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## Environmental Impact Assessment for the Newcastle Landfill Project

## Heritage Impact Assessment

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**Project Number:**

GCS5072 (GCS: 17-0212)

**Prepared for:**

GCS Water and Environmental Consultants

March 2018

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Digby Wells and Associates (South Africa) (Pty) Ltd  
Co. Reg. No. 2010/008577/07. Turnberry Office Park, 48 Grosvenor Road, Bryanston, 2191. Private Bag  
X10046, Randburg, 2125, South Africa  
Tel: +27 11 789 9495, Fax: +27 11 069 6801, info@digbywells.com, www.digbywells.com

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Directors: GE Trusler (C.E.O), GB Beringer, LF Koestlag, J Leaver (Chairman)\*, NA Mehlomakulu\*,  
MJ Morifi\*, DJ Otto, RA Williams\*  
\*Non-Executive

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<b>Name</b>	<b>Responsibility</b>	<b>Signature</b>	<b>Date</b>
Shannon Hardwick Assistant HRM Consultant ASAPA Member: 451	Site Visit HIA Compilation		March 2018
Justin du Piesanie Manager: HRM ASAPA Member 270	Technical Review		

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## EXECUTIVE SUMMARY

Digby Wells Environmental (hereinafter Digby Wells) are providing specialist services to GCS Water and Environmental Consultants (hereinafter GCS). GCS has been appointed to undertake an Environmental Impact Assessment (EIA) for the Newcastle Landfill (“the Project”) proposed by the Newcastle Local Municipality (NLM).

The aim of the Heritage Resources Management (HRM) process was to comply with the regulatory requirements encapsulated in Section 38(3) of the National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act, 2008 (Act 4 of 2008) (KZNHA). The following activities were completed:

- Description of the predominant cultural landscape supported by primary and secondary data collection;
- Identification, as far as feasible, of the heritage resources within the site-specific study area which may be impacted by Project activities;
- The assessment of the Cultural Significance (CS) of the heritage resources identified as per the activity above;
- Identification of potential impacts to heritage resources based in Project activities;
- Recommendations of feasible management or mitigation measures to avoid and/or minimise negative impacts and enhance potential benefits; and
- Considerations of the socio-economic benefits of the Project.

Through an understanding of the distribution of the various heritage resources within the site-specific study area, a statement of CS as presented in the table below demonstrates a generally negligible significance rating for the defined cultural landscape, the very high CS of the palaeontological features underlying the site-specific study area notwithstanding.

Resource ID	Description	INTEGRITY	CS Value	Cultural Significance
Vryheid Formation	Geological strata with palaeontological sensitivity	4	20	Very High
LFC-001	Late Farming Community (LFC) stonewalled site (1)	2	3	Negligible
LFC-002	LFC stonewalled site (2)	1	1	Negligible

The proposed Project will include the construction of infrastructure associated with the landfill, including: a canteen, guardhouse, perimeter fence, leachate management infrastructure, site offices, staff ablutions, stormwater management system, a weighbridge and a workshop, as well as an access road and other roads on site. It is understood that this construction may include some excavation activities. The construction activities pose a risk of negative impacts (such as damage or destruction) to the identified heritage resources; this risk is intrinsically linked to the depth and location of the proposed construction activities. These risks are summarised in the table below (Table 6-6 in the main text).

### Summary of the potential risk to heritage resources

Phase	Activity	Risk	Potential Impact
Construction	Construction of the aforementioned infrastructure relating to the landfill	<p>Construction activities that take place within a buffer zone created to protect the heritage resources may cause harm to the LFC stonewalled sites.</p> <p>Excavation related to construction activities may damage or destroy fossils in the palaeontologically sensitive geological layers.</p>	<p>Destruction of or disturbance to NHRA Section 35 resources and KZNHA Section 36 resources, i.e. archaeological and/or palaeontological resources.</p>

The two LFC stonewalled sites are of negligible CS. According to the South African Heritage Resources Authority (SAHRA) Minimum Standards, heritage resources of negligible CS require no further mitigation beyond their inclusion into this report. The stonewalled sites have been included into Table 5-4 in the main text and this is considered sufficient to meet the SAHRA Minimum Requirements. This notwithstanding, Digby Wells recommends that a buffer zone be created where possible between these heritage resources and the proposed infrastructure associated with the landfill.

The geological setting of the site-specific study area includes the palaeontologically-sensitive layers of the Ecca Group of the Karoo Supergroup, represented by the *Vryheid Formation*. This feature is known for its fossil potential and has been assigned a very high CS.

A Chance Finds Procedure must be developed and implemented prior to the commencement of the construction phase of the Project. A Fossil Chance Finds Procedure must be developed and implemented prior to the commencement of the construction phase and a qualified palaeontologist must oversee excavation activities associated with the proposed construction if necessary.

Where these recommendations are adopted, Digby Wells does not object to the implementation of the Project.

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## 1 Introduction

The Newcastle Local Municipality (NLM) proposes to construct a landfill and associated infrastructure (“the Project”) to meet the waste disposal needs of its inhabitants. To this end, a Draft Basic Assessment Report (BAR) was submitted<sup>1</sup> to the relevant Heritage Resource Authorities (HRAs), in this instance the South African Heritage Resources Agency (SAHRA) and *Amafa AkwaZulu-Natali* (Amafa). Amafa subsequently issued interim comment<sup>2</sup> requiring that a desktop palaeontological assessment and a Phase 1 Heritage Impact Assessment (HIA) be undertaken in accordance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and the KwaZulu-Natal Heritage Act, 2008 (Act 4 of 2008) (KZNHA).

Digby Wells Environmental (hereinafter Digby Wells) were appointed by GCS to provide specialist services to GCS Water and Environmental Consultants (hereinafter GCS). GCS has been appointed to undertake an Environmental Impact Assessment (EIA) for the Project (GCS project reference: 17-0212).

This report constitutes the HIA to comply with the NHRA and KZNHA and to address the requirements of the interim comment issued by Amafa.

### 1.1 Project background and description

The NLM proposes to construct a landfill and associated infrastructure, including:

- Canteen;
- Guardhouse;
- Perimeter fence;
- Leachate management infrastructure;
- Site offices;
- Staff ablutions;
- Stormwater management system;
- Weighbridge;
- Workshop; and
- Access and internal roads.

The landfill is expected to have a lifespan of 42 years, with an assumed annual growth rate of 3%. The landfill will cover approximately 55 hectares (ha) reaching a maximum height of

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<sup>1</sup> Gasa 2016. SAHRIS Case ID: 7654; accessible at: <http://www.sahra.org.za/sahris/cases/newcastle-landfill-development>

<sup>2</sup> Dated 17 June 2015, available at: <http://www.sahra.org.za/sahris/node/280286>



35 m. When considering the ancillary infrastructure, the total development footprint will cover an approximate 180 ha (Gasa, 2016).

Several locations within the NLM were assessed for suitability in respect of this Project (please refer to Gasa, 2016 for more detail). The selected site for the proposed landfill is on the farm Greenwich 8784. The location details for the Project are presented in Table 1-1 and illustrated in Plan 1 (attached in Appendix B). The farm is accessible via a gravel road which joins the N11 highway. The NLM proposes to upgrade this road to facilitate access to the site.

**Table 1-1: Project location details**

<b>Province</b>	KwaZulu-Natal (KZN)
<b>Responsible Municipalities</b>	NLM Amajuba District Municipality (ADM)
<b>Town</b>	Newcastle
<b>Erf or farm number/s</b>	Greenwich 8784
<b>Street address or location (e.g.: Off R44)</b>	Located on a gravel road off of the N11 highway, approximately 11 km south of Newcastle
<b>Coordinates of approximate centre of project area</b>	27° 50'53.6" S 29° 55'12.2" E
<b>Extent of property</b>	Approximately 780 ha
<b>Maximum extent of proposed development</b>	180 ha
<b>Current use</b>	Vacant land, animal husbandry
<b>Predominant land cover of surrounding properties</b>	Grasslands and plantations (woodlots) with some thicket and dense bush.

## 1.2 Project alternatives

Prior to the commencement of this study and as part of the site-selection process, the following alternatives were considered (refer to Gasa 2016 for more detail):

- Location alternatives: sixteen alternative sites on vacant land within the NLM were assessed for their suitability in terms of access and receiving environment;
- Technological alternatives: these alternatives included waste minimisation and other waste management strategies. These strategies aim to reduce the amount of waste which requires disposal and were considered in the design of the proposed landfill; and
- The no-go alternative, which would result in the *status quo* remaining unchanged.

The Greenwich site was chosen as the most suitable site for the landfill, due to its access to the N11 highway and various components of the natural setting.

### 1.3 Terms of Reference

The Terms of Reference (ToR) for the specialist HRM Process are to address the requirements of the interim comment issued by Amafa through the completion of an HIA report. Digby Wells completed the HRM process in accordance with Section 38(8) of the NHRA and the KZNHA.

### 1.4 Scope of Work

The Scope of Work (SoW) for the specialist HRM process included the compilation of an HIA to comply with the requirements of the interim comment passed by Amafa as well as those encapsulated in the KZNHA and Section 38(3) of the NHRA. The following activities were completed as part of the SoW:

- Description of the predominant cultural landscape supported through secondary and primary data collection;
- Undertaking historical layering to identify potential structures older than 60 years that are protected under Section 34 of the NHRA and Section 33 of the KZNHA, or any other tangible heritage resources;
- Assessment of the Cultural Significance (CS) of identified heritage resources;
- Identification of potential impacts to heritage resources based on Project activities;
- An evaluation of the potential impacts to heritage resources relative to the sustainable socio-economic benefits that may be derived from the Project;
- Recommending feasible management or mitigation measures to avoid and/or minimise negative impacts and enhance potential benefits; and
- Submission of the HIA report to SAHRA and Amafa for Statutory Comment as required under Section 38(8) of the NHRA.

## 1.5 Expertise of the specialist

The expertise of the specialists is presented in Table 1-2. The relevant CVs are attached in Appendix A.

**Table 1-2: Expertise of the specialists**

Team Member	Bio Sketch
<p><b>Shannon Hardwick</b></p> <p>ASAPA Member: 451</p> <p>Years' Experience: 1</p>	<p>Shannon joined the Digby Wells team in May 2017 as a Heritage Management Intern, and has subsequently been appointed as an Assistant Heritage Resources Management Consultant. Shannon is an archaeologist who obtained an MSc degree from the University of the Witwatersrand in 2013, specialising in historical archaeobotany in the Limpopo Province. She is a published co-author of one paper in <i>Journal of Ethnobiology</i>. Since joining Digby Wells, Shannon has gained generalist experience through the compilation of NID applications, cultural baselines and HRM (Heritage Scoping, HIA and Heritage Basic Assessment) reports. Her other experience includes compiling a Community Health, Safety and Security Management Plan (CHSSMP) and social baselines and researching Artisanal and Small-Scale Mining for input into a Livelihood Restoration Framework (LRF). Shannon's experience in the field includes pre-disturbance surveys in South Africa and fieldwork in Malawi.</p>
<p>Justin du Piesanie</p> <p>ASAPA Member 270</p> <p>AMAFSA Registered ICOMOS Member 14274</p> <p>IAIASa Member</p> <p>Years' Experience: 11</p>	<p>Justin is the HRM Manager at Digby Wells. Justin joined the company in August 2011 as an archaeologist and was subsequently made manager in the Social and Heritage Services Department. He obtained his Master of Science (MSc) degree in Archaeology from the University of the Witwatersrand in 2008, specialising in the Southern African Iron Age. Justin also attended courses in architectural and urban conservation through the University of Cape Town's Faculty of Engineering and the Built Environment Continuing Professional Development Programme in 2013. Justin is a professional member of the Association of Southern African Professional Archaeologists (ASAPA), and accredited by the association's Cultural Resources Management (CRM) section. He is also a member of the International Council on Monuments and Sites (ICOMOS), an advisory body to the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Convention. He has over 12 years combined experience in HRM in South Africa, including heritage assessments, archaeological mitigation, grave relocation, and NHRA Section 34 application processes. Justin has gained further generalist experience since his appointment at Digby Wells in Botswana, Burkina Faso, Cameroon, the Democratic Republic of Congo, Liberia, Mali, Tanzania, and Senegal on projects that have required compliance with IFC requirements such as Performance Standard 8: Cultural Heritage. Furthermore, Justin has acted as a technical expert reviewer of HRM projects undertaken in Cameroon and Senegal. Justin's current focus at Digby Wells is to develop the HRM process as an integrated discipline following international HRM principles and standards. This approach aims to provide clients with comprehensive, project-specific solutions that promote ethical heritage management and assist in achieving</p>

Team Member	Bio Sketch
	strategic objectives.

## 1.6 Structure of the report

The remainder of the report, with references to the relevant information required in terms of Section 38(3) of the NHRA, is structured as per the below table.

**Table 1-3: Structure of the report**

Section	Description	NHRA information requirements
2	Outlines the legislative framework relevant to the specialist heritage study.	-
3	Identifies the specific constraints and limitations of the HIA.	-
4	Describes the methodology employed in the compilation of this HIA.	-
5	Provides the baseline cultural landscape.	38(3)(a)
0	Motivates for the defined CS of the identified heritage resources and landscape.	38(3)(b)
	Considers the potential impacts to heritage resources by project related activities.	38(3)(c)
	Outlines possible risks to heritage resources and heritage related risks to the project.	
7	Considers the development context to assess the socio-economic benefits of the project in relation to the presented impacts and risks.	38(3)(d)
8	Presented the results of consultation.	38(3)(e)
9	Details the specific recommendations based on the contents of the HIA.	38(3)(g)
10	Collates the most salient points of the HIA and concludes with the specific outcomes and recommendations of the study.	38(3)(f) 38(3)(g)
11	Lists the source material used in the development of the report.	-

## 2 Legislative and policy framework

The HRM process is governed by the national legislative framework. This section provides a brief summary of the relevant legislation pertaining to the conservation and responsible management of heritage resources.

**Table 2-1: Applicable legislation considered in the HRM process**

Applicable legislation used to compile the report	Reference where applied
<p><b><u>Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)</u></b></p> <p>Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –</p> <ol style="list-style-type: none"> <li>i. Prevent pollution and ecological degradation;</li> <li>ii. Promote conservation; and</li> <li>iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development</li> </ol>	<p>The HRM process is being undertaken to identify heritage resources and determine heritage impacts associated with the Project.</p> <p>As part of the HRM process, applicable mitigation measures, monitoring plans and/or remediation will be recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.</p>
<p><b><u>National Environmental Management Act, 1998 (Act No. 107 of 1998)</u></b></p> <p>The NEMA, as amended, was set in place in accordance with section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making on issues affecting the environment. Section 24 (1)(a), (b) and (c) of NEMA state that:</p> <p><i>The potential impact on the environment, socio-economic conditions and cultural heritage of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.</i></p> <p>The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN)</p>	<p>The application process is being undertaken in accordance with the principles of Section 2 of NEMA as well as with the EIA 2017 Regulations, promulgated in terms of NEMA.</p> <p>Based on the regulatory process, it has been identified that a full EIA process is required for the Project.</p>

Applicable legislation used to compile the report	Reference where applied
<p>R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2) and GN R.985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended.</p>	
<p><b><u>GN R. 982: Environmental Impact Assessment Regulations, 2014 (as amended by GN R 326 of 7 April 2017)</u></b></p> <p>These three listing notices set out a list of identified activities which may not commence without an Environmental Authorisation from the relevant Competent Authority through one of the following processes:</p> <ul style="list-style-type: none"> <li>▪ Regulation GN R. 983 - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation and which must follow a basic assessment process.</li> <li>▪ Regulation GN R. 984 – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation and which must follow an environmental impact assessment process.</li> <li>▪ Regulation GN R. 985 – Listing Notice 3: This notice provides a list of various environmental activities which have been identified by provincial governmental bodies which if undertaken within the stipulated provincial boundaries will require environmental authorisation. The basic assessment process will need to be followed.</li> </ul>	<p>This HIA was completed to inform the EIA process to comply with Section 24 of the NEMA.</p>
<p><b><u>National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA)</u></b></p> <p>The NHRA is the overarching legislation that protects and regulates the management of heritage resources in South Africa, with specific reference to the following Sections:</p> <ul style="list-style-type: none"> <li>▪ 5. General principles for HRM</li> </ul>	<p>This HIA will be submitted to the SAHRA and Amafa. The HIA was compiled to comply with Section 5, 38(3), (4) and (8) of the NHRA.</p>

Applicable legislation used to compile the report	Reference where applied
<ul style="list-style-type: none"> <li>▪ 6. Principles for management of heritage resources</li> <li>▪ 7. Heritage assessment criteria and grading</li> <li>▪ 38. Heritage resources management</li> </ul> <p>The Act requires that Heritage Resources Authorities (HRAs), in this case SAHRA and MPRHA, be notified as early as possible of any developments that may exceed certain minimum thresholds in terms of Section 38(1), or when assessments of impacts on heritage resources are required by other legislation in terms of Section 38(8) of the Act.</p>	
<p><b><u>KwaZulu Natal Heritage Act, 2008 (Act no. 4 of 2008) (KZNHA)</u></b></p> <p>The KZNHA provides for the protection and management of heritage resources within KZN. These heritage resources take account of those under general protection and special protection, including:</p> <ul style="list-style-type: none"> <li>■ General protection:                             <ul style="list-style-type: none"> <li>▪ Structures under Section 33;</li> <li>▪ Graves of victims of conflict under Section 34;</li> <li>▪ Traditional burial places under Section 35; and</li> <li>▪ Battlefields, archaeological sites, rock art sites, palaeontological sites, historic fortifications, meteorite or meteorite impact sites under Section 36.</li> </ul> </li> <li>■ Special Protection:                             <ul style="list-style-type: none"> <li>▪ Heritage Landmark under Section 38;</li> <li>▪ Provincial Landmark under Section 39;</li> <li>▪ Graves of members of the Royal Family under Section 40;</li> <li>▪ Battlefield sites, public monuments</li> </ul> </li> </ul>	<p>This HIA was compiled to comply with the NHRA (as above) but takes into consideration the requirements encapsulated in the KZNHA, particularly the general protection afforded to heritage resources including archaeological sites under Section 36.</p>

Applicable legislation used to compile the report	Reference where applied
<p>and memorials under Section 41; and</p> <ul style="list-style-type: none"> <li>▪ Heritage Objects under Section 43.</li> </ul> <p>In terms of the KZNHA, a permit is required to carry out certain listed activities. To accomplish this, a NDA form must be completed for any proposed development. This form is submitted to Amafa for processing after which Amafa will issue comments for further heritage studies, if necessary.</p>	

**Table 2-2: Applicable policies considered in the HRM process**

Applicable policies used to compile the report	Reference where applied
<p><b><u>SAHRA Archaeology, Palaeontology and Meteorites (APM) Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports (2007)</u></b></p> <p>The guidelines provide the minimum standards that must be adhered to for the compilation of a HIA Report.</p> <p>Chapter II Section 7 outlines the minimum requirements for inclusion in the heritage assessment as follows:</p> <ul style="list-style-type: none"> <li>▪ Background information on the Project;</li> <li>▪ Background information on the cultural baseline;</li> <li>▪ Description of the properties or affected environs;</li> <li>▪ Description of identified sites or resources;</li> <li>▪ Recommended field rating of the identified sites to comply with Section 38 of the NHRA;</li> <li>▪ A statement of Cultural Significance in terms of Section 3(3) of the NHRA; and</li> <li>▪ Recommendations for mitigation or management of identified heritage resources.</li> </ul>	<p>The HIA was compiled to adhere to the minimum standards as defined by Chapter II of the SAHRA APM Guidelines (2007)</p>



### 3 Constraints and limitations

The following limitations and constraints were experienced in the compilation of this report:

- Whilst every attempt was made to obtain the most recent information available, the reviewed literature does not represent an exhaustive list of information sources for the greater study area;
- Visibility at the site was hampered by the local vegetation, including tall grass and dense copses of trees (please see Section 5.1 for a description of the local environment);
- Palaeontological and archaeological resources commonly occur at subsurface levels. These types of resources may not be adequately recorded or documented by assessors without intrusive and destructive methodologies. Therefore, the reviewed literature, previously completed assessments, and the results of the field survey are in themselves limited to surface observations.

## 4 Methodology

### 4.1 Defining the study area

Heritage resources do not exist in isolation to the greater natural and social (including socio-cultural, -economic and -political) environment. In addition, the NHRA requires the grading of heritage resources in terms of national, provincial and local concern based on their importance and consequent official (i.e. State) management effort required. The type and level of baseline information required to adequately predict heritage impacts varies between these categories. Three 'concentric' study areas were defined for the purposes of this study. The defined study areas include the following:

- The *site-specific* study area: the farm portion/s associated with the proposed Project including a 500m buffer area or, in a linear development, the proposed development footprint(s) including a 200m buffer on either side. The site-specific study area here is not linear and so is defined by the former criteria;
- The *local* study area: the area most likely to be influenced by any changes to heritage resources in the Project area, or where project development could cause heritage impacts. Defined as the area bounded by the local municipality, in this instance the NLM, with particular reference to the immediate surrounding properties / farms. The local study area was specifically examined to offer a backdrop to the socio-economic conditions within which the proposed development will occur. The local study area furthermore provided the local development and planning context that may contribute to cumulative impacts; and
- The *regional study* area: the area bounded by the district municipality, which here is the ADM. Where necessary, the regional study area may be extended outside the boundaries of the district municipality to include much wider regional expressions of

specific types of heritage resources and historical events. The regional study area also provided the regional development and planning context that may contribute to cumulative impacts.

## 4.2 Statement of cultural significance

Digby Wells designed the significance rating process to provide a numerical rating of the CS<sup>3</sup> of identified heritage resources. This process considered heritage resources assessment criteria set out in subsection 3(3) of the NHRA, which determined the intrinsic, comparative and contextual significance of identified heritage resources. A resource's importance rating was based on information obtained through review of available credible sources and the representativity or uniqueness of that resource (i.e. known examples of similar resources to exist).

The rationale behind the heritage value matrix takes into account that a heritage resource's value is a direct indication of its sensitivity to change (i.e. impacts). Value, therefore, was determined prior to completing any assessment of impacts.

The matrix rated the potential, or importance, of an identified resource relative to its contribution to certain values – aesthetic, historical, scientific and social. Resource significance was directly related to the impact on it that could result from project-related activities, as it provided minimum accepted levels of change to the resource.

## 4.3 Definition of heritage impacts

Potential impacts to heritage resources may manifest differently across geographical areas or diverse communities when one considers the simultaneous affect to the tangible resource and social repercussions associated with the intangible aspects. Furthermore, potential impacts may concurrently influence the CS of heritage resources. This assessment therefore considers three broad categories adapted from Winter & Baumann (2005, p. 36).

**Table 4-1: Impact definition**

Category	Description
Direct Impact	Affect the fabric or physical integrity of the heritage resource, for example destruction of an archaeological site or historical building. Direct impacts may be the most immediate and noticeable. Such impacts are usually ranked as the most intense, but can often be erroneously assessed as high-ranking.
Indirect Impact	Occur later in time or at a different place from the causal activity, or as a

<sup>3</sup> Cultural significance is defined in the NHRA as the intrinsic "aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance" of a heritage resource. These attributes are combined and reduced to four themes used in the Digby Wells significance matrix: aesthetic, historical, scientific and social.

Category	Description
	result of a complex pathway. For example, restricted access to a heritage resource resulting in the gradual erosion of its CS that may be dependent on ritual patterns of access. Although the physical fabric of the resource is not affected through any direct impact, its significance is affected to the extent that it can ultimately result in the loss of the resource itself.
Cumulative Impact	Result from in-combination effects on heritage resources acting within a host of processes that are insignificant when seen in isolation, but which collectively have a significant effect. Cumulative effects can be: <ul style="list-style-type: none"> <li>▪ Additive: the simple sum of all the effects, e.g. the reclamation of a historical TSF will minimise the sense of the historic mining landscape.</li> <li>▪ Synergistic: effects interact to produce a total effect greater than the sum of the individual effects, e.g. the removal of all historical TSFs will sterilise the historic mining landscape.</li> <li>▪ Time crowding: frequent, repetitive impacts on a particular resource at the same time, e.g. the effect of regular blasting activities on a nearby rock art site or protected historical building could be high.</li> <li>▪ Neutralizing: where the effects may counteract each other to reduce the overall effect, e.g. the effect of changes from a historic to modern mining landscape could reduce the overall impact on the sense-of-place of the study area.</li> <li>▪ Space crowding: high spatial density of impacts on a heritage resource, e.g. density of new buildings resulting in suburbanisation of a historical rural landscape.</li> </ul>

#### 4.4 Secondary data collection

Data collection assists in the development of a cultural heritage baseline profile of the study area under consideration. Qualitative data was collected to inform this HIA and was primarily obtained through secondary information sources, i.e. desktop literature review and historical layering.

A survey of diverse information repositories was made to identify appropriate relevant information sources. These sources were analysed for credibility and relevance. Credible, relevant sources were then critically reviewed. The objectives of the literature review were to:

- Gain an understanding of the cultural landscape within which the proposed Project is located; and
- Identify any potential fatal flaws, sensitive areas, current social complexities / issues and known or possible tangible heritage.

Repositories that were surveyed included the South African Heritage Resources Information System (SAHRIS), online / electronic journals and platforms, and certain internet sources.

This HIA only includes a summary and discussion of the most relevant findings. Relevant sources were cited and included in a reference list (Section 11).

**Table 4-2: Qualitative data sources**

<b>Reviewed Qualitative Data</b>		
<b>Databases</b>		
SAHRIS	Wazimap (2017 adapted from Statistics South Africa (2011))	
<b>SAHRIS Cases</b>		
Case ID: 10261	Case ID: 8442	Map ID: 2881
Case ID: 5016	Case ID: 5812	
<b>Cited Text</b>		
AMAFA, 2017	Amajuba District Municipality, 2014	Bamford, 2012, 2014, 2016
Behrens & Swanepoel, 2008	Clark, 1982	Deacon & Deacon, 1999
Delius, et al., 2014	Derwent, 2006	Esterhuysen & Smith, 2007
Gasa, 2016	Groenewald & Groenewald, 2014	Huffman, 2007
Johnson, et al., 1996, 2006	Makhura, 2007	Mitchell, 2002
Mucina & Rutherford, 2010	NLM, 2017	Rubidge, 2013a, 2013b
SAHRA, 2017	SAHRA, 2013	South African History, 2014
Swanepoel, et al., 2008	Williams & Brundy, 2014	

Historical layering is a process whereby diverse cartographic sources from various time periods are layered chronologically using Geographic Information System (GIS). The rationale behind historical layering is threefold, as it:

- Enables a virtual representation of changes in the land use of a particular area over time;
- Provides relative dates based on the presence / absence of visible features; and

- Identifies potential locations where heritage resources may exist within an area.

The historical images used are listed in Table 4-3.

**Table 4-3: Historical imagery sources**

Historical Imagery					
Map Series	Name / Number				Date
Jackson	Vryheid				1904
Aerial photographs					
Job no.	Flight plan	Photo no.	Area	Date	Ref.
66	6	16531	Dundee/Newcastle	1944	66/1944
66	7	16532, 16564	Dundee/Newcastle	1944	66/1944

## 4.5 Primary data collection

Primary data was collected by Shannon Hardwick and Tsholofelo Selepeng through a pre-disturbance survey of the Project area which was completed on 20 and 21 February 2018. The field-based data collection was pedestrian and non-intrusive (i.e. no samples were taken). The objectives of the pre-disturbance survey were to:

- Visually record the current state of the cultural landscape;
- Verify certain heritage resources identified in the historical layering; and
- Record a representative sample of visible tangible heritage resources present within the site-specific and regional study areas.

Identified heritage resources are recorded as waypoints using a handheld GPS device and documented through written and photographic records. The results of the survey are discussed in Section 5.4.

## 4.6 Site naming convention

Heritage resources identified by Digby Wells during the field survey were prefixed by the SAHRIS case identification generated for this Project. Information on the relevant period / feature code and site number followed (e.g. 7654/LFC-001). This number may be shortened on plans or figures to the period / feature code and site number (e.g. LFC-001). The time periods considered in this report are presented in Table 5-1.

Heritage resources identified through secondary data collection were prefixed by the relevant SAHRIS case or map identification (*where applicable*), and the original site name used by the author (e.g. 2881/Site1).

## 5 Cultural heritage baseline description

The cultural heritage baseline description considered the predominant landscape based on the identified heritage resources within the regional and local study area. Table 5-1 presents the broad timeframes for the major periods of the past in South Africa.

**Table 5-1: Archaeological periods in South Africa (adapted from Esterhuysen & Smith, 2007)**

<b>The Stone Age</b>	Early Stone Age (ESA)	2 million years ago (mya) to 250 thousand years ago (kya)
	Middle Stone Age (MSA)	250 kya to 20 kya
	Later Stone Age (LSA)	20 kya to 500 Common Era <sup>4</sup> (CE)
<b>Farming Communities</b>	Early Farming communities (EFC)	500 to 1400 CE
	Late Farming Communities (LFC)	1100 to 1800 CE
<b>Historical Period</b>	-	1500 CE to 1994 (Behrens & Swanepoel, 2008)

In southern Africa, the last 500 years represents a formative period that is marked by enormous internal economic invention and political experimentation that shaped the cultural contours and categories of modern identities outside of European contact. This period is currently not well documented, but is being explored through the 500 year initiative (Swanepoel, et al., 2008).

### 5.1 Existing Environment

The site-specific study area was subject to an ecological analysis in 2014 (Williams & Brundy, 2014). This study classified the site-specific study area as being of the Northern KZN Moist Grassland. This grassland unit occurs in the northern and north-western regions of KZN within the Thukela River catchment (Mucina & Rutherford, 2010). Tall tussock grassland occurs over hilly and undulating landscapes and open savannoid woodlands can occur in disturbed areas. The vegetation is usually associated with mudstones, shales and sandstones of the Karoo Supergroup (see Section 5.2). This habitat is considered vulnerable, with much of the vegetation removed for cultivation, plantations and dams and through urban sprawl.

<sup>4</sup> Common Era (CE) refers to the same period as *Anno Domini* ("In the year of our Lord", referred to as AD): i.e. the time after the accepted year of the birth of Jesus Christ and which forms the basis of the Julian and Gregorian calendars. Years before this time are referred to as 'Before Christ' (BC) or, here, BCE (Before Common Era).

Williams and Bundy (2014) noted that the site-specific study area was heavily disturbed, which has affected the species diversity of the site. The site has been subject to anthropogenic disturbance, including regular burning, and overgrazing. Portions of the site have been invaded by an invasive exotic wattle species, *Acacia mearnsii*, which has caused changes in the ecology of the site. These disturbances were evident in the pre-disturbance survey undertaken for this assessment. The environmental conditions are illustrated in Figure 5-1 below.



**Figure 5-1: Summary of the environmental conditions in the site-specific study area**

## 5.2 Geological context and palaeontological sensitivity

KZN is underlain by the Main Karoo Basin and lithostratigraphic units associated with the Karoo Supergroup. The regional geology is illustrated in Plan 2 (attached in Appendix B) and the relevant geological sequence is illustrated in Table 5-2.

The Main Karoo Basin dates to the Late Carboniferous to Middle Jurassic periods (approximately 320 to 145 mya) and constitutes a retro-arc foreland basin. As described by Johnson *et al* (2006), this is because of:

- The thick flysch-molasse succession which wedges out northwards over the adjacent craton;
- The Main Karoo Basin's position behind an inferred magmatic arc; and



- The associated fold thrust belt produced by the northward subduction of oceanic lithosphere located south of the arc.

The basin was subsequently sedimented, forming what is collectively known as the Karoo Supergroup (Johnson, et al., 2006). These sediments cover approximately 700 000 km<sup>2</sup>, including the site-specific study area. The Karoo Supergroup is known for its extensive dolerite dykes and sills among the sediments, which include terrestrial vertebrate fossils, distinctive plant fossil assemblages and thick glacial deposits (Johnson, et al., 1996; 2006). Figure 5-2 illustrates the extent of the Karoo basins and the envisaged plate tectonic setting of the basin in the Late Triassic.



**Table 5-2: Geological setting and fossil heritage of the site-specific study area within the regional study area**

Eon	Era	Period	Mya	Lithostratigraphic Units			Significance	Fossils
				Supergroup	Group	Formation		
Phanerozoic	Mesozoic	Jurassic	145			Karoo dolerites	Negligible	None
	Palaeozoic	Permian	300	Karoo	Ecca	Vryheid	Very High	Abundant fossils of Glossopteris and other plants, including lycopods, rare ferns and horsetails, abundant glossopterids, cordaitaleans, conifers and ginkgoaleans. Fossil wood is rare, but does occur. Diverse palynomorphs. Abundant, low-diversity trace fossils, rare insects, possible conchostracans, non-marine bivalves and fish scales also occur. The reptile Mesosaurus has been found in the southern part of the Karoo Basin.

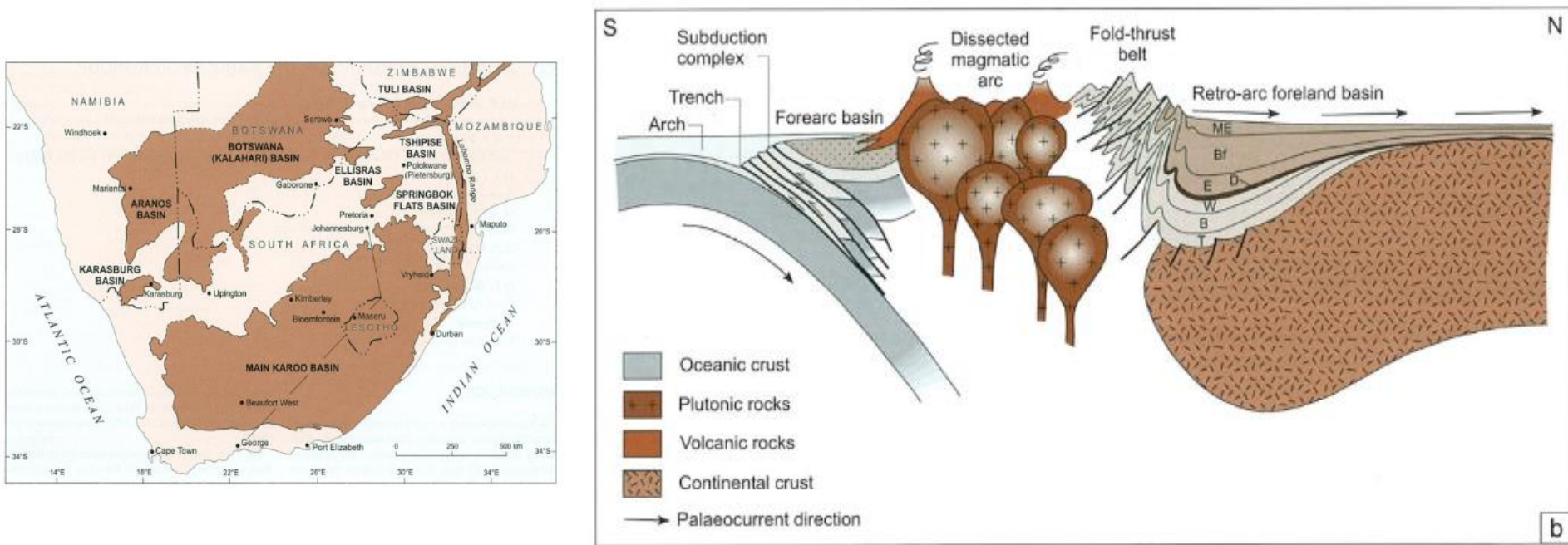


Figure 5-2: Location and envisaged plate tectonic setting of the Main Karoo Basin during the Late Triassic. E = Ecca Group (adapted from Johanson, *et al.*, 2006)



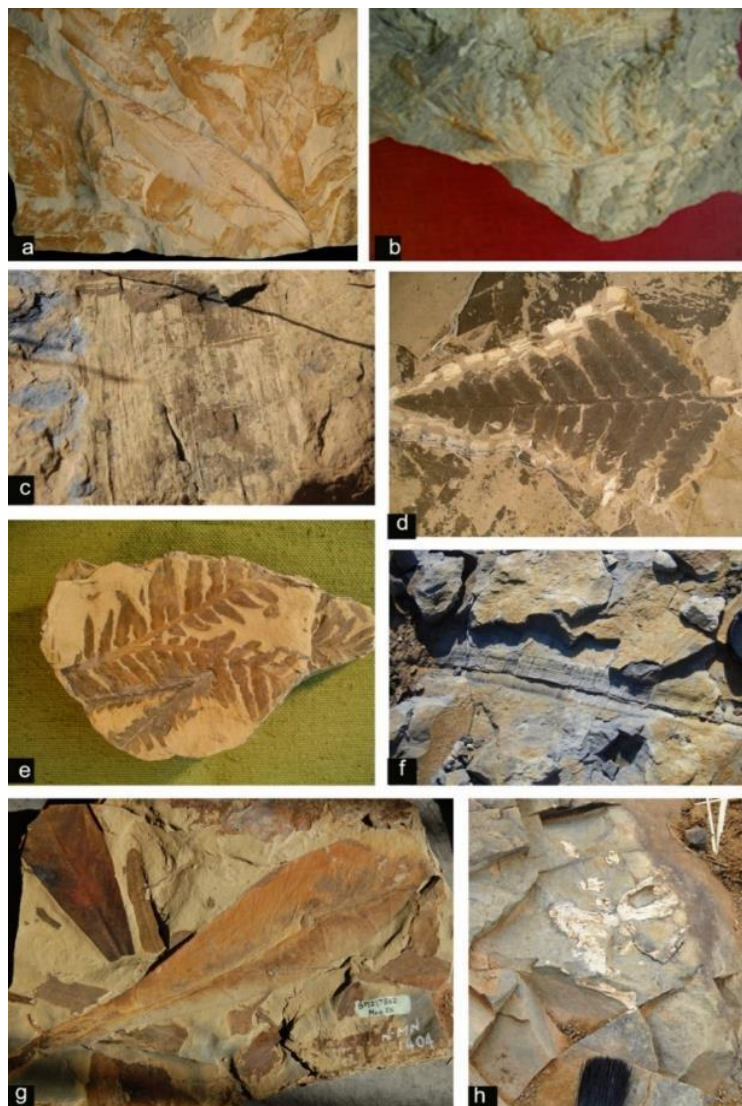
The Karoo Supergroup includes the Dwyka, Ecca and Beaufort Groups. Of relevance to this region is the Ecca Group which dates to the Permian Period. The Ecca Group overlies the Dwyka Group and is the most palaeontologically-sensitive layer of the Karoo Supergroup. These sediments are well-known for the wealth of plant fossils, characterised by assemblages of *Glossopteris* (plant species which are defined through fossil leaves) and contain significant coal reserves (Groenewald & Groenewald, 2014). The Ecca Group includes the following formations:

- The *Pietermaritzburg Formation*, which rarely forms good outcrops and fossils are rare and difficult to find. This formation is of moderate palaeontological sensitivity;
- The *Vryheid Formation*, which is the main coal-producing formation in South Africa. This formation has produced a number of fossils, including extensive *Glossopteris* assemblages. Other fossils reported from this formation include: trace fossils, rare insects, possible conchostracans (bivalve crustaceans and shrimp clams, which are presently still extant), non-marine bivalves and fish scales; and
- The *Volksrust Formation*: a monotonous sequence of grey shale. Fossils are significant but rare and include: temnospondyl amphibian remains, invertebrates and minor coal with plant remains, petrified wood and trace fossils assemblages (Groenewald & Groenewald, 2014).

The Ecca Group is represented within the regional study area by the *Vryheid Formation*. These layers feature shales, sandstones and mudstones as well as coal and were deposited approximately 180 mya in a deltic<sup>5</sup> environment (Bamford, 2016). Coal is formed through the compression and alteration by heat of plant matter; alteration happens to such an extent that potential plant fossil remains are no longer recognisable. The potential for the preservation of plant fossils lies in the shales between the coal horizons, were very good examples of these fossils may occur (Bamford, 2014; 2016). The sandstone surface outcrops may also preserve fossil plants, to a lesser extent. Common fossil plants that could be expected within the *Vryheid Formation* include *Glossopteris* leaves, roots and inflorescences; and *Calamites* stems. These potential plant fossils are illustrated in Figure 5-3. Coal deposits can potentially also include fossils of mammal-like reptiles and mammals but these are however, rarely, if ever, preserved with plant fossils (Bamford, 2012; 2016).

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<sup>5</sup> This occurs when lithologies are deposited onto an alluvial plain through river action.



**Figure 5-3: Composite of possible Karoo-aged fossil plants that may be identified within the site-specific study area (Bamford, 2016)**

The Karoo dolerites are also represented within the regional study area. These are intrusive diatremes<sup>6</sup> classified as plutonic igneous rocks. These features include no fossiliferous material and their palaeo-sensitivity is negligible (Rubidge, 2013a; 2013b; SAHRA, 2013; 2017). The Karoo dolerite suite is therefore considered no further in this report.

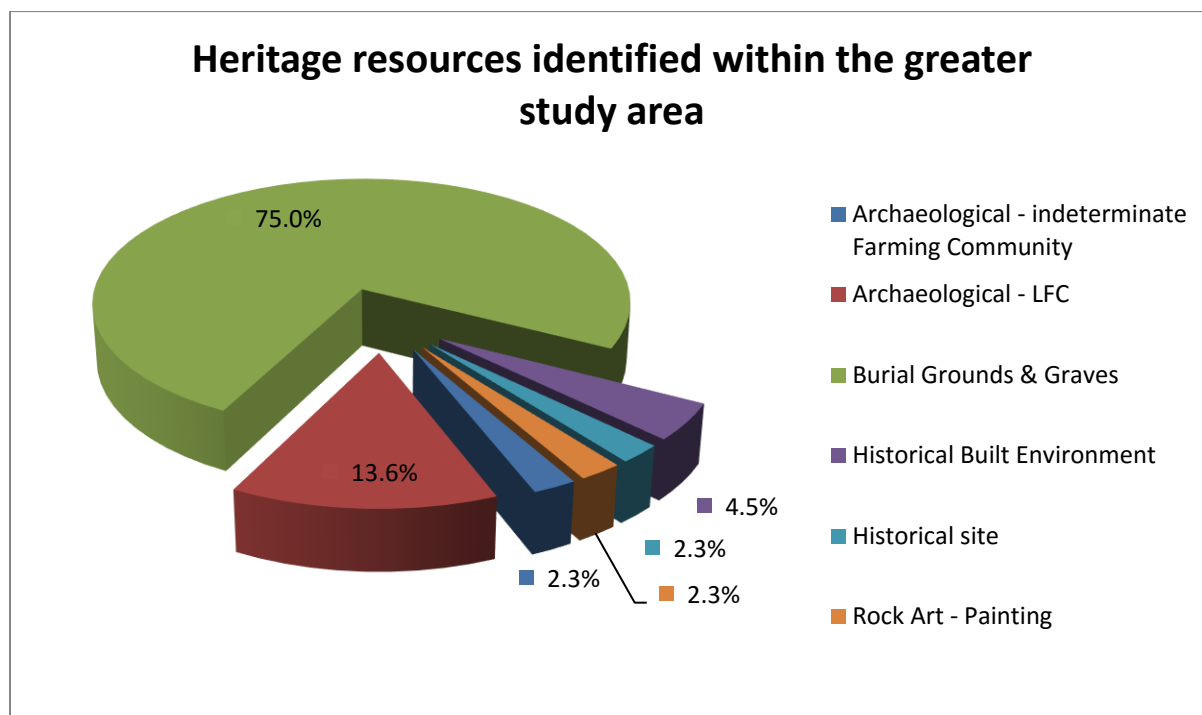
### 5.3 Regional cultural heritage baseline

The potential palaeontological sensitivity of the *Vryheid Formation* notwithstanding, the cultural heritage baseline description considers the predominant landscape based on the

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<sup>6</sup> These formations are created when rising magma comes into contact with groundwater, which potentially results in gaseous explosions and a volcanic 'pipe' (diatreme).

identified heritage resources within the greater study area. A total of 44 heritage resources were recorded within the regional, local and site-specific study areas (see Figure 5-4). These resources comprised resources associated with the Farming Community period, the historical period and a single rock art site associated with the LSA. Burial grounds and graves comprise the dominant category of tangible resources recorded in the regional study area (75% of the recorded heritage resources).



**Figure 5-4: Heritage resources identified within the greater study area.**

To provide the reader with context and assist in identifying preliminary risks and impacts to the heritage resources, this section presents a cultural heritage baseline description that describes the archaeological periods relevant to the regional study area.

### 5.3.1 The Stone Age

The Stone Age in South Africa comprises three broad periods, which are determined according to the lithic tools and material culture produced by the various hominid species through times. These periods are:

- The ESA;
- The MSA; and
- The LSA.

The ESA dates between approximately 2 mya and 250 kya and is comprised predominantly of large hand axes and cleavers made of coarse-grained material (Esterhuysen & Smith,

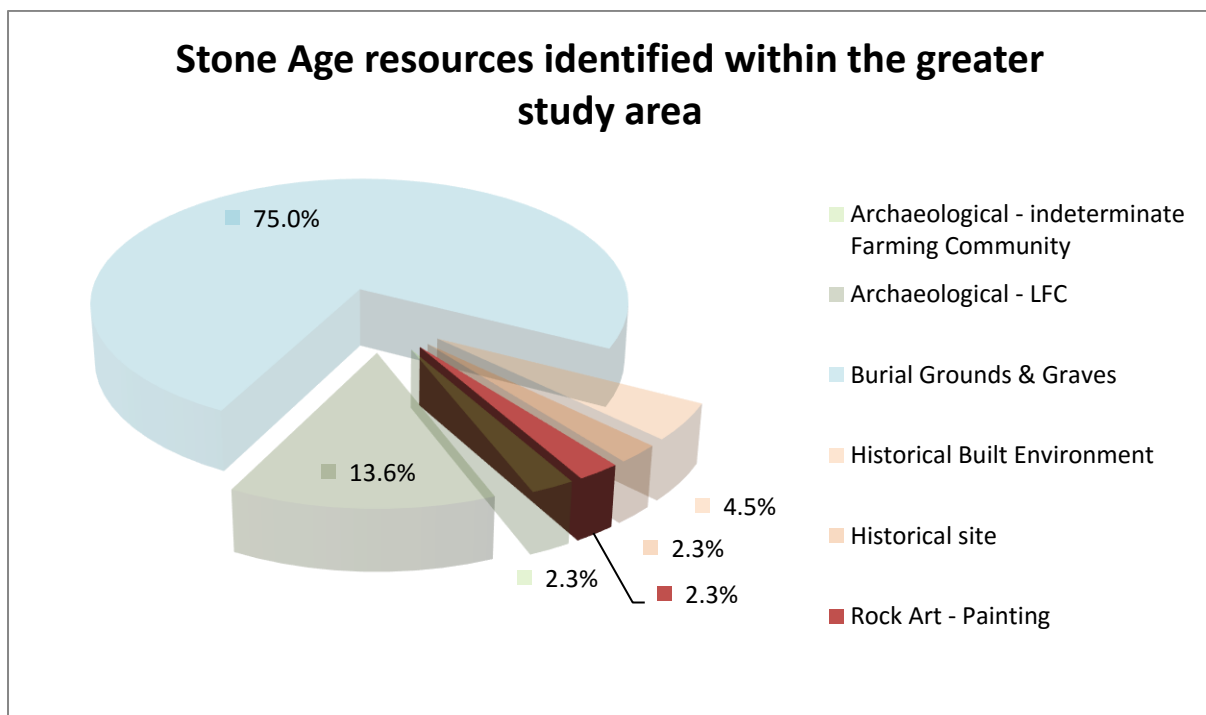
2007). The hominids associated with the ESA include *Australopithecus* and early *Homo* species.

The MSA dates between approximately 250 to 20 kya. Early MSA stone tool industries include high proportions of blades which have been minimally modified and which have been made using the the Levallois technique (Clark, 1982; Deacon & Deacon, 1999). Bone tools, ochre, beads and pendants appear in the archaeological record at this time and lithics are generally made using good quality raw materials. Archaic *H. sapiens* and early anatomically-modern *H. sapiens sapiens* are generally associated with the MSA.

Stone tools in the LSA are specialised (specific tools have been created for specific functions) (Mitchell, 2002). LSA assemblages include diagnostic tools such as microlithic scrapers and segments and bone points are also included in these collections. This period dates between 20 kya and 500 CE (i.e. the historical period). The LSA is associated with anatomically and behaviourally modern *H. sapiens sapiens*. LSA sites are usually open and are poorly preserved; this speaks to the nomadic nature of hunter-gatherers. In southern Africa, the LSA is specifically associated with hunter-gatherer groups such as the San (Mitchell, 2002; Makhura, 2007).

The LSA is further defined by evidence of ritual practices and complex societies, including rock art (Deacon & Deacon, 1999).

The review of the available literature highlighted one LSA site, a rock art site (at Ncamde Falls) and the point included multiple Stone Age sites (Becker 2008).



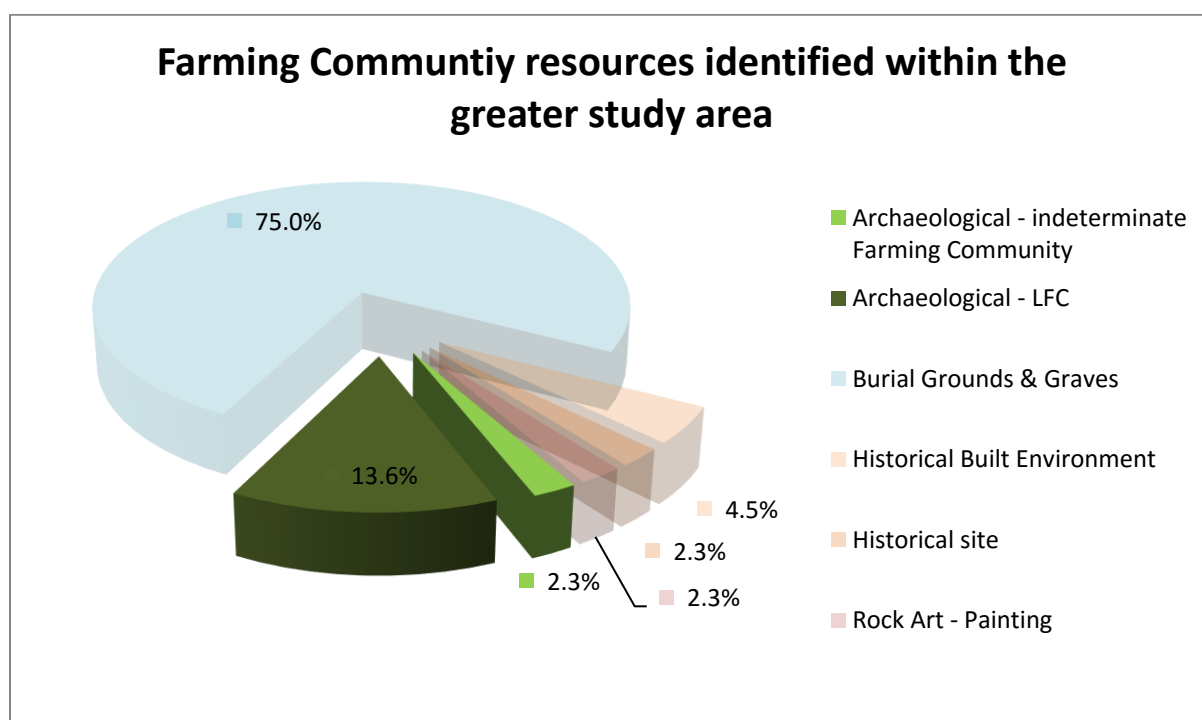
**Figure 5-5: Stone Age heritage resources identified within the greater study area**

### 5.3.2 Farming Communities

In southern Africa, the Stone Age is followed by the Farming Community period. The farming community period correlates to the movements of Bantu-speaking agro-pastoralists moving into southern Africa (Makhura, 2007). The period is divided into two phases:

- The EFC, between 200 and 1000 CE; and
- The LFC between 1000 and 1840 CE.

No EFC material was identified in the available literature and so this phase will not be considered further in this report. The LFC resources accounted for 13.6% (six records) within the regional study area, as shown in Figure 5-6. A further resource was associated with the general Farming Community period.



**Figure 5-6: Farming Community heritage resources identified within the greater study area**

Stonewalling is the most visible indicator of LFC settlements and attests to the complex processes of development and decline over several years (Delius, et al., 2014). Stonewalled settlements are classified into various groups according to their construction technique, coursing height, shape and the internal division of the settlement and the walling (Huffman, 2007). Of relevance to this study are two stonewalled settlement clusters: the *Moor Park* and the *Ntsuanatstsi*. In KZN, the *Moor Park* settlements are associated with Nguni-speaking people and are characterised by the presence of low hut platforms. These platforms would

have supported beehive huts, which would have been located in the residential area behind the cattle kraals, between the 14<sup>th</sup> and 16 centuries.

Within the site-specific study area, the LFC was represented as:

- Stonewalling (Becker 2008; Prins, 2013; Van Schalkwyk, L. 2015); and
- Sites of low complexity (Becker 2008; Digby Wells 2016).

### 5.3.3 The Historical period

The historical period<sup>7</sup> is commonly regarded as the period characterised by contact between Europeans and Bantu-speaking African groups and the written records associated with this interaction. The distinction between these two periods is largely artificial and within the regional study area, there is a large amount of overlap. This section will however consider the historical landscape from the beginning of the 19<sup>th</sup> Century, as the pre-European history has already been discussed in the preceding sections.

Named after the Duke of Newcastle, the town of Newcastle was established in 1864 and was the fourth town of the Natal Colony (Derwent, 2006). The economy centred on the washing and spinning of wool produced by sheep farmers in the region (Amajuba District Municipality, 2014).

The Transvaal War (*also known as the First Anglo Boer War*) occurred between 1880 and 1881 (South African History, 2014). War erupted in Potchefstroom through tensions caused by Boers who refused to fall under British rule and the British, who were endeavouring to expand their territory. Within the greater study area, Fort Amiel is linked to this event. The fort was built in 1879 by the British. Several battles occurred in the regional study area, including:

- The Battle of Laing's Nek (28 January 1881);
- The Battle of Ingogo (8 February 1881); and
- The Battle of Majuba (27 February 1881).

Coal was discovered in the Newcastle area and, by 1885, coal mining on the farm Kilbarchen and surrounding areas were hosting coal mining activities. Railways and trains were introduced to the area in 1890, in response to the infrastructure requirements of the new coal industry (Amajuba District Municipality, 2014).

Today, many of the places and features associated with historical Newcastle and the surrounding areas have been declared protected heritage resources (AMAFA, 2017). These resources are listed in Table 5-3 below and include historical built environment resources

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<sup>7</sup> In southern Africa, the last 500 years represents a formative period that is marked by enormous internal economic invention and political experimentation that shaped the cultural contours and categories of modern identities outside of European contact. This period is currently not well documented, but is being explored through the 500 year initiative (Swanepoel, et al., 2008).



and resources associated with the above-mentioned Transvaal War. These resources are illustrated in Plan 3, attached in Appendix B.

**Table 5-3: Specially protected heritage resources within the Amajuba District Municipality (AMAFA, 2017)**

Site Name	Landmark Status	Erf / Farm Number
<b>NLM</b>		
Town Hall, Scott Street	Provincial (State Ownership)	Portion 2, Lot 433, Newcastle
Old Carnegie Library, Voortrekker Street	Provincial	Lot 435 Remainder, Newcastle
Old Magazine, Scott Street	Provincial	Lot 13051, Newcastle
Fort Amiel, Fort Street	Provincial	Extension 22, Lot 4859, Newcastle
Buffalo River Bridge	Provincial	Portions of farms Milton 15007 and Homer 8692, Klip River
Old Residency, 96 Allen Street	Provincial	Lot 11902, Newcastle
New State School, Albert (corner Havelock Street)	Provincial	Lot 199, Charlestown
Old Court House, Holland Street	Provincial	Lot 312 Remainder, Charlestown
Battlefield (Majuba North)	Heritage Landmark (private ownership)	Majuba North 11267, Majuba South 10614 and Laing's Nek A 8441, Klip River County
Majuba Battlefield: Conservation Area	Heritage Conservancy	Majuba North 11267 (unproclaimed area)
O'Neills's Cottage, Stonewall 3109	Heritage Landmark	Portion 5 (remainder) of Stonewall 3109, Klip River County
St Dominic's Academy Pavilion, St Dominic's Street	Heritage Landmark	Consolidated lot 382, Newcastle Township
Hilldrop House, Hilldrop road	Heritage Landmark	Portion 36 ( a portion of 1) of Bosch Hoek 3345, Klip River County

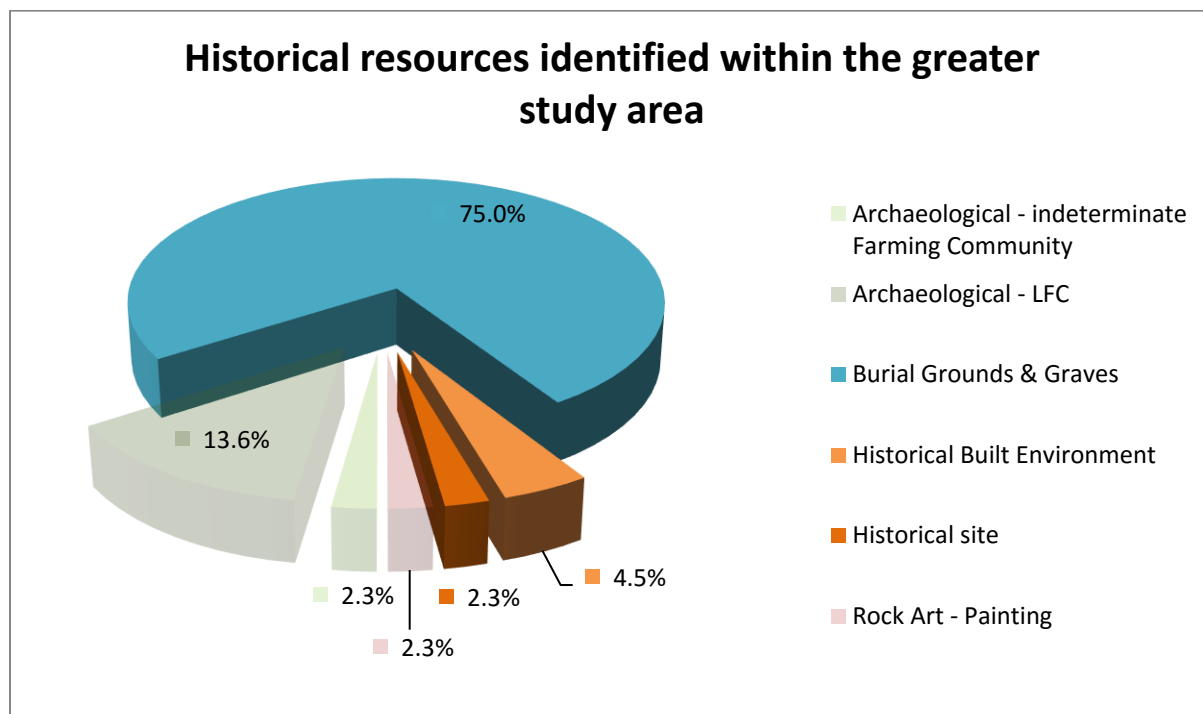


Site Name	Landmark Status	Erf / Farm Number
Kliphuis, 64 Voortrekker Road	Heritage Landmark	Erf 679, Newcastle
<b>eMadlangeni (formerly Utrecht) Local Municipality</b>		
Pieter LafrasUys Monument and Grave, Church Street	Provincial	Lot 190, Utrecht
Old Residency, 60 Church Street (corner Van Rooyen Street)	Provincial	Erf 1860, Utrecht
Magistrate's Court, 57 Voor Street	Provincial	Portion of Erf 190, Utrecht
Town Hall, 55 Voor Street	Provincial	Erf 188 remainder, Utrecht
Old Powder Magazine, President Street	Provincial	Portion of Lot 739, Utrecht
Blood River / Ncome Battlefield, Vechtkop 168	Heritage Landmark	CharlCilliers A of Vechtkop 168 remainder (portion of Blood River Township), Utrecht
Dutch Reformed Church, 50 Church Street	Heritage Landmark	Erf 996 (consolidated from 236, 237 and 238), Utrecht
George Shaw House, 67 Church Street	Heritage Landmark	Erf 244, Utrecht
Rothman House, 65 Church Street (corner Van Rooyen Street)	Heritage Landmark	Erf 244, Utrecht
Dirk Uys House, 61 Church Street	Heritage Landmark	Portion 3 of Lot 242, Utrecht
Old Dutch Reformed Church Pasonage (De Oude Pastorie), corner of Church and Loop Streets)	Provincial	Portion 1 of Erf 192, Utrecht

Within the site-specific study area, the historical period includes three resources and burial grounds and graves, which accounts for 33 records, or 75% of the identified heritage resources (illustrated in Figure 5-7). The historical period is represented by:

- Historical built environment (Digby Wells 2016);
- Resources associated with battlefields, in this case a Boer campsite (Becker 2008); and

- Burial grounds of graves, from single graves to burial grounds including less than one hundred graves (Becker 2008; Prins 2013; Digby Wells 2016). The size of most of the burial grounds (i.e. number of graves) was not recorded.



**Figure 5-7: Historical heritage resources identified within the greater study area**

## 5.4 Results from the pre-disturbance survey

The survey tracks and the waypoints recorded during the pre-disturbance survey are illustrated in Plan 4, attached in Appendix B. Table 5-4 below describes the heritage resources that were identified during the survey. These resources are illustrated in Figure 5-8 below. No historical structures or graves were recorded.

**Table 5-4: Heritage Resources identified through the pre-disturbance survey**

Site Name	Latitude	Longitude	Description
7654/LFC-001	27°51'19.73" S	29°55'32.4" E	Stonewalling in a circle of approximately 9 to 10 m in diameter. The wall is approximately 0.5 m at its tallest. While there is very little vegetation growing inside the stonewalled circle, trees are growing amongst the walls and the vegetation outside the circle is tall and overgrown. This feature is positioned at the base of a

			small slope.
7654/LFC-002	27°51'17.72" S	29°55'26.99" E	A collection of stones that could represent collapsed stone walling and/or a stone terrace. This stone feature is poorly defined, but does appear to be associated with the LFC. The site extends up to point LFC-002a in loosely concentric arcs up the slope.
	27°51'18.55" S	29°55'27.33" E	



**Figure 5-8: Examples of identified heritage resources (A: LFC-001; B and C: LFC-002)**

Two buildings which may potentially be afforded general protection under Section 34 of the NHRA and Section 33 under the KZNHA (i.e. buildings which may potentially be older than sixty years) were identified on the historical imagery. Figure 5-9 below shows these two points on the historical layering.

These two potential historical buildings were not verified during the pre-disturbance survey and they appear to have been demolished at some point. A sheep and goat pen and two smaller, more recent houses now stand at the GPS co-ordinates indicated in the historical layering. Therefore no historical buildings were identified during the survey.

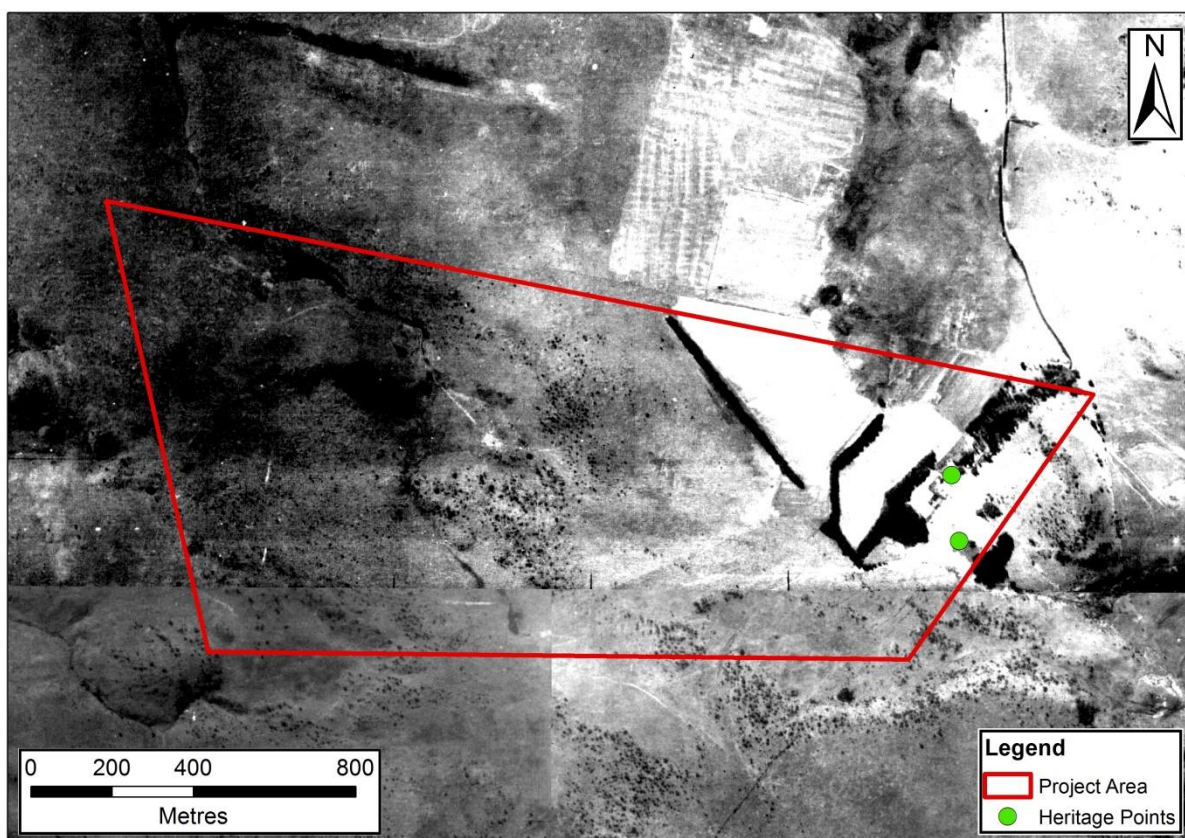


Figure 5-9: Historical imagery of the site-specific study area (demarcated in red)

## 6 Impact Assessment

### 6.1 Cultural Significance of the identified landscape

Heritage resources are intrinsic to the history and beliefs of communities. They characterise community identity and cultures and are finite, non-renewable and irreplaceable. Considering the innate value of heritage resources, HRM acknowledges that these have lasting worth as evidence of the origins of life, humanity and society. Notwithstanding the inherent value ascribed to heritage, it is incumbent on the assessor to determine resources' significance to allow implementation of appropriate management. This is achieved through

assessing heritage resources' value relative to certain prescribed criteria encapsulated in policies and legal frameworks.

This section presents a statement of cultural significance as relevant to the newly identified heritage resources and landscape importance or contribution to four broad value categories: aesthetic, historical, scientific and social values to summarise the CS and other values described in Section 3(3) of the NHRA.

Two heritage resources were recorded during the field survey of the Newcastle Landfill site-specific project area. Both these sites comprised stone walling associated with the LFC period.

The assessment of the CS and Field Ratings demonstrated that the identified heritage resources have a CS designation ranging from negligible to very high. A summary of this is presented in Table 6-1, which also includes suggested Field Ratings. Site LFC-001 and LFC-002 will be grouped together for the purposes of the impact assessment presented in 6.2, as they share the same CS and Field Rating.

**Table 6-1: CS and Field Ratings of newly identified heritage resources within the Newcastle Landfill site-specific study area**

Resource ID	Type	Description	Aesthetic	Historic	Scientific	Social	INTEGRITY	VALUE	Designation	Recommended Field Rating	Field Rating Description	Recommended Mitigation <sup>8</sup>
VRYH	Geological	<i>Vryheid Formation</i>	- This geological formation was not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA.	- This geological formation was not assessed against historic criteria as defined in Section 3(3) of the NHRA.	5 The fossils within this palaeontologically sensitive formation potentially provide significant scientific information and are considered rare heritage resources.	- This geological formation was not assessed against social criteria as defined in Section 3(3) of the NHRA.	4 The integrity of the formation is considered to be excellent with both tangible and intangible fabric preserved.	20	Very High	Grade I	Heritage resources with qualities so exceptional that they are of special national significance.	Project design must change to avoid all change to resource; Conserved in entirety and included in HSMP.
LFC-001	Site	LFC stonewalled site	1 The aesthetics shown by this resource are commonly represented across a wide cultural landscape	1 This resource may have some importance in the community's history but is a well-represented resource.	1 A commonly-represented example of stonewalling	2 A commonly-represented resource which may hold significance to the local community	2 The fabric of the stonewalling is preserved and provides some (limited) information potential. The meaning is evident.	3	Negligible	General Protection IV C	Heritage resources with qualities so exceptional that they are of special national significance.	Project design must change to avoid all change to resources; Conserved in entirety and included in HSMP.
LFC002			0 The aesthetic qualities of this resource do not add to its overall value, as it is in some state of collapse and does not showcase any technical skill.	1 This resource may have some importance in the community's history but is a well-represented resource.	0 This resource is in some state of collapse and provides no scientific value and no clear meaning.	1 If this resource can be connected to a community, it may hold some social significance to that community.	1 This resource is in a state of collapse. There is little meaning ascribed to it with limited information potential.	1				

<sup>8</sup> Please note, this recommended mitigation refers to the minimum mitigation requirements as encapsulated in the NHRA.



## 6.2 Heritage Impact Assessment

The assessment of potential impacts to heritage resources considers the aforementioned activities associated with the Project, specifically the construction activities. The proposed construction will include the following infrastructure: a canteen, guardhouse, perimeter fence, leachate management infrastructure, site offices, staff ablutions, stormwater management system, a weighbridge and a workshop, as well as an access road and other roads on site.

The SAHRA Minimum Standards recommend that heritage resources with negligible CS require no further mitigation and their inclusion into this report is considered sufficient in terms of recording these resources. The inclusion of the two stonewalled sites into Table 5-4 is considered sufficient to meet these requirements. The proposed landfill footprint has been determined and this development is not expected to impact on the LFC sites identified within the site-specific study area. The development footprints of the other proposed infrastructure is not known at this point and so potential risks to these heritage resources are discussed in Section 6.4.

Palaeontological heritage resources are at risk of negative impacts from Project activities. This risk is intrinsically linked to the depth and location of the excavations undertaken as part of the construction for the proposed infrastructure. The risk posed to the fossil heritage underlying the site-specific study area is discussed below.

### 6.2.1 Fossil potential within the *Vryheid Formation*

The fossils contained in the palaeontologically-sensitive geological layers of the *Vryheid Formation* are at risk of being damaged or destroyed through the construction phase of the Project. The assessment of this direct impact is presented in Table 6-2.

**Table 6-2: Summary of the potential direct impacts to the potential fossils of the *Vryheid Formation***

IMPACT DESCRIPTION: Damage or destruction to fossils within the Formation				
Dimension	Rating	Motivation		
<b>PRE-MITIGATION</b>				
Duration	Permanent (7)	Damage or destruction to any fossil resource will result in the permanent loss of this information.	Consequence: Extremely detrimental (-20)	Significance: Minor- negative (-60)
Extent	National (6)	The fossils within the <i>Vryheid Formation</i> are of national importance and damage or destruction will have national repercussions.		





<b>IMPACT DESCRIPTION: Damage or destruction to fossils within the Formation</b>				
<b>Dimension</b>	<b>Rating</b>	<b>Motivation</b>		
Intensity x type of impact	Extremely high - negative (-7)	The destruction of this resource is considered a major negative change to a resource with very high CS.		
Probability	Unlikely (3)	The risk is linked to the depth and location of proposed construction activities. It is unlikely that the construction activities will affect the shales, which are most likely to be 20 to 30 m below the surface.		
<b>MITIGATION:</b>				
<p>Bamford (2016) undertook a palaeontological study for a different project which was underlain by the same formation. She concluded in that study that any field assessments would not yield any further information until these layers were excavated. Digby Wells feels this inference is applicable to this Project.</p> <p>A Fossil Chance Finds Procedure must however be developed and implemented prior to the commencement of construction activities. A palaeontologist must be present to examine any palaeontologically-sensitive material that has been removed during construction activities to assess the significance of any fossils recovered.</p>				
<b>POST-MITIGATION</b>				
Duration	Permanent (7)	Impacts to the fossil-bearing palaeontological layers will occur during the construction phase of the Project, but the results of the impacts will be permanent if the fossils are removed from their geological situation and palaeontological context.	Consequence: Highly detrimental  (-15)	Significance: Minor –positive  (+45)
Extent	Local (3)	If the information potential of the fossil heritage can be retained, the Project will impact only on the resources within the Project area.		
Intensity x type of	High - positive (-5)	The accidental exposure of fossils (when a Fossil Finds Procedure is followed) may		

IMPACT DESCRIPTION: Damage or destruction to fossils within the Formation			
Dimension	Rating	Motivation	
impact		have scientific potential and can contribute to the fossil record.	
Probability	Unlikely (3)	The risk of exposing fossil material will be decreased if the palaeontologically-sensitive layers are avoided. The presence of a palaeontologist during excavation activities will result in a decrease in the likelihood of the fossils being damaged or destroyed.	

### 6.2.2 Consideration of alternatives

As described in Section 1.2, several Project alternatives were assessed prior to the commencement of this study. Among sixteen other location alternatives, the Greenwich site was chosen as the most suitable site for the landfill, due to its access to the N11 highway and various factors in the natural setting. Waste minimisation and other waste management alternatives were assessed. These alternatives aim to reduce the amount of waste that requires disposal in a landfill. These alternatives however do not eliminate the need for waste disposal and therefore a landfill is still necessary within the NLM. These waste minimisation alternatives were considered in the design of the landfill.

The no-go alternative was also assessed. This alternative is not feasible for this Project, due to the pressing need for waste management solutions in the municipality (described in Section 7 of this report). The no-go option would result in the *status quo* remaining, i.e.: a lack of municipal waste management will result in the increase in illegal dumping and waste disposal, and a decrease in sanitation in the municipality. Additionally no additional job opportunities will be created through the no-go option.

This impact assessment therefore considered only the Greenwich landfill site with no alternatives.

### 6.3 Cumulative impacts on the cultural landscape

Cumulative impacts occur from in-combination effects of various impacts on heritage resources acting within a host of processes that result in an incremental effect. The importance of identifying and assessing cumulative impacts is that the whole is often greater than the sum of its parts. This implies that the total effect of multiple stressors or change processes acting simultaneously on a system may be greater than the sum of their effects when acting in isolation.

This Project requires consideration, in conjunction with other planned developments in line with strategic plans KZN, to identify the possible in-combination effects of various impacts to known heritage resources. The following possible cumulative impacts of the Project that have been identified here are presented in Table 6-3.

**Table 6-3: Summary of potential cumulative impacts**

Type	Cumulative Impact	Direction of Change	Extent of Impact
Additive	The effects of construction activities on the integrity of the known heritage resources within the site-specific study area.	Negative	Site-specific
Additive Synergistic	Increased significance of remaining <i>in situ</i> archaeological sites regardless of integrity within the greater local study area.	Negative	Local

## 6.4 Low risks and unplanned events

This section considers the potential risk to protected heritage resources and the potential risks that could arise for the NLM in terms of the implementation of the Project. These two aspects are discussed below.

Any activities relating to construction which occur close to a heritage resource present the risk or damage to the resources or destruction of the resource entirely. Where the NLM knowingly do not take proactive management measures and where the identified risks as per Table 6-6 manifest, possible risks for the NLM may include:

- Litigation in respect of Section 51 of the NHRA and Section 51 of the KZNHA;
- Social repercussions; and
- Reputational risk.

Table 6-4 summarises the primary risks that may arise for the NLM.

**Table 6-4: Identified heritage risks that may arise for the NLM**

Description	Primary Risk
Heritage resources with a high CS rating are inherently sensitive to any development in so far that the continued survival of the resource could be threatened. In addition to this, certain heritage resources are formally protected thereby restricting various development activities.	Negative Record of Decision (RoD) and/or development restrictions issued by SAHRA and/or Amafa in terms of Section 38(8).
Impacting on heritage resources formally and generally protected by the NHRA and KZNHA without following due process.	Fines Penalties

Description	Primary Risk
Due process may include social consultations and/or permit application processes to SAHRA and/or Amafa.	Seizure of Equipment Compulsory Repair / Cease Work Orders Imprisonment

Despite their negligible CS, the two above-mentioned LFC stonewalled sites are still afforded general protection under Section 35 of the NHRA and Section 36 of the KZNHA. Digby Wells therefore recommends that the infrastructure be aligned in such a way so as to create a buffer zone between the identified heritage resources and the development footprints to minimise the risk to the heritage resources. Table 6-5 presents the potential risk to the LFC stonewalled sites.

**Table 6-5: Potential risk to identified protected heritage resources**

Phase	Activity	Risk	Potential Impact
Construction	Construction of the aforementioned infrastructure relating to the landfill	Construction activities that take place within a buffer zone created to protect the heritage resources may cause harm to the LFC stonewalled sites.	Destruction of or disturbance to NHRA Section 35 and KZNHA Section 36 resources, i.e. archaeological and/or palaeontological resources.

The identified risks from construction activities may include damage and or destruction of previously unidentified heritage resources. Table 6-6 presents a summary of the potential risk to protected heritage resources. To mitigate the risks and impacts described below, a Chance Finds Protocol must be developed and implemented prior to the commencement of the construction phase.

**Table 6-6: Potential risk to unidentified heritage resources**

Phase	Activity	Risk	Potential Impact
Construction	Construction of the aforementioned infrastructure relating to the landfill	Construction activities may expose previously unidentified heritage resources within the Project area.	Destruction of or disturbance to: <ul style="list-style-type: none"> <li>■ NHRA Section 34 and KZNHA Section 33 resources (structures);</li> <li>■ NHRA Section 35 and KZNHA Section 36 resources (archaeological and/or palaeontological resources); and/or</li> <li>■ NHRA Section 36 (graves) and KZNHA Section 35 resources (traditional burial places).</li> </ul>

## 7 Identified heritage impacts versus socio-economic benefit

The site-specific Project Area is included in the NLM which is included in the ADM of KZN. This section presents an overview of the socio-economic conditions relevant to this Project using data obtained from the NLM Integrated Development Plan (IDP) for the 2017/2018 financial year to the 2021/2022 financial year (NLM, 2017) coupled with relevant data from Wazimap (2017). This data was used because it realigns the 2011 Census data captured and presented by Statistics South Africa (Statistics South Africa, 2011) with new municipal boundaries used in the 2016 Municipal Elections (Open Up, 2017).

Service delivery is a prominent issue within the NLM. Speaking at the State of the Town (SOTA) address in 2017, the Mayor Cllr E.M. Nkosi highlighted the need for ‘the delivery of meaningful services’ (NLM, 2017). Poor access to water and sanitation was one of the challenges highlighted here.

Most of the households (71%) in the NLM have adequate access to refuse removal i.e. refuse is removed by the local authority or a private company at least once a week (NLM, 2017). Within the local municipality, 4% have no access to refuse removal and 25% have inadequate access (households with access to communal dumps or their own refuse dumps and households whose refuse is removed by the local authority or by private companies less than once a week). Waste generation in the NLM was estimated at 123.9 tons per day in Newcastle West and 97 tons per day in Newcastle East. The municipality IDP highlighted the importance of developing a new refuse disposal site.

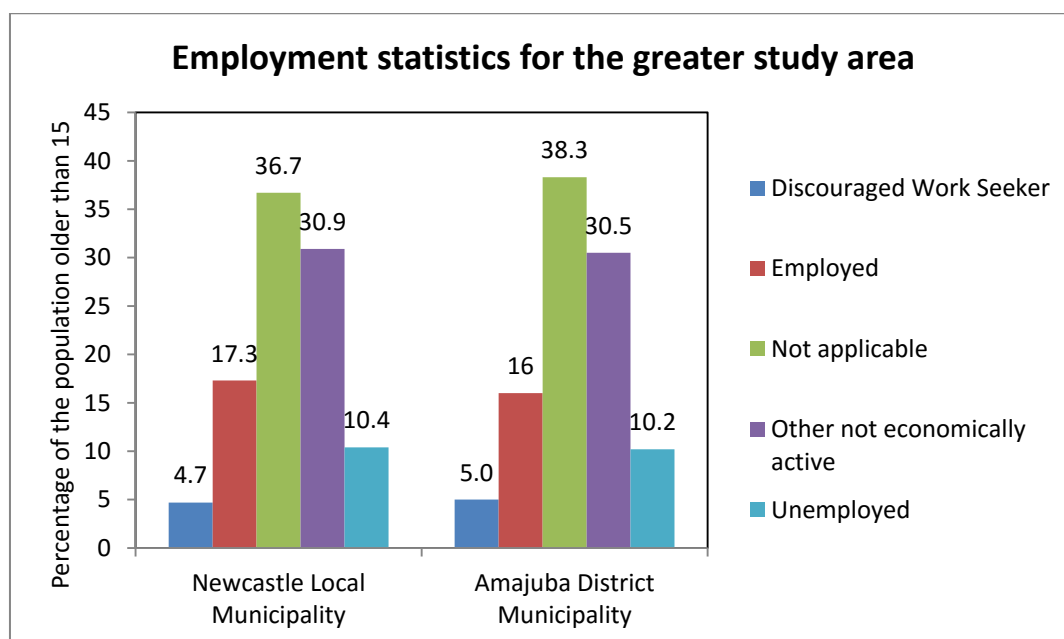
The Newcastle Waste Disposal Site (NWDS) currently services the Newcastle West and the Madadeni/Ozisweni areas (NLM, 2017). The end of life for this landfill has been projected for

the end of 2017. The Madadeni and Osizweni Landfill Sites have recently been shut down by the Department of Water and Sanitation (DWS) for non-compliance to the governing legislation (Gasa, 2016). This has resulted in an increase of solid waste which must be disposed of in within the existing waste management systems; this will affect the lifespan of the NWDS.

Unemployment is another important issue within the NLM. The statistics relevant to the employment of the local and district municipalities is shown in Table 7-1 and Figure 7-1 below. The figure represents the economic status of the population of NLM and ADM below the age of 15.

**Table 7-1: Summary of employment statistics for the greater study area, adapted from Wazimap (2017)**

Population (2011)	NLM		ADM	
	Percentage	Number	Percentage	Number
Total Population	-	389 116	-	531 328
Working Age (18-64)	53.60	208 488	51.80	275 449
Employed	17.30	62 968	16.00	79 886
Reported Unemployment Rate	10.20	-	17.00	-



**Figure 7-1: Employment statistics for the greater study area as percentages (adapted from Wazimap, 2017)**



Within the NLM, the community services industry is the largest sector of formal employment, employing 38% of the workforce (NLM, 2017). Construction accounts for 5% of formal employment within the municipality. The present strategy followed by the NLM is to focus on the development of young entrepreneurs. The Project would contribute to job opportunities, including temporary employment during the construction phase and more permanent jobs during the operational phase. The Project will focus on the local community for their employment requirements (Gasa, 2016).

Based on the review of the applicable planning documents, the potential socio-economic benefits that may arise from the Project outweigh the identified risks and impacts to the known heritage resources within the site-specific study area. This statement is supported by the following:

- Identified impacts and risks to the palaeontologically-sensitive *Vryheid Formation* can be managed through the proposed recommendations;
- The two LFC stonewalled sites are of negligible CS and their inclusion into this report is considered sufficient mitigation;
- The Project will add a significant resource to the waste management infrastructure of the NLM, which is currently under pressure; and
- The Project will provide temporary job opportunities to the local community in the construction phase and more permanent employment opportunities during the operational phase.

## 8 Consultation

Site surveys can often present an opportunity for informal consultation with specific stakeholders, usually farm owners, managers and employees. This consultation can result in the identification of burial grounds and graves – importantly, these could include burial grounds or graves with no visible surface markers. Consultation can also result in the identification of sacred places, places of local significance or other places of importance which may not otherwise be identified. No informal consultation was undertaken by the Digby Wells heritage specialists during this study.

This report was undertaken prior to the commencement of the regulated Stakeholder Engagement Process (SEP). Any heritage-specific comments received during the SEP will be considered in the Comments and Response Report and submitted to SAHRA and Amafa via SAHRIS.

## 9 Recommendations

Much of the site-specific study area is underlain by the *Vryheid Formation*. This geological feature is palaeontologically sensitive and is afforded a high CS due to its potential for fossils. Plant fossils of the genus *Glossopteris* occur below the surface, in shale lenses between coal seams. Digby Wells acknowledges the significance of the *Vryheid Formation*.

This notwithstanding, commensurate to the nature of the Project, Digby Wells recommends and requests exemption from further palaeontological assessment considering the works of Bamford (2016) on a similar project, and on the condition that a Fossil Finds Procedure be developed and implemented during the construction phase.

The proposed construction activities pose the risk of negative impacts to the two heritage resources identified within the site-specific study area. Two heritage resources were identified within the site-specific study area, both associated with the LFC period. These resources have negligible CS. According to the SAHRA Minimum Standards, the recording of these heritage resources is considered sufficient mitigation and their inclusion herein this report is considered compliant. No further mitigation is necessary.

This statement notwithstanding, Digby Wells does recommend the inclusion of buffer zones between the identified heritage resources and the development footprints of the proposed infrastructure associated with the landfill. Digby Wells further recommends a Chance Finds Procedure be developed and implemented prior to the commencement of the construction phase of the Project to mitigate against potential negative impacts on previously unidentified heritage resources which may be exposed during Project activities.

## 10 Conclusion

The aim of the HRM process was to comply with regulatory requirements contained within the KZNHA and Section 38 of the NHRA through the following activities:

- Defining the cultural landscape within which the Project is situated;
- Identifying, as far as is feasible, heritage resources that may be impacted upon by the project as well as defining the CS of identified heritage resources;
- Assessing the possible impacts to the identified heritage resources;
- Consider the socio-economic benefits of the Project; and
- Provide feasible mitigation and management measures to avoid, remove or reduce perceived negative impacts and risks.

These objectives were met as presented in Sections 5 through 9 above. Based on the understanding of the Project while considering the results of this assessment, Digby Wells does not object to the Project, provided a Fossil Finds Procedure and a Chance Finds Procedure be developed and implemented prior to the commencement of the construction phase of the Project. The presence of a qualified palaeontologist to oversee any excavations will be required for the Project if necessary.



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Heritage Impact Assessment

Environmental Impact Assessment for the Newcastle Landfill Project

GCS5072 (GCS: 17-0212)



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## Appendix A: Specialist CV










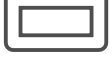
## Appendix B: Maps and Plans

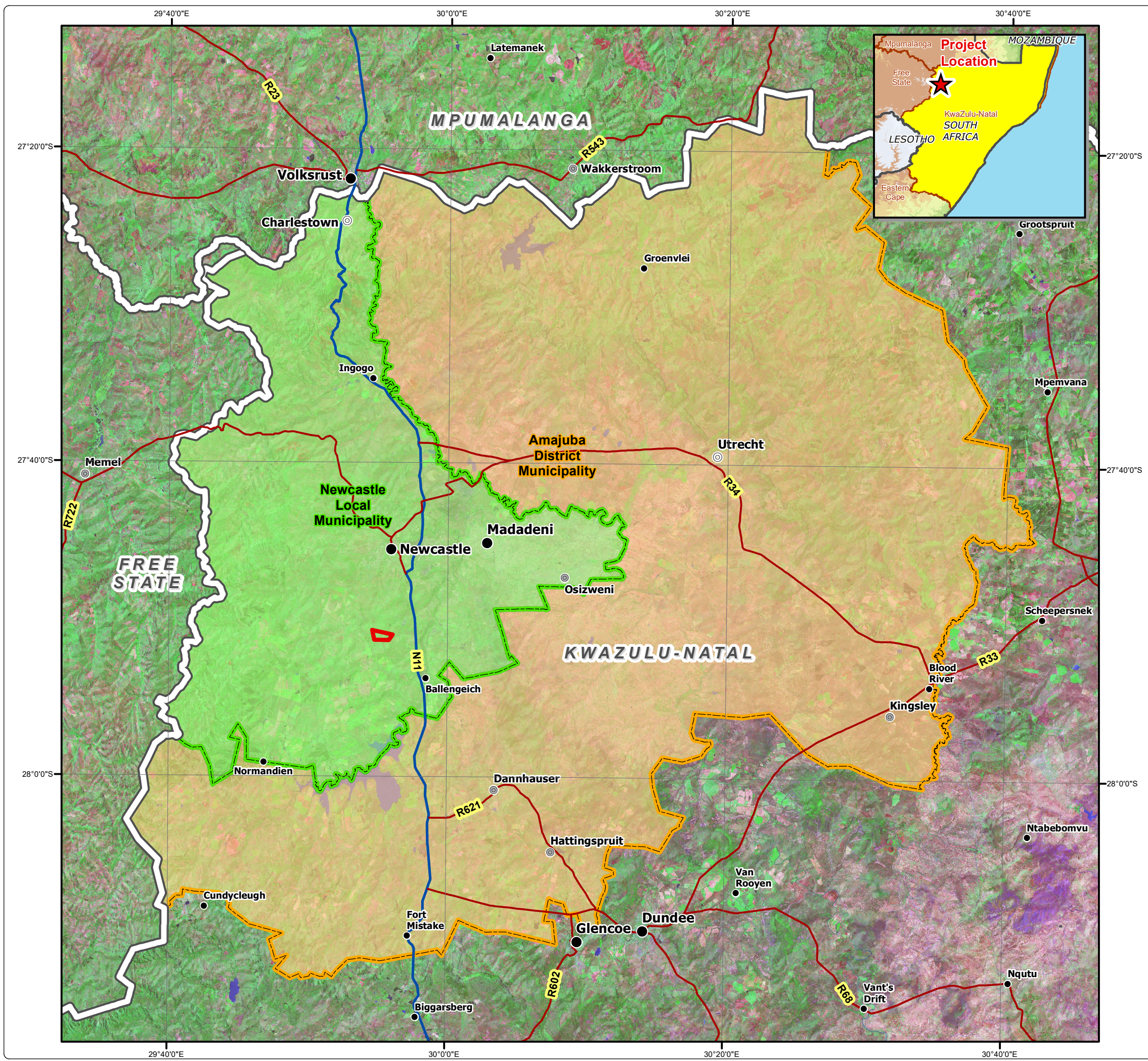
1. Study area
2. Regional geology
3. Plan showing Specially Protected Heritage Resources
4. Survey tracks and identified heritage resources

# Newcastle Landfill Project

## Study Areas

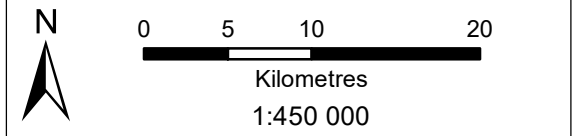
### Legend

-  Project Area (Site-Specific Study Area)
-  Regional Study Area
-  Local Study Area
-  Major Town
-  Secondary Town
-  Other Town
-  Settlement
-  Main Road
-  National Road
-  Provincial Boundary



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# Newcastle Landfill Project

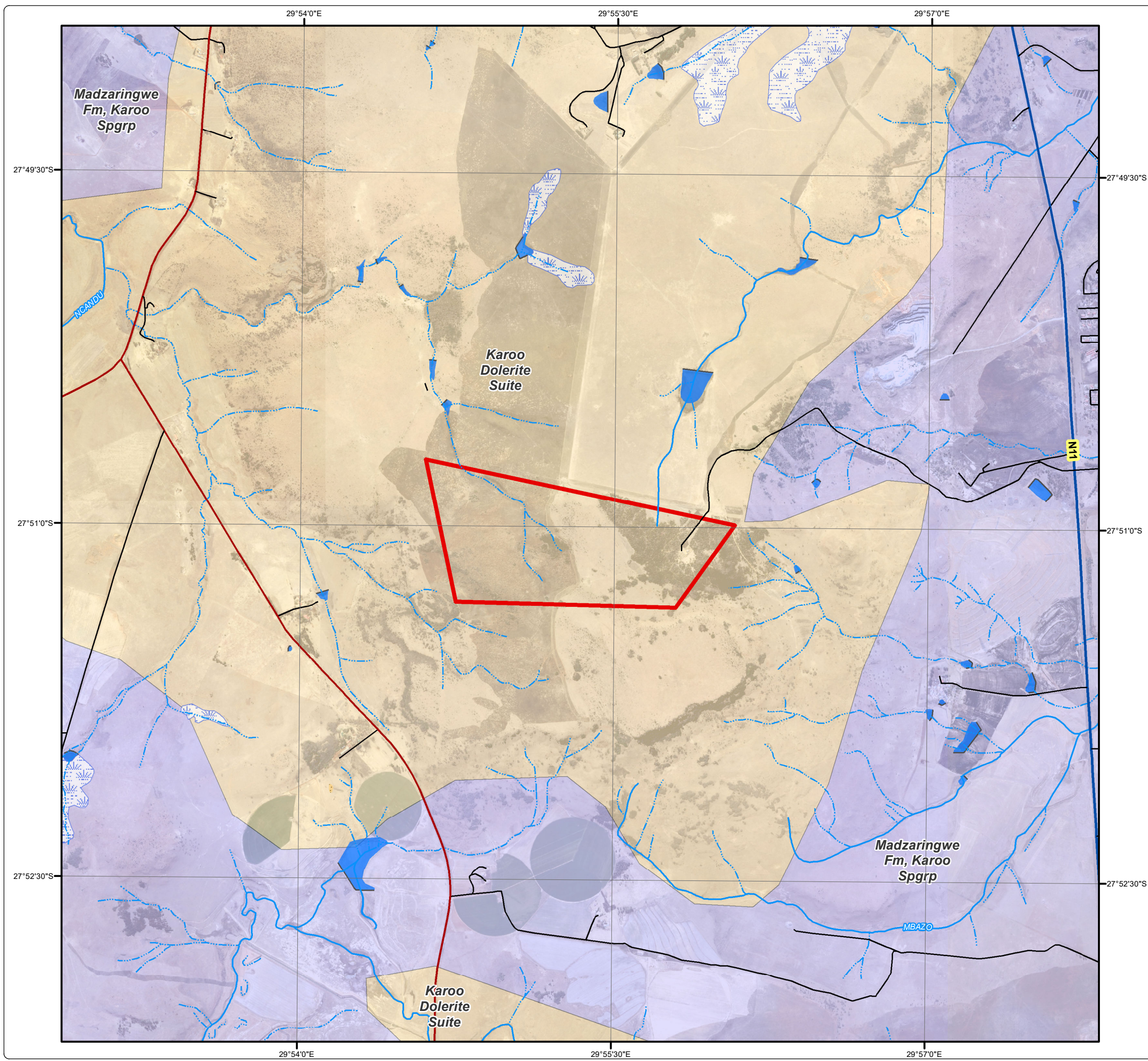
## Geology


### Legend

-  Project Area
-  Arterial / National Road
-  Main Road
-  Minor Road
-  Non-Perennial Stream
-  Perennial Stream
-  Dam Wall
-  Dam / Lake
-  Non-Perennial Pan
-  Wetland

### Geology

-  Karoo Dolerite Suite
-  Madzaringwe Formation, Karoo Supergroup






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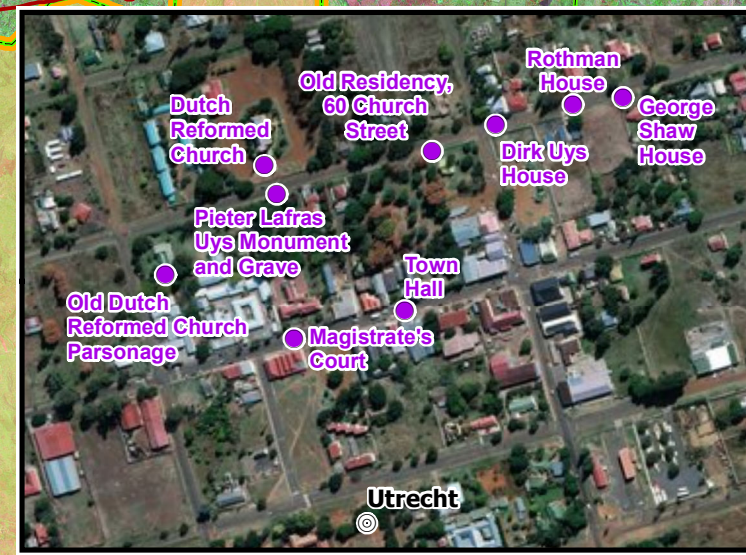
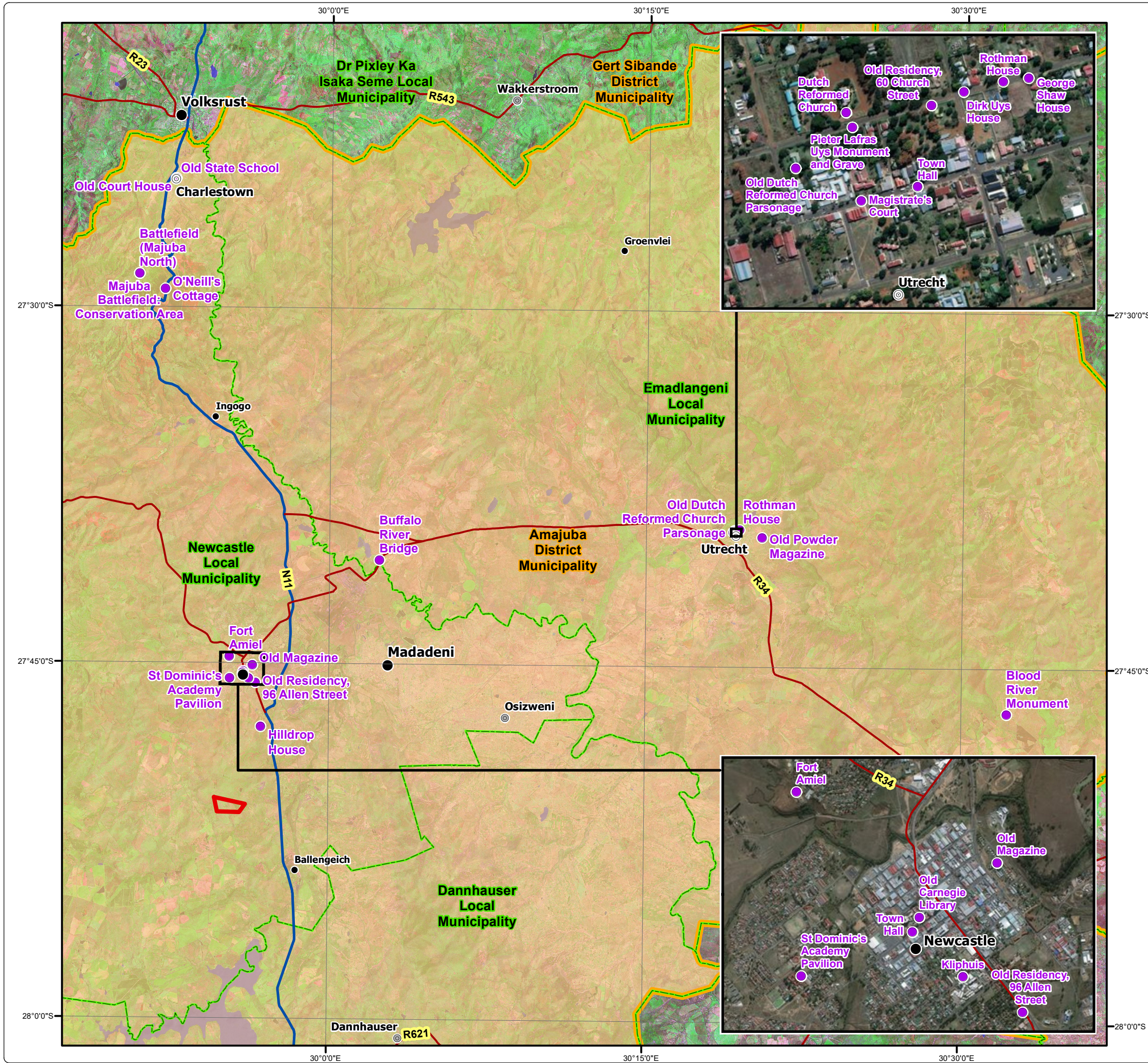
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# Newcastle Landfill Project

## Specially Protected Resources

### Legend

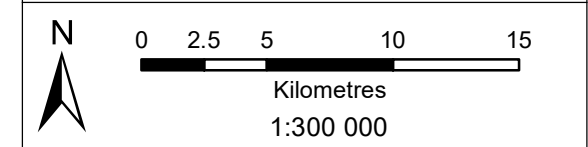
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-  Amajuba District Municipality (Regional Study Area)
-  Specially Protected Resources within the Amajuba District Municipality
-  Major Town
-  Secondary Town
-  Other Town
-  Settlement
-  Main Road
-  National Road
-  Local Municipality Boundary
-  District Municipality Boundary



  
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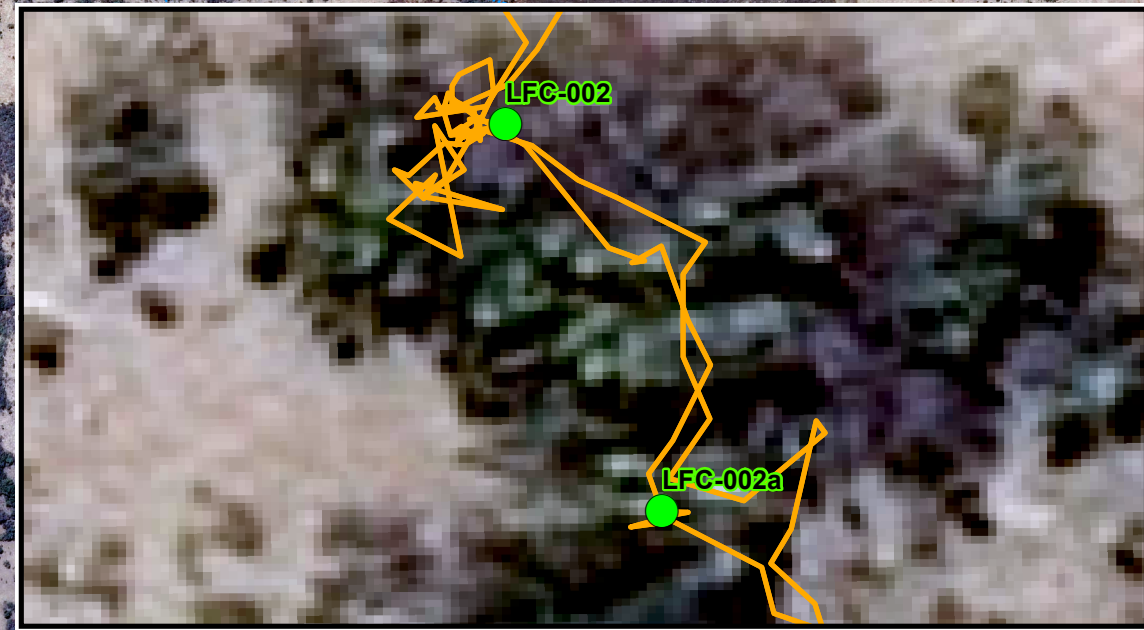
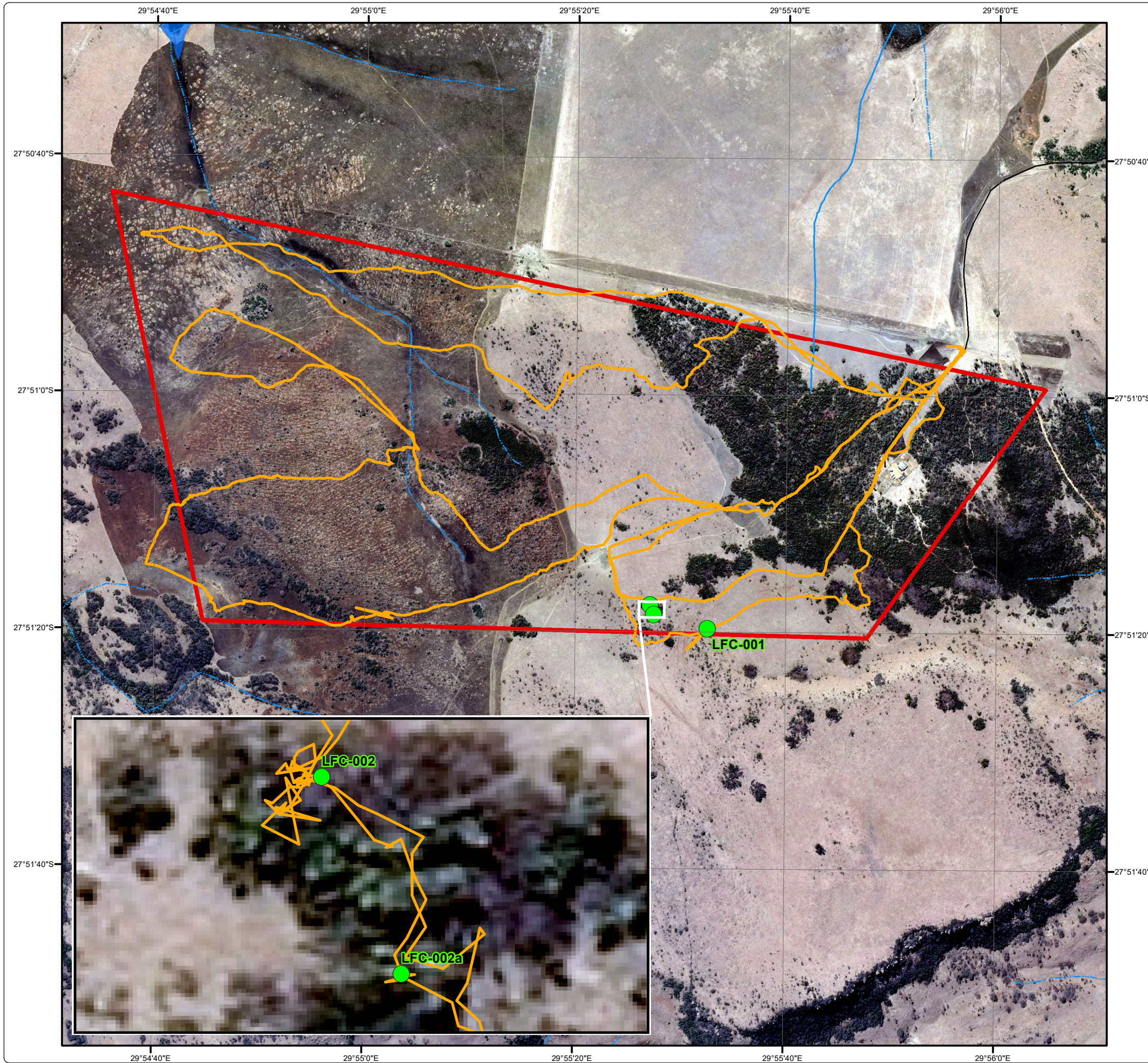


# Newcastle Landfill Project

## Survey Track Log

### Legend

-  Project Area
-  Survey Points
-  Survey Track Log
-  Minor Road
-  Non-Perennial Stream
-  Perennial Stream
-  Dam Wall
-  Dam / Lake

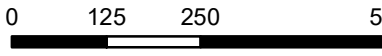


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