# BRIEF PALAEONTOLOGICAL IMPACT ASSESSMENT

## PROPOSED ST. HELENA COMMUNITY WIND FARM DEVELOPMENT
## Saldanha Bay Municipality, Vredenburg District, Western Cape


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**Prepared at the Request of**


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**For**
Just Energy & Seeland Development Trust,

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***SUMMARY***

The context of this report is the proposed St. Helena Community Wind Farm Development on the farm Lange Klip 47 (Figure 1), near the township of Laingville on the St. Helena Bay coast. The owner, Seeland Development Trust is partnered by Just Energy in the project, which is intended to benefit of the local community. Just Energy have appointed Arcus GIBB (Pty) Ltd to undertake the Environmental Impact Assessment Process for the proposed project.

The proposed development will involve the installation of 8 wind turbines on concrete foundations, underground cabling, a substation and other operational infrastructure and access roads.

The entire property is underlain by granite rocks of the Vredenburg Batholith (Figure 2 which are of no palaeontological interest. A thin soil of the "heuweltjiesveld" type mantles the granites. The potential for fossils in the soil mantle is very low. Notwithstanding, the excavations may expose buried crevices and "gullies" in the granite slopes where there is greater potential for fossil finds.

In view of the low fossil potential it is proposed that only a basic degree of mitigation is required.

It is recommended that an alert for the uncovering of fossil bone and implements be included in the Construction Phase EMP for the project.

Appendices 1 and 2 outline monitoring by construction personnel and general Fossil Find Procedures. This is a general guideline, to be adapted to circumstances.

In the event of possible fossil and/or archaeological finds, the contracted archaeologist or palaeontologist must be contacted. For possible fossil finds, the palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established.

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The author, John Pether, is an independent consultant/researcher and is a recognized authority in the field of coastal-plain and continental-shelf palaeoenvironments and is consulted by exploration and mining companies, by the Council for Geoscience, the Geological Survey of Namibia and by colleagues/students in academia pursuing coastal-plain/shelf projects.

Expertise

- Shallow marine sedimentology.
- Coastal plain and shelf stratigraphy (interpretation of open-pit exposures and on/offshore cores).
- Marine macrofossil taxonomy (molluscs, barnacles, brachiopods).
- Marine macrofossil taphonomy.
- Sedimentological and palaeontological field techniques in open-cast mines (including finding and excavation of vertebrate fossils (bones).
- Analysis of the shelly macrofauna of modern samples e.g. for environmental surveys.

Membership Of Professional Bodies

- South African Council of Natural Scientific Professions. Earth Science. Reg. No. 400094/95.
- Geological Society of South Africa.
- Palaeontological Society of Southern Africa.
- Southern African Society for Quaternary Research.
- Heritage Western Cape. Member, Permit Committee for Archaeology, Palaeontology and Meteorites.
- Accredited member, Association of Professional Heritage Practitioners, Western Cape.

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## 1 INTRODUCTION

The context of this report is the proposed St. Helena Community Wind Farm Development on the farm Lange Klip 47 (Figure 1), near the township of Laingville on the St. Helena Bay coast. The property is owned by a community-based trust, Seeland Development Trust, and the aim is to generate income for the benefit of the local community. The trust is partnered by Just Energy, founded by Oxfam UK to aid local communities to participate in renewable energy generation. Just Energy have appointed Arcus GIBB (Pty) Ltd as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment Process for the proposed project.

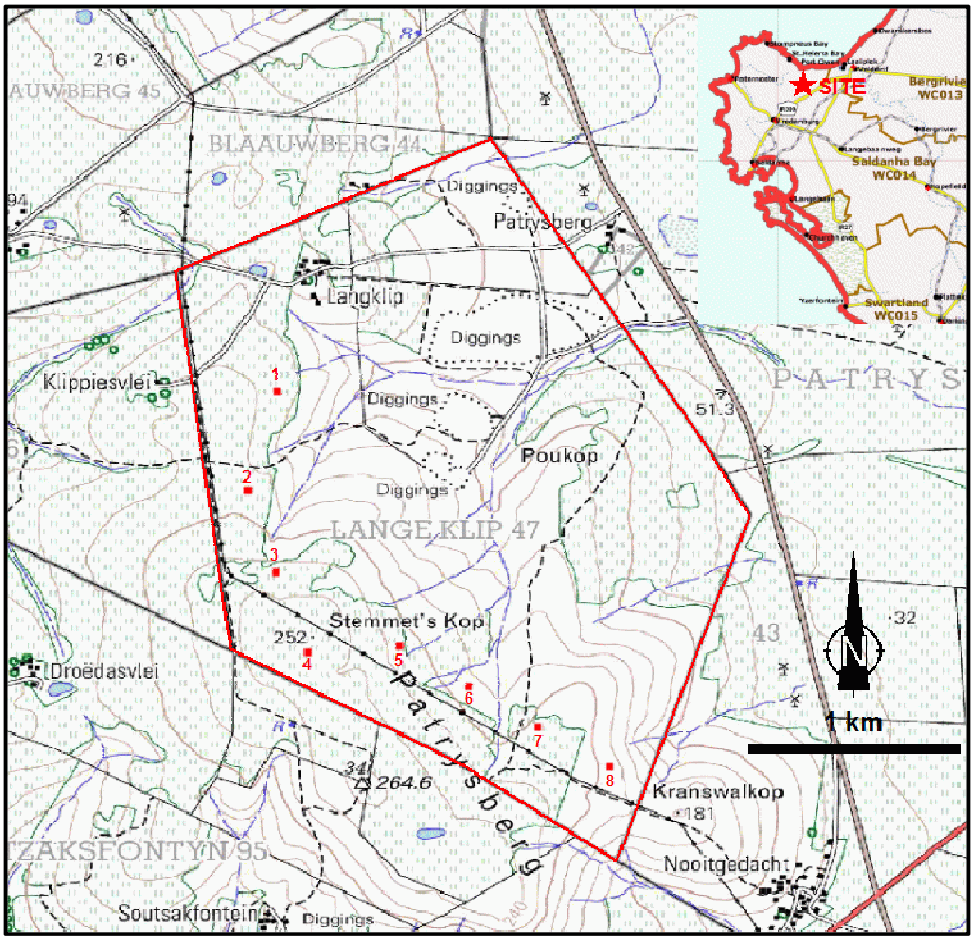


***Figure 1. Location of the proposed St. Helena Community Wind Farm Development. Extract from 3218CA_CC_2003_ED5_GEO.TIF 1:50000 topo-cadastral map . Chief Directorate: Surveys & Mapping.***

The proposed development will involve the installation of 8 wind turbines on concrete foundations (Figure 1), underground cabling between turbines, a substation, a control room, switchgear housings and power lines to the national grid network into which the generated electricity will feed. Also involved are access roads and temporary construction-related laydown areas.

## 2 GEOLOGICAL SETTING

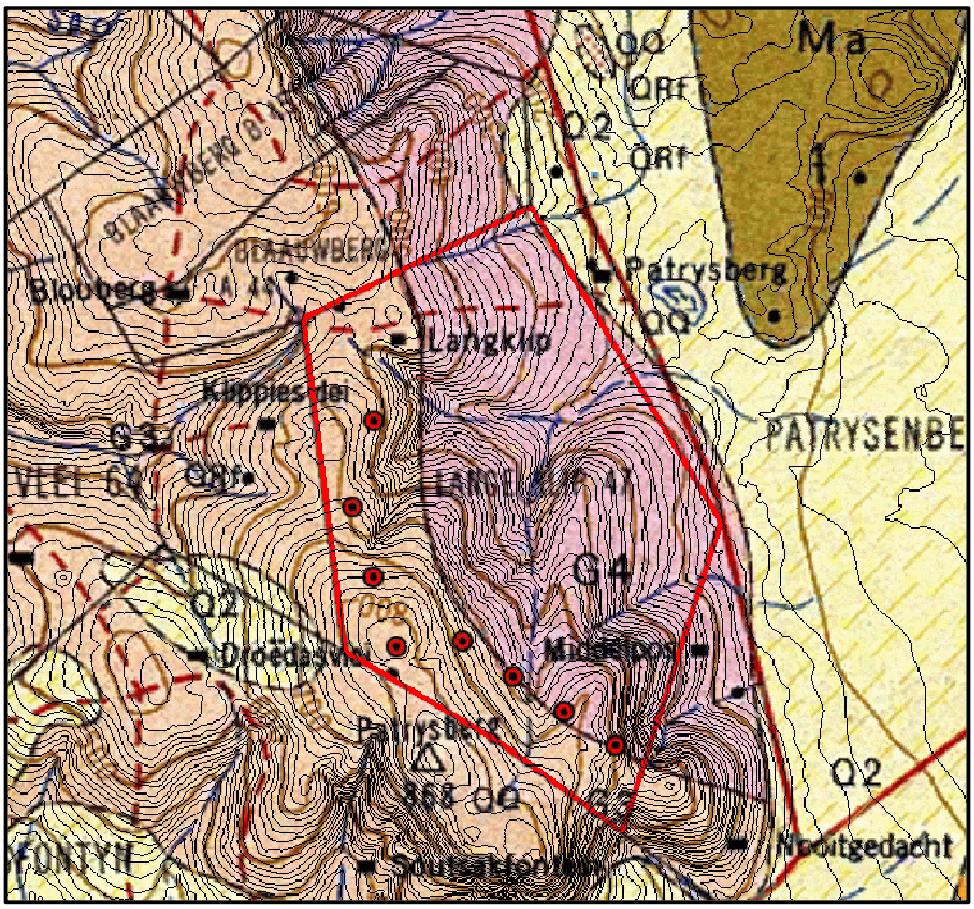


***Figure 2. Geology of the study area. From Visser & Schoch (1972). Contours at 5 m intervals added.***

The project area is situated on the slopes and crest of an elevated ridge, the Patrysberg. The provisional positions of the wind turbines are near or on the crest of the ridge, at elevations ranging between ~170 to ~250 m asl. The main information for the area is Visser & Schoch (1972, 1973) and the accompanying geological map, the relevant part of which is reproduced as Figure 2.

The entire property is underlain by granite rocks of the Vredenburg Batholith. These are labelled G3 (Saldanha Granite) and G4 (Cape Columbine Granite) (Figure 2). Subsequently, the granites have been re-examined and renamed. The G3 granite is now called the Vredenburg Granite while the G4 granite is comprised of the Patrysberg Biotite Granite and the Slippers Bay Granite (Siegfried, 2006). Diggings on the flanks of the drainage in the northern portion of the area (Figures 1 & 3) relate to quarrying of kaolin clay formed by the deep weathering of the granites.

The soil cover is generally thin and numerous outcrops of the granite bedrock can be seen in aerial images (Figure 3). The less steep parts of the property have been cultivated. The dot-patterned nature of the soil cover is evident

(Figure 3) and is typical of “heuweltjiesveld”, the low hillocks being termitaria. The “heuweltjiesveld” is an old soil cover depicted as Q2 on the geological map (Figure 2), but it is only mapped where thicker and for mapping purposes is ignored where thinly developed on bedrock.

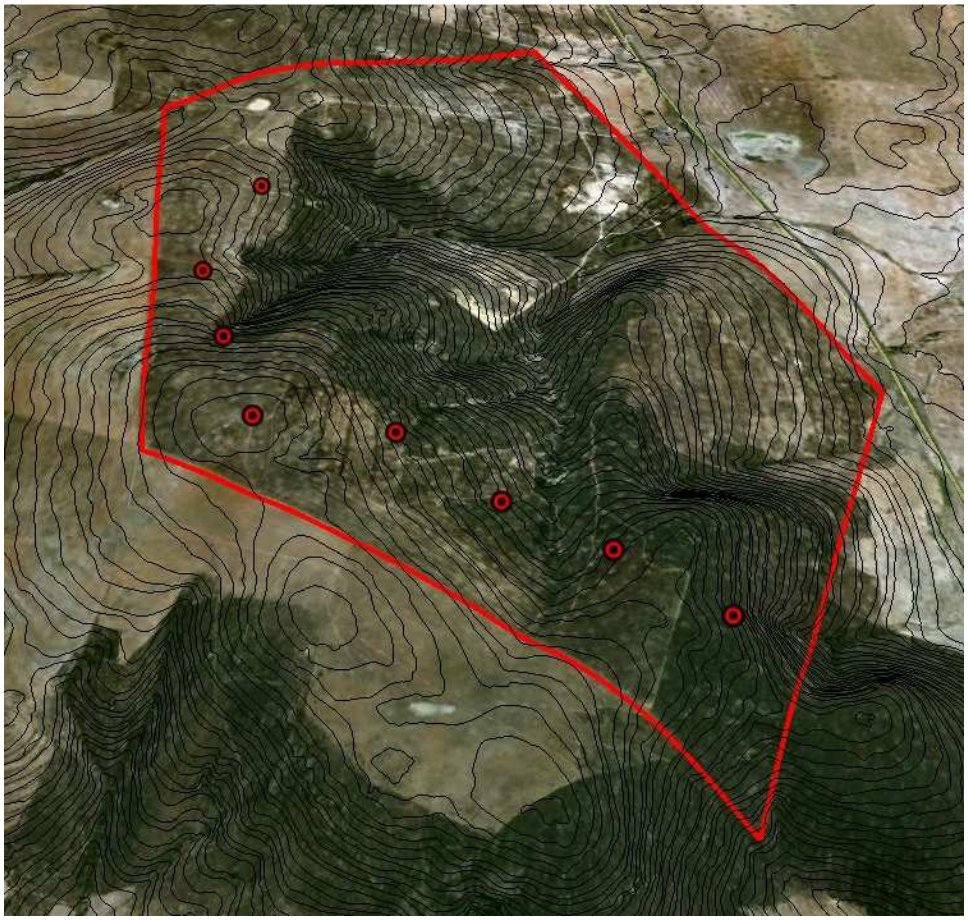

***Figure 3. Simulated oblique view of the project area, looking north. From Google Earth.***

## *3 EXPECTED PALAEONTOLOGY*

The granite bedrock underlying the property is of no palaeontological interest.

The turbine foundation excavations will fully penetrate the thin Q2 soil to the granite bedrock. Similarly, trenches for cabling will likely penetrate to the bedrock for much of their length. The overall potential for fossils in the soil mantle is very low. Notwithstanding, the excavations may expose buried crevices and “gullies” in the granite slopes where there is greater potential for fossil finds.

## *4 RECOMMENDATIONS*

In view of the low fossil potential it is proposed that only a basic degree of mitigation is required.

It is recommended that an alert for the uncovering of fossil bone and implements be included in the EMP for the project.

Appendices 1 and 2 outline monitoring by construction personnel and general Fossil Find Procedures. This is a general guideline, to be adapted to circumstances.

In the event of possible fossil and/or archaeological finds, the contracted archaeologist or palaeontologist must be contacted. For possible fossil finds, the palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established.

### *4.1 Monitoring*

**Table 2. Basic measures for the Construction EMP**

| | | |
|---|---|---|
| **OBJECTIVE:** To see and rescue fossil material that may be exposed in the various excavations made for installation foundations and cabling. | | |
| | | |
| **Project components** | Foundation excavations, trenches for cabling and pipes, spoil from excavations. | |
| **Potential impact** | Loss of fossils by their being unnoticed and/ or destroyed. | |
| **Activity/ risk source** | All bulk earthworks. | |
| **Mitigation: target/ objective** | To facilitate the likelihood of noticing fossils and ensure appropriate actions in terms of the relevant legislation. | |
| | | |
| **Mitigation: Action/ control** | **Responsibility** | **Timeframe** |
| Inform staff of the need to watch for potential fossil occurrences. | Just Energy, Arcus GIBB, the ECO & contractors. | Pre-construction. |
| Inform staff of the procedures to be followed in the event of fossil occurrences. | ECO/specialist. | Pre-construction. |
| Monitor for presence of fossils | Contracted personnel and ECO. | Construction. |
| Liaise on nature of potential finds and appropriate responses. | ECO and specialist. | Construction. |
| Excavate main finds, inspect pits & record selected, key/higher-risk excavations. | Specialist. | Construction. |

| | | |
|---|---|---|
| Obtain permit from HWC for finds. | Specialist. | Construction |
| | | |
| **Performance Indicator** | Reporting of and liaison about possible fossil finds. Fossils noticed and rescued. | |
| **Monitoring** | Due effort to meet the requirements of the monitoring procedures. | |

## *5 APPLICATION FOR A PALAEONTOLOGICAL PERMIT*

A permit from Heritage Western Cape (HWC) is required to excavate fossils. The applicant should be the qualified specialist responsible for assessment, collection and reporting (palaeontologist).

Should fossils be found that require rapid collecting, application for a palaeontological permit will be made to HWC immediately.

The application requires details of the registered owners of the sites, their permission and a site-plan map.

All samples of fossils must be deposited at a SAHRA-approved institution.

## *6 REPORTING*

Should fossils be found a detailed report on the occurrence/s must be submitted. This report is in the public domain and copies of the report must be deposited at the IZIKO S.A. Museum and Heritage Resources Western Cape. It must fulfil the reporting standards and data requirements of these bodies.

The report will be in standard scientific format, basically:

- A summary/abstract.
- Introduction.
- Previous work/context.
- Observations (incl. graphic sections, images).
- Palaeontology.
- Interpretation.
- Concluding summary.
- References.
- Appendices

The draft report will be reviewed by the client, or externally, before submission of the Final Report.

## *7 REFERENCES*


Siegfried, H.P. 2006. Vredenburg Batholllth Units. Catalogue of South African Lithostratigraphic Units. Editor: M.R. Johnson. SA Commlttee for Stratigraphy.

Visser, H.N. & Schoch, A.E. 1972. Map Sheet 255: 3217D & 3218C (St Helenabaai), 3317B & 3318A (Saldanhabaai). *Geological Survey of South Africa*.

Visser, H.N. and Schoch, A.E. 1973. The geology and mineral resources of the Saldanha Bay area. *Memoir Geological Society of South Africa* **63**.


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## *8 APPENDIX 1 – MONITORING FOR FOSSILS*

A regular monitoring presence over the period during which excavations are made, by either an archaeologist or palaeontologist, is generally not practical.

The field supervisor/foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential fossil and buried archaeological material. Workers seeing potential objects are to report to the field supervisor who, in turn, will report to the ECO. The ECO will inform the archaeologist and/or palaeontologist contracted to be on standby in the case of fossil finds.

To this end, responsible persons must be designated. This will include hierarchically:

- The field supervisor/foreman, who is going to be most often in the field.
- The Environmental Control Officer (ECO) for the project.
- The Project Manager.

Should the monitoring of the excavations be a stipulation in the Archaeological Impact Assessment, the contracted Monitoring Archaeologist (MA) can also monitor for the presence of fossils and make a field assessment of any material brought to attention. The MA is usually sufficiently informed to identify fossil material and this avoids additional monitoring by a palaeontologist. In shallow coastal excavations, the fossils encountered are usually in an archaeological context.

The MA then becomes the responsible field person and fulfils the role of liaison with the palaeontologist and coordinates with the developer and the Environmental Control Officer (ECO). If fossils are exposed in non-archaeological contexts, the palaeontologist should be summoned to document and sample/collect them.

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## 9 APPENDIX 2 - FOSSIL FIND PROCEDURES

In the context under consideration, it is improbable that fossil finds will require declarations of permanent “no go” zones. At most a temporary pause in activity at a limited locale may be required. The strategy is to rescue the material as quickly as possible.

The procedures suggested below are in general terms, to be adapted as befits a context. They are couched in terms of finds of fossil bones that usually occur sparsely, such as in the aeolian deposits. However, they may also serve as a guideline for other fossil material that may occur.

In contrast, fossil shell layers are usually fairly extensive and can be easily documented and sampled.

Bone finds can be classified as two types: isolated bone finds and bone cluster finds.

### 9.1 ISOLATED BONE FINDS

In the process of digging the excavations, isolated bones may be spotted in the hole sides or bottom, or as they appear on the spoil heap. By this is meant bones that occur singly, in different parts of the excavation. If the number of distinct bones exceeds 6 pieces, the finds must be treated as a bone cluster (below).

*Response by personnel in the event of isolated bone finds*

- **Action 1:** An isolated bone exposed in an excavation or spoil heap must be retrieved before it is covered by further spoil from the excavation and set aside.
- **Action 2:** The site foreman and ECO must be informed.
- **Action 3:** The responsible field person (site foreman or ECO) must take custody of the fossil. The following information to be recorded:
    - Position (excavation position).
    - Depth of find in hole.
    - Digital image of hole showing vertical section (side).
    - Digital image of fossil.
- **Action 4:** The fossil should be placed in a bag (*e.g.* a Ziplock bag), along with any detached fragments. A label must be included with the date of the find, position info., depth.
- **Action 5:** ECO to inform the developer, the developer contacts the standby archaeologist and/or palaeontologist. ECO to describe the occurrence and provide images asap. by email.

*Response by Palaeontologist in the event of isolated bone finds*

The palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established.

### *9.2 BONE CLUSTER FINDS*

A bone cluster is a major find of bones, *i.e*. several bones in close proximity or bones resembling part of a skeleton. These bones will likely be seen in broken sections of the sides of the hole and as bones appearing in the bottom of the hole and on the spoil heap.

*Response by personnel in the event of a bone cluster find*

- **Action 1:** Immediately stop excavation in the vicinity of the potential material. Mark (flag) the position and also spoil that may contain fossils.
- **Action 2:** Inform the site foreman and the ECO.
- **Action 3:** ECO to inform the developer, the developer contacts the standby archaeologist and/or palaeontologist. ECO to describe the occurrence and provide images asap. by email.

*Response by Palaeontologist in the event of a bone cluster find*
The palaeontologist will assess the information and liaise with the developer and the ECO and a suitable response will be established. It is likely that a Field Assessment by the palaeontologist will be carried out asap.

It will probably be feasible to "leapfrog" the find and continue the excavation farther along, or proceed to the next excavation, so that the work schedule is minimally disrupted. The response time/scheduling of the Field Assessment is to be decided in consultation with developer/owner and the environmental consultant.

The field assessment could have the following outcomes:

- If a human burial, the appropriate authority is to be contacted (see AIA). The find must be evaluated by a human burial specialist to decide if Rescue Excavation is feasible, or if it is a Major Find.
- If the fossils are in an archaeological context, an archaeologist must be contacted to evaluate the site and decide if Rescue Excavation is feasible, or if it is a Major Find.
- If the fossils are in an palaeontological context, the palaeontologist must evaluate the site and decide if Rescue Excavation is feasible, or if it is a Major Find.

### *9.3 RESCUE EXCAVATION*

Rescue Excavation refers to the removal of the material from the just the "design" excavation. This would apply if the amount or significance of the exposed material appears to be relatively circumscribed and it is feasible to remove it without compromising contextual data. The time span for Rescue Excavation should be reasonably rapid to avoid any or undue delays, *e.g*. 1-3 days and definitely less than 1 week.

In principle, the strategy during mitigation is to "rescue" the fossil material as quickly as possible. The strategy to be adopted depends on the nature of the occurrence, particularly the density of the fossils. The methods of collection would depend on the preservation or fragility of the fossils and whether in loose or in lithified sediment. These could include:

- On-site selection and sieving in the case of robust material in sand.
- Fragile material in loose/crumbly sediment would be encased in blocks using Plaster-of Paris or reinforced mortar.

If the fossil occurrence is dense and is assessed to be a “Major Find”, then carefully controlled excavation is required.

## *9.4 MAJOR FINDS*

A Major Find is the occurrence of material that, by virtue of quantity, importance and time constraints, cannot be feasibly rescued without compromise of detailed material recovery and contextual observations.
A Major Find is not expected.

*Management Options for Major Finds*
In consultation with developer/owner and the environmental consultant, the following options should be considered when deciding on how to proceed in the event of a Major Find.

*Option 1: Avoidance*

Avoidance of the major find through project redesign or relocation. This ensures minimal impact to the site and is the preferred option from a heritage resource management perspective. When feasible, it can also be the least expensive option from a construction perspective.

The find site will require site protection measures, such as erecting fencing or barricades. Alternatively, the exposed finds can be stabilized and the site refilled or capped. The latter is preferred if excavation of the find will be delayed substantially or indefinitely. Appropriate protection measures should be identified on a site-specific basis and in wider consultation with the heritage and scientific communities.

This option is preferred as it will allow the later excavation of the finds with due scientific care and diligence.

*Option 2: Emergency Excavation*

Emergency excavation refers to the “no option” situation wherein avoidance is not feasible due to design, financial and time constraints. It can delay construction and emergency excavation itself will take place under tight time constraints, with the potential for irrevocable compromise of scientific quality. It could involve the removal of a large, disturbed sample by excavator and conveying this by truck from the immediate site to a suitable place for “stockpiling”. This material could then be processed later.

Consequently, emergency excavation is not a preferred option for a Major Find.

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