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Heritage Impact Assessment Report

HERITAGE IMPACT ASSESSMENT FOR THREE ALTERNATIVE SITES FOR THE RELOCATION OF THE DEVON LANDFILL SITE



PREPARED BY:

G&A HERITAGE

PREPARED FOR:

ZITHOLELE ENVIRONMENTAL CONSULTING

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***Disclaimer;** Although all possible care is taken to identify all sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the study. G&A Heritage and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.*

SIGNED OFF BY: STEPHAN GAIGHER



MANAGEMENT SUMMARY

Site name and location: Devon Landfill Site Relocation.

Municipal Area: Lesedi Local Municipality

Developer: Lesedi Local Municipality.

Consultant: G&A Heritage, PO Box 522, Louis Trichardt, 0920, South Africa

Date development was mooted: May 2010

Date of Report: 28 February 2011

Proposed date of commencement of development: September 2011

The purpose of this project is the proposed relocation of the original Devon landfill site located in the Lesedi Local Municipality. The site will be replaced by one of three alternative sites.

The purpose of this scoping report is to outline the cultural heritage sensitivity of the three proposed alternative locations and to advise on mitigation should any sites or landscapes be affected and through this make a decision on the most appropriate option.

Findings;

No sites of any particular heritage significance were located within any of the three proposed alternatives. No culturally sensitive landscape types could be identified within any of the study areas.

Recommendations;

No site specific recommendations are necessary. It is recommended that Alternative 1 be selected.

Fatal Flaws;

No fatal flaws were identified.



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HERITAGE IMPACT REPORT

HERITAGE IMPACT REPORT FOR THE PROPOSED RELOCATION OF THE DEVON LANDFILL SITE TO ONE OF THREE ALTERNATIVES.

INTRODUCTION

Legislation and methodology

G&A Heritage was appointed by Zitholele Consulting Pty (Ltd) to undertake a heritage impact assessment for the proposed relocation of the Devon Landfill Site under the South African Heritage Resources Act (25 of 1999). Section 27(1) of the Provincial Act requires such an assessment in case of:

- (a) construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- (b) construction of a bridge or similar structure exceeding 50 m in length; and
- (c) any development, or other activity which will change the character of an area of land, or water –
 - (1) exceeding 10 000 m² in extent;
 - (2) involving three or more existing erven or subdivisions thereof; or
 - (3) involving three or more erven, or subdivisions thereof, which have been consolidated within the past five years; or
- (d) the costs of which will exceed a sum set in terms of regulations; or
- (e) any other category of development provided for in regulations.

A heritage impact assessment is not limited to archaeological artefacts, historical buildings and graves. It is far more encompassing and includes intangible and invisible resources such as places, oral traditions and rituals. A heritage resource is defined any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes the following wide range of places and objects:

- (a) places, buildings, structures and equipment;
- (b) places to which oral traditions are attached or which are associated with living heritage;
- (c) historical settlements and townscapes;
- (d) landscapes and natural features;
- (e) geological sites of scientific or cultural importance;
- (f) archaeological and palaeontological sites;
- (g) graves and burial grounds, including –
 - (1) ancestral graves,
 - (2) royal graves and graves of traditional leaders,
 - (3) graves of victims of conflict (iv) graves of important individuals,
 - (4) historical graves and cemeteries older than 60 years, and
 - (5) other human remains which are not covered under the Human Tissues Act, 1983 (Act No.65 of 1983 as amended);
- (h) movable objects, including ;
 - (1) objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects and material, meteorites and rare geological specimens;
 - (2) ethnographic art and objects;
 - (3) military objects;
 - (4) objects of decorative art;

- (5) objects of fine art;
- (6) objects of scientific or technological interest;
- (7) books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings; and
- (8) any other prescribed categories, but excluding any object made by a living person;
- (i) battlefields;
- (j) traditional building techniques.

A **'place'** is defined as:

- (a) A site, area or region;
- (b) A building or other structure (which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure);
- (c) a group of buildings or other structures (which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures); and (d) an open space, including a public square, street or park; and in relation to the management of a place, includes the immediate surroundings of a place.

'Structures' means any building, works, device, or other facility made by people and which is fixed to land and any fixtures, fittings and equipment associated therewith older than 60 years.

'Archaeological' means ;

- (a) material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- (b) rock art, being a form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years including any area within 10 m of such representation; and
- (c) wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land or in the maritime cultural zone referred to in section 5 of the Maritime Zones Act 1994 (Act 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which are older than 60 years or which in terms of national legislation are considered to be worthy of conservation;
- (d) features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found.

'Palaeontological' means 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 contains such fossilised remains or trace.

'Grave' means a place of interment and includes the contents, headstone or other marker of and any other structures on or associated with such place. SAHRA will only issue a permit for the alteration of a grave if it is satisfied that every reasonable effort has been made to contact and obtain permission from the families concerned.

Removal of graves are subject to the following procedures as outlined by the South African Heritage Resources Agency:

- Notification of the impending removals (using English, Afrikaans and local language media and notices at the grave site);
- Consultation with individuals or communities related or known to the deceased;
- Satisfactory arrangements for the curation of human remains and / or headstones in a museum, where applicable;
- Procurement of a permit from SAHRA;
- Appropriate arrangements for the exhumation (preferably by a suitably trained archaeologist) and re-interment (sometimes by a registered undertaker, in a formally proclaimed cemetery);
- Observation of rituals or ceremonies required by the families.

The limitations and assumptions associated with this heritage impact assessment are as follows;

- Limited field investigations were performed on foot and by vehicle where access was readily available.
- Sites were evaluated by means of description of the cultural landscape, direct observations and analysis of written sources and available databases.

- It was assumed that the site layout as provided by Zitholele Environmental Consulting was accurate.
- We assumed that the public participation process performed as part of the environmental management plan was sufficiently encompassing not to be repeated in the Heritage Assessment Phase.

BACKGROUND INFORMATION

PROPOSED RELOCATION OF THE DEVON LANDFILL SITE

MOTIVATION FOR THE RELOCATION

The existing Devon Landfill Site is currently being used without any formal management guidelines. It has grown without planning parameters for the last couple of years and it is necessary to close the existing landfill site and move it to a new location as soon as possible. This is needed to ensure the safe and efficient operation and management of the landfill site in future.

EXISTING LANDFILL SITE DESCRIPTION

The existing Devon Landfill site is approximately 2.7 ha in size and lies next to the R29. It is currently fenced with diamond mesh wire fencing.



Existing Landfill site

LOCATION OF EXISTING LANDFILL SITE

The site is located within the Lesedi Local Municipality in Gauteng. The site itself is located to the south of the R29 approximately 1.1km southeast of the town of Devon.

ALTERNATIVES CONSIDERED

ALTERNATIVE 1

The first alternative is located directly adjacent to the existing landfill site and to the north.



ALTERNATIVE 2

Alternative 2 is located to the north-west of the town of Devon. It is adjacent to an informal housing location. Several concrete foundations of unknown purpose and origin are located on the site.



ALTERNATIVE 3

This alternative is located further to the west of the town of Devon and slightly further south than Alternative 2. This alternative is located along the R29.



METHODOLOGY

This study defines the heritage component of the Environmental Impact Assessment process. It is described as a first phase Heritage Impact Assessment (HIA). This report attempts to evaluate both the accumulated heritage knowledge of the area as well as information derived from direct physical observations.

EVALUATING HERITAGE IMPACTS

A combination of document research as well as the determination of the geographic suitability of areas and the evaluation of aerial photographs determined which areas could and should be accessed.

After plotting of the site on GPS the areas were accessed using suitable combinations of vehicle access, access by foot as well as four-wheeler motorbike.

Sites were documented by digital photography and geo-located with GPS readings using the WGS 84 datum.

Further techniques included interviews with local inhabitants, visiting local museums and information centers and discussions with local experts. All this information was combined with information from an extensive literature study as well as the result of archival studies based on SAHRA provincial databases.

Geological maps guided investigations into the paleontological riches of the area.

ASSESSING VISUAL IMPACT

Visual impacts of developments result when sites that are culturally celebrated are visually affected by a development. The exact parameters for the determination of visual impacts have not yet been rigidly defined and are still mostly open to interpretation. CNdV and DEAP (2006) have developed some guidelines for the management of the visual impacts of wind turbines in the Western Cape, although these have not yet been formalized. In these guidelines they recommend a buffer zone of 1km around significant heritage sites to minimize the visual impact.

ASSUMPTIONS AND RESTRICTIONS

- It is assumed that the SAHRA database locations are correct
- It is assumed that the paleontological information collected for the project is comprehensive.
- It is assumed that the inclusive Visual Impact Assessment for the EIA is sufficiently thorough.
- It is assumed that the social impact assessment and public participation process of the EIA will result in the identification of any intangible sites of heritage potential.



HERITAGE INDICATORS WITHIN THE RECEIVING ENVIRONMENTS

REGIONAL CULTURAL CONTEXT

All three the alternative sites are located very close to each other geographically and their regional cultural context will be discussed together.

PALEONTOLOGY

Since the late 19th century, quarrying operations in Vereeniging have revealed some fossiliferous sandstone outcrops in the area. Dr T. N. Leslie was one of the first to discover these plant fossils. The discoveries were made at places such as Leeukuil and the Central Colliery Mine as well as at other localities close to the Vaal River. Specimens are displayed at the Bernard Price Institute for palaeontological Research (Leslie Collection), the Geological Museum in Johannesburg and in the Vereeniging Museum. The most common genera present are *Noeggerathiopsis*, *Gangamopteris* and *Glassopteris*.

The fact that the large Witbank coal field is located close to here is also an indication of the possible occurrence of fossiliferous materials since coal is basically just fossilized organic matter.

STONE AGE

This area is home to all three the known phases of the Stone Age, *nl*. The Early (2.5 million – 250 000 years ago), Middle (250 000 – 22 000 years ago) and Late Stone Age (22 000 – 200 years ago). The Late Stone Age in this area also contains sites with rock art from the San and Khoi San cultural groups. Early to Middle Stone Age sites are uncommon in this area, however rock-art sites and Late Stone Age sites are much better known.

IRON AGE

The Iron Age sequence is divided into the Early Iron Age (200 – 1400 BP) and the Late Iron Age (1400 – 1900 BP). Although the Early Iron Age is not known from this specific area (EIA sites are known from Lydenburg and Bambata), several Late Iron Age sites of Sotho and Ndebele origin is found here

Stone walled sites are also spread out along the range of hills running from Randfontein in the west through Johannesburg to Heidelberg in the east. These sites are associated with the ancestors of the Sotho-Tswana peoples.

THE HISTORIC ERA

Although the eastern Rand area has a rich history of both mining and colonial expansion, the town of Devon is a quite recent addition and holds little of historic significance. The town was named after a large county in southwestern England.

CULTURAL LANDSCAPE

The cultural landscape for this area is richly associated with the colonial period as well as its violent past. A unique stone architectural heritage was established in the Eastern Highveld from the second half of the 19th century well into the early 20th century. During this time period stone was used to build farmsteads and dwellings, both in urban and in rural areas. Although a contemporary stone architecture also existed in the Karoo and in the Eastern Free State Province of South Africa a wider variety of stone types were used in the Eastern Highveld. These included sandstone, ferricrete (*ouklip*), dolerite (*blouklip*), granite, shale and slate.

The origins of a vernacular stone architecture in the Eastern Highveld may be ascribed to various reasons of which the ecological characteristics of the region may be the most important. Whilst this region is

generally devoid of any natural trees which could be used as timber in the construction of farmsteads, outbuildings, cattle enclosures and other structures, the scarcity of fire wood also prevented the manufacture of baked clay bricks. Consequently stone served as the most important building material in the Eastern Highveld.

REGISTER OF CULTURAL SITES IDENTIFIED

No sites of cultural heritage significance are located within any of the three alternative landfill site.

IMPLICATION OF SITES IDENTIFIED

No Sites were identified.



MEASURING AND EVALUATING THE CULTURAL SENSITIVITY OF THE SELECTED OPTIONS

In 2003 the South African Heritage Resource Agency (SAHRA) compiled the following guidelines to evaluate the cultural significance of individual heritage resources;

TYPE OF RESOURCE;

- Place
- Archaeological Site
- Structure
- Grave
- Paleontological Feature
- Geological Feature

TYPE OF SIGNIFICANCE

1. HISTORIC VALUE

It is important in the community, or pattern of history

- o Important in the evolution of cultural landscapes and settlement patterns
- o Important in exhibiting density, richness or diversity of cultural features illustrating the human occupation and evolution of the nation, province, region or locality.
- o Important for association with events, developments or cultural phases that have had a significant role in the human occupation and evolution of the nation, province, region or community.
- o Important as an example for technical, creative, design or artistic excellence, innovation or achievement in a particular period.

It has strong or special association with the life or work of a person, group or organisation of importance in history;

- o Importance for close associations with individuals, groups or organisations whose life, works or activities have been significant within the history of the nation, province, region or community.

It has significance relating to the history of slavery

- o Importance for a direct link to the history of slavery in South Africa.

2. AESTHETIC VALUE

It is important in exhibiting particular aesthetic characteristics valued by a community or cultural group.

- o Important to a community for aesthetic characteristics held in high esteem or otherwise valued by the community.
- o Importance for its creative, design or artistic excellence, innovation or achievement.
- o Importance for its contribution to the aesthetic values of the setting demonstrated by a landmark quality or having impact on important vistas or otherwise contributing to the identified aesthetic qualities of the cultural environs or the natural landscape within which it is located.
- o In the case of an historic precinct, importance for the aesthetic character created by the individual components which collectively form a significant streetscape, townscape or cultural environment.

3. SCIENTIFIC VALUE

It has potential to yield information that will contribute to an understanding of natural or cultural

heritage

- Importance for information contributing to a wider understanding of natural or cultural history by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.
- Importance for information contributing to a wider understanding of the origin of the universe or of the development of the earth.
- Importance for information contributing to a wider understanding of the origin of life; the development of plant or animal species, or the biological or cultural development of hominid or human species.
- Importance for its potential to yield information contributing to a wider understanding of the history of human occupation of the nation, Province, region or locality.
- It is important in demonstrating a high degree of creative or technical achievement at a particular period
- Importance for its technical innovation or achievement.

4. SOCIAL VALUE

- It has strong or special association with a particular community or cultural group for social, cultural or spiritual reasons
- Importance as a place highly valued by a community or cultural group for reasons of social, cultural, religious, spiritual, symbolic, aesthetic or educational associations.
- Importance in contributing to a community's sense of place.

DEGREES OF SIGNIFICANCE

1. RARITY

It possesses uncommon, rare or endangered aspects of natural or cultural heritage.

- Importance for rare, endangered or uncommon structures, landscapes or phenomena.

2. REPRESENTIVITY

- It is important in demonstrating the principal characteristics of a particular class of natural or cultural places or objects.
- Importance in demonstrating the principal characteristics of a range of landscapes or environments, the attributes of which identify it as being characteristic of its class.
- Importance in demonstrating the principal characteristics of human activities (including way of life, philosophy, custom, process, land-use, function, design or technique) in the environment of the nation, Province, region or locality.

Spheres of Significance	High	Medium	Low
International			
National			
Provincial			
Regional			
Local			
Specific Community			

What other similar sites may be compared to this site?

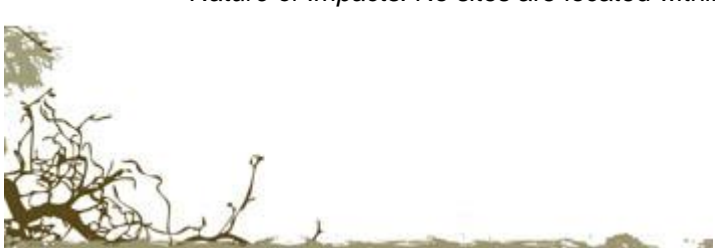
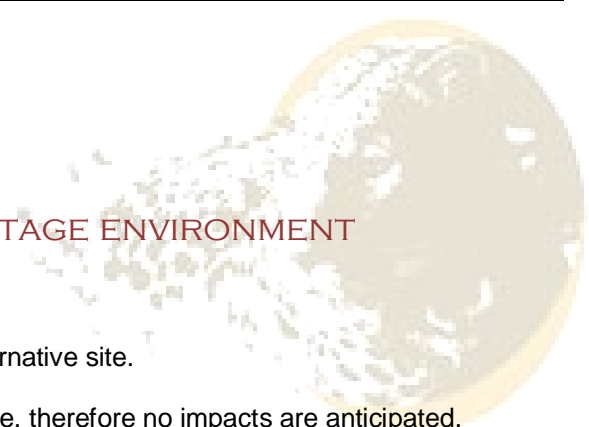
ASSESSMENT OF IMPACTS

ACTIVITIES THAT WILL AFFECT THE HERITAGE ENVIRONMENT ALTERNATIVE 1

Palaeontology

No sites of palaeontological value are located within this alternative site.

Nature of Impacts: No sites are located within the landfill site, therefore no impacts are anticipated.



Extent of Impact: Due to the lack of paleontological sites within this area, the extent of impacts will be zero.

Nature of Impact: Possible disturbing of sub-surface deposits of fossiliferous materials.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

PRE-CONTACT ARCHAEOLOGY (PREHISTORIC)

This alternative shows no signs of pre-contact sites in the investigated area.

Nature of Impacts: The development can result in the localized uncovering of sites from the pre-contact era.

Extent of Impacts: Taking into account the lack of sites in the study area these impacts can be seen as minimal.

Nature of Impact: Possible disturbance of sub-surface sites that could be exposed by activities at this landfill site alternative.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	N/A
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Neutral to negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

POST-CONTACT HERITAGE

No post-contact sites could be identified here.

Nature of Impacts: No impacts.

Extent of Impacts: None anticipated.

Nature of Impact: Possible post-contact sites could be uncovered locally by the landfill activities		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Moderate	Low
Probability	Probable	Possible
Significance	Medium	Low

Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Unlikely
Mitigation	NA	
Cumulative impacts	None	
Residual impacts	Not applicable	

CULTURAL LANDSCAPE

The area does not contain any characteristics that puts it within a sensitive cultural landscape scenario therefore no impacts of this size is anticipated.

Nature of Impacts: NA

Extent of Impacts: NA

The mitigation of the effects of the closure of the landfill site on sensitive landscapes lies within the domain of the Visual Impact Assessment (VIA).

Nature of Impact: Visual Impact on sensitive Cultural Landscapes.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	NA	NA
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	NA	Na
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

IMPACT STATEMENT

PALEONTOLOGICAL SITES

No paleontological sites of high value could be identified at this alternative.

Mitigation

No mitigation is recommended.

ARCHEOLOGICAL SITES

No archaeological sites were identified. Possible sub-surface sites could be disturbed by future landfill activities.

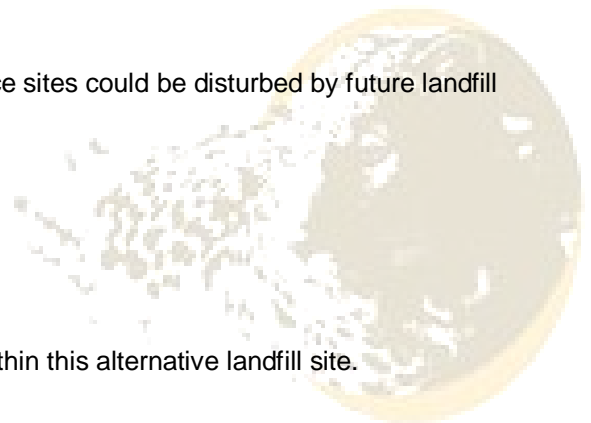
Mitigation

No mitigation is recommended.

BUILT ENVIRONMENT

No Sites associated with the built environment is located within this alternative landfill site.

Mitigation



No mitigation is recommended.

CULTURAL LANDSCAPE

No impacts are anticipated.

Mitigation

No mitigation is needed.

ALTERNATIVE 2

Palaeontology

No sites of paleontological value are located within this alternative site.

Nature of Impacts: No sites are located within the landfill site, therefore no impacts are anticipated.

Extent of Impact: Due to the lack of paleontological sites within this area, the extent of impacts will be zero.

Nature of Impact: Possible disturbing of sub-surface deposits of fossiliferous materials.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

Pre-Contact Archaeology (Prehistoric)

This alternative shows no signs of pre-contact sites in the investigated area.

Nature of Impacts: The development can result in the localized uncovering of sites from the pre-contact era.

Extent of Impacts: Taking into account the lack of sites in the study area these impacts can be seen as minimal.

Nature of Impact: Possible disturbance of sub-surface sites that could be exposed by activities at this landfill site alternative.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	N/A
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Neutral to negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	NA	
Cumulative impacts	NA	

Residual impacts	Not applicable
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Post-Contact Heritage

No post-contact sites could be identified here.

Nature of Impacts: No impacts.

Extent of Impacts: None anticipated.

Nature of Impact: Possible post-contact sites could be uncovered locally by the landfill activities		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Moderate	Low
Probability	Probable	Possible
Significance	Medium	Low
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Unlikely
Mitigation	NA	
Cumulative impacts	None	
Residual impacts	Not applicable	

Cultural Landscape

The area does not contain any characteristics that puts it within a sensitive cultural landscape scenario therefore no impacts of this size is anticipated.

Nature of Impacts: NA

Extent of Impacts: NA

The mitigation of the effects of the closure of the landfill site on sensitive landscapes lies within the domain of the Visual Impact Assessment (VIA).

Nature of Impact: Visual Impact on sensitive Cultural Landscapes.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	NA	NA
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	NA	Na
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

IMPACT STATEMENT

Paleontological sites

No paleontological sites of high value could be identified at this alternative.

Mitigation

No mitigation is recommended.

Archeological Sites

No archaeological sites were identified. Possible sub-surface sites could be disturbed by future landfill activities.

Mitigation

No mitigation is recommended.

Built Environment

No Sites associated with the built environment is located within this alternative landfill site.

Mitigation

No mitigation is recommended.

Cultural Landscape

No impacts are anticipated.

Mitigation

No mitigation is needed.

ALTERNATIVE 3

Palaeontology

No sites of paleontological value are located within this alternative site.

Nature of Impacts: No sites are located within the landfill site, therefore no impacts are anticipated.

Extent of Impact: Due to the lack of paleontological sites within this area, the extent of impacts will be zero.

Nature of Impact: Possible disturbing of sub-surface deposits of fossiliferous materials.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

Pre-Contact Archaeology (Prehistoric)

This alternative shows no signs of pre-contact sites in the investigated area.

Nature of Impacts: The development can result in the localized uncovering of sites from the pre-contact era.

Extent of Impacts: Taking into account the lack of sites in the study area these impacts can be seen as minimal.

Nature of Impact: Possible disturbance of sub-surface sites that could be exposed by activities at this landfill site alternative.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	N/A
Magnitude	Small	Small
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	Neutral to negative	Positive
Reversibility	Non-reversible	Non-reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Yes
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

Post-Contact Heritage

No post-contact sites could be identified here.

Nature of Impacts: No impacts.

Extent of Impacts: None anticipated.

Nature of Impact: Possible post-contact sites could be uncovered locally by the landfill activities		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Moderate	Low
Probability	Probable	Possible
Significance	Medium	Low
Status	Negative	Negative
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	No	Unlikely
Mitigation	NA	
Cumulative impacts	None	
Residual impacts	Not applicable	

Cultural Landscape

The area does not contain any characteristics that puts it within a sensitive cultural landscape scenario therefore no impacts of this size is anticipated.

Nature of Impacts: NA

Extent of Impacts: NA

The mitigation of the effects of the closure of the landfill site on sensitive landscapes lies within the domain of the Visual Impact Assessment (VIA).

Nature of Impact: Visual Impact on sensitive Cultural Landscapes.		
	Without Mitigation	With Mitigation
Extent	Local	Local
Duration	Long term	Long term
Magnitude	Low	Low
Probability	Unlikely	Unlikely
Significance	Low	Low
Status	NA	NA
Reversibility	Reversible	Reversible
Irreplaceable loss of resource	No	No
Can impacts be mitigated	NA	Na
Mitigation	NA	
Cumulative impacts	NA	
Residual impacts	Not applicable	

IMPACT STATEMENT

Paleontological sites

No paleontological sites of high value could be identified at this alternative.

Mitigation

No mitigation is recommended.

Archeological Sites

No archaeological sites were identified. Possible sub-surface sites could be disturbed by future landfill activities.

Mitigation

No mitigation is recommended.

Built Environment

No Sites associated with the built environment is located within this alternative landfill site.

Mitigation

No mitigation is recommended.

Cultural Landscape

No impacts are anticipated.

Mitigation

No mitigation is needed.



RESOURCE MANAGEMENT RECOMMENDATIONS

Although unlikely, sub-surface remains of heritage sites could still be encountered during the construction activities associated with the project. Such sites would offer no surface indication of their presence due to the high state of alterations in the area. The following indicators of unmarked sub-surface sites could be encountered;

- Ash deposits (unnaturally grey appearance of soil compared to the surrounding substrate)
- Bone concentrations, either animal or human
- Ceramic fragments such as pottery shards either historic or pre-contact
- Stone concentrations of any formal nature

Although no sites of heritage significance were identified within the proposed study area, the following recommendations are given should any sub-surface remains of heritage sites be identified as indicated above;

- All operators of excavation equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered.
- All construction in the immediate vicinity (50m radius of the site should cease).
- The heritage practitioner should be informed as soon as possible.
- In the event of obvious human remains the SAPS should be notified.
- Mitigative measures (such as refilling etc.) should not be attempted.
- The area in a 50m radius of the find should be cordoned off with hazard tape.
- Public access should be limited.
- The area should be placed under guard.
- No media statements should be released until such time as the heritage practitioner has had sufficient time to analyze the finds.

CONCLUSION

After evaluation of the three alternative sites it was determined that all three have the same cultural sensitivity. Of the three alternative sites, Alternative 1 is chosen merely due to the fact that it is located next to the existing landfill site. This will result in minimising visual impacts on the landscape.



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APPENDIX A

GENERAL METHODOLOGY



METHODOLOGY

INVENTORY

Inventory studies involve the in-field survey and recording of archaeological resources within a proposed development area. The nature and scope of this type of study is defined primarily by the results of the overview study. In the case of site-specific developments, direct implementation of an inventory study may preclude the need for an overview.

There are a number of different methodological approaches to conducting inventory studies. Therefore, the proponent, in collaboration with the archaeological consultant, must develop an inventory plan for review and approval by the SAHRA prior to implementation (*Dincause, Dena F., H. Martin Wobst, Robert J. Hasenstab and David M. Lacy 1984*).

SITE SURVEYING

Site surveying is the process by which archaeological sites are located and identified on the ground. Archaeological site surveys often involve both surface inspection and subsurface testing. For the purposes of heritage investigations, *archaeological sites* refer to any site with heritage potential (i.e. historic sites, cultural sites, rock art sites etc.).

A systematic surface inspection involves a foot traverse along pre-defined linear transects which are spaced at systematic intervals across the survey area. This approach is designed to achieve representative area coverage. Alternatively, an archaeological site survey may involve a non-systematic or random walk across the survey area. Subsurface testing is an integral part of archaeological site survey. The purpose of subsurface testing, commonly called "shovel testing", is to:

- (a) assist in the location of archaeological sites which are buried or obscured from the surveyor's view, and
- (b) help determine the horizontal and vertical dimensions and internal structure of a site.

In this respect, subsurface testing should not be confused with evaluative testing, which is a considerably more intensive method of assessing site significance (*King, Thomas F., 1978*).

Once a site is located, subsurface testing is conducted to record horizontal extent, depth of the cultural matrix, and degree of internal stratification. Because subsurface testing, like any form of site excavation, is destructive it should be conducted only when necessary and in moderation.

Subsurface testing is usually accomplished by shovel, although augers and core samplers are also used where conditions are suitable. Shovel test units averaging 40 square cm are generally appropriate, and are excavated to a sterile stratum (i.e. C Horizon, alluvial till, etc.).

Depending on the site survey strategy, subsurface testing is conducted systematically or randomly across the survey area. Other considerations such as test unit location, frequency, depth and interval spacing will also depend on the survey design as well as various biophysical factors. (*Lightfoot, Keng G. 1989*).

SURVEY SAMPLING

Site survey involves the complete or partial inspection of a proposed project area for the purpose of locating archaeological or other heritage sites. Since there are many possible approaches to field survey, it is important to consider the biophysical conditions and archaeological site potential of the survey area in designing the survey strategy.

Ideally, the archaeological site inventory should be based on intensive survey of every portion of the impact area, as maximum area coverage will provide the most comprehensive understanding of archaeological and other heritage resource density and distribution. However, in many cases the size of the project area may render a complete survey impractical because of time and cost considerations.

In some situations it may be practical to intensively survey only a sample of the entire project area. Sample selection is approached systematically, based on accepted statistical sampling procedures, or judgementally, relying primarily on subjective criteria (*Butler, W., 1984*).

SYSTEMATIC SURVEY SAMPLING

A systematic sample survey is designed to locate a representative sample of archaeological or heritage resources within the project area. A statistically valid sample will allow predictions to be made regarding total resource density, distribution and variability. In systematic sample surveys it may be necessary to exempt certain areas from intensive inspection owing to excessive slope, water bodies, landslides, land ownership, land use or other factors. These areas must be explicitly defined. Areas characterized by an absence of road access or dense vegetation should not be exempted. (*Dunnell, R.C., Dancey W.S. 1983*).

JUDGEMENTAL SURVEY SAMPLING

Under certain circumstances, it is appropriate to survey a sample of the project area based entirely on professional judgement regarding the location of sites. Only those areas which can reasonably be expected to contain archaeological or heritage sites are surveyed.

However, a sufficient understanding of the cultural and biophysical factors which influenced or accounted for the distribution of these sites over the landscape is essential. Careful consideration must be given to ethnographic patterns of settlement, land use and resource exploitation; the kinds and distribution of aboriginal food sources; and restrictions on site location imposed by physical terrain, climatic regimes, soil chemistry or other factors. A judgemental sample survey is not desirable if statistically valid estimates of total heritage resource density and variability are required (*McManamon F.P. 1984*).

ASSESSMENT

Assessment studies are only required where conflicts have been identified between heritage resources and a proposed development. These studies require an evaluation of the heritage resource to be impacted, as well as an assessment of project impacts. The purpose of the assessment is to provide recommendations as to the most appropriate manner in which the resource may be managed in light of the identified impacts. Management options may include alteration of proposed development plans to avoid resource impact, mitigative studies directed at retrieving resource values prior to impact, or compensation for the unavoidable loss of resource values.

It is especially important to utilize specialists at this stage of assessment. The evaluation of any archaeological resource should be performed by professionally qualified individuals.

SITE EVALUATION

Techniques utilized in evaluating the significance of a heritage site include systematic surface collecting and evaluative testing. Systematic surface collection is employed wherever archaeological remains are evident on the ground surface. However, where these sites contain buried deposits, some degree of evaluative testing is also required.

Systematic surface collection from archaeological sites should be limited, insofar as possible, to a representative sample of materials. Unless a site is exceptionally small and limited to the surface, no attempt should be made at this stage to collect all or even a major portion of the materials. Intensive surface collecting should be reserved for full scale data recovery if mitigative studies are required.

Site significance is determined following an analysis of the surface collected and/or excavated materials (*Miller, C.L. II, 1989*).

SIGNIFICANCE CRITERIA

There are several kinds of significance, including scientific, public, ethnic, historic and economic, that need to be taken into account when evaluating heritage resources. For any site, explicit criteria are used to measure these values. Checklists of criteria for evaluating pre-contact and post-contact archaeological sites are provided in Appendix B and Appendix C. These checklists are not intended to be exhaustive or inflexible. Innovative approaches to site evaluation which emphasize quantitative analysis and objectivity are encouraged. The process used to derive a measure of relative site significance must be rigorously documented, particularly the system for ranking or weighting various evaluated criteria.

Site integrity, or the degree to which a heritage site has been impaired or disturbed as a result of past land alteration, is an important consideration in evaluating site significance. In this regard, it is important to recognize that although an archaeological site has been disturbed, it may still contain important scientific information.

Heritage resources may be of scientific value in two respects. The potential to yield information which, if properly recovered, will enhance understanding of Southern African human history is one appropriate measure of scientific significance. In this respect, archaeological sites should be evaluated in terms of their potential to resolve current archaeological research problems. Scientific significance also refers to the potential for relevant contributions to other academic disciplines or to industry.

Public significance refers to the potential a site has for enhancing the public's understanding and appreciation of the past. The interpretive, educational and recreational potential of a site are valid indications of public value. Public significance criteria such as ease of access, land ownership, or scenic setting are often external to the site itself. The relevance of heritage resource data to private industry may also be interpreted as a particular kind of public significance.

Ethnic significance applies to heritage sites which have value to an ethnically distinct community or group of people. Determining the ethnic significance of an archaeological site may require consultation with persons having special knowledge of a particular site. It is essential that ethnic significance be assessed by someone properly trained in obtaining and evaluating such data.

Historic archaeological sites may relate to individuals or events that made an important, lasting contribution to the development of a particular locality or the province. Historically important sites also reflect or commemorate the historic socioeconomic character of an area. Sites having high historical value will also usually have high public value.

The economic or monetary value of a heritage site, where calculable, is also an important indication of significance. In some cases, it may be possible to project monetary benefits derived from the public's use of a heritage site as an educational or recreational facility. This may be accomplished by employing established economic evaluation methods; most of which have been developed for valuating outdoor recreation. The objective is to determine the willingness of users, including local residents and tourists, to pay for the experiences or services the site provides even though no payment is presently being made. Calculation of user benefits will normally require some study of the visitor population (*Smith, L.D. 1977*).

ASSESSING IMPACTS

A heritage resource impact may be broadly defined as the net change between the integrity of a heritage site with and without the proposed development. This change may be either beneficial or adverse.

Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource. For example, development may have a beneficial effect by preventing or lessening natural site erosion. Similarly, an action may serve to preserve a site for future investigation by covering it with a protective layer of fill. In other cases, the public or economic significance of an archaeological site may be enhanced by actions which facilitate non-destructive public use. Although beneficial impacts are unlikely to occur frequently, they should be included in the assessment.

More commonly, the effects of a project on heritage sites are of an adverse nature. Adverse impacts occur under conditions that include:

- (a) destruction or alteration of all or part of a heritage site;
- (b) isolation of a site from its natural setting; and
- (c) introduction of physical, chemical or visual elements that are out-of-character with the heritage resource and its setting.

Adverse effects can be more specifically defined as direct or indirect impacts. Direct impacts are the immediately demonstrable effects of a project which can be attributed to particular land modifying actions. They are directly caused by a project or its ancillary facilities and occur at the same time and place. The

immediate consequences of a project action, such as slope failure following reservoir inundation, are also considered direct impacts.

Indirect impacts result from activities other than actual project actions. Nevertheless, they are clearly induced by a project and would not occur without it. For example, project development may induce changes in land use or population density, such as increased urban and recreational development, which may indirectly impact upon heritage sites. Increased vandalism of heritage sites, resulting from improved or

newly introduced access, is also considered an indirect impact. Indirect impacts are much more difficult to assess and quantify than impacts of a direct nature.

Once all project related impacts are identified, it is necessary to determine their individual level-of-effect on heritage resources. This assessment is aimed at determining the extent or degree to which future opportunities for scientific research, preservation, or public appreciation are foreclosed or otherwise adversely affected by a proposed action. Therefore, the assessment provides a reasonable indication of the relative significance or importance of a particular impact. Normally, the assessment should follow site evaluation since it is important to know what heritage values may be adversely affected.

The assessment should include careful consideration of the following level-of-effect indicators, which are defined in Appendix D:

- magnitude
- severity
- duration
- range
- frequency
- diversity
- cumulative effect
- rate of change

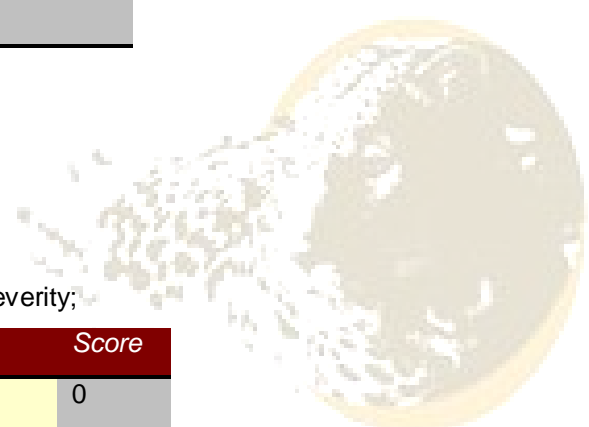
The level-of-effect assessment should be conducted and reported in a quantitative and objective fashion. The methodological approach, particularly the system of ranking level-of-effect indicators, must be rigorously documented and recommendations should be made with respect to managing uncertainties in the assessment. (*Zubrow, Ezra B.A., 1984*).

<i>Impact Effect</i>	<i>Score</i>
Magnitude	0-4
Severity	0-4
Duration	0-4
Range	0-4
Frequency	0-4
Diversity	0-4
Cumulative effect	0-4
Rate of change	0-4
Total score:	0-32

Impact severity table.

Impacts will be defined along the following parameters of severity;

<i>Effect</i>	<i>Score</i>
No effect on site	0
Insignificant impact on site	1-5



Significant impact on site	6-16
Major destruction of site and attributes	17-24
Total destruction of sites and attributes	25-32

The study area was surveyed using standard archaeological surveying methods. The area was surveyed using directional parameters supplied by the GPS and surveyed by foot. This technique has proven to result in the maximum coverage of an area. This action is defined as;

'an archaeologist being present in the course of the carrying-out of the development works (which may include conservation works), so as to identify and protect archaeological deposits, features or objects which may be uncovered or otherwise affected by the works' (DAHGI 1999a, 28).

Standard archaeological documentation formats were employed in the description of sites. Using standard site documentation forms as comparable medium, it enabled the surveyors to evaluate the relative importance of sites found. Furthermore GPS (Global Positioning System) readings of all finds and sites were taken. This information was then plotted using a **eTrex Legend** GPS (WGS 84- datum).

Indicators such as surface finds, plant growth anomalies, local information and topography were used in identifying sites of possible archaeological importance. Test probes were done at intervals to determine sub-surface occurrence of archaeological material. The importance of sites was assessed by comparisons with published information as well as comparative collections.

Test excavation is that form of archaeological excavation where the purpose is to establish the nature and extent of archaeological deposits and features present in a location which it is proposed to develop (though not normally to fully investigate those deposits or features) and allow an assessment to be made of the archaeological impact of the proposed development. It may also be referred to as archaeological testing' (DAHGI 1999a, 27).

'Test excavation should not be confused with, or referred to as, archaeological assessment which is the overall process of assessing the archaeological impact of development. Test excavation is one of the techniques in carrying out archaeological assessment which may also include, as appropriate, documentary research, field walking, examination of upstanding or visible features or structures, examination of aerial photographs, satellite or other remote sensing imagery, geophysical survey, and topographical assessment' (DAHGI 1999b, 18).

All sites or possible sites found were classified using a hierarchical system wherein sites are assessed using a scale of zero to four according their importance. These categories are as follows;

<i>Degree of significance</i>	<i>Justification</i>	<i>Score</i>
-------------------------------	----------------------	--------------

Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	13 – 16
High significance	High degree of original fabric. Demonstrates a key element of item's significance. Alterations do not detract from significance.	9 – 12
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	5 – 8
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 4
Intrusive	Damaging to the item's heritage significance.	0

Table 1. Site significance table for pre-contact sites.

<i>Degree of significance</i>	<i>Justification</i>	<i>Score</i>
Exceptional significance	Rare or outstanding, high degree of intactness. Can be interpreted easily.	29 – 24
High significance	High degree of original fabric. Demonstrates a key element of item's significance. Alterations do not detract from significance.	13 – 18
Moderate significance	Altered or modified elements. Element with little heritage value, but which contribute to the overall significance.	7 – 12
Little significance	Alterations detract from significance. One of many. Alterations detract from significance.	1 – 6
Intrusive	Damaging to the item's heritage significance.	0

Table 2. Site significance table for post contact sites.

The qualitative value of a site's significance will be calculated by tabling its significance characteristics (as outlined in appendix B & C) on a sliding value scale and determining an accumulative value for the specific site. Two tables will be used;

Site significance characteristics slide scale (Pre-Contact Criteria)

Scientific Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
					Total Score

Table 3. Pre-contact site criteria (0- no value, 4- highest value)

Site significance characteristics slide scale (Post-Contact Criteria)					
Scientific Significance	0	1	2	3	4
Historic Significance	0	1	2	3	4
Public Significance	0	1	2	3	4
Other Significance	0	1	2	3	4
Ethnic Significance	0	1	2	3	4
Economic Significance	0	1	2	3	4
					Total Score

Table 4. Post-contact site criteria (0- no value, 4- highest value)

The values calculated (as specified in appendix B&C) are attributed to a category within the site significance table to provide the site with a quantifiable significance value. This will only be done for identified sites. Should an area under investigation not show any evidence of human activity this will be stated and no further qualifying will be done.

This information will be contained in a report that will strive to;

Review the purpose, approach, methodology and reporting of archaeological assessment and monitoring and propose guidelines on how to adequately address four key questions:

- i. What is the research value and potential of the archaeological remains?
- ii. What will the impact of development be?
- iii. What types of mitigation (by design modification or further investigation) would be appropriate to mitigate the impact of development and/or make a useful contribution to knowledge?
- iv. What will be the likely cost and timescale of any further investigation, analysis and reporting, given the nature of the archaeology and the type and extent of further work required?

Scientific Significance

(a) Does the site contain evidence which may substantively enhance understanding of culture history, culture process, and other aspects of local and regional prehistory?

internal stratification and depth

chronologically sensitive cultural items

materials for absolute dating

association with ancient landforms

quantity and variety of tool type

distinct intra-site activity areas

tool types indicative of specific socio-economic or religious activity

cultural features such as burials, dwellings, hearths, etc.



- diagnostic faunal and floral remains
- exotic cultural items and materials
- uniqueness or representativeness of the site
- integrity of the site

(b) Does the site contain evidence which may be used for experimentation aimed at improving archaeological methods and techniques?

- monitoring impacts from artificial or natural agents
- site preservation or conservation experiments
- data recovery experiments
- sampling experiments
- intra-site spatial analysis

(c) Does the site contain evidence which can make important contributions to paleoenvironmental studies?

- topographical, geomorphological context
- depositional character
- diagnostic faunal, floral data

(d) Does the site contain evidence which can contribute to other scientific disciplines such as hydrology, geomorphology, pedology, meteorology, zoology, botany, forensic medicine, and environmental hazards research, or to industry including forestry and commercial fisheries?

Public Significance

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

- integrity of the site
- technical and economic feasibility of restoration and development for public use
- visibility of cultural features and their ability to be easily interpreted
- accessibility to the public

- opportunities for protection against vandalism
- representativeness and uniqueness of the site
- aesthetics of the local setting
- proximity to established recreation areas
- present and potential land use
- land ownership and administration
- legal and jurisdictional status
- local community attitude toward development

(b) Does the site receive visitation or use by tourists, local residents or school groups?



Ethnic Significance

(a) Does the site presently have traditional, social or religious importance to a particular group or community?

ethnographic or ethno-historic reference

documented local community recognition or, and concern for, the site

Economic Significance

(a) What value of user-benefits may be placed on the site?

visitors' willingness-to-pay

visitors' travel costs

Scientific Significance

(a) Does the site contain evidence which may substantively enhance understanding of historic patterns of settlement and land use in a particular locality, regional or larger area?

(b) Does the site contain evidence which can make important contributions to other scientific disciplines or industry?

Historic Significance

(a) Is the site associated with the early exploration, settlement, land use, or other aspect of southern Africa's cultural development?

(b) Is the site associated with the life or activities of a particular historic figure, group, organization, or institution that has made a significant contribution to, or impact on, the community, province or nation?

(c) Is the site associated with a particular historic event whether cultural, economic, military, religious, social or political that has made a significant contribution to, or impact on, the community, province or nation?

(d) Is the site associated with a traditional recurring event in the history of the community, province, or nation, such as an annual celebration?

Public Significance

(a) Does the site have potential for public use in an interpretive, educational or recreational capacity?

visibility and accessibility to the public

ability of the site to be easily interpreted

opportunities for protection against vandalism

economic and engineering feasibility of reconstruction, restoration and maintenance

representativeness and uniqueness of the site

proximity to established recreation areas

compatibility with surrounding zoning regulations or land use

land ownership and administration

local community attitude toward site preservation, development or destruction

present use of site

(b) Does the site receive visitation or use by tourists, local residents or school groups?

Ethnic Significance

(a) Does the site presently have traditional, social or religious importance to a particular group or community?

Economic Significance

(a) What value of user-benefits may be placed on the site?

visitors' willingness-to-pay

visitors' travel costs

Integrity and Condition

(a) Does the site occupy its original location?

(b) Has the site undergone structural alterations? If so, to what degree has the site maintained its original structure?

(c) Does the original site retain most of its original materials?

(d) Has the site been disturbed by either natural or artificial means?

Other

(a) Is the site a commonly acknowledged landmark?

(b) Does, or could, the site contribute to a sense of continuity or identity either alone or in conjunction with similar sites in the vicinity?

(c) Is the site a good typical example of an early structure or device commonly used for a specific purpose throughout an area or period of time?

(d) Is the site representative of a particular architectural style or pattern?

Indicators of Impact Severity

Magnitude

The amount of physical alteration or destruction which can be expected. The resultant loss of heritage value is measured either in amount or degree of disturbance.

Severity

The irreversibility of an impact. Adverse impacts which result in a totally irreversible and irretrievable loss of heritage value are of the highest severity.

Duration

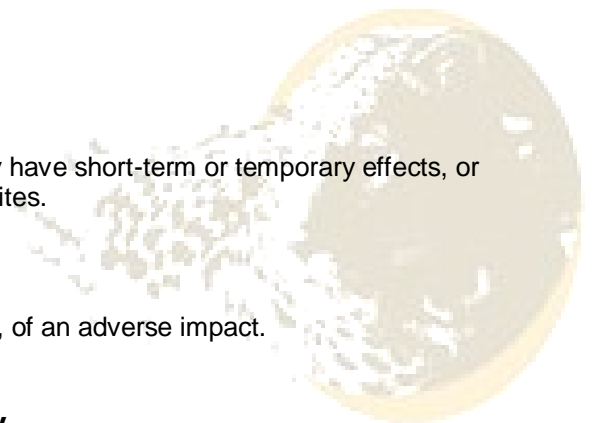
The length of time an adverse impact persists. Impacts may have short-term or temporary effects, or conversely, more persistent, long-term effects on heritage sites.

Range

The spatial distribution, whether widespread or site-specific, of an adverse impact.

Frequency

The number of times an impact can be expected. For



example, an adverse impact of variable magnitude and severity may occur only once. An impact such as that resulting from cultivation may be of recurring or ongoing nature.

Diversity

The number of different kinds of project-related actions expected to affect a heritage site.

Cumulative Effect

A progressive alteration or destruction of a site owing to the repetitive nature of one or more impacts.

Rate of Change

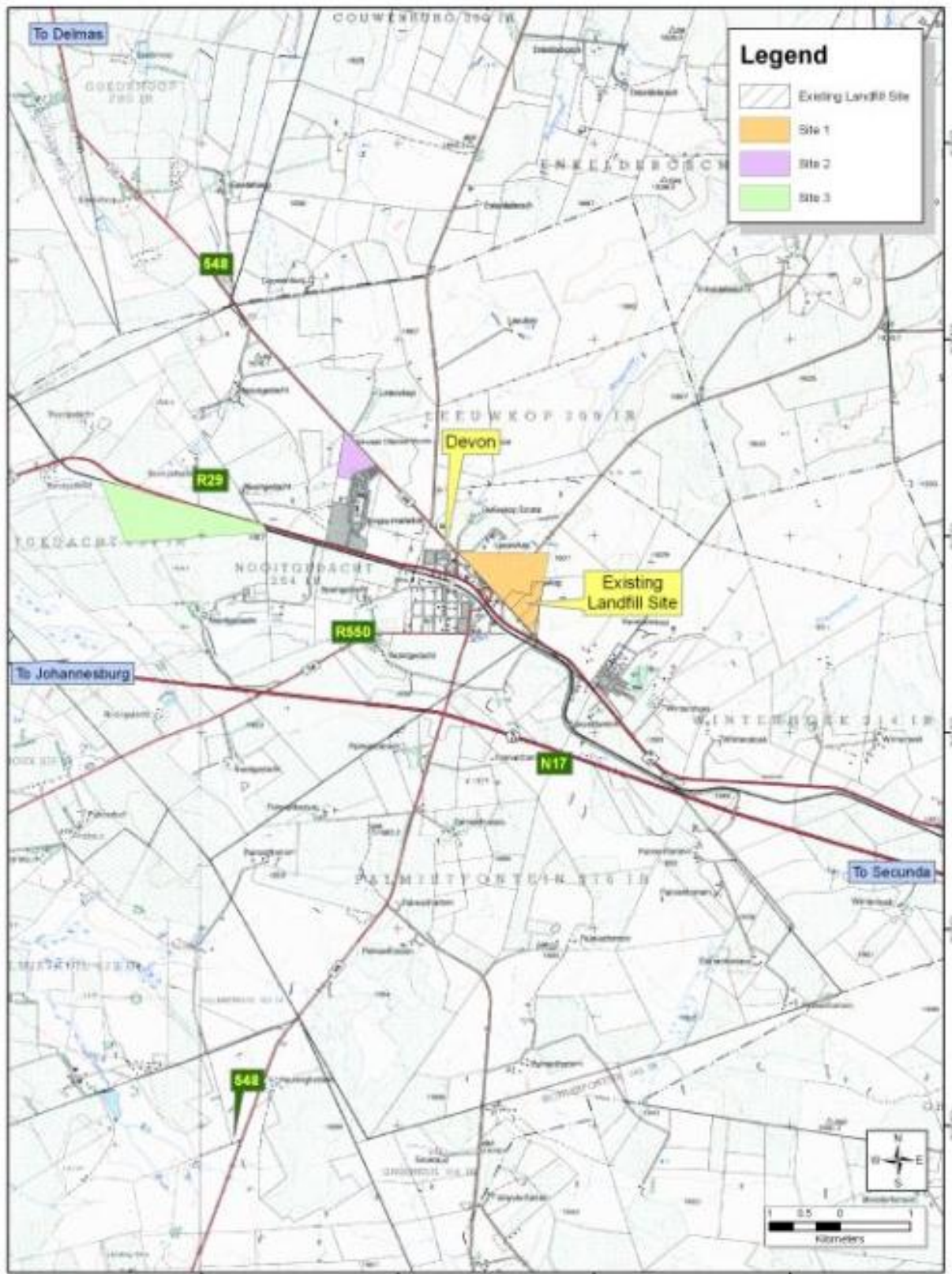
The rate at which an impact will effectively alter the integrity or physical condition of a heritage site. Although an important level-of-effect indicator, it is often difficult to estimate. Rate of change is normally assessed during or following project construction.



APPENDIX B

Location Map







Alternative 3

Alternative 2

Alternative 1

R550

R548

R29

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©2010 Google

Imagery Dates: Oct 23, 2004 - May 4, 2005

26°20'57.99" S 28°46'27.73" E elev 1667 m

Eye alt 7.04 km

