, typically 2-15



centimeters long, often preserved as moulds. Trace fossils are extremely common including Zoophycos (spiral burrows), Chondrites (branching burrows), Skolithos (vertical tubes), and Cruziana (ribbed crawling traces). Crinoid columnals resemble stacked coins, 0.5-3 centimeters diameter with central holes. Any unusual rock structures, patterns, or embedded objects should be reported to the ECO immediately.

#### **9.4 IMMEDIATE ACTIONS UPON DISCOVERY**

If fossil material is discovered, the following actions are mandatory: stop all work immediately in a minimum 10-meter radius; do not remove, collect, or further expose the fossil; secure the site from disturbance, damage, weathering, and unauthorized access; if safe, photograph the find from multiple angles with scale reference (coin, ruler); record GPS coordinates; note depth below ground surface, excavation activity, discoverer's name, and date/time. The person discovering the fossil must immediately notify their supervisor, who must notify the Site Agent/Project Manager and Environmental Control Officer.

#### **9.5 Notification Procedures**

The ECO must notify Heritage Western Cape within 24 hours of discovery. Contact Heritage Western Cape at: 3 Dorp Street, Cape Town, 8001; Tel: 021 483 9685; Email: [info@hwc.org.za](mailto:info@hwc.org.za); HWC Case No. HWC25042505EJV0505; Case Officer: Emily-Jane Vowles ([emily.vowles@westerncape.gov.za](mailto:emily.vowles@westerncape.gov.za)). Alternative contact: South African Heritage Resources Agency (SAHRA), 111 Harrington Street, Cape Town, 8000; Tel: 021 462 4502; Email: [info@sahra.org.za](mailto:info@sahra.org.za). Notification must include: project name and location; HWC Case Number; date, time, and GPS location of discovery; detailed description; high-quality photographs from multiple angles with scale; stratigraphic context photos; depth; excavation activity; discoverer's name; and ECO/Site Agent contact details.

#### **9.6 Work Stoppage and Site Protection**

Heritage Western Cape must give written permission before any building work may take place within 10 meters of the find. This is true no matter what the schedules or expenses are. Outside the exclusion zone, work can continue in regions that are not impacted, but only with ECO approval. There should be obvious signs, barrier tape, fence, or cones in the exclusion zone. To keep exposed fossils from being damaged by the elements, they should be covered with plastic sheeting and held down with sandbags (without touching the fossils directly). The exclusion zone should also keep anyone from getting in and stealing them and from accidentally damaging them. Heritage Western Cape can provide you specialized advice on how to safeguard your property.



## 9.7 Heritage Western Cape Assessment

Heritage Western Cape will evaluate the discovery and reach one of three conclusions. Although the NHRA does not provide legislative timescales, professional experience with such palaeontological mitigation initiatives indicates that assessments often need 2-4 weeks, although this duration may be prolonged based on case complexity and the workload of the authorities involved. Should the discovery be deemed devoid of substantial cultural significance, Heritage Western Cape will provide written approval, allowing building to proceed without delay. A qualified palaeontologist must be appointed, if necessary, normally needing 1-2 weeks based on expert availability, and must first get a SAHRA fossil collection permission before initiating rescue excavation. According to SAHRA instructions and practitioner experience, permit processing generally necessitates 2-4 weeks from the submission of a full application, however this duration may be extended if further information is requested. The designated expert will methodically excavate and document fossil specimens, record stratigraphic context and GPS coordinates, collect samples with appropriate field labelling, deposit all materials in an accredited repository (museum or university collection), and submit a mitigation report to Heritage Western Cape for approval prior to receiving written authorization to continue work. Drawing from professional experience with analogous projects in the Western Cape, the entire process from initial discovery to mitigation reporting and approval generally spans 6-12 weeks, contingent upon the volume of fossil material, and specialist availability; however, extraordinary discoveries may necessitate prolonged investigation durations of 8-16 weeks or more. Should fossils of considerable scientific importance be found, Heritage Western Cape may necessitate further investigation, alterations to project design, the creation of heritage buffer zones, or the relocation of infrastructure; however, this scenario is deemed uncommon due to the primarily marine invertebrate composition of Ceres Subgroup fossils.

## 9.8 Training and Awareness

All personnel must receive mandatory induction training covering: what fossils are and their importance; legal protection under NHRA and penalties; types of fossils likely encountered with visual examples; Chance Find Protocol procedures; reporting contact details; and consequences of non-compliance. Training delivered by ECO with signed attendance registers retained. Monthly talks must cover fossil identification refreshers, protocol procedures, discussion of discoveries, and Q&A. Visual aids must be displayed at site entrance, offices, canteens, ablution facilities, and equipment yards showing: fossil photographs with identification; protocol summary flowchart; ECO contact details; Heritage Western Cape contacts with HWC Case Number; and legal warnings.

## 9.9 Eco Responsibilities



The ECO must: ensure all personnel receive induction training and maintain attendance registers; conduct monthly talks and maintain visual aids; monitor excavations exceeding 1.5 meters depth or encountering fresh bedrock; inspect excavations for fossils before backfilling; maintain a Chance Find Register documenting discoveries, notifications, assessments, and mitigation; serve as primary contact for Heritage Western Cape and specialists; enforce work stoppage and site protection; facilitate specialist site access; and report non-compliance immediately.

## **9.10 Documentation**

The ECO is required to: guarantee that all personnel undergo induction training and keep attendance records; hold monthly discussions and utilize visual aids; oversee excavations surpassing 1.5 meters in depth or reaching fresh bedrock; examine excavations for fossils prior to backfilling; uphold a Chance Find Register that records discoveries, notifications, assessments, and mitigation measures; act as the principal liaison for Heritage Western Cape and specialists; implement work stoppages and site protection; enable specialist access to the site; and promptly report any instances of non-compliance.

## **9.11 Positive Outcomes**

Proper implementation of this protocol results in positive heritage outcomes: scientifically valuable fossils are rescued and preserved rather than destroyed; specimens enhance South Africa's national fossil collections; scientific knowledge of regional palaeontology advances; compliance with legal requirements is demonstrated; and irreplaceable heritage is protected for future generations. Fossil discoveries, when properly managed, contribute positively to scientific research and public education while ensuring the developer fulfils heritage obligations under South African law.

# **10 BIBLIOGRAPHY**

Almond, J.E. (2018) Palaeontological Impact Assessment: Desktop Study. Proposed Development on Remainder of Erf 1449, Stanford, Overstrand Municipality, Western Cape. Unpublished report for Orchard Environmental Services.

Almond, J.E. and Pether, J. (2008) Palaeontological Heritage of the Northern Cape: A Brief Survey of Precambrian to Recent Fossil Sites, Biostratigraphy and Palaeoenvironments. Unpublished report for SAHRA, Cape Town.

Almond, J.E., Pether, J. and Groenewald, G. (2013) South African National Fossil Sensitivity Map. SAHRA PalaeoMap. Available at: [www.sahra.org.za](http://www.sahra.org.za).

Anderson, J.M. and Anderson, H.M. (1985) Palaeoflora of Southern Africa: Prodrum of South African Megafloras, Devonian to Lower Cretaceous. Rotterdam: A.A. Balkema.



- Boucot, A.J. (1999) 'Silurian and Devonian biogeography', in Harper, E.M., Taylor, J.D. and Crame, J.A. (eds.) *The Evolutionary Biology of the Bivalvia*. Geological Society, London, Special Publications, 177, pp. 335-359.
- Braddy, S.J. and Almond, J.E. (1999) 'Eurypterid trackways from the Table Mountain Group (Ordovician) of South Africa', in Lovering, J.R. (ed.) *Proceedings of the VII International Symposium on Fossil Cnidaria and Porifera*, Madrid, pp. 481-491.
- Braddy, S.J., Almond, J.E. and Ruta, M. (2004) 'A new eurypterid from the Devonian of South Africa', *Palaeontology*, 47(3), pp. 547-556.
- Caster, K.E. and Brooks, H.K. (1989) 'A new Devonian arthropod trackway from the Bokkeveld Group (Table Mountain Series) of South Africa', *South African Journal of Geology*, 92(4), pp. 395-400.
- Cater, J.M.L. (1989) 'Palynological studies in the Cape and Karoo Supergroups, South Africa', Unpublished PhD thesis, University of Witwatersrand.
- Cocks, L.R.M. and Fortey, R.A. (1997) 'A new Ordovician fauna from South Africa and its implications for the timing and pattern of the Early Palaeozoic diversification', *Journal of the Geological Society, London*, 154, pp. 335-345.
- Cooper, M.R. (1982) 'A revision of the Devonian (Emsian-Eifelian) Trilobita from the Bokkeveld Group of South Africa', *Annals of the South African Museum*, 89(1), pp. 1-174.
- Gess, R.W. and Coates, M.I. (2015) 'A new reconstruction of *Onychodus jandemarrai* n. gen. et sp. (Sarcopterygii; Onychodontiformes) from the Devonian of South Africa', *PLoS ONE*, 10(6), e0128333.
- Lieberman, B.S. and Kloc, G.J. (1997) 'Evolutionary and biogeographic patterns in the Asteropyginae (Trilobita, Devonian) Delo, 1935', *Bulletin of the American Museum of Natural History*, 232, pp. 1-127.
- Long, J.A. (1995) *The Rise of Fishes: 500 Million Years of Evolution*. Baltimore: Johns Hopkins University Press.
- Rust, I.C. (1967) 'On the sedimentation of the Table Mountain Group in the Western Cape Province', unpublished D.Sc. thesis, University of Stellenbosch.
- Shone, R.W. (2006) 'Onshore post-Karoo Mesozoic deposits', in Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds.) *The Geology of South Africa*. Johannesburg/Pretoria: Geological Society of South Africa/Council for Geoscience, pp. 541-552.
- Thamm, A.G. and Johnson, M.R. (2006) 'The Cape Supergroup', in Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J. (eds.) *The Geology of South Africa*. Johannesburg/Pretoria: Geological Society of South Africa/Council for Geoscience, pp. 443-459.
- Theron, J.N. (1972) 'The stratigraphy and sedimentation of the Bokkeveld Group', unpublished D.Sc. thesis, University of Stellenbosch.
- Theron, J.N., Gresse, P.G., Siegfried, H.P. and Rogers, J. (1991) *The Geology of the Cape Town Area*. Explanation to 1:250 000 Geology Sheet 3318 Cape Town. Pretoria: Geological Survey of South Africa.
- Webster, G.D. and Webster, M.A. (2014) 'New Lower Devonian (Pragian-Emsian) crinoids from South Africa', *Journal of Paleontology*, 88(5), pp. 938-955.



## APPENDIX 1

### CURRICULUM VITAE

|                    |                                                                                                                                                                                                                              |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROFESSION:        | Palaeontologist                                                                                                                                                                                                              |
| YEARS' EXPERIENCE: | 30 years in Palaeontology                                                                                                                                                                                                    |
| EDUCATION:         | University of the Orange Free State<br>B.Sc Botany and Zoology, 1988<br><br>University of the Orange Free State<br>B. Sc (Hons) Zoology, 1991<br><br>University of the Free State<br>M. Sc. <i>Cum laude</i> (Zoology), 2009 |

Dissertation title: The postcranial skeleton of the Early Triassic non-mammalian Cynodont *Galesaurus planiceps*: implications for biology and lifestyle.

#### EMPLOYMENT HISTORY

|                                                        |                                            |
|--------------------------------------------------------|--------------------------------------------|
| Research Assistant                                     | National Museum, Bloemfontein 1993 – 1997  |
| Principal Research Assistant<br>and Collection Manager | National Museum, Bloemfontein<br>1998–2022 |
| Banzai Environmental                                   | 2016 to present                            |

Elize Butler has conducted approximately **900** Palaeontological Impact Assessments for developments in the Free State, KwaZulu-Natal, Eastern, Northern and Western Cape, Northwest, Gauteng, Limpopo, and Mpumalanga. She has an MSc (*cum laude*) in Zoology (specializing in Palaeontology) from the University of the Free State, South Africa. She has experience in locating, collecting, and curating fossils. She has been a member of the Palaeontological Society of South Africa (PSSA) since 2006 and has been conducting PIAs since 2014.

#### MEMBERSHIP

Palaeontological Society of South Africa (PSSA) 2006-currently.

A full CV is available on request.