

**A Phase I Palaeontological Impact Assessment for the development of
the Brother CISA (PTY) LTD chemical plant property, Newcastle, Kwa-
Zulu Natal Province**

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DECLARATION OF INDEPENDENCE

I, Dr Matthew V. Caruana, declare that I acted as the independent palaeontological practitioner and performed the work relating to the application in an objective manner. I declare that there are no circumstances that compromised my objectivity in performing this work, and I have expertise in conducting heritage impact assessments, including knowledge of the Act, Regulations and relevant guidelines. I had no conflicting interests in undertaking this work.

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EXECUTIVE SUMMARY

Brother CISA (Pty) Ltd ('Brother CISA') is a chemical enterprise company specializing in the development, manufacture and sale of plastics, rubber, specialty chemicals and intermediates. They wish to expand their product range to include chrome tanning salts (CTS) at its Newcastle plant in KwaZulu Natal. Brother CISA intends to develop existing facilities to process inorganic and organic CTS at 50 000 t/a and 30 000 t/a, respectively, as well as 2 000 t/a of synthetic vitamin K. This involves the installation of equipment within the existing plant. The proposed expansion requires an Environmental Authorisation in terms of The National Environmental Management Act, 1998 (Act No. 107 of 1998, as amended) (NEMA), and Brother CISA have contracted EScience Associates (Pty) Ltd to conduct an Environmental Impact Assessment (EIA). A palaeontological impact assessment (PIA) is required as a section of the EIA, which is outlined below.

Desktop Study Findings

Anderson (2020) and Bamford (2020) conducted PIA's near to the study area (~8 km), although did not report any fossil accumulations. Moreover, Anderson (2020) recommended exemption from further survey or mitigation. PIA studies in Kwa-Zulu Natal focused on the Ecca Group geological formation, which underlies the Brother CISA plant, have concluded that construction and mining activities were unlikely to disturb important palaeontological resources, which also applies to work reviewed in this report (see Bamford, 2013, 2019, 2020; Rubidge, 2013).

Survey Findings

1. The Brother CISA property consists of pre-existing, industrial structures;
2. The property has been disturbed by previous development activities;
3. It is highly unlikely that any further development activities in the study would expose or endanger any palaeontological materials.

Recommendations

If development on this property should involve any excavation that exposes fossil deposits, a professional palaeontologist should be contacted to assess whether mitigation actions are necessary. Trace fossil (plants & insects) are associated with the Witbank Coalfield as a part of the Vryheid Formation, although it is unlikely that they will be of any importance (cf. Bamford, 2013; Rubidge, 2013).

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SPECIALIST QUALIFICATIONS

Dr. Matthew V. Caruana is a Stone Age specialist and surveyor. He has undertaken extensive and in-depth research at several palaeoanthropological localities around southern Africa including Swartkrans, Drimolen and Taung. He has also published several scientific articles with a focus on Earlier Stone Age technologies, as well as palaeoanthropological finds. He is registered with the Association of Southern African Professional Archaeologists (ASAPA) and has CRM accreditation within the said organisation. He is also a member of the Palaeontological Society of South Africa.

BACKGROUND

Project Background

Brother CISA (Pty) Ltd (hereafter 'Brother CISA') has commissioned the services of EScience Associates (Pty) Ltd (hereafter 'EScience Associates') to conduct an Environmental Impact Assessment (EIA) to expand its existing product range to include the production of chrome tanning salt (CTS) and synthetic vitamin K production at its Newcastle plant in the Kwa-Zulu Natal Province. Brother CISA is a chemicals enterprise that currently develops, manufactures and sells plastics, rubber, specialty chemicals and intermediates. They intend to install necessary equipment in existing facilities to process inorganic and organic CTS at 50 000 t/a and 30 000 t/a, respectively, as well as 2 000 t/a of synthetic vitamin K. According to the SAHRIS PalaeoSensitivity Map (<https://sahris.sahra.org.za/map/palaeo>), the Brother CISA plant is located on palaeontologically sensitive ground (Ecca Group, Karoo Supergroup) (Fig. 1). As such, Brother CISA requires a Phase I PIA report, which forms a portion of the EIA. Mr. James Pugin of EScience Associates contacted Dr M. V. Caruana to conduct the Phase I PIA.

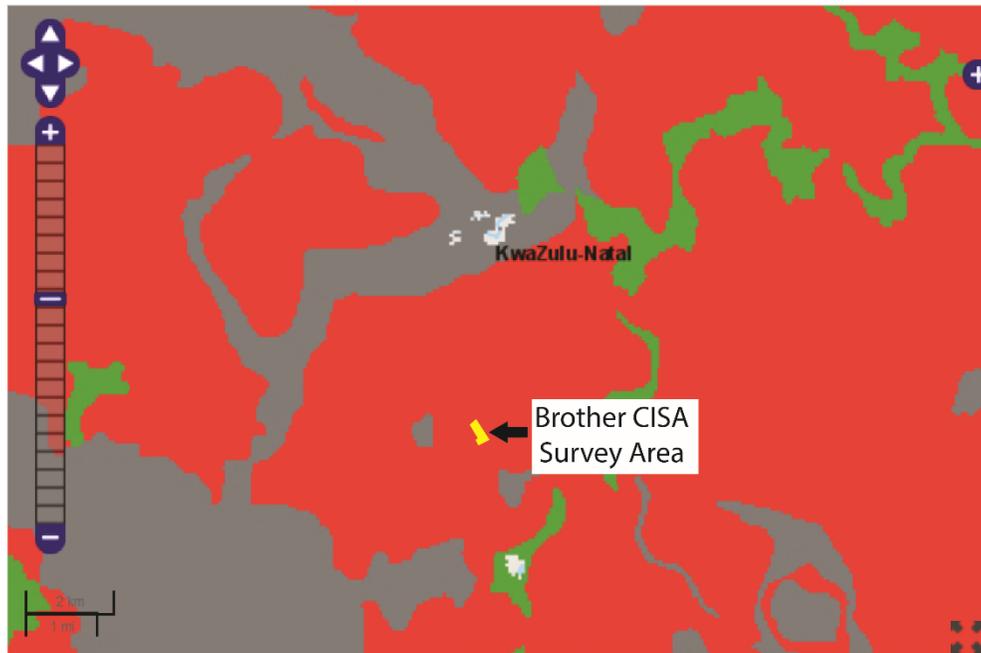


Figure 1. Location of the Brother CISA chemical plant and survey area on the SAHRIS PalaeoSensitivity Map. (Colours reflect sensitivity scale: Red = Very high; Green = Moderate; Grey = No significance).

DESCRIPTION OF THE BROTHER CISA SURVEY AREA

Property Location

Brother CISA Industrial Plant, Newcastle Chemical Plant, Albert Wessels Drive, Amajuba District, Newcastle, Kwa-Zulu Natal Province, South Africa (Fig. 2).

Geographic Coordinates

27°46'44.79"S; 29°58'42.42"E

Physical Description of the Survey Area

Figure 2 shows the geographic location of the study area on the Brother CISA chemical plant property, approximately 6 km southeast from the city center of Newcastle, Kwa-Zulu Natal Province. It is situated within the Newcastle Chemical Park (comprising ERF#: 13361/3, 13361/1, 13361/5, 13361/4, 13744/2, 15432/0). Figure 3 displays the physical property (~8 ha) within the study area, which is largely composed of pre-existing industrial buildings and terraced (flattened) veld to the south, which contains spoil heaps from previous construction activities (Fig. 4). Previous developments have disturbed the property significantly and there are no fossil outcrops or scatters noted.

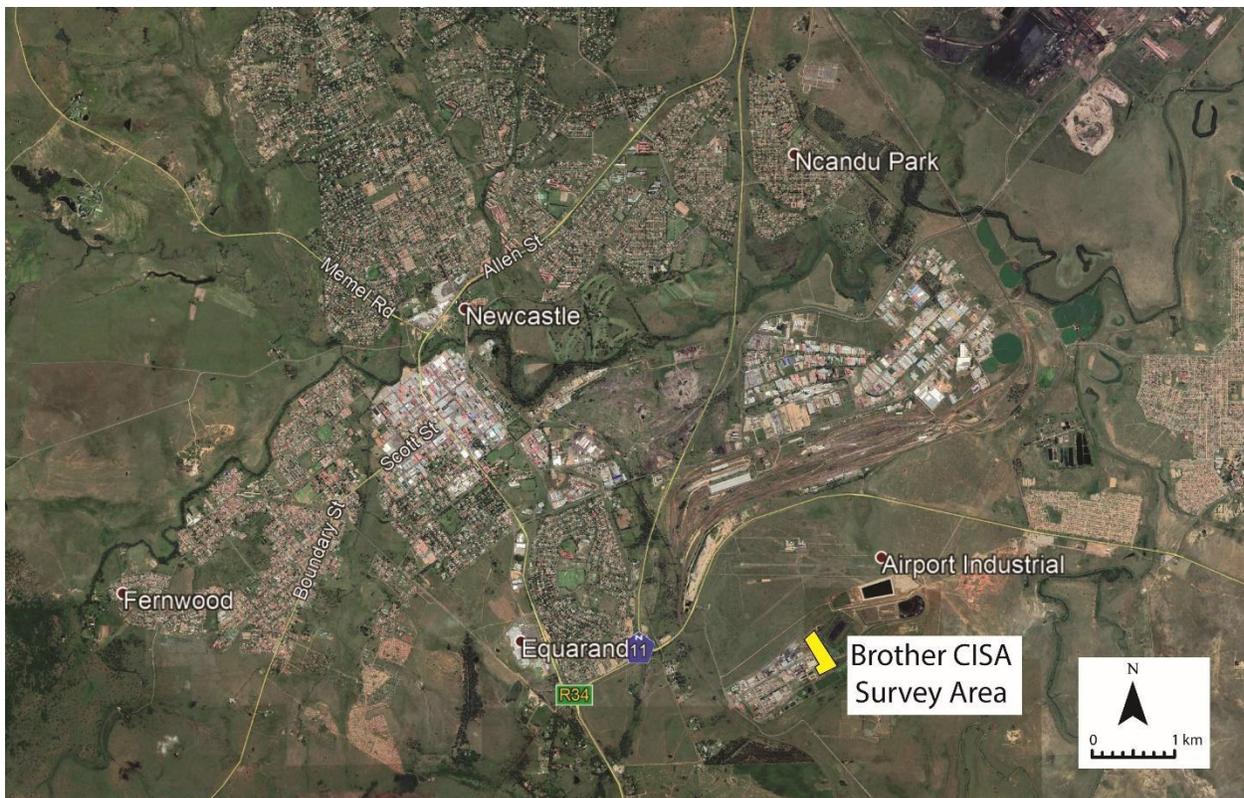


Figure 2. Geographical location of the Brother CISA chemical plant and survey area.



Figure 3. Physical location of the Brother CISA chemical plant survey area.



Figure 4. Open veld in the southern portion of the Brother CISA chemical plant survey area.

METHODOLOGY

According to the NHRA (no 25 of 1999) and the National Environmental Management Act (NEMA) (no 107 of 1998). The PIA process consisted of three steps:

Step I – Literature Review: Background information on the study area was based on archival reports available in SAHRIS, as well as available academic literature on relevant fossiliferous formations.

Step II – Physical Survey: The physical survey was conducted on foot and by vehicle according to safety protocols. The survey aimed to identify fossil scatters within the study area, and to inspect any exposed sediment profiles. Any significant finds are recorded through standard palaeo-science procedures including GPS notation, photographic records and descriptions of finds.

Step III – Report: The final step involved the recording and documentation of the survey results, which were analysed and summarized here by Dr Matthew V. Caruana. The purpose of the report is to provide a field rating and significance statement, recommending if any mitigation procedures are necessary before development commences.

The field rating and significance of the survey area was based on four main criteria:

- Site integrity (i.e. primary vs. secondary context);
- Abundance of fossil materials;
- Density of fossils;
 - Low - <10/50m²
 - Medium - 10-50/50m²
 - High - >50/50m²
- Uniqueness; and
- Potential to answer scientific research questions.

Study Limitations

Not detracting in any way from the comprehensiveness of the survey undertaken, it is necessary to realise that the lack of palaeontological resources located during the survey does not reflect an overall lack of fossil-bearing deposits in the area. The presence of the Ecca Group formation indicates possible trace fossils, such as plants and insects preserved in this area.

IMPACT ASSESSMENT

Palaeontological Background

The Brother CISA survey area is geologically located within the Ecca Group (Karoo Supergroup), which formed during the Early to Middle Permian period, and is affiliated with the

Gondwanaland sequence in South Africa (Anderson and McLauchlan, 1976; Stainstreet et al., 1980; Cairncross and Cadle, 1987; Bamford, 2004; Johnson et al., 2006; Rubidge, 2014;) (Fig. 5). Sedimentary formations within the Ecca Group that are known to outcrop in the Kwa-Zulu Natal region, specifically the Vryheid Formation, preserve important plant trace fossils including *Diplocraterion parallelum*, *Skolithos*, *Monocraterwn*, *Scalaruuba*, *Siphonichnus ecccaensis* and *Glossopteris* flora, which have contributed to the formation of the Witbank coalfield (Anderson and McLauchlan, 1976; Cairncross and Cadle, 1987). It should be noted that fossil materials are exclusively found within the coal seam zones of the Ecca Group. An extensive review of the plant fossils from the Ecca Group can be read in Bamford (2004). While no macro-fossils (i.e. mammalin/reptilian animals) have been found in the Vryheid Formation, its trace fossils of plants and invertebrates have been important for understanding palaeoenvironmental conditions during the Permian Period (Stainstreet et al., 1980).

Archival Findings

Previously Conducted Palaeontological Impact Assessment of Significance to this Study:

- Bamford, M. 2013. Palaeontological Impact Assessment for the Establishment of a 600 MW Power Plant and Ash Disposal Facility at Delmas (Mpumalanga/Gauteng). Phase I Report.
- Rubidge, B. 2013. Palaeontological Desktop Study Leeuwpan Mine, Delmas, Nkangala District Municipality, Mpumalanga Province. Phase I Report.
- Fourie, H. 2015. Palaeontological Impact Assessment: Phase 1 Field study - Ngululu Resources Opencast Coal Mine, Nkangala District Municipality, Mpumalanga Province. Farm: Portion 26, 46 and 47 Droogenfontein 242 IR. Phase I Report.
- Bamford, M. 2019. Palaeontological Impact Assessment for the Proposed Prospecting Rights Application on Rietvlei 150 HU, ~20km east of Vryheid, Kwa-Zulu-Natal Province. Phase II Report.
- Bamford, M. 2020. Palaeontological Impact Assessment for the proposed iThala Madadeni Industrial Economic Hub, south of Newcastle, Kwa-Zulu Natal Province. Phase I Report.
- Anderson, G. 2020. Desktop Study for the Blaauwbosch BWSS, Osizweni, Newcastle, Kwa-Zulu Natal. Phase I Report.

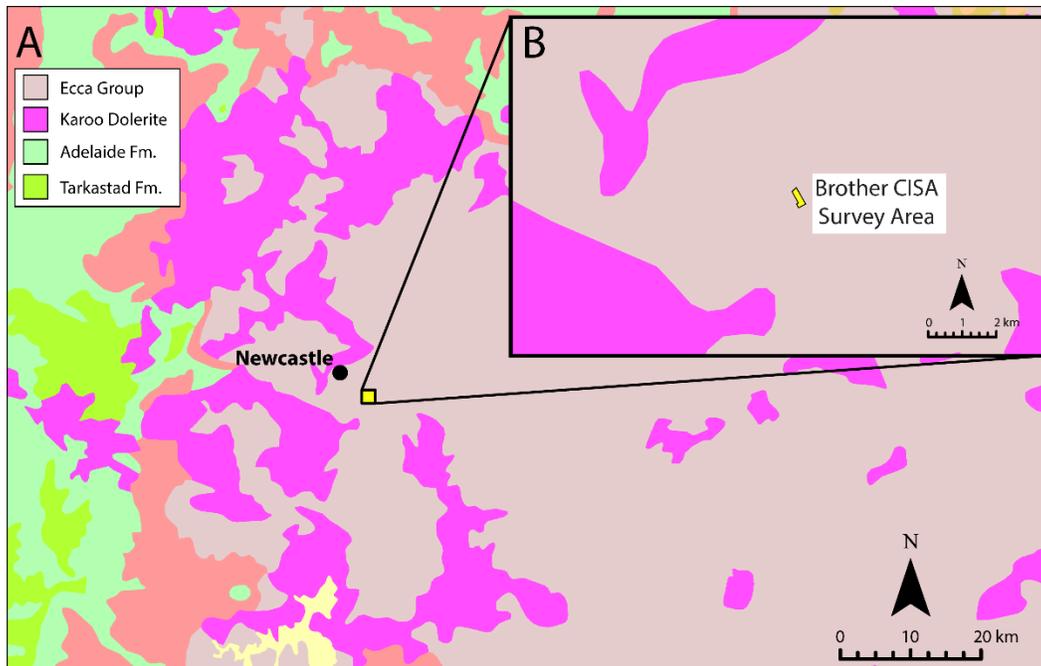


Figure 5. Geological location of the Brother CISA chemical plant survey area. A) Yellow box indicates the area near the Brother CISA chemical plant; B) Inlay indicating the location of the survey area.

Researching the SAHRA APM Report Mapping Project records and the SAHRIS online database (<http://www.sahra.org.za/sahris>; accessed 06/30/20), showed that Anderson (2020) and Bamford (2020) have previously conducted palaeontological impact assessments within ~8 km of the study area. Both these reports did not recommend any mitigation and Anderson (2020) applied for an exemption letter to forgo any further palaeontological surveys related to developments. All above mentioned PIAs (Bamford, 2013, 2019, 2020; Rubidge, 2013; Fourie, 2015; Anderson, 2020) were conducted in a similar geological region (i.e. Ecce Group) and thus are relevant to this study. These assessments did not report any significant fossils or outcrops nor recommended mitigation. The Brother CISA property is already developed, consisting of industrial buildings, and thus it is extremely unlikely that any important palaeontological resources will be exposed or disturbed by any further development of the property (cf. Bamford, 2013, 2019, 2020; Rubidge, 2013; Fourie, 2015).

It should be noted that Bamford (2019) estimated that the uppermost Witbank coal seam in the Kwa-Zulu Natal region, where fossil materials would be located, is approximately 100 m below current surface levels. As such, without significant earth moving activities, it is extremely unlikely that any development of the Brother CISA survey area will disturb fossil outcrops or palaeontological materials.

Survey Findings

The survey was conducted on Friday, June 26th, 2020, on foot and by vehicle in line with safety protocols. All open spaces were surveyed for cultural and fossil materials (Fig. 6). During the survey, significant modification via terracing (landscape flattening activities) was noted,

particularly in the southern portion of the property. Spoil heaps were located and surveyed, but no fossil materials were identified (Fig. 7). The majority of the property is occupied by industrial buildings and no fossils or fossiliferous deposits were identified.



Figure 6. Survey track log (red) and survey area perimeter (green).



Figure 7. Spoil heap located in the southern portion of the survey area.

Field Rating

Field Rating: Low significance and no mitigation required.

- **Site integrity:** highly disturbed
- **Abundance of fossils:** none
- **Density of fossils:** none
- **Uniqueness:** low
- **Potential to answer scientific questions:** none

Statement of Significance (Heritage Value)

Given the previous development and disturbance of the property noted in the survey findings, the proposed upgrade of the Brother CISA property is extremely unlikely to expose or disturb any fossil deposits. As such, it is deemed that the survey area represents a low priority for mitigation, and highly unlikely that any palaeontological resources will be endangered.

RECOMMENDATIONS

According to current development plans, no mitigation measures are required. If construction activities on this property should involve excavation of the property (i.e. earth movement) that expose any fossil deposits, a professional palaeontologist should be contacted to assess if mitigation actions are necessary. In the latter scenario, it is possible that trace fossils of plants and insects associated with the Vryheid Formation may be exposed, although it is unlikely that they will be of any scientific importance (cf. Bamford, 2013, 2019, 2020).

CONCLUSIONS

The results of the archival study show that two PIAs have been conducted near the study area, although these concluded that no mitigation was required (Anderson, 2020; Bamford, 2020). Conclusions reached in all PIA's consulted in the archival study suggested that it is highly unlikely that any significant fossils will be exposed and/or disturbed by development activities that did not involve mining. Furthermore, the survey component of this study found no fossils exposed on the property. However, if developments should expose any fossil deposits, SAHRA should be contacted immediately and a professional palaeontologist should be brought in to assess their significance and provide recommendations (e.g. recording, sampling, collection and mitigation).

The absence of fossils on the property, combined with a lack of mitigation of palaeontological resources in the local area, suggests a low negative impact on palaeontological resources. As such, no mitigation is recommended at this time and development of the Brother CISA property should continue.

REFERENCES

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- Stainstreet, I.G., Smith, G.L-B., Cadle, A.B. 1980. Trace Fossils as Sedimentological and Palaeoenvironmental Indices in the Ecca Group (Lower Permian) of the Transvaal. *Transactions of the Geological Society of South Africa* 83: 333-344.

I. APPENDIX

LEGISLATIVE CONTEXT

The identification, evaluation and assessment of any cultural heritage site, artefact or find in the South African context is required and governed by the following legislation:

- i. National Environmental Management Act (NEMA), Act 107 of 1998
- ii. National Heritage Resources Act (NHRA), Act 25 of 1999
- iii. Mineral and Petroleum Resources Development Act (MPRDA), Act 28 of 2002

The following sections in each Act refer directly to the identification, evaluation and assessment of cultural heritage resources.

- i. National Environmental Management Act (NEMA) Act 107 of 1998
 - a. Basic Environmental Assessment (BEA) – Section (23)(2)(d)
 - b. Environmental Scoping Report (ESR) – Section (29)(1)(d)
 - c. Environmental Impact Assessment (EIA) – Section (32)(2)(d)
 - d. Environmental Management Plan (EMP) – Section (34)(b)
- ii. National Heritage Resources Act (NHRA) Act 25 of 1999
 - a. Protection of Heritage Resources – Sections 34 to 36; and
 - b. Heritage Resources Management – Section 38
- iii. Mineral and Petroleum Resources Development Act (MPRDA) Act 28 of 2002
 - a. Section 39(3)

The NHRA stipulates that cultural heritage resources may not be disturbed without authorization from the relevant heritage authority. Section 34(1) of the NHRA states that, “no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...” The NHRA is utilized as the basis for the identification, evaluation and management of heritage resources and in the case of CRM those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through NEMA, MPRDA legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorizations are granted for development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impacts Processes required by NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage.

The NEMA 23(2)(b) states that an integrated environmental management plan should, “...identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage”.

A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken account of in the Regulations under NEMA is the Specialist Report requirements laid down in Section 33 of the regulations.