



# ECOLOGICAL IMPACT ASSESSMENT



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ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES



**DEVELOPMENT AND INSTALLATION OF SATELLITE  
ANTENNAE AT THE SOUTH AFRICAN NATIONAL SPACE  
AGENCY (SANSA) SPACE OPERATIONS ON FARM  
HARTEBEESTHOEK 502 JQ, GAUTENG**

**ECOLOGICAL IMPACT ASSESSMENT REPORT**

**DEFF REFERENCE: TO BE ASSIGNED**  
(ORIGINAL GDARD EA REFERENCE – GAUT: 002/09-10/N0227)

**Prepared for:**



**The South African National Space Agency (SANSA)**

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**SEPTEMBER 2020**



## REVISIONS TRACKING TABLE

### *CES Report Revision and Tracking Schedule*

<b>Document Title:</b>	Ecological Response on the Amendment of the Environmental Authorisation for the Development and Installation of Satellite Antennae at the South African National Space Agency (SANSA) Space Operations on Farm Hartebeesthoek 502 JQ, Gauteng.		
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<b>Study Leader/ Registered Environmental Assessment Practitioner – Approval:</b>	Dr Anthony Avis		
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## EXECUTIVE SUMMARY

Environmental Authorisation (EA) Gaut: 002/09-10/N0227 was issued by the Gauteng Department of Agriculture and Rural Development (GDARD) on the 22<sup>nd</sup> of September 2010 for the development and installation of satellite antennae on Farm Hartebeesthoek 502 JQ. Construction initiated within the two year period within which the commencement of the activity was stipulated in the EA. The construction of new satellite antennae has occurred on a regular basis, with approximately three antennae being constructed per year since the commencement of construction in 2011. The environmental authorisation remains valid due to the absence of a specified validity end date on the authorisation. To better align with the 2014 National Environmental Management Act (NEMA, No. 107 of 1998) Environmental Impact Assessment (EIA) Regulations (as amended), the applicant intends to apply for an EA Amendment.

SANSA Space Operations (formerly known as the CSIR SAC) proposes to construct additional satellite antennae and associated infrastructure at the Hartebeesthoek Radio Astronomy Observatory (HartRAO) on Farm Hartebeesthoek 502 JQ, located in the Mogale City Local Municipality in the West Rand District Municipality, Gauteng. There are already 40 existing antennae present at the site, built up over the previous 60 years. The additional antennae that will be built are an extension of the existing facility. Eight sites have been identified for the additional 81 planned satellite antennae, each with a total footprint of 225m<sup>2</sup> and a height between 3-7m. The total area impacted by these antennae will be 1.8ha. Other associated infrastructure will include the construction of internal, tarred access roads to the antennae. These will be 4m wide and up to 244m in length impacting an area of 0.1ha. The existing offices on site will be used as a site office during the construction phase. Construction of 22 of the 81 the antennae platforms is currently underway at the north-eastern (Galileo) sites, as confirmed during the site visit on 11 June 2020.

CES was appointed by SANSA as an independent Environmental Assessment Practitioner (EAP) to submit an application for the Amendment of EA Gaut: 002/09-10/N0227 to the National Department of Environment, Forestry and Fisheries (DEFF) for decision making. The Ecological Impact Assessment (this report) will provide input into the EA Amendment application.

The original Ecological Impact Assessment was conducted by EnviRoss CC between November 2009 and January 2010. This included a comprehensive terrestrial and aquatic ecological assessment of the entire Hartebeesthoek 502 JQ farm. The ToR for the current ecological study was to:

- Highlight key aspects from the original assessment;
- Provide updates where applicable;
- Attempt to fill potential gaps; and
- Determine whether there has been any change to the ecological impacts assessed by EnviRoss CC (2010).

The ecological impacts of the proposed amendments were reviewed to determine whether the original findings are still valid. The project sites were assessed using a two-phased approach. Firstly, a desktop assessment of the site was conducted, which included a review of the



original study and the latest vegetation classifications, biodiversity programmes and plans. Secondly, a site visit was conducted on 11 June 2020 (winter) to ground truth the findings of the desktop assessment.

Please note: The site visit was initially scheduled for earlier in the year (late March to early April 2020). However, in response to the COVID-19 pandemic, the President of South Africa announced the implementation of a nationwide lockdown period during his national address on 23 March 2020. The lockdown imposed travel restrictions, which prevented the specialist from conducting the site visit prior to the easing of the restrictions on 5 June 2020. The site assessment was therefore conducted on 11 June 2020 during the dry (winter) season rather than during the wet season when many bushveld plants are flowering. Consequently, it is possible that some species have gone undetected. However, given that this assessment builds on the previous study undertaken by EnviRoss CC (2010), the site assessment was sufficient to determine changes to provide updates to the original study and determine the status of the affected area.

The site visit served to inform potential impacts of the proposed project and to describe the significance of these impacts on the surrounding flora and fauna. The vegetation across all proposed antennae sites and their immediate surrounding ranges from near-natural Andesite Mountain Bushveld to variably-modified open grassland with at least some elements of Andesite Mountain Bushveld vegetation, i.e. a “medium-tall thorny bushveld with a well-developed grassy layer on hill slopes and some valleys with undulating landscapes” (Mucina and Rutherford, 2018, p. 467). The descriptions of the vegetation at the proposed antennae sites are summarised below.

SITE	VEGETATION DESCRIPTION
North-eastern (1)	Open grassland with elements of Andesite Mountain Bushveld vegetation, namely a medium-height mixed, thorny bushveld with a well-developed grassy layer. Most of the site is dominated by near-intact grasslands, mainly the plagioclimax species <i>Hyperthelia dissoluta</i> , with some <i>Eragrostis curvula</i> and <i>Melinis repens</i> cover. The woody species layer is comprised of scattered clusters of liana ( <i>Clematis brachiata</i> ) and perennial shrublets ( <i>Helichrysum</i> c.f. <i>kraussii</i> ) to small, shrub-like trees, including <i>Grewia occidentalis</i> , <i>Searsia lancea</i> and <i>Vachellia karroo</i> . The site is transformed in some areas due to the construction of a new satellite antenna platform in the north-eastern corner of the site, as well as by dirt roads running along the southern and eastern perimeter fences.
North-eastern (2)	Heavily-modified open grassland with few remaining elements of Andesite Mountain Bushveld vegetation. Degraded grassland cover (a: mostly <i>Hyperthelia dissoluta</i> and <i>Hyparrhenia hirta</i> ) ranging from intact to sparsely-covered to bare, with isolated clusters of select forbs (e.g. <i>Aloe greadheadii</i> var. <i>davyana</i> ), shrubs (e.g. <i>Ilex mitis</i> ) and trees (e.g. <i>Searsia lancea</i> ). The site is highly transformed due to the construction of new satellite antenna platforms, construction materials and existing infrastructure.
North-western (3-5)	Rocky Highveld Grassland, with some scattered Andesite Mountain Bushveld species. Near-natural, discontinuous and rocky grassland, comprised of <i>Arisida congesta</i> , <i>Hyperthelia dissoluta</i> and <i>Melinis repens</i> , interspersed with small shrublets, e.g. <i>Lasiosiphon caffer</i> , <i>Oocephala staeheleinoides</i> and <i>Asparagus larcinus</i> . A few larger shrub-like trees were also observed on site, including <i>Combretum molle</i> , <i>Euclea crispa</i> and <i>Searsia</i> spp. Grassy cover becomes increasingly more intact downslope, with some transformation at the foot of the slope. Blesbok ( <i>Damaliscus pygargus phillipsi</i> ) were observed grazing around the site. These were purchased and placed on the farm by SANSA. A hare (c.f. <i>Lepus victoriae</i> ) was also spotted on site.
South-western	Open grassland with elements of Andesite Mountain Bushveld vegetation, namely a medium-tall scattered bushveld with a well-developed grassy layer. Mostly-intact grassland dominated by <i>Hyperthelia dissoluta</i> and <i>Eragrostis curvula</i> , with scattered forbs,



SITE	VEGETATION DESCRIPTION
	shrubs and tree, including <i>Combretum molle</i> , <i>Cussonia paniculata</i> , <i>Euclea crispa</i> , <i>Ilex mitis</i> and <i>Searsia lancea</i> .
South-eastern (8)	Open to moderately-modified open grassland with elements of Andesite Mountain Bushveld vegetation, namely a medium-height scattered bushveld with a well-developed grassy layer. Moderately degraded yet intact grassland, dominated by <i>Hyperthelia dissoluta</i> and <i>Cymbopogon c.f. plurinodis</i> , with a fringing stand of invasive <i>Acacia dealbata</i> on the eastern side of the site. Near-natural Andesite Mountain Bushveld vegetation is found upslope to the north of the site. A few scattered shrubs and trees are present on site, including <i>Asparagus suaveolens</i> , c.f. <i>Commiphora tenuipetiolata</i> , <i>Combretum molle</i> , <i>Helichrysum c.f. kraussii</i> , <i>Ilex mitis</i> and <i>Searsia lancea</i> . The adjacent area to the west of the site, earmarked for the access road, was recently mowed.

The following sensitive environments were identified:

- World Heritage Site (WHS) – Entire farm falls within the Cradle of Humankind WHS.
- Endangered ecosystem – Most of the farm is located within an endangered ecosystem, namely the Witwatersberg Skeerpoort Mountain Bushveld.
- Critical Biodiversity Area (CBA) and Ecological Support Area (ESA) – Portions of the proposed antennae construction sites fall within a CBA (~1.76ha) and an ESA (~16 m<sup>2</sup>) in terms of the Gauteng Conservation Plan (CPlan).
- Class 1 Ridge and buffer – A small portion of one of the proposed sites (~16 m<sup>2</sup>) is situated on a Class 1 Ridge and four of the five smaller sites (~1 550 m<sup>2</sup>) fall within the 200 m buffer of the Class 1 Ridge.
- Wetlands and watercourses – Two of the proposed sites, covering an area of approximately 5 300m<sup>2</sup>, fall within a wetland.

EnviRoss CC (2010) identified and assessed the following ecological impacts:

- Habitat destruction;
- Impacts on floral and faunal communities and Red Data List (RDL) species;
- Impacts on avifaunal communities and RDL avifaunal species;
- Wetland/Riparian zone habitat impacts;
- Water quality impacts; and
- Impacts to soil, including compaction, contamination and erosion.

Based on a review of the original study, the information gained from a desktop assessment and an ecological walk through conducted on 11 June 2020, the nature of the proposed changes to the EA specifications will not have a material change or increase in ecological impacts compared with the original project description, with the exception of the wetland/riparian habitat impacts. All issues identified in the 2010 Ecological Impact Assessment still remain valid and all recommended mitigations identified must still be implemented for all phases of the proposed development. In addition, the following are recommended for the proposed development:

- Vegetation clearing must be kept to a minimum and must remain in the demarcated areas;
- Areas which are already disturbed should be utilised, such as areas with a low number of SCC, where invasive alien species are present and those that are disturbed due to grazing and poor land management practices;



- Eradication of the already established alien invasive species on site (This should be done during all phases of the project);
- Active management of alien species throughout both the construction and operation phases to prevent their spread into areas where they have not already been established;
- An Alien Invasive Control Programme must be implemented;
- It is recommended that the proposed layout be amended to:
  - Avoid development on the Class 1 Ridge and ESA at the western-most site; and
  - Avoid development within the wetland.
- All mitigation measures must be incorporated into the Environmental Management Plan (EMP).
- All mitigation measures recommended by EnviRoss (2010) should be implemented.



## LIST OF ACRONYMS

AIS	Alien Invasive Species
CBA	Critical Biodiversity Area
CITES	Convention on International Trade in Endangered Species
CES	CES Environmental and Social Advisory Services
ECO	Environmental Control Officer
ESA	Ecological Support Area
GIS	Geographical Information System
IUCN	International Union for Conservation of Nature
NEMBA	National Environmental Management Biodiversity Act
QDS	Quarter Degree Square
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
TOPS	Threatened or Protected Species



## SPECIALIST CHECKLIST

Section	NEMA 2014 Regs - Appendix 6(1) Requirement	Position in report
1	A specialist report prepared in terms of these Regulations must contain—	
(a)	details of-	
	(i) the specialist who prepared the report; and	Section 1.1
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 1.2 and Appendix B1
(b)	a declaration that the person is independent in a form as may be specified by the competent authority;	Section 1.3
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Chapter 2
(d)	the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.4 and Section 5.2
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process;	Chapter 4
(f)	the specific identified sensitivities of the site related to the activity and its associated structures and infrastructure;	Chapter 6
(g)	an identification of any areas to be avoided, including buffers;	Chapter 6 and 8
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitive of the site including areas to be avoided, including buffers;	Figure 6.1, Figure 6.2 and Figure 8.1
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.4
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	Chapter 7 and EnviRoss CC (2010) report (Appendix B2)
(k)	any mitigation measures for inclusion in the EMPr;	Chapter 7 and EnviRoss CC (2010) report (Appendix B2)
(l)	any conditions for inclusion in the environmental authorization;	
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	
(n)	a reasoned opinion- (i) as to whether the proposed activity or portions thereof should be authorized and (ii) if the opinion is that the proposed activity of portion thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Chapter 8
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Refer to Amendment Report



Section	NEMA 2014 Regs - Appendix 6(1) Requirement	Position in report
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to Amendment Report
(q)	any other information requested by the competent authority.	None for the Ecological report



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# 1 PROJECT TEAM AND EXPERTISE

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## 1.1 DETAILS OF SPECIALIST

### **Mr Aidan Gouws, *Cand.Sci.Nat* (Specialist, Lead Report Writer)**

Aidan obtained his MSc in Environmental Science (*Cum laude*) from Rhodes University, having conducted research on the spatio-temporal dynamics of *Acacia dealbata* invasions and broader land-use and cover changes in the northern Eastern Cape, funded through a study bursary awarded by the Agricultural Research Council (ARC). Prior to this, he obtained his BSc Honours in Geographical and Environmental Sciences (*Cum laude*) from the University of Pretoria, studying plant ecology and EIA methodology amongst others. He is also member of the Golden Key Honours Society. Aidan joined CES in 2018 and has been involved in several projects, including Basic Assessments, Full Scoping and Environmental Impact Assessments, Environmental Audits and Resettlement Action Plan (RAP) Audit. He works from the Gauteng office and his interests include the general Environmental Impact Assessment (EIA) process, GIS mapping, ecological studies and the Public Participation Process (PPP).

### **Ms Tarryn Martin, *Pr.Sci.Nat* (Reviewer and Quality Control)**

Ms Tarryn Martin, Senior Environmental Consultant and Ecological Specialist. Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C3 and C4 Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. Tarryn specialises in conducting vegetation assessments including vegetation and sensitivity mapping to guide developments and thereby minimise their impacts on sensitive vegetation. She has conducted a number of vegetation and impact assessments in Mozambique (to IFC standards) which include the Lurio Forestry Project in Nampula, the Baobab Iron Ore Mine in Tete and the Syrah Graphite Mine, Metals of Africa Graphite Mine, Triton Ancuabe Graphite Mine and Nicanda Hills Graphite Mine in Cabo Delgado. She has also worked on a Critical Habitat Assessment for Sasol in Inhambane Province and has co-designed and implemented the Terrestrial Monitoring Program for Kenmare, MOMA, a heavy minerals mine in Mozambique.

Please refer to full Curriculum Vitae in Appendix B1.



## 1.2 DECLARATION

### Mr Aidan Gouws

- I, Aidan Gouws, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this report are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of specialist



## 2 INTRODUCTION

### 2.1 BACKGROUND

Environmental Authorisation (EA) Gaut: 002/09-10/N0227 was issued by the Gauteng Department of Agriculture and Rural Development (GDARD) on the 22<sup>nd</sup> of September 2010 for the development and installation of satellite antennae on Farm Hartebeesthoek 502 JQ. Construction initiated within the two year period within which the commencement of the activity was stipulated in the EA. The construction of new satellite antennae has occurred on a regular basis, with approximately three antennae being constructed per year since the commencement of construction in 2011. The environmental authorisation remains valid due to the absence of a specified validity end date on the authorisation.

To better align with the 2014 National Environmental Management Act (NEMA, No. 107 of 1998) Environmental Impact Assessment (EIA) Regulations (as amended), the applicant intends to apply for an amendment of the Environmental Authorisation. The applicant is proposing the following amendments:

- i. A Part 1 Amendment to update the name of the holding entity from CSIR SAC to South African National Space Agency (SANSA) Space Operations;
- ii. An amendment in terms of Section 47A of the National Environmental Management Act (NEMA, No. 107 of 1998) to provide clarity and include detailed parameters to the current Environmental Authorisation (EA) by specifying *inter alia* the number of satellites to be constructed on site and the locations earmarked for development. This amendment will also update the listed activities from the 2006 NEMA Environmental Impact Assessment (EIA) Regulations to the 2014 NEMA EIA Regulations (as amended in 2017); and
- iii. An amendment of the Environmental Management Plan (EMP).

CES was appointed by SANSA as an independent Environmental Assessment Practitioner (EAP) to submit an application for the Amendment of EA Gaut: 002/09-10/N0227 to the National Department of Environment, Forestry and Fisheries (DEFF) for decision making. The Ecological Impact Assessment (this report) will provide input into the Amendment application.

### 2.2 PROJECT DESCRIPTION AND LOCATION

SANSA Space Operations (formerly known as the CSIR SAC) proposes to construct additional satellite antennae and associated infrastructure at the Hartebeesthoek Radio Astronomy Observatory (HartRAO) on Farm Hartebeesthoek 502 JQ, located in the Mogale City Local Municipality in the West Rand District Municipality, Gauteng (Figure 2.1). This is fulfilment of their vision to coordinate and integrate national space science and technology programmes and conduct long-term planning and implementation of space-related activities in South Africa. The antenna will be used to track satellites in orbit.

There are already 40 existing antennae present at the site, built up over the previous 60 years. The additional antennae that will be built are an extension of the existing facility. Eight sites have been identified for the additional antenna (Figure 2.2). The three larger polygons (1, 2



and 8) will each have 22 antennae and the five smaller polygons (3-7) will each have 3 antennae, for a total of 81 planned satellite antennae, each with a total footprint of 225m<sup>2</sup> and a height between 3-7m. The total area impacted by these antennae will be 1.8ha. Other associated infrastructure will include the construction of an internal, tarred access road to the antennae. This will be 4m wide and up to 244m in length impacting an area of 0.1ha. The existing offices on site will be used as a site office during the construction phase. Construction of 22 of the 81 the antennae platforms is currently underway at the north-eastern (Galileo) sites (Figure 2.3), as confirmed during the site visit on 11 June 2020.

## 2.3 OBJECTIVES AND TERMS OF REFERENCE (TOR)

The original Ecological Impact Assessment was conducted by EnviRoss CC between November 2009 and January 2010 (Appendix B2). This included a comprehensive terrestrial and aquatic ecological assessment of the entire Hartebeesthoek 502 JQ farm. The proposed amendment aims to delineate the specific sites on the farm for the installation of the antennae.

The description of the biophysical environment is well documented in the study by EnviRoss CC (2010). The Terms of Reference (TOR) for the current study was to:

- Highlight key aspects from the original assessment;
- Provide updates where applicable;
- Attempt to fill potential gaps; and
- Determine whether there has been any change to the ecological impacts assessed by EnviRoss CC (2010).

## 2.4 ASSUMPTIONS AND LIMITATIONS

The following limitations and assumptions are implicit:

- The report is based on a project description provided by the client;
- Descriptions of the natural environments are based on a field survey and available literature, including the ecological assessment by EnviRoss CC (2010).
- Species of Conservation Concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is almost certain that additional SCCs will be found during construction and operation of the development.
- Sampling could only be carried out at one stage in the annual or seasonal cycle.

Please note: The site visit was initially scheduled for earlier in the year (late March to early April 2020). However, in response to the COVID-19 pandemic, the President of South Africa announced the implementation of a nationwide lockdown period during his national address on 23 March 2020. The lockdown imposed travel restrictions, which prevented the specialist from conducting the site visit prior to the easing of the restrictions on 5 June 2020. The site assessment was therefore conducted on 11 June 2020 during the dry (winter) season rather than during the wet season when many bushveld plants are flowering. Consequently, it is possible that some species have gone undetected. However, given that this assessment builds on the previous study undertaken by EnviRoss CC (2010), the site assessment was sufficient to determine changes to provide updates to the original study and determine the status of the affected area.

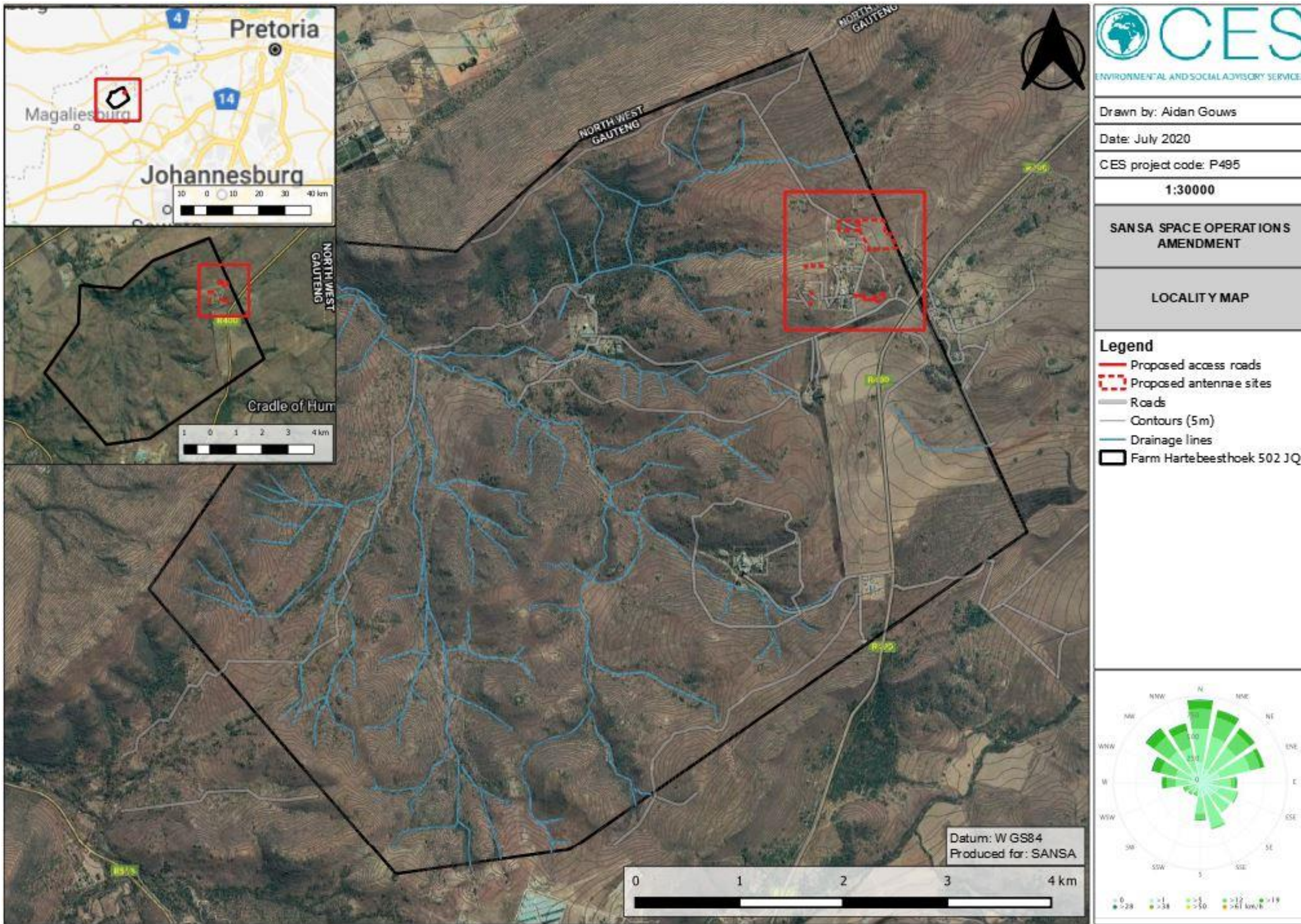


Figure 2.1: Locality of Farm Hartebeesthoek 502 JQ

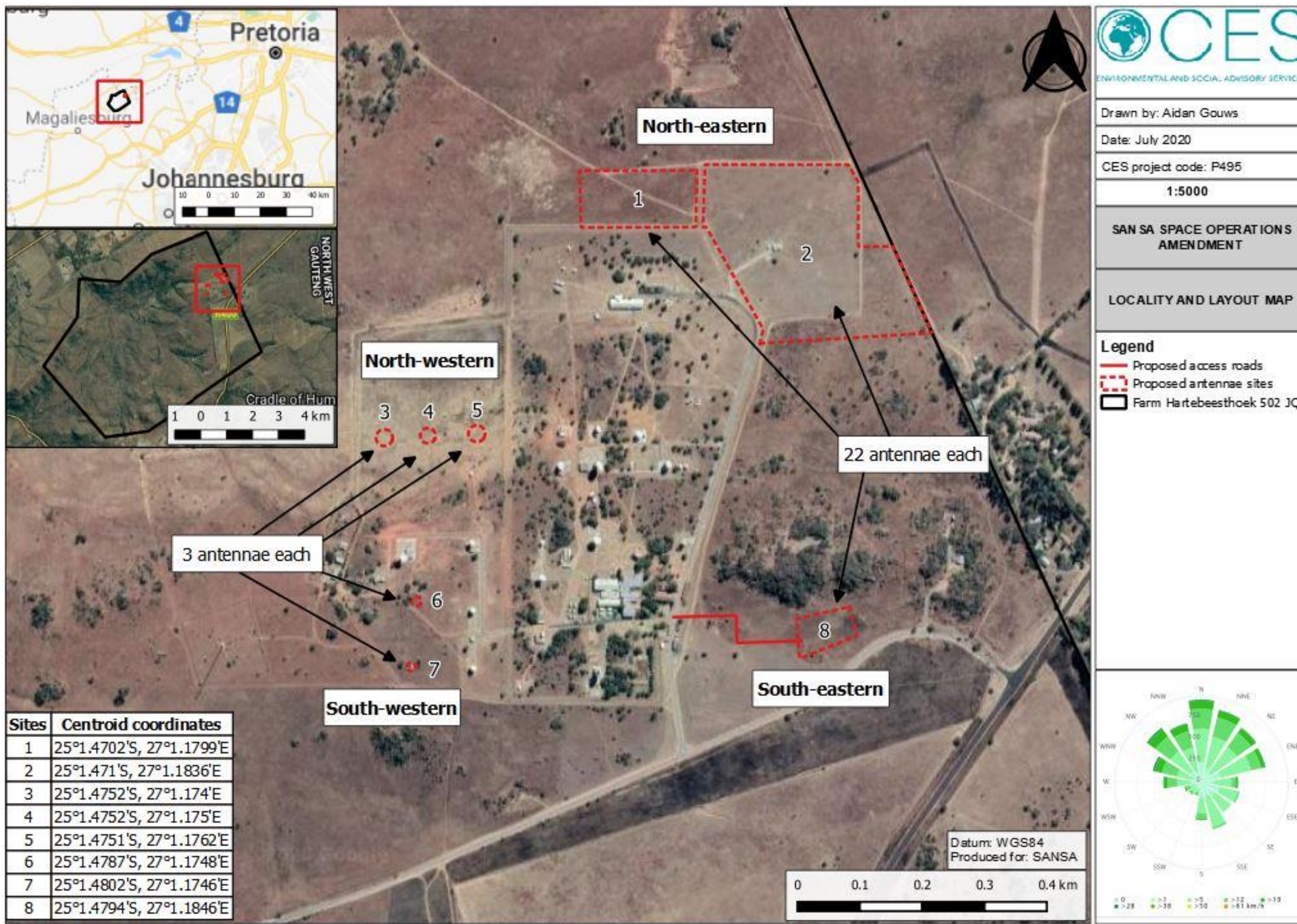


Figure 2.2: Locality of proposed sites earmarked for construction of satellite antennae

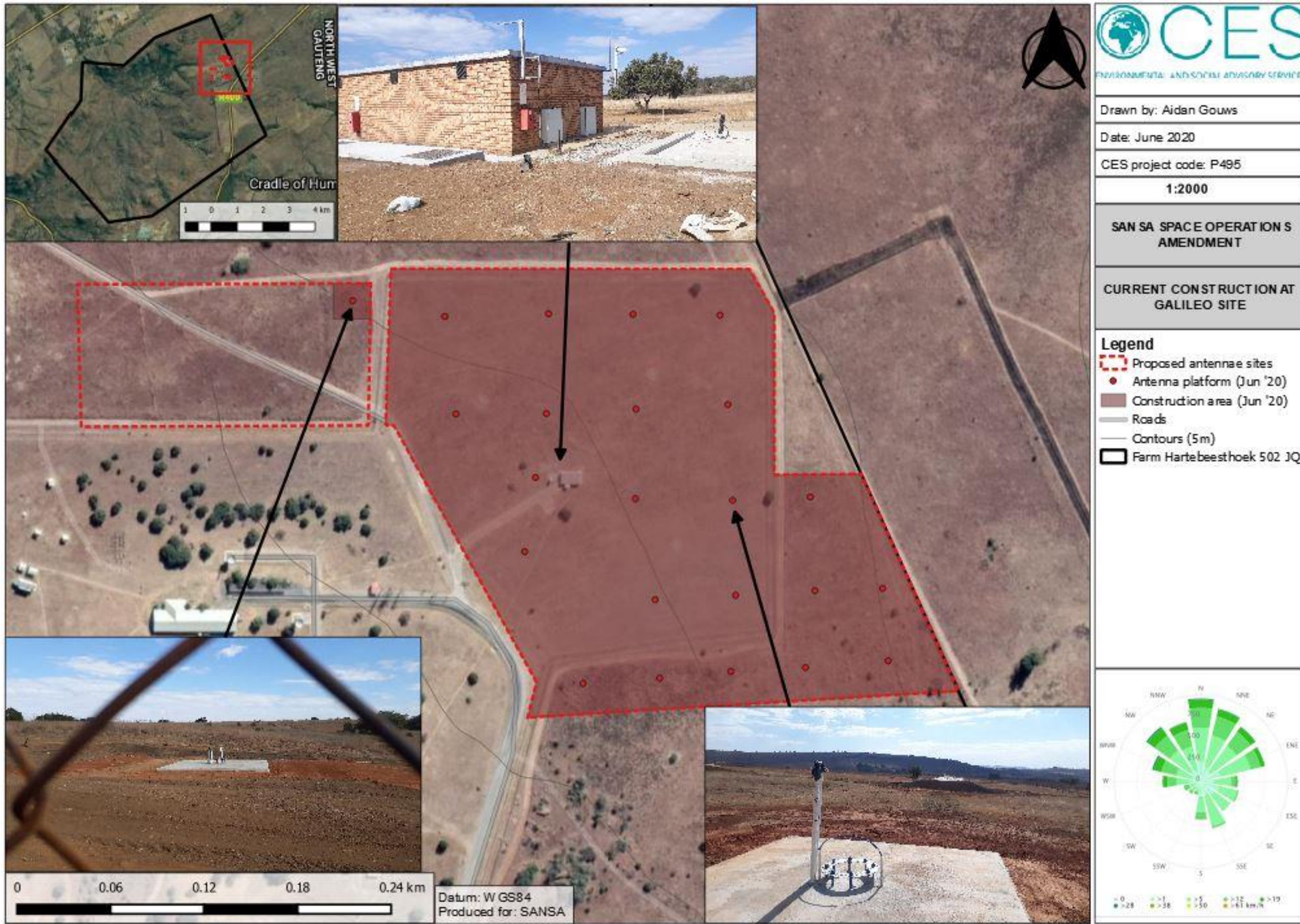


Figure 2.3: Current construction at the north-eastern (Galileo) sites



### 3 RELEVANT LEGISLATION

Environmental legislation relevant to the proposed activity is summarised in Table 3.1 below.

**Table 3.1: Environmental legislation considered in the preparation of this report**

LEGISLATION/POLICY	DESCRIPTION	RELEVANCE TO THE DEVELOPMENT
<p><b>The Constitution</b></p>	<p>The Constitution of the Republic of South Africa is the supreme law of the land. As a result, all laws, including those pertaining to this Management Plan, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right:</p> <p><i>a) To an environment that is not harmful to their health or well-being; and</i></p> <p><i>b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:</i></p> <p><i>i. Prevent pollution and ecological degradation;</i></p> <p><i>ii. Promote conservation; and</i></p> <p><i>iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i></p>	<ul style="list-style-type: none"> <li>- Obligation to ensure that the proposed activity will not result in pollution and ecological degradation; and</li> <li>- Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.</li> </ul>
<p><b>National Environmental Management Act (NEMA) (No. 108 of 1998), and its subsequent amendments.</b></p>	<p>The objective of NEMA is: <i>“To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for coordinating environmental functions exercised by organs of state; and to provide for matters connected therewith.”</i></p> <p>This report has been guided by the NEMA Principles detailed in Section 2 of the Act. NEMA introduces the “duty of care” concept,</p>	<ul style="list-style-type: none"> <li>- The undertaking of a specialist study, in this case, the ecological study, in order to identify potential impacts on the ecological environment and to recommend mitigation measures to minimise these impacts, complies with Section 28 of NEMA.</li> </ul>



LEGISLATION/POLICY	DESCRIPTION	RELEVANCE TO THE DEVELOPMENT
	<p>which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution, and may lead to the prosecution of responsible persons, including companies, for the conduct of the legal persons.</p>	<ul style="list-style-type: none"> <li>- The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA.</li> </ul>
<p><b>National Environmental Management Act (NEMA): Environmental Impact Assessment (EIA) Regulations (2014) and its subsequent amendments.</b></p>	<p>The NEMA EIA Regulations (2014, as amended) aim to avoid detrimental environmental impacts through the regulation of specific activities that cannot commence without prior environmental authorisation. Authorisation either requires a Basic Assessment or a Full Scoping and Environmental Impact Assessment, depending on the type of activity. These assessments specify mitigation and management guidelines to minimise negative environmental impacts and optimise positive impacts. Should any portion of an area be proposed for development (after proclamation) these Regulations should be consulted.</p>	<ul style="list-style-type: none"> <li>- An application for Environmental Authorisation (as triggered by the EIA 2014 Regulations, as amended) is required to be submitted to the Competent Authority.</li> <li>- This report complies with Appendix 6 of the EIA 2014 Regulations, as amended (GNR. 326 of 2017) as regulated by NEMA (Act 107 of 1998, as amended), which cover the requirements of the content of a Specialist Report.</li> </ul>
<p><b>National Environmental Management: Protected Areas Act (No. 57 of 2003), and its subsequent amendments.</b></p>	<p>The National Environmental Management: Protected Areas Act (NEMPAA), No. 57 of 2003, aims to protect, conserve and manage ecologically viable areas that represent South Africa’s biological diversity; this is achieved through a network of representative protected areas on state, private and communal land.</p>	<ul style="list-style-type: none"> <li>- The proposed activity is situated within the Cradle of Humankind National World Heritage Site.</li> </ul>
<p><b>National Environmental Management: Biodiversity Act (No. 10 of 2004), and its subsequent amendments.</b></p>	<p>The National Environmental Management: Biodiversity Act (NEMBA), No. 10 of 2004, aims to assist with the management and conservation of South Africa’s biological diversity through the use of legislated planning tools. These planning tools include the declaration of bioregions and the associated bioregional plans as well as other mechanisms for managing and conserving biodiversity. The objectives of the Act include inter alia:</p>	<ul style="list-style-type: none"> <li>- Activities may not be carried out in threatened or protected ecosystems without first gaining authorisation for such activities.</li> <li>- Most of the farm occurs within the Witwatersberg Skeerpoort Mountain Bushveld which is a listed threatened</li> </ul>



LEGISLATION/POLICY	DESCRIPTION	RELEVANCE TO THE DEVELOPMENT
	<ul style="list-style-type: none"> <li>• The management and conservation of biological diversity within the Republic and of the components of such biological diversity;</li> <li>• The use of indigenous biological resources in a suitable manner;</li> <li>• The fair and equitable sharing of benefits arising from bio-prospecting of genetic material derived from indigenous biological resources; and</li> <li>• To give effect to ratified international agreements relating to biodiversity which are binding on the Republic.</li> <li>• To provide for co-operative governance in biodiversity management and conservation; and</li> <li>• To provide for a South African National Biodiversity Institute to assist in achieving the objectives of the Act.</li> </ul> <p>In addition to this, Sections 50-62 of the Act provide details relating to the protection of threatened or protected ecosystems and species, while Sections 63-77 of the Act provide details relating to alien and invasive species with the purpose of preventing their introduction and spread, managing, controlling and eradicating of alien and invasive species.</p>	<p>ecosystem and has a threat status of Endangered (EN).</p> <ul style="list-style-type: none"> <li>- No protected species may be removed or damaged without a permit.</li> </ul>
<p><b>NEMBA National List of Threatened Ecosystems (GNR 1002 of 9 December 2011)</b></p>	<p>The National List of Ecosystems is in place for the ecosystems that are threatened and in need of protection. The NEMBA provides for listing of threatened or protected ecosystems in one of the following categories:</p> <ul style="list-style-type: none"> <li>• Critically endangered (CR) ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;</li> <li>• Endangered (EN) ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;</li> </ul>	



LEGISLATION/POLICY	DESCRIPTION	RELEVANCE TO THE DEVELOPMENT
	<ul style="list-style-type: none"> <li>• Vulnerable (VU) ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems;</li> <li>• Protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.</li> </ul>	
<p><b>NEMBA: Alien Invasive Species Regulations (2014)</b></p>	<p>Invasive alien species are plants, animals and microbes that are introduced into countries, and then out-compete the indigenous species. Invasive alien species are cause billions of Rands of damage to South Africa’s economy on an annual basis and are a major threat to the country’s biological biodiversity.</p> <p>The Alien and Invasive Species Regulations (2014) categorises the different types of alien and invasive plant and animal species and how they should be managed:</p> <ul style="list-style-type: none"> <li>• Category 1a Listed Invasive Species – species which must be <u>combatted or eradicated</u>.</li> <li>• Category 1b Listed Invasive Species – species which must be <u>controlled</u>.</li> <li>• Category 2 Listed Invasive Species – species which <u>require a permit</u> and must not be allowed to spread outside of the designated area.</li> <li>• Category 3 Listed Invasive Species – species which are <u>subject to exemptions</u> in terms of section requiring a permit, but where such a species occurs in riparian areas, must, for the purposes of these regulations, be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.</li> </ul>	<ul style="list-style-type: none"> <li>- An invasive species management, control and eradication plan for land/activities under their control should be developed, as part of their environmental plans in accordance with section 11 of NEMA.</li> <li>- Invasive alien species should not be introduced to the site.</li> </ul>



LEGISLATION/POLICY	DESCRIPTION	RELEVANCE TO THE DEVELOPMENT
<p><b>National Forest Act (Act 84 of 1998) and its subsequent amendments.</b></p>	<p>The NFA provides the legal framework for the protection and sustainable use of South Africa’s indigenous forests. Any area that has vegetation which is characterised by a closed and contiguous canopy and under storey plant establishment is defined as a ‘forest’ and as a result falls under the authority of the Department of Agriculture, Forestry and Fisheries (DAFF): Forestry sector. A clause in Chapter 3, Part 1 covers:</p> <p><u>Prohibition on destruction of trees in natural forests</u>                      Section 7 (1) No person may cut, disturb, damage or destroy any indigenous living tree in, or remove or receive any such tree from, a natural forest except in terms of (a) a licence issued under subsection (4) or section 23.</p> <p><u>Prohibition on destruction of protected trees</u>                      Section 15 (1) No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated.</p> <p><u>Effect of setting aside protected areas</u>                      Section 10 (1) No person may cut, disturb, damage or destroy any forest produce in, or remove or receive any forest produce from, a protected area, except—</p> <ul style="list-style-type: none"> <li>(a) in terms of the rules made for the proper management of the area in terms of section 11(2)(b);</li> <li>(b) in the course of the management of the protected area by the responsible organ of State or person;</li> <li>(c) in terms of a right of servitude;</li> <li>(d) in terms of the authority of a licence granted under section 7(4) or 23;</li> </ul>	<ul style="list-style-type: none"> <li>- No forest or trees that form part of a forest or forest association may be damaged or destroyed without a permit. However, no forest patches were identified within the construction footprint and no protected tree species were identified on site.</li> </ul>



LEGISLATION/POLICY	DESCRIPTION	RELEVANCE TO THE DEVELOPMENT
	<p>(e) in terms of an exemption under section 7(1)(b) or 24(6); or in the case of a protected area on land outside a State forest, with the consent of the registered owner or by reason of another right which allows the person concerned to do so, subject to the prohibition in section 7(1).</p>	
<p><b>Conservation of Agricultural Resources Act, (No. 43 of 1983).</b></p>	<p>The Conservation of Agricultural Resources Act, No. 43 of 1983 aims to control over-utilisation of the natural agricultural resources to promote the conservation of soil, water sources and vegetation through the combat of weeds and invader plants. Regulations 15 and 16 under this Act, which relate to problem plants, were amended in March 2001.</p> <p>This is achieved by:</p> <ul style="list-style-type: none"> <li>• Production potential of land is maintained,</li> <li>• Preventing and combating erosion,</li> <li>• Preventing and combating weakening or destruction of the water sources, and</li> <li>• Protecting vegetation and combating of weeds and invader plants.</li> </ul>	<p>- It should be noted that the CARA regulations for the legal obligations regarding alien invasive plants in South Africa have been superseded by the National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which was promulgated on 1 October 2014. However, CARA has not been repealed and is still included as a reference point to use in terms of the management of AIS where certain species may not be included in the NEM:BA AIS list.</p>
<p><b>National Veld and Forest Fire Act (No. 101 of 1998), and its subsequent amendments.</b></p>	<p>The National Veld and Forest Fire Act, No. 101 of 1998 (amended in 2001), aims to prevent and combat forest, veld and mountain fires throughout South Africa. This includes the regulation of the establishment, registration, functioning and duties of Fire Protection Associations (FPAs). FPAs manage all aspects of forest, veld and mountain fire prevention and firefighting.</p>	<p>- The development should take note of the Act.</p>



## 4 ASSESSMENT METHODOLOGY

### 4.1 THE ASSESSMENT

The original Ecological Impact Assessment was conducted by EnviRoss CC between November 2009 and January 2010. This included a comprehensive terrestrial and aquatic ecological assessment of the entire Hartebeesthoek 502 JQ farm. The proposed amendment aims to delineate the specific sites on the farm for the installation of the antennae.

The project site and surrounding areas were described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. This included the consideration of:

- The EnviRoss CC (2010) Ecological Impact Assessment (Appendix B2);
- The South African Vegetation Map (Mucina and Rutherford, 2018);
- The Gauteng Conservation Plan (C-Plan) version 3.3;
- Gauteng Ridge Guidelines; and
- Available literature on the regional vegetation.

Further to the above, a site visit was conducted in winter on 11 June 2020 to assess the site-specific ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities. The site visit also served to verify the impacts identified by EnviRoss CC (2010) and determine whether these are still applicable in light of the proposed amendments.

### 4.2 SPECIES OF CONSERVATION CONCERN

Data on the known distribution and conservation status for each potential species of conservation concern has to be obtained to develop a list of 'Species of Concern'. These species are those that may be impacted significantly by the proposed activity. In general these will be species that are already known to be threatened or at risk, or those that have restricted distributions (endemics) with a portion (at least 50%) of their known range falling within the project site i.e. strict endemic and near endemic species. Species that are afforded special protection, notably those that are protected by NEMBA (No. 10 of 2004), NWBMA (2016) Schedule 2, the National Forest Act or which occur on the South African Red Data List. According to SANBI (2019), SCCs include those belonging to the following Red List categories: Extinct in the Wild (EW); Regionally Extinct (RE); Critically Endangered, Possibly Extinct (CR PE); Critically Endangered (CE); Endangered (EN); Vulnerable (VU); Near Threatened (NT); Critically Rare; Rare; Declining; or, Data deficient – Insufficient Information (DDD). This excludes species categorised as 'Least Concern'.

### 4.3 SAMPLE SITE SELECTION

An ecological walkthrough was conducted at the proposed sites. The aim of this visit was to characterise and describe each vegetation community within the sites as well as identifying areas of high sensitivity and species of conservation concern. Visible species within the sites



were identified using plant field guides and published literature. One to four sample points were taken per site, depending on the extent, heterogeneity and biodiversity of the site. Vegetation types within the sites were assessed and surveyed and vegetation communities were then described according to the dominant species recorded from each type. These were mapped and assigned a sensitivity score.

#### 4.4 VEGETATION MAPPING

The SANBI National Vegetation Map (2018) was used to describe the vegetation types found within the proposed development area. This is the third and latest update to the original 2006 Vegetation Map of South Africa, Lesotho and Swaziland. Changes made in the 2009 and 2012 versions were retained and additional portions of the 2006 map have been mapped at a finer scale, with 47 new vegetation types mapped since 2012 (SANBI, 2018). The map and accompanying book describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa.

The vegetation map was compared to the EnviRoss CC (2010) vegetation map and the actual conditions of vegetation observed onsite during the site assessment through mapping from aerial photographs, satellite images, literature descriptions (e.g. SANBI and Gauteng Conservation Plan) and related data gathered on the ground.

#### 4.5 SITE SENSITIVITY

This section of the report explains the approach to determining the ecological sensitivity of the project site on a broad scale. The approach identifies zones of high, medium and low sensitivity according to a system developed by CES and used in numerous proposed development studies. It must be noted that the sensitivity zonings in this study are based solely on ecological (primarily vegetation) characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 10 criteria which are considered to be of importance in determining ecosystem and landscape sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation (Table 4.1).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity.

**Table 4.1 Criteria used for the analysis of the sensitivity of the site.**

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	<b>Topography</b>	Level, or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	<b>Vegetation -</b> Extent or habitat type in the region	Extensive	Restricted to a particular region/zone	Restricted to a specific locality / site
3	<b>Conservation status</b> of fauna/flora or habitats	Well conserved independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value



CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
4	<b>Species of conservation concern</b> - Presence and number	None, although occasional regional endemics	No endangered or vulnerable species, some indeterminate or rare endemics	One or more endangered and vulnerable species, or more than 2 endemics or rare species
5	<b>Habitat fragmentation</b> leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	<b>Biodiversity</b> contribution	Low diversity, or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	<b>Visibility</b> of the site or landscape from other vantage points	Site is hidden or barely visible from any vantage points with the exception in some cases from the sea.	Site is visible from some or a few vantage points but is not obtrusive or very conspicuous.	Site is visible from many or all angles or vantage points.
8	<b>Erosion potential</b> or instability of the region	Very stable and an area not subjected to erosion.	Some possibility of erosion or change due to episodic events.	Large possibility of erosion, change to the site or destruction due to climatic or other factors.
9	<b>Rehabilitation</b> potential of the area or region	Site is easily rehabilitated.	There is some degree of difficulty in rehabilitation of the site.	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce.
10	<b>Disturbance</b> due to human habitation or other influences (Alien invasives)	Site is very disturbed or degraded.	There is some degree of disturbance of the site.	The site is hardly or very slightly impacted upon by human disturbance.

A Geographical Information System (GIS) map was drawn up and with the aid of a satellite image the sensitive regions and vegetation types could be plotted. The description of the sample plots helped to map the vegetation, and these descriptions as well as sensitivity ratings were illustrated on the resultant maps.



## 5 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

The ecological impacts of the proposed amendments were reviewed to determine whether the original findings are still valid. The project sites were assessed using a two-phased approach. Firstly, a desktop assessment of the site was conducted, which included a review of the original study and the latest vegetation classifications, biodiversity programmes and plans. Secondly, a site visit was conducted on 11 June 2020 (winter) to ground truth the findings of the desktop assessment.

### 5.1 DESKTOP ASSESSMENT

#### 5.1.1 Vegetation and Flora

According to Mucina and Rutherford (2018), the farm is comprised of Andesite Mountain Bushveld, Gauteng Shale Mountain Bushveld, Gold Reef Mountain Bushveld and Moot Plains Bushveld vegetation units. Additionally, EnviRoss CC (2010) identified Northern Afrotropical Forests along drainage lines on the farm. The proposed sites all fall within the Andesite Mountain Bushveld vegetation unit (Figure 5.1). This vegetation is characterised by a dense, medium-tall thorny bushveld with a well-developed grassy layer on hill slopes and some valleys with undulating landscape (Mucina and Rutherford, 2018). It is classified as least threatened, with only 7% of the 24% provincial conservation target conserved in statutory reserves (Suikerbosrand Nature Reserve and Magaliesberg Nature Area) and an additional 1-2% conserved in other reserves, mainly in the Hartebeesthoek Radio Astronomy Observatory (Mucina and Rutherford, 2018). Approximately 15% is transformed, mainly due to cultivation and some urbanisation, with some of the vegetation unit fringes on major urban areas (Mucina and Rutherford, 2018). Erosion is generally very low throughout the vegetation unit (Mucina and Rutherford, 2018). Table 5.1 includes the dominant and typical floral species for the vegetation type.

**Table 5.1: Dominant and typical floristic species for the Andesite Mountain Bushveld**

GRASS SPECIES	FORB SPECIES	TREE/SHRUB SPECIES
<i>Eragrostis curvula</i>	<i>Commelina Africana</i>	<i>Acacia caffra</i> (= <i>Senegalia caffra</i> )
<i>Hyparrhenia hirta</i>	<i>Vernonia galpinii</i>	<i>Acacia karroo</i> (= <i>Vachellia karroo</i> )
<i>Setaria sphacelata</i>	<i>Vernonia oligocephala</i>	<i>Celtis africana</i>
<i>Themeda triandra</i>	<i>Aloe greatheadii</i> var. <i>davyana</i>	<i>Protea caffra</i>
<i>Cymbopogon pospischilii</i>		<i>Zanthoxylum capense</i>
<i>Eragrostis racemosa</i>		<i>Ziziphus mucronata</i>
<i>Eragrostis superba</i>		<i>Asparagus laricinus</i>
<i>Panicum maximum</i>		<i>Euclea crispa</i> subsp. <i>crispa</i>
		<i>Rhus pyroides</i> subsp. <i>pyroides</i> (= <i>Searsia pyroides</i> subsp. <i>pyroides</i> )
		<i>Diospyros lycoides</i> subsp. <i>lycoides</i>
		<i>Gymnosporia polycantha</i>
		<i>Lippia javanica</i>
		<i>Rhamnus prinoides</i>
		<i>Asparagus suaveolens</i>
		<i>Rhus rigida</i> var. <i>margaretae</i> (= <i>Searsia rigida</i> var. <i>margaretae</i> )
		<i>Teucrium trifidum</i>
		<i>Isoglossa grantii</i>
		<i>Rhoicissus tridentata</i>



## 5.1.2 Threatened Ecosystems

Most of the farm is located within an endangered ecosystem, namely the Witwatersberg Skeerpoort Mountain Bushveld. Approximately 6.6 ha of the proposed antennae sites fall within this ecosystem (Figure 5.1). However, the majority of the sites are degraded and/or transformed (refer to section 5.2.1 for further details).

## 5.1.3 Habitat Units and Ecological Processes

EnviRoss (2010) identified the major habitat units and ecological processes on site based on vegetation type and pertinent ecological processes identified in the Gauteng C-Plan Version 2 (2005), including ridges, hydrology and various potential habitats. The units included agricultural areas, developed areas, disturbed grasslands, exotic vegetation, forests, natural areas and wetlands (See Chapter 4 of EnviRoss, 2010, Figure 5.2).

## 5.1.4 Gauteng C-Plan and Ridges

The original ecological assessment described the biodiversity of the area in terms of the Gauteng Conservation Plan Version 2 (Section 4.1). In terms of Version 3.3 of the C-Plan, which was adopted in 2011, most of the farm falls within an Ecological Support Area (ESA), namely a Class 1 ridge, with sections falling within Critical Biodiversity Areas (CBA), namely those considered Important Areas to the east and south-west of the property. A portion of proposed antennae Site 2 falls within a CBA (~1.76 ha). Additionally, a small portion of Site 3 (~16 m<sup>2</sup>) is situated within an ESA and on a Class 1 Ridge (Figure 5.3). Four of the five smaller sites (~1 550 m<sup>2</sup>) fall within the 200 m buffer of the Class 1 Ridge (Figure 5.3). As per the Gauteng Ridge Guidelines (extract below), no development is permitted on Class 1 ridges and only low impact activities are permitted within the buffer zone. It is recommended that the layout of the site within the Class 1 ridge zone be amended to comply with the guideline.

**Class 1 ridges** include ridges of which 5% or less of their surface area has been converted to urban development, quarries and/or alien vegetation. (Approximately 51% of ridges currently fall within Class 1, including the Suikerbosrand and parts of the Magaliesberg).

**Guidelines:**

- The consolidation of properties on Class 1 ridges is supported.
- Further development activities and subdivisions will not be permitted on Class 1 ridges.
- Only low impact activities with an ecological footprint of 5% or less will be permitted in the 200 metre buffer zone of the ridge.

## 5.1.5 Wetlands

EnviRoss CC (2010) identified a seepage wetland to the south of the developed area (Figure 5.3). Proposed Site 7 and Site 8 are located within a moist grassland seepage zone. According to EnviRoss (2010, p. viii), “even though this area is not strictly regarded as a wetland as it does not remain inundated with water for long enough periods to support wetland vegetation, it does contribute to the wetlands within the lower-lying areas”.

The south-eastern and south-western sites fall within the upper wetland areas. EnviRoss CC (2010) recommended the repositioning of the Orbcomm site northwards to the nearby higher-



lying area to avoid negative impacts on this wetland. Although this wetland was not identified in the National Wetlands Map Version 5 (NWM5; Figure 5.3), CES endorse the EnviRoss (2010) recommendation to move the infrastructure out of the wetland (see Figure 7.1 b & c). Alternatively, should this not be feasible, CES recommend that SANSA appoint a Wetland Specialist to determine whether the sites indeed fall within a wetland, identify the associated impacts and propose appropriate mitigation measures.

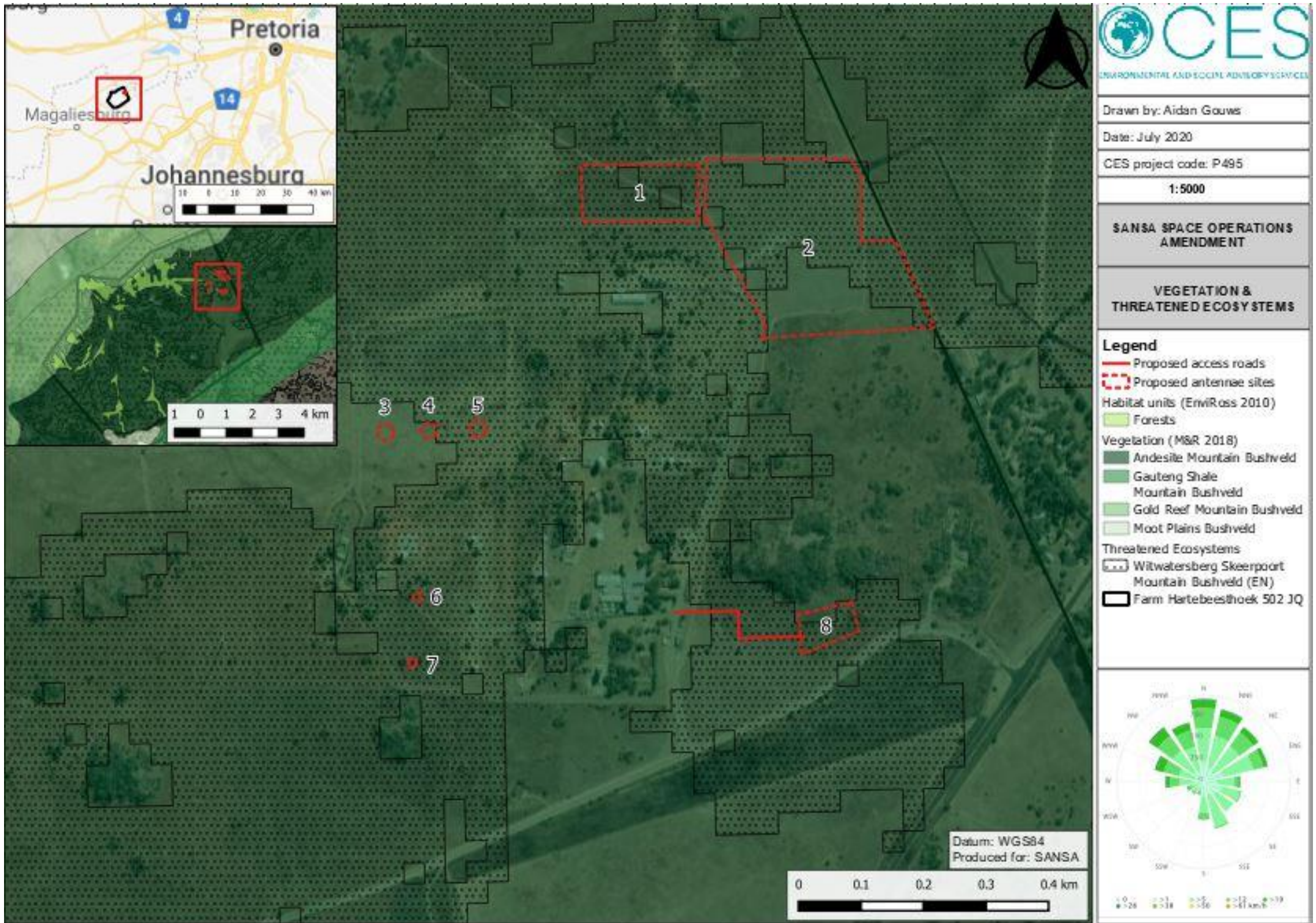


Figure 5.1: Map of vegetation types and threatened ecosystems surrounding the proposed development sites (Mucina and Rutherford, 2018; EnviRoss CC, 2010).



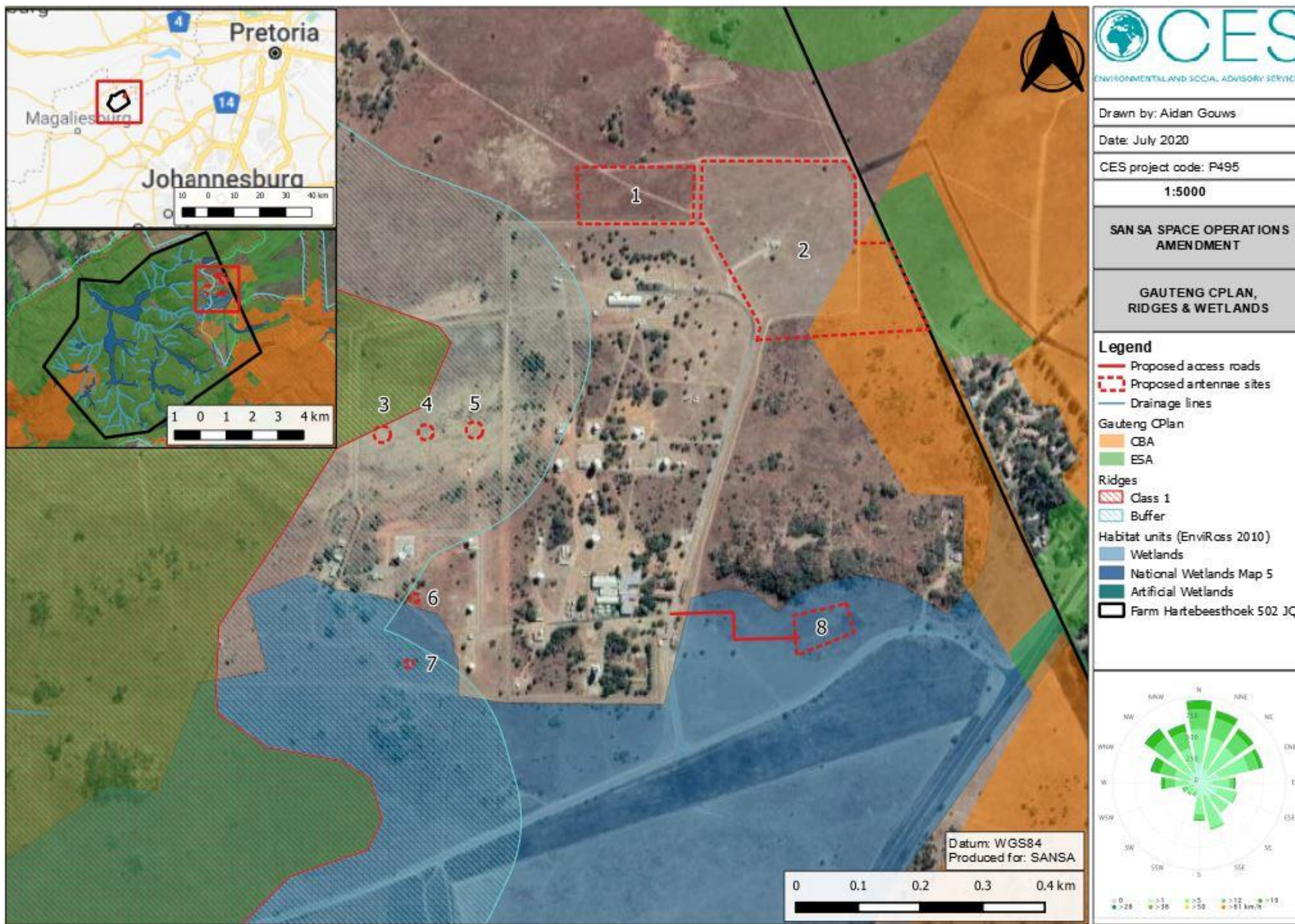


Figure 5.3: Map of Gauteng CPlan, Ridges and Major Wetlands surrounding the proposed development sites. Only the south eastern corner of one of the sites occurs within a CBA.



### 5.1.6 Expected Site Conditions

The ecological assessment by EnviRoss CC (2010) described specific sites on the farm, originally earmarked for the construction of antennae (Figure 5.2). These sites are located in close proximity to the current proposed sites, representing the expected ecological conditions on site. The current proposed sites were further assessed during the site visit.

#### North-eastern sites

The two northern-eastern proposed sites (1 and 2 in Figure 5.2) are located in close proximity to the original 'Galileo GSS' site (Plate 5.1). According to EnviRoss CC (2010: p. 20) "*the proposed Galileo GSS site falls within an areas where some development has already taken place. The localised area has also been historically utilised for agricultural purposes, with the result that the grasslands are transformed within the area.*" The two northern-eastern proposed sites are expected to resemble the impacted grasslands community as described by EnviRoss CC (2010, see Section 6.1.2), characterised by a low species diversity and dominated by the plagioclimax species *Hyperthelia dissoluta*, indicating a loss of overall ecological integrity. According to EnviRoss CC (2010: p. 28) "*there is a high degree of Pioneer (e.g. Cynodon dactylon) and Increaser (e.g. Aristida spp and Pogonarthria squarrosa) grass species noted, indicating historical and ongoing impacts.*"



**Plate 5.1: Galileo GSS site during the 2009/2010 ecological assessment (from EnviRoss CC, 2010)**

#### North-western sites

The three north-western proposed sites (3-5 in Figure 5.2) are located approximately 130 m north of the original 'New Antennae' site (Plate 5.2), which is characterised by open grasslands, which do not incorporate the seepage zones to the south (EnviRoss CC, 2010: p. 19). It is anticipated that the north-western sites will be moderately impacted, with characteristics of the impacted and unimpacted (see Section 6.1.1) grasslands described by EnviRoss CC (2010), including woody elements within areas of sporadic rocky outcroppings.



**Plate 5.2: New Antennae site during the 2009/2010 ecological assessment (from EnviRoss CC, 2010)**

### South-western sites

The two south-western proposed sites (6 and 7 in Figure 5.2) are located immediately north and south of the original 'Orbcomm' site (Plate 5.3). EnviRoss CC (2010: p. 18-19) describe the Orbcomm site as follows:

*"The area ... falls within open grasslands that incorporate a low gradient rocky ridge and associated rocky outcroppings. The site is considered a moist grassland or poorly-developed temporary wetland area where the groundwater seepage occurs during times of high rainfall. The soils within the ridge are not inundated for long enough periods to support hydrophytic (wetland) plant species. The area does, however, support the wetlands below and disturbance of the soils and associated hydrology of this area will have an impact on the wetlands within the lower-lying areas."*

*It is recommended that the proposed layout be modified to reposition the proposed infrastructure further northwards to the nearby higher-lying area. This would mean that these seepage areas could be avoided and the negative effects be abated. There is an existing roadway within this area that serves as an access roadway to the existing Collimation Tower. Veld associated with this site was noted to have suffered some degradation to during the construction of the roadway and the existing antennae and therefore further construction within this area will not have an undue impact on the ecological integrity within the area."*

The south-western sites are anticipated to include a mixture of the impacted grassland and upper wetland (see Section 6.1.4) communities. According to EnviRoss CC (2010: p. 31) *"the wetland area within the farm occur as seepage zone or moist grasslands along the slopes of the higher-lying rocky grasslands. The wetland systems mature and become well-developed within the lower-lying areas."*



**Plate 5.3: Orbcomm site during the 2009/2010 ecological assessment (from EnviRoss CC, 2010)**

#### South-eastern site

The two south-eastern proposed site (8 in Figure 5.2) is located approximately 100 m south of the original 'Raytheon' site (Plate 5.4). According to EnviRoss CC (2010: p. 20) the Raytheon site *“falls on a rocky outcropping (kopje), which is dominated by woodlands. The actual proposed site is where existing historical farming infrastructure (small outbuildings) are. The localised area has therefore already suffered from clearing and transformation.”* The south-eastern site is expected to resemble the impacted grasslands and open woodlands (see Section 6.1.3) communities, with some sporadic trees and shrubs, and a basal layer of diverse grasses and forbs.



**Plate 5.4: Raytheon site during the 2009/2010 ecological assessment (from EnviRoss CC, 2010)**

## 5.2 SITE ASSESSMENT

Please note: The site visit was initially scheduled for earlier in the year (late March to early April 2020). However, in response to the COVID-19 pandemic, the President of South Africa announced the implementation of a nationwide lockdown period during his national address on 23 March 2020. The lockdown imposed travel restrictions, which prevented the specialist from conducting the site visit prior to the easing of the restrictions on 5 June 2020. The site assessment was therefore conducted on 11 June 2020 during the dry (winter) season rather than during the wet season when many bushveld plants are flowering. Consequently, it is



possible that some species have gone undetected. However, given that this assessment builds on the previous study undertaken by EnviRoss CC (2010), the site assessment was sufficient to determine changes to provide updates to the original study and determine the status of the affected area. The site investigation was conducted to:

- Verify desktop findings;
- Assess the vegetation;
- Assess the current land-use;
- Identify potential sensitive ecosystems;
- Identify plant species of conservation concern associated with the proposed project activities; and
- Identify animal species associated with the proposed project activities.

The site visit served to inform potential impacts of the proposed project and to describe the significance of these impacts on the surrounding flora and fauna.

### 5.2.1 Vegetation Survey

Nine sample points were captured for the two north-eastern sites (Figure 5.4). Unfortunately, due to restricted access at the time of the site visit, Site 1 and a portion of Site 2 were surveyed from their respective perimeter fences (Figure 5.4). Two sample points were captured for the three north-western sites (Figure 5.4) and two were captured for the two south-western sites (Figure 5.4). Three sample points were captured for the south-eastern site and the proposed access road (Figure 5.4).

Figure 5.4 provides a map of the vegetation observed on site at the proposed antennae sites and their immediate surrounding. The vegetation across all proposed antennae sites and their immediate surrounding ranges from near-natural Andesite Mountain Bushveld to variably-modified open grassland with at least some elements of Andesite Mountain Bushveld vegetation, i.e. a “*medium-tall thorny bushveld with a well-developed grassy layer on hill slopes and some valleys with undulating landscapes*” (Mucina and Rutherford, 2018, p. 467).

The vegetation at each of the proposed sites is described in Table 5.2 below, along with illustrative examples of the species, land uses and general site conditions observed on site.

Plant Species Observed

Table 5.3 provides a list of plant species, along with their protection status, observed at the proposed antennae sites. A total of 30 plants were identified during the site visit, none of which were Species of Conservation Concern (SCC). One Alien Invasive Species (AIS) was observed on site, namely *Acacia dealbata*.

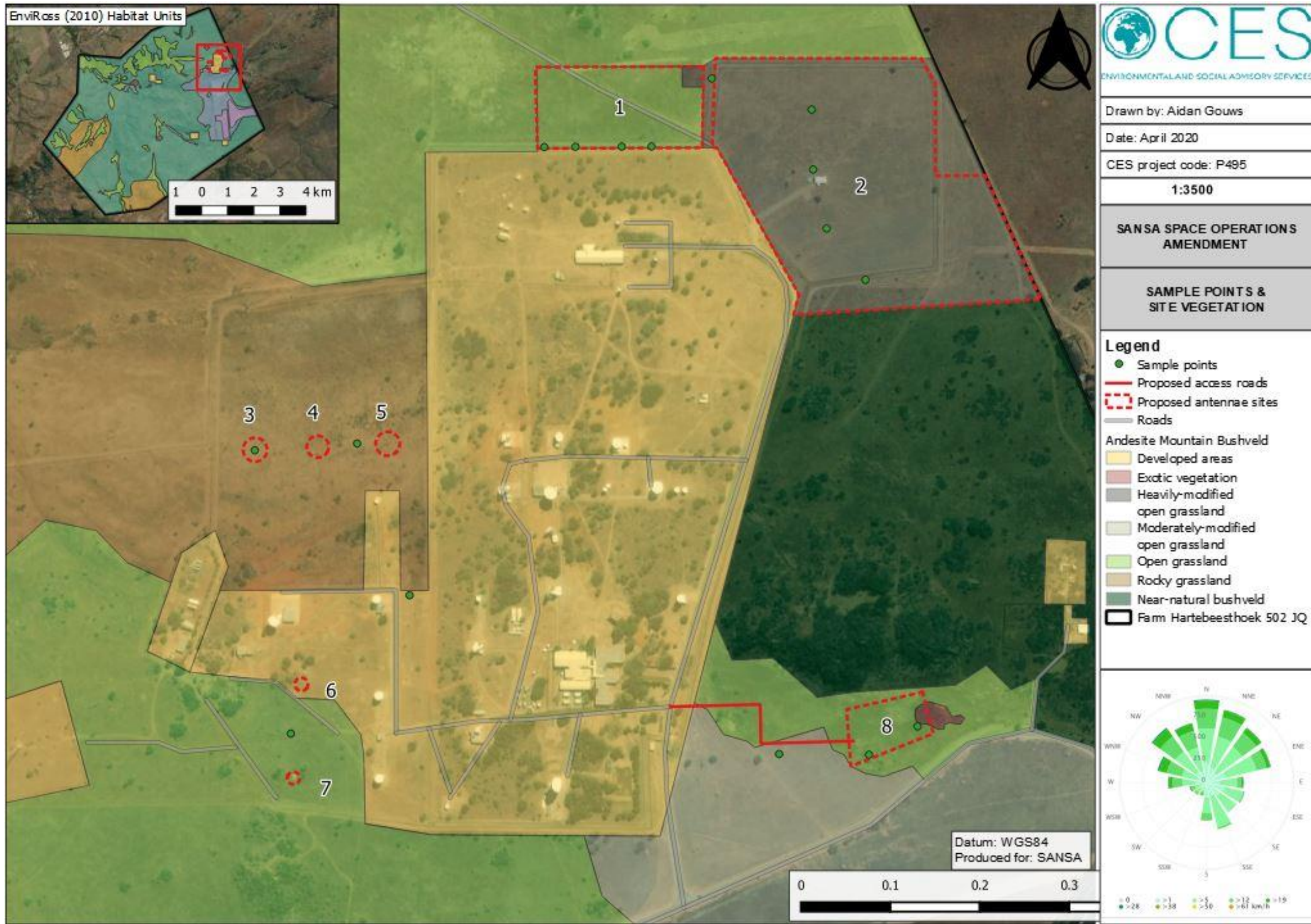






Figure 5.4: Vegetation map of the proposed antennae sites and their immediate surroundings.



Table 5.2: Vegetation survey at proposed antennae sites

SITE	VEGETATION DESCRIPTION	PHOTOGRAPH	
<p>North-eastern (1)</p>	<p>Open grassland with elements of Andesite Mountain Bushveld vegetation, namely a medium-height mixed, thorny bushveld with a well-developed grassy layer.</p> <p>Most of the site is dominated by near-intact grasslands (a), mainly the plagioclimax species <i>Hyperthelia dissoluta</i>, with some <i>Eragrostis curvula</i> and <i>Melinis repens</i> cover.</p> <p>The woody species layer is comprised of scattered clusters of liana (<i>Clematis brachiata</i>) and perennial shrublets (<i>Helichrysum</i> c.f. <i>kraussii</i>) to small, shrub-like trees, including <i>Grewia occidentalis</i>, <i>Searsia lancea</i> and <i>Vachellia karroo</i> (b-c).</p> <p>The site is transformed in some areas due to the construction of a new satellite antenna platform in the north-eastern corner of the site (d), as well as by dirt roads running along the southern and eastern perimeter fences.</p>		
			
<p>Plate 5.5: Vegetation cover and land-use at the north-eastern site (1)</p>			



SITE	VEGETATION DESCRIPTION	PHOTOGRAPH			
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">North-eastern (2)</p>	<p>Heavily-modified open grassland with few remaining elements of Andesite Mountain Bushveld vegetation.</p>				
	<p>Degraded grassland cover (a: mostly <i>Hyperthelia dissoluta</i> and <i>Hyparrhenia hirta</i>) ranging from intact to sparsely-covered to bare, with isolated clusters of select forbs (b: e.g. <i>Aloe greadheadii</i> var. <i>davyana</i>), shrubs (c: e.g. <i>Ilex mitis</i>) and trees (d: e.g. <i>Searsia lancea</i>).</p>				
	<p>The site is highly transformed due to the construction of new satellite antenna platforms (e-f), construction materials (g) and existing infrastructure (h).</p>				
		<p>Plate 5.6: Vegetation cover and land-use at the north-eastern site (2)</p>			



SITE	VEGETATION DESCRIPTION	PHOTOGRAPH			
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">North-western (3-5)</p>	<p>Rocky Highveld Grassland, with some scattered Andesite Mountain Bushveld species.</p>				
	<p>Near-natural, discontinuous and rocky grassland (a), comprised of <i>Arisida congesta</i>, <i>Hyperthelia dissoluta</i> and <i>Melinis repens</i> (a), interspersed with small shrublets, e.g. <i>Lasiosiphon caffer</i> (b), <i>Oocephala staeheleinoides</i> (c) and <i>Asparagus larycinus</i> (d).</p>				
	<p>A few larger shrub-like trees were also observed on site (e-f), including <i>Combretum molle</i>, <i>Euclea crispa</i> and <i>Searsia</i> spp. Grassy cover becomes increasingly more intact downslope, with some transformation at the foot of the slope (f-g).</p>				
	<p>Blesbok (<i>Damaliscus pygargus phillipsi</i>) were observed grazing around the site (h). These were purchased and placed on the farm by SANSA. A hare (c.f. <i>Lepus victoriae</i>) was also spotted on site.</p>	<p>Plate 5.7: Vegetation cover and land-use at the north-western sites (3-5)</p>			



SITE	VEGETATION DESCRIPTION	PHOTOGRAPH	
<p>South-western (6-7)</p>	<p>Open grassland with elements of Andesite Mountain Bushveld vegetation, namely a medium-tall scattered bushveld with a well-developed grassy layer.</p> <p>Mostly-intact grassland dominated by <i>Hyperthelia dissoluta</i> and <i>Eragrostis curvula</i> (a), with scattered forbs (b), shrubs and trees (c), including <i>Combretum molle</i>, <i>Cussonia paniculata</i> (d), <i>Euclea crispa</i>, <i>Ilex mitis</i> and <i>Searsia lancea</i>.</p>		
<p>Plate 5.8: Vegetation cover and land-use at the south-western sites (6-7)</p>			



SITE	VEGETATION DESCRIPTION	PHOTOGRAPH	
<p style="text-align: center; transform: rotate(-90deg);">South-eastern (8)</p>	<p>Open to moderately-modified open grassland with elements of Andesite Mountain Bushveld vegetation, namely a medium-height scattered bushveld with a well-developed grassy layer.</p>		
	<p>Moderately degraded yet intact grassland (a-b), dominated by <i>Hyperthelia dissoluta</i> and <i>Cymbopogon</i> c.f. <i>plurinodis</i>, with a fringing stand of invasive <i>Acacia dealbata</i> on the eastern side of the site (c).</p>		
	<p>Near-natural Andesite Mountain Bushveld vegetation is found upslope to the north of the site (d). A few scattered shrubs and trees are present on site (d-e), including <i>Asparagus suaveolens</i>, c.f. <i>Commiphora tenuipetiolata</i>, <i>Combretum molle</i>, <i>Helichrysum</i> c.f. <i>kraussii</i>, <i>Ilex mitis</i> and <i>Searsia lancea</i>.</p>		
	<p>The adjacent area to the west of the site, earmarked for the access road, was recently mowed (f).</p>	<p>Plate 5.9: Vegetation cover and land-use at the south-eastern site (8)</p>	



Table 5.3: Plant species observed at the proposed antennae sites.

FAMILY	SPECIES	STATUS	SITES				
			NE (1)	NE (2)	NW (3-5)	SW (6-7)	SE (8)
Anacardiaceae	<i>Searsia lancea</i>	- Least Concern	X	X	X	X	X
Anacardiaceae	<i>Searsia zeyheri</i>	- Least Concern		X	X		
Aquifoliaceae	<i>Ilex mitis</i>	- Least Concern		X	X	X	X
Araliaceae	<i>Cussonia paniculata</i>	- Least Concern				X	
Asparagaceae	<i>Asparagus laricinus</i>	- Least Concern			X		
Asparagaceae	<i>Asparagus suaveolens</i>	- Least Concern					X
Asphodelaceae	<i>Aloe greatheadii</i> var. <i>davyana</i>	- Least Concern		X		X	X
Asteraceae	<i>Bidens Pilosa</i>	- Not Evaluated		X			
Asteraceae	<i>Helichrysum</i> c.f. <i>kraussii</i>	- Least Concern	X	X	X	X	X
Asteraceae	<i>Oocephala staehelinoides</i>	- Least Concern			X		
Asteraceae	<i>Tagetes minuta</i>	- Not Evaluated		X			
Burseraceae	c.f. <i>Commiphora tenuipetiolata</i>	- Least Concern					X
Combretaceae	<i>Combretum molle</i>	- Least Concern			X		X
Ebenaceae	<i>Euclea crispa</i> subsp. <i>crispa</i>	- Least Concern	X		X	X	
Elatinaceae	<i>Bergia decumbens</i>	- Least Concern		X			
Fabaceae	<i>Acacia dealbata</i> *	- Not evaluated - *Category 2 Invader (NEMBA, 2016)					X
Fabaceae	<i>Vachellia karroo</i>	- Least Concern	X	X			
Hypericaceae	<i>Hypericum aethiopicum</i>	- Least Concern		X			
Malvaceae	<i>Grewia occidentalis</i>	- Least Concern	X	X			
Phyllanthaceae	<i>Phyllanthus pentandrus</i>	- Least Concern			X		
Poaceae	<i>Aristida congesta</i>	- Least Concern			X		
Poaceae	<i>Cymbopogon</i> c.f. <i>caesius</i>	- Least Concern		X			
Poaceae	<i>Cymbopogon pospischilii</i>	- Least Concern					X
Poaceae	<i>Eragrostis curvula</i>	- Least Concern	X	X		X	X
Poaceae	<i>Hyparrhenia hirta</i>	- Least Concern		X			
Poaceae	<i>Hyperthelia dissoluta</i>	- Least Concern	X	X	X	X	X
Poaceae	<i>Melinis repens</i>	- Least Concern	X	X	X		



FAMILY	SPECIES	STATUS	SITES				
			NE (1)	NE (2)	NW (3-5)	SW (6-7)	SE (8)
Ranunculaceae	<i>Clematis brachiate</i>	- Least Concern	X	X			
Sapotaceae	<i>Mimusops obovate</i>	- Least Concern		X			
Thymelaeaceae	<i>Lasiosiphon caffer</i>	- Least Concern			X		



## 6 SITE SENSITIVITY

### 6.1 SENSITIVITY ANALYSIS

Sensitivity maps were developed by identifying areas of high, medium and low sensitivity (Figure 6.1).

Areas of high sensitivity include:

- Process areas such as rivers, wetlands and drainage lines that are important for ecosystem functioning, regardless of vegetation degradation;
- Class 1 Ridges, regardless of existing development; and
- Critical Biodiversity Areas (CBAs) where natural vegetation is still present.

Areas of medium sensitivity include:

- 32m buffers around rivers and drainage lines, excluding existing development areas;
- 500m buffers around wetlands, excluding existing development areas;
- 200m buffers around Class 1 Ridge, excluding existing development areas;
- Near-natural bushveld;
- Open and rocky grasslands;
- Endangered Ecosystems where natural ecosystem is still present; and
- Ecological Support Areas (ESAs) where natural vegetation is still present.

Areas of low sensitivity include:

- Areas transformed by the current space operations development on site, including roads, historical development and the recent construction at the north-eastern sites;
- Areas impacted by exotic species; and
- Moderately- to heavily-modified open grasslands.

### 6.2 SITE SENSITIVITY

The project sites fall within areas of low, moderate and high sensitivity (Figure 6.1). Construction activities within high sensitivity areas should be avoided and the sites falling within these areas should thus be amended. These include:

- The north-western site which intersects a Class 1 ridge; and
- The two of southern sites which fall within the wetlands.

Construction activities should be permitted within the moderate sensitivity areas, with the implementation of appropriate mitigation measures, as well as in low sensitivity areas. It is recommended that the construction laydown area be located within an already degraded zone within the low sensitivity areas to limit further impact.

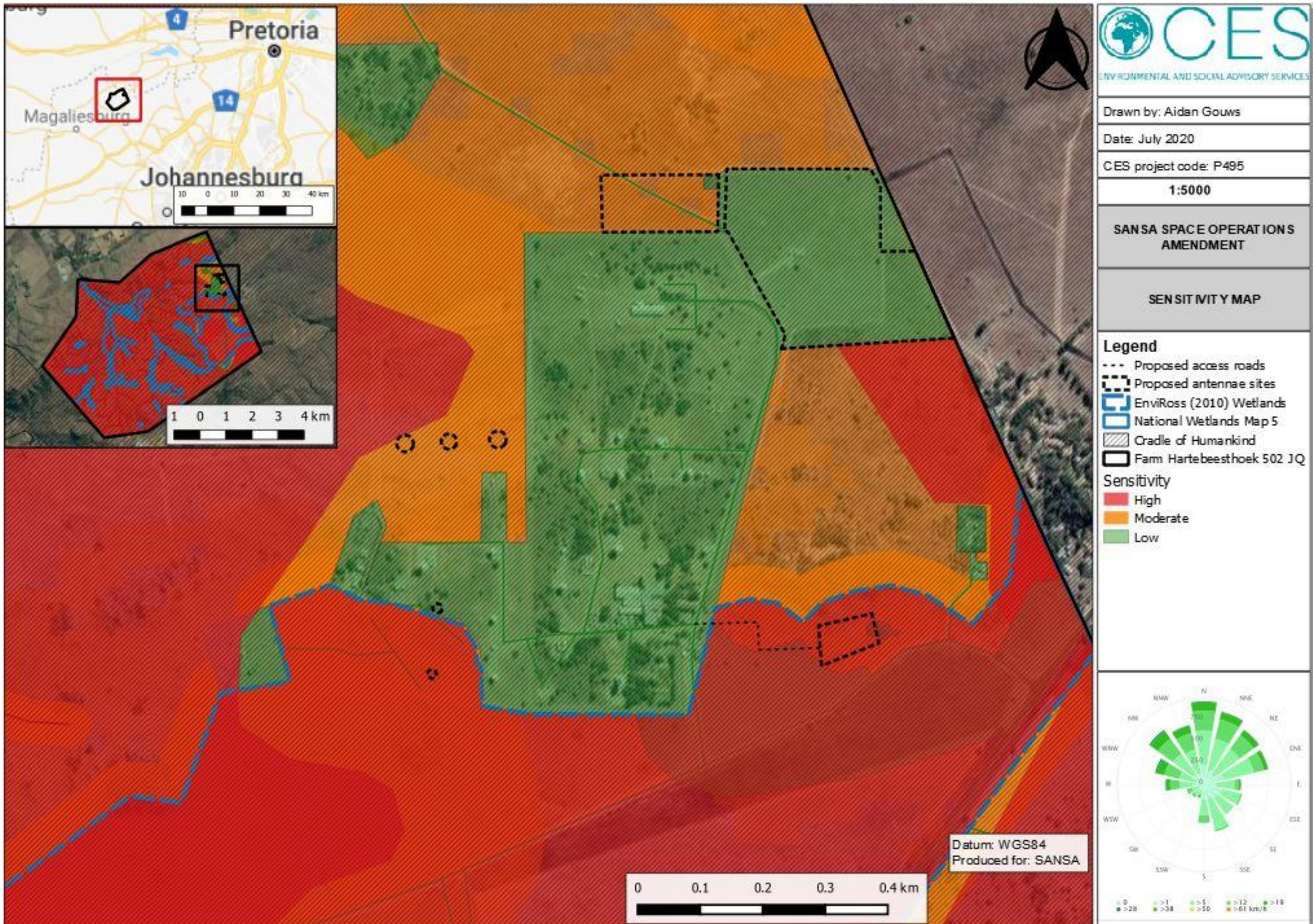




Figure 6.1 Sensitivity map of the proposed sites.



## 7 IMPACTS OF PROPOSED AMENDMENTS

### 7.1 ENVIROSS 2010 ECOLOGICAL IMPACTS

The ecological impacts identified and assessed by EnviRoss CC (2010) are summarised in Table 7.1 below. Consult Appendix E4, p.118-121 of the EnviRoss CC (2010) ecological report for the full impact assessment. With the exception of the wetland/riparian zone habitat impacts, the proposed amendments will not result in any additional impacts over and above those already identified and assessed, provided that the mitigation measures are adhered to during the construction and operation of the antennae.

**Table 7.1: Summary of ecological impacts identified and assessed by EnviRoss CC (2010). Impact(s) marked with an asterisk are anticipated to change in light of the proposed EA amendments and have been revised in Table 7.2.**

Potential impact	Project activity or issue	Significance before mitigation	Significance after mitigation	
<b>Pre-construction &amp; construction phases</b>				
Habitat destruction	Vegetation removal through soil stripping.	Med	Low	
Impacts on RDL floral and faunal species	Direct impacts due to inclusion of RDL species in vegetation removal.	Low	Low	
Impacts on floral communities	Vegetation removal and site disturbances leading to shifts in floral community and habitat unit structures.	Med	Low	
	Depletion of biodiversity through indiscriminate collecting and harvesting of floral species by construction teams.	Low	Low	
	Disturbance through construction activities that will destroy various floral species.	Low	Low	
Impacts on faunal communities	Habitat destruction leading to loss of faunal diversity	Med	Low	
	Impacts on faunal communities by indiscriminate collecting and hunting by construction teams.	Low	Low	
	Increased disturbance factors such as noise that will displace sensitive faunal species.	Low	Low	



Potential impact	Project activity or issue	Significance before mitigation	Significance after mitigation	
Impacts on RDL avifaunal species – habitat destruction leading to displacement	Direct impacts due to inclusion of RDL species nesting sites in vegetation removal or habitat destruction leading to RDL species displacement.	Low	Low	
Impacts on avifaunal communities	Vegetation removal and site disturbance leading to shifts in floral community and habitat unit structures. This would shift the avifaunal communities dependent on the habitat.	Low	Low	
	Depletion of avifaunal biodiversity through indiscriminate collecting and hunting by construction teams.	Low	Low	
	Disturbances through construction activities that will displace various avifaunal species.	Low	Low	
Wetland/Riparian zone habitat impacts *	<b>Construction activities altering soil conditions, hydrological features &amp; topography from the movement of heavy machinery, leading to loss of wetland functionality. This will affect wetland-dependent faunal and floral species as well as the functionality of the wetlands.</b>	Low	Low	
Water quality impacts	Soil erosion and inappropriate on-site sewerage management leading to contamination of nearby wetlands and watercourses. This will affect sensitive wetland-dependent faunal species.	Low	Low	
Compaction of soils	Movement of heavy machinery leading to soil compaction that will	Med	Low	



Potential impact	Project activity or issue	Significance before mitigation	Significance after mitigation	
	modify habitat, destroy vegetation and inhibit re-vegetation.			
Soil contamination	Pollution of soils due to oil/fuel leaks & wastes that will affect floral species.	Low	Low	
Soil erosion	Erosion of stockpiled topsoil & disturbance of soils due to vegetation stripping leading to habitat inundation and potential smothering of wetland species and other vegetation.	Low	Low	
<b>Management phase</b>				
	Exotic vegetation encroachment following soil disturbances.	Low	Low	
Biodiversity impacts	Maintenance of footprint area and area surrounding the substation for fire risk management will further disturb naturalized species within the re-established habitat type of the area.	Med	Low	
Soil contamination	Contamination of soils during oil maintenance of transformers and infrastructure that could lead to local soil pollution and pollution of nearby aquatic systems.	Med	Low	
Avifaunal biodiversity impacts	Exotic vegetation encroachment following soil disturbances leading to displacement of habitat specialists.	Med	Low	
	Collision of avifaunal species with antennae and anchor cables.	Low	Low	

## 7.2 REVISION OF IMPACT: WETLAND/RIPARIAN ZONE HABITAT IMPACTS

### Cause:



Construction activities altering soil conditions, hydrological features and topography from the movement of heavy machinery, leading to loss of wetland functionality. This will affect wetland-dependent faunal and floral species as well as the functionality of the wetlands.

### **Comment:**

EnviRoss CC (2010) identified a seepage wetland to the south of the developed area (Figure 5.3). The south-eastern (7) and south-western (8) sites fall within the upper wetland areas. Although this wetland was not identified in the National Wetlands Map Version 5 (NWM5; Figure 5.3) and typical wetland vegetation was not observed at these sites during the field assessment, it could not definitively be ruled out that these sites do not fall within a temporary wetland area. Assuming these two sites fall within a wetland area, as identified EnviRoss (2010), the impact assessment should be revised as per the below:

### **Impact revision:**

Due to the severity of the impact of the proposed antennae construction at these sites, the impact will carry an overall HIGH NEGATIVE significance (Table 7.2), even in already-transformed areas. This is attributed to the high ecological functionality and sensitivity of wetlands.

**Table 7.2: Revision of impact(s) identified and assessed by EnviRoss (2010).**

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
<b>Wetland/Riparian zone habitat impacts</b>					
Without Mitigation	Permanent	Study area	Severe	Definite	HIGH -
With Mitigation	Long-term	Localised	Moderate	Possible	MODERATE -

### **Mitigation – Option 1:**

EnviRoss CC (2010) recommended the repositioning of the then proposed Orbcomm site northwards to the nearby higher-lying area to avoid negative impacts on this wetland. CES endorse the EnviRoss (2010) recommendation to move proposed sites northwards and out of the wetland (see Figure 7.1 b & c). However, even if this measure is employed, it is still possible that the wetland will be moderately impacted as the sites will still be within 200m of the wetland.

### **Mitigation – Option 2:**

Alternatively, should this not be feasible, CES recommend that SANSA appoint a Wetland Specialist to determine whether the sites indeed fall within a wetland, identify any other associated impacts and propose appropriate measures to mitigate these impacts.

## **7.3 MITIGATION MEASURES**

The following mitigation measures are recommended for the proposed development:

- Vegetation clearing must be kept to a minimum and must remain in the demarcated areas;
- Areas which are already disturbed should be utilised, such as areas with a low number of SCC, where invasive alien species are present and those that are disturbed due to grazing and poor land management practices;



- Eradication of the already established alien invasive species on site (This should be done during all phases of the project);
- Active management of alien species throughout both the construction and operation phases to prevent their spread into areas where they have not already been established;
- An Alien Invasive Control Programme must be implemented;
- It is recommended that the proposed layout be amended to:
  - Avoid development on the Class 1 Ridge and ESA at the western-most site (Figure 7.1 a); and
  - Avoid development within the wetland (Figure 7.1 b & c)
- All mitigation measures must be incorporated into the Environmental Management Plan (EMP).

In addition to the above, the mitigation measures recommended in Appendix E of the EnviRoss (2010) Ecological Impact Assessment (p. 122-125) are reiterated in Table 7.3 below. CES highly recommend adhering to these mitigation measures.



**Table 7.3: Mitigation measures recommended for the construction and operational phases of the proposed development (from EnviRoss, 2010)**

Environmental consideration	Environmental Impacts	Mitigation Measures
<b>Construction phase</b>		
Flora	<ul style="list-style-type: none"> <li>• Destruction of RDL and sensitive floral species;</li> <li>• Damage to habitat that could potentially support RDL or sensitive floral species;</li> <li>• Transformation of vegetation community structures;</li> <li>• Soil disturbances that allow for the establishment of exotic vegetation;</li> <li>• Damage to plant life outside of the footprint area.</li> </ul>	<ul style="list-style-type: none"> <li>• Movement of personnel and machinery to be limited to the areas designated for the established access roadways and construction footprint area;</li> <li>• No movement of personnel or machinery to take place within the wetland areas in order for this ecologically sensitive habitat unit to retain its features;</li> <li>• Any recruitment of exotic vegetation to be managed on an ongoing basis until indigenous pioneering vegetation has dominated the disturbed areas. These species should be limited to naturally- occurring species representative of the vegetation type for the locality. Ongoing monitoring of exotic vegetation recruitment should be undertaken and any recruitment controlled;</li> <li>• Dumping or storage of topsoil must not be done on established vegetation, but should remain within designated areas;</li> <li>• Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to plants;</li> <li>• Indiscriminate damage of vegetation to be avoided.</li> </ul>
Fauna	<ul style="list-style-type: none"> <li>• Habitat destruction;</li> <li>• Destruction of RDL and displacement of sensitive species;</li> <li>• Impacts on faunal biodiversity.</li> </ul>	<ul style="list-style-type: none"> <li>• Important habitat to avifaunal conservation within the area (i.e. wetland and riparian habitat) should be avoided);</li> <li>• Movement of personnel and machinery to be limited to the areas designated for the established servitude area;</li> <li>• No movement of personnel or machinery to take place within the wetland areas in order for this ecologically sensitive habitat unit to retain its features;</li> <li>• Dumping or storage of topsoil must not be done on established vegetation, but should remain within the construction footprint.</li> <li>• Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to habitat.</li> <li>• Indiscriminate damage of the environment to be avoided.</li> </ul>
	<ul style="list-style-type: none"> <li>• Avifauna; collisions with antennae and anchor cables.</li> </ul>	<ul style="list-style-type: none"> <li>• Mitigation measures are aimed at making the anchor cables line more visible to flying birds (e.g. placement of bird flappers periodically on cables).</li> </ul>
Wetlands and Aquatic habitats	<ul style="list-style-type: none"> <li>• Wetland habitat being impacted upon by the development activities;</li> <li>• Wetlands being impacted upon by soil</li> </ul>	<ul style="list-style-type: none"> <li>• Wetland habitat should be avoided when designing the layout plan;</li> <li>• If wetland sections are to be crossed for vehicular access, this should be limited to existing roadways. No further roadways should be established within wetland habitat.</li> </ul>



Environmental consideration	Environmental Impacts	Mitigation Measures
	<ul style="list-style-type: none"> <li>• compaction from heavy machinery;</li> <li>• Soil erosion leading to siltation of the aquatic habitat;</li> <li>• Impacts on sensitive aquatic environments.</li> </ul>	<ul style="list-style-type: none"> <li>• Soil erosion to be actively managed, but the nature and localised extent of the development largely renders this impact highly improbable</li> <li>• Soil erosion leading to siltation of the aquatic environment is probably the only impact that could potentially occur. The proposed site locality and its relation to sensitive aquatic habitats largely renders this impact as improbable;</li> <li>• Regardless of this, construction activities should be limited to the dry season and measures to control soil erosion should be implemented. This will ensure that wetlands and aquatic environments will not be impacted by soil erosion.</li> </ul>
Soil	<ul style="list-style-type: none"> <li>• Pollution of soil will adversely affect vegetation and habitat integrity.</li> <li>• Compaction of soils leading to lowered potential for re-vegetation.</li> <li>• Destruction of wetland habitat through servitude roads running through wetlands and destroying wetland vegetation.</li> <li>• Wetland functionality loss through the reinstatement of the incorrect soil layers, which will impact on wetland floristic features</li> </ul>	<ul style="list-style-type: none"> <li>• The source of the pollution must immediately be identified and rectified;</li> <li>• Polluted soils should be immediately cleaned and transferred to an appropriate registered landfill site;</li> <li>• Subsequently removed soils should be replaced with unpolluted soils of similar geological, chemical and pedological characteristics.</li> <li>• Soil should be shallow-ripped and scoured prior to replanting and placing of a geotextile layer (on steep topographies) to avoid soil erosion.</li> <li>• Heavy machinery should be limited to designated roadways.</li> <li>• Wetland habitat should be avoided as far as possible during the construction of lines as access roads can cause major damage to these sensitive systems (van Rooyen, 2004).</li> <li>• Soil that is removed for any excavations should be placed in the layers that it was removed and replaced according to the layers that it was removed.</li> </ul>
<b>Operational phase</b>		
Flora	<ul style="list-style-type: none"> <li>• Damage to plant life outside of the footprint area;</li> <li>• Encroachment of alien vegetation following site disturbances.</li> </ul>	<ul style="list-style-type: none"> <li>• Ecologically sensitive areas should be retained as prohibited areas to workers;</li> <li>• Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to plants;</li> <li>• Encroachment of alien vegetation to be monitored for regularly and controlled.</li> </ul>
Fauna	<ul style="list-style-type: none"> <li>• Ongoing Impacts that will affect avifaunal biodiversity;</li> <li>• Collisions of avifauna with antennae and anchor cabling.</li> </ul>	<ul style="list-style-type: none"> <li>• Ecologically sensitive areas should be retained as prohibited areas to workers;</li> <li>• Workers and machinery to remain inside construction footprint. All labourers to be informed of disciplinary actions for the wilful damage to plants and animals;</li> </ul>



Environmental consideration	Environmental Impacts	Mitigation Measures
		<ul style="list-style-type: none"> <li>• Maintenance crews to monitor for bird collisions and to mitigate for this impact if found to be necessary.</li> </ul>
General		<ul style="list-style-type: none"> <li>• The relevant mitigation measures proposed for the construction phase should be carried forward to operations, where potential environmental impacts may still occur.</li> <li>• Special conditions relating to operations, as stipulated in the RoD, need to be adhered to.</li> <li>• The contractor must perform appropriate maintenance functions, as required. Responsible parties must be competent in the necessary maintenance tasks.</li> <li>• Feedback must be provided to the ECO and project proponent on a frequent basis</li> </ul>

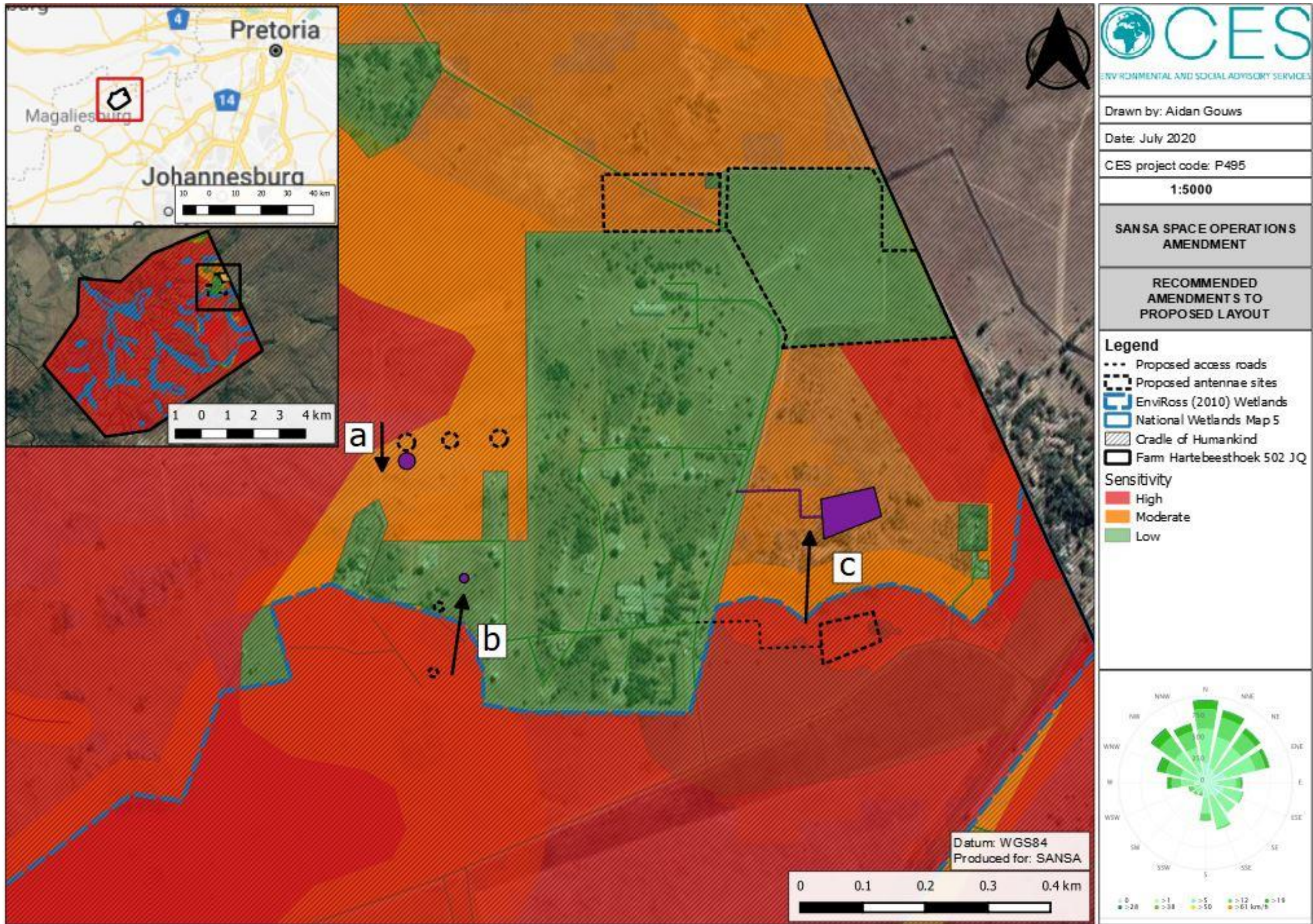


Figure 7.1: Recommended layout amendment to proposed antennae sites



## 8 SPECIALIST OPINION

Based on a review of the original study, the information gained from a desktop assessment and an ecological walk through conducted on 11 June 2020, the nature of the proposed changes to the EA specifications will not have a material change or increase in ecological impacts compared with the original project description, with the exception of the wetland/riparian habitat impacts. All issues identified in the 2010 Ecological Impact Assessment still remain valid and all recommended mitigations identified must still be implemented for all phases of the proposed development. In addition, the following are recommended for the proposed development:

- Vegetation clearing must be kept to a minimum and must remain in the demarcated areas;
- Areas which are already disturbed should be utilised, such as areas with a low number of SCC, where invasive alien species are present and those that are disturbed due to grazing and poor land management practices;
- Eradication of the already established alien invasive species on site (This should be done during all phases of the project);
- Active management of alien species throughout both the construction and operation phases to prevent their spread into areas where they have not already been established;
- An Alien Invasive Control Programme must be implemented;
- It is recommended that the proposed layout be amended to:
  - Avoid development on the Class 1 Ridge and ESA at the western-most site (Figure 7.1 a) and
  - Avoid development within the wetland (Figure 7.1 b & c).
- All mitigation measures must be incorporated into the Environmental Management Plan (EMP).



## 9 REFERENCES

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- Driver, A. S., Nel, J., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., . . . Maze, K. (2012). *National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report*. Pretoria.: South African National Biodiversity Institute and Department of Environmental Affairs. <http://biodiversityadvisor.sanbi.org/wp-content/uploads/2016/07/NBA-2011-Synthesis-Report-low-resolution.pdf>.
- EnviRoss CC. (2010). *Ecological Assessment for the Farm Hartebeesthoek 502JQ and the Area Associated with the Proposed Infrastructure Development at the CSIR Satellite Applications Centre (SAC), Hartebeesthoek*. Johannesburg: EnviRoss CC.
- Skowno, A. (2019). *Updated assessment of terrestrial ecosystem threat status in the National Biodiversity Assessment 2018. Circular from SANBI October 2019*. Pretoria: South African National Biodiversity Institute and Department of Environment, Forestry and Fisheries. <http://hdl.handle.net/20.500.12143/6724>.
- Skowno, A., Raimondo, D., Poole, C., Fizzotti, B., & Slingsby, J. (2019). *South African National Biodiversity Assessment 2018 Technical Report Volume 1: Terrestrial Realm*. Pretoria: South African National Biodiversity Institute. <http://hdl.handle.net/20.500.12143/6370>.



## 10 APPENDICES

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## 10.1 APPENDIX B1 – CURRICULUM VITAE

**AIDAN JOHN GOUWS**  
*Curriculum Vitae*



### CONTACT DETAILS

<b>Name of Company</b>	<b>CES – Environmental and Social Advisory Services</b>
<b>Designation</b>	Centurion Branch
<b>Profession</b>	Environmental Consultant
<b>Years with firm</b>	1.5 Years
<b>E-mail</b>	<a href="mailto:a.gouws@cesnet.co.za">a.gouws@cesnet.co.za</a>
<b>Office number</b>	+27 (0)10 045 1372
<b>Nationality</b>	South African
<b>Professional Affiliations</b>	<ul style="list-style-type: none"> <li>• South African Council for Natural Scientific Professions (SACNASP) (<i>Cand.Sci.Nat</i> 121901)</li> <li>• International Association of Impact Assessment (IAIAsa)</li> </ul>
<b>Key areas of expertise</b>	<ul style="list-style-type: none"> <li>• Environmental Authorisations</li> <li>• Geographical Information Systems (GIS)</li> <li>• Ecological Impact Assessments</li> <li>• Database Management</li> </ul>

### PROFILE

#### Mr Aidan Gouws

Aidan obtained his MSc in Environmental Science (*Cum laude*) from Rhodes University, having conducted research on the spatio-temporal dynamics of *Acacia dealbata* invasions and broader land-use and cover changes in the northern Eastern Cape, funded through a study bursary awarded by the Agricultural Research Council (ARC). Prior to this, he obtained his BSc Honours in Geographical and Environmental Sciences (*Cum laude*) from the University of Pretoria, studying plant ecology and EIA methodology amongst others. He is also member of the Golden Key Honours Society. Aidan joined CES in 2018 and has been involved in several projects, including Basic Assessments, Full Scoping and Environmental Impact Assessments, Environmental Audits and Resettlement Action Plan (RAP) Audits. He works from the Centurion office and his interests include the general Environmental Impact Assessment (EIA) process, GIS mapping, ecological studies and database management. Aidan is registered with the South African Council for Natural Scientific Professions (SACNASP) as a Candidate Natural Scientist (*Cand.Sci.Nat.* 121901) and with the International Association for Impact Assessments (IAIA).



## AIDAN JOHN GOUWS

### Curriculum Vitae



#### EMPLOYMENT EXPERIENCE

##### Environmental Consultant - Coastal and Environmental Services (Centurion) July 2018-Current

- Responsible for conducting a range of environmental studies in the broad fields of Environmental Impact Assessment and Environmental Management.
- Sourcing small to medium projects by preparing proposals under supervision.
- Taking responsibility for Basic Assessments, and small projects under the guidance and supervision of a more senior staff member.
- Taking responsibility for specialist ecological, database management and GIS tasks when required

##### Volunteer – Khulisa Social Solutions (Johannesburg) May 2018 – July 2018

- Responsible for refining the organisational participatory research and intervention methodology guidelines

##### Departmental tutor – Department of Environmental Science, Rhodes University (Grahamstown) January 2016 – December 2017

- General assistance: helping staff and fellow post-graduate students with GIS- and statistics-related queries.
- Demonstrator: assistance with undergraduate environmental science practical sessions and marking of practical reports.

##### Demonstrator – Department of Plant Science, University of Pretoria (Pretoria) July 2015 – December 2015

- Assisting third year students in practical plant identification using dichotomous keys and family recognition by diagnostic reproductive and vegetative characters

#### ACADEMIC QUALIFICATIONS

- 2014 - BSc Environmental Science (University of Pretoria)
- 2015 - BSc (Hons) Geographical and Environmental Science (University of Pretoria)
- 2018 - MSc Environmental Science (Rhodes University)

#### PUBLICATIONS

- Gouws, A. J., & Shackleton, C. M. (2019). A spatio-temporal, landscape perspective on *Acacia dealbata* invasions and broader land use and cover changes in the northern Eastern Cape, South Africa. *Environmental Monitoring and Assessment*, 191(2), 74.
- Gouws, A. J., & Shackleton, C. M. (2019). Abundance and correlates of the *Acacia dealbata* invasion in the northern Eastern Cape, South Africa. *Forest Ecology and Management*, 432, 455-466.



## AIDAN JOHN GOUWS

### Curriculum Vitae



#### PROFESSIONAL EXPERIENCE

##### BASIC ASSESSMENTS

###### **Ramotshere Moiloa Local Municipality Residential Extensions, Zeerust, North West Province, 2019–**

Two Basic Assessments for the proposed extension of two residential extensions in Zeerust, North West. Assigned the role of project manager, PPP manager, Ecological Specialist and lead author of the Basic Assessment Report.

###### **SANRAL Koster R52 Road Upgrade, Koster, North West Province, 2018–**

Basic Assessment for the road upgrade of the R52 route between Koster and the N4 Rustenburg. Assigned the role of project manager, PPP manager, Vegetation and Wetland Specialist, WULA manager and lead author of the Basic Assessment Report.

###### **Transnet Freight Rail Installation of Telecommunications Masts and Associated Infrastructure at Various Locations in South Africa, 2019–**

Three Basic Assessments for the installation of telecommunications masts in Gauteng, Mpumalanga and KwaZulu-Natal. Assigned the role of project manager, PPP manager and lead author of the Basic Assessment Report.

##### FULL SCOPING AND ENVIRONMENTAL IMPACT ASSESSMENTS

###### **SANRAL Zandkraal-Winburg N1 Road Upgrade Quarry S&EIR Authorisation, Winburg, Free State Province, 2018–**

Full Scoping and Environmental Impact Assessment for the mining of borrow pits and quarries associated with the upgrade of the N1 between Zandkraal and Winburg South. Assigned the role of project manager, PPP manager and lead author of the Scoping Report and Environmental Impact Assessment Report.

###### **SANRAL Masekwaspoort N1 Road Quarry S&EIR Authorisation, Musina, Limpopo Province, 2018–On hold**

Full Scoping and Environmental Impact Assessment for the mining of borrow pits and quarries associated with the upgrade of the N1 between Louis Trichardt and Musina. Assigned the role of co-author of the Scoping Report. Project on hold due to pending design changes.

##### ENVIRONMENTAL AUDITING

###### **SANRAL Hendrina N11 Road Upgrade ECO Audits, Hendrina, Mpumalanga Province, 2018–2019**

Environmental Auditing for the construction of the road and mining of borrow pits associated with the upgrade of the N11 route between Hendrina and Hendrina Power Station. Assigned the role of Environmental Control Officer (ECO), author of ECO audit reports and author of the borrow pit closure report.

###### **South African National Biodiversity Institute (SANBI) Office Complex Development, Pretoria, Gauteng Province, 2018**

Environmental Auditing for the construction of the Office Complex at the Pretoria National Botanical Gardens. Assigned the role of interim ECO and co-author of ECO audit reports.

**AIDAN JOHN GOUWS**  
*Curriculum Vitae***RESETTLEMENT ACTION PLAN (RAP) AUDITING****Millennium Challenge Account Malawi (MCA-M) RAP Audits, 2018–2019**

Completion audits for six Resettlement Action Plans (RAPs) conducted for the Infrastructure Development Project in Malawi. These RAPs documented the physical and economic displacement impacts and compensation for assets of people affected by wayleave corridors along 400kV, 132kV, 66kV and 33kV OHLs, as well as for substations and permanent access roads. Assigned the role of database support, auditor, training assistant and assistant author. Later assigned the role of database manager.

**CERTIFICATION**

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

**Aidan John Gouws**

Date: February 2020



## TARRYN MARTIN

### Curriculum Vitae



#### CONTACT DETAILS

<b>Name of Company</b>	<b>CES – Environmental and Social Advisory Services</b>
<b>Designation</b>	Cape Town Branch
<b>Profession</b>	Principal Environmental Consultant, Botanical Specialist and Branch Manager
<b>Years with firm</b>	Eight (8) years
<b>E-mail</b>	<a href="mailto:t.martin@cesnet.co.za">t.martin@cesnet.co.za</a>
<b>Office number</b>	+27 (0)21 045 0900
<b>Nationality</b>	<b>South African</b>
<b>Professional Body</b>	<p><b>SACNASP:</b> South African Council for Natural Scientific Profession: Professional Natural Scientist (400018/14)</p> <p><b>SAAB:</b> Member of the South African Association of Botanists</p> <p><b>IAIASa:</b> Member of the International Association for Impact Assessments South Africa</p> <p>Member of Golden Key International Honour Society</p>
<b>Key areas of expertise</b>	<ul style="list-style-type: none"> <li>• Biodiversity Surveys and Impact Assessments</li> <li>• Environmental Impact Assessments</li> <li>• Critical Habitat Assessments</li> <li>• Biodiversity Management and Monitoring</li> </ul>

#### PROFILE

##### Ms Tarryn Martin

Tarryn holds a BSc (Botany and Zoology), a BSc (Hons) in African Vertebrate Biodiversity and an MSc with distinction in Botany from Rhodes University. Tarryn's Master's thesis examined the impact of fire on the recovery of C<sub>3</sub> and C<sub>4</sub> Panicoid and non-Panicoid grasses within the context of climate change for which she won the Junior Captain Scott-Medal (Plant Science) for producing the top MSc of 2010 from the South African Academy of Science and Art as well as an Award for Outstanding Academic Achievement in Range and Forage Science from the Grassland Society of Southern Africa. Tarryn specialises in conducting vegetation assessments in South Africa, Mozambique and other African countries. These assessments are often to IFC standards, specifically Performance Standard 6. Tarryn has also undertaken critical habitat assessments for areas requiring biodiversity offsets. Other botanical related work includes, developing alien management plans as well as implementing a terrestrial monitoring plan, which includes monitoring forest health, at Kenmare Moma Heavy Minerals Mine.



**TARRYN MARTIN**  
Curriculum Vitae



**EMPLOYMENT EXPERIENCE**

**Environmental Consultant and Botanical Specialist**, EOH Coastal and Environmental Services

*May 2012-Present*

- Botanical and ecological assessments for local and international EIAs in Southern Africa
- Identifying and mapping vegetation communities and sensitive areas
- Designing and implementing monitoring plans
- Designing rehabilitation and biodiversity offset plans
- Designing alien management plans
- Critical Habitat Assessments
- Large ESIA studies
- Managing budgets
- Cape Town branch manager
- Coordinating specialists and site visits

**Accounts Manager**, Green Route DMC

*October 2011- January 2012*

- Project and staff co-ordination
- Managing large budgets for incentive and conference groups travelling to southern Africa
- Creating tailor-made programs for clients
- Negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

**Camp Administrator and Project Co-ordinator**, Windsor Mountain International Summer Camp, USA

*April 2011 - September 2012*

- Co-ordinated staff and camper travel arrangements
- Coordinated main camp events
- Assisted with marketing the camp to prospective families.

**Freelance Project Manager**, Green Route DMC

*November 2010 - April 2011*

- Project and staff co-ordination
- Managing large budgets for incentive and conference groups travelling to southern Africa
- Creating tailor-made programs for clients
- Negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction.

**Camp Counselor**, Windsor Mountain Summer Camp, USA

*June 2010 - October 2010*

**NERC Research Assistant**, Botany Department, Rhodes University, Grahamstown in collaboration with Sheffield University, Sheffield, England

*April 2009 - May 2010*



**TARRYN MARTIN**  
*Curriculum Vitae*



**PUBLICATIONS**

- Set up and maintained experiments within a common garden plot experiment
- collected, collated and entered data
- Assisted with the analysis of the data and writing of journal articles

**Head Demonstrator**, Botany Department, Rhodes University  
*March 2007 - October 2008*

**Operations Assistant**, Green Route DMC  
*September 2005 - February 2007*

- Project and staff co-ordination
- Managing large budgets for incentive and conference groups travelling to southern Africa
- Creating tailor-made programs for clients
- Negotiating rates with vendors and assisting with the ground management of inbound groups to ensure client satisfaction

**COURSES**

1. Ripley, B.; Visser, V.; Christin, PA.; Archibald, S.; Martin, T and Osborne, C. Fire ecology of C<sub>3</sub> and C<sub>4</sub> grasses depends on evolutionary history and frequency of burning but not photosynthetic type. *Ecology*. 96 (10): 2679-2691. 2015
  2. Taylor, S.; Ripley, B.S.; Martin, T.; De Wet, L-A.; Woodward, F.I.; Osborne, C.P. Physiological advantages of C<sub>4</sub> grasses in the field: a comparative experiment demonstrating the importance of drought. *Global Change Biology*. 20 (6): 1992-2003. 2014
  3. Ripley, B; Donald, G; Osborne, C; Abraham, T and Martin, T. Experimental investigation of fire ecology in the C<sub>3</sub> and C<sub>4</sub> subspecies of *Alloteropsis semialata*. *Journal of Ecology*. 98 (5): 1196 - 1203. 2010
  4. South African Association of Botanists (SAAB) conference, Grahamstown. Title: Responses of C<sub>3</sub> and C<sub>4</sub> Panicoid and non-Panicoid grasses to fire. January 2010
  5. South African Association of Botanists (SAAB) conference, Drakensberg. Title: Photosynthetic and Evolutionary determinants of the response of selected C<sub>3</sub> and C<sub>4</sub> (NADP-ME) grasses to fire. January 2008
- 
1. Rhodes University and CES, Grahamstown  
 EIA Short Course 2012
  2. Fynbos identification course, Kirstenbosch, 2015.
  3. Photography Short Course, Cape Town School of Photography, 2015.
  4. Using Organized Reasoning to Improve Environmental Impact Assessment, 2018, International IAIA conference, Durban



**TARRYN MARTIN**  
Curriculum Vitae



**CONSULTING  
EXPERIENCE**

**International Projects**

1. 2020" Biodiversity Management Plan and Monitoring Plan for mine at Piliivilli in Nampula Province, Mozambique. This assessment was to IFC standards.
2. 2019: Botanical Assessment for a cocoa plantation, Tanzania.
3. 2019: Critical Habitat Assessment, Biodiversity Management Plan and Ecosystem Services Assessment for JCM Solar Farm in Cameroon.
4. 2019: Undertook the Kenmare Road and Infrastructure Botanical Baseline Survey and Impact Assessment for an infrastructure corridor that will link the existing mine at Moma to the new proposed mine at Piliivilli in Nampula Province, Mozambique. This assessment was to IFC standards.
5. 2012 – Present: Kenmare Terrestrial Monitoring Program Project Manager and Specialist Survey, Nampula Province, Mozambique.
6. 2018: Conducted a field survey and wrote a botanical report to IFC standards for the proposed Balama Graphite Mine Environmental and Social Impact Assessment (ESIA) in Cabo Delgado Province, Mozambique.
7. 2018: Co-authored the critical habitat assessment chapter for the proposed Kenmare Piliivilli Heavy Minerals Mine.
8. 2018: Authored the Conservation Efforts chapter for the Kenmare Piliivilli Heavy Minerals Mine.
9. 2017-2018: Co-authored and analysed data for the Kenmare Bioregional Survey of *Icuria dunensis* (species trigger for critical habitat) in Nampula Province, Mozambique. This was for a mining project that needed to be IFC compliant.
10. 2017: Conducted a field survey and wrote a botanical report to IFC standards for the proposed Ancuabe Graphite Mine Environmental and Social Impact Assessment (ESIA) in Cabo Delgado Province, Mozambique.
11. 2017-2018: Managed the Suni Resources Montepuez Graphite Mine Environmental Impact Assessment. This included the management of ten specialists, the co-ordination of their field surveys, regular client liaison and the writing of the Environmental Impact Assessment Report which summarised the specialists findings, assessed the impacts of the proposed mine on the environment and provided mitigation measures to reduce the impact.  
I was also the lead botanist for this baseline survey and impact assessment and undertook the required field work and analysed the data and wrote the report.
12. 2017: Undertook the botanical baseline survey and impact assessment for the proposed Kenmare Piliivilli Heavy Mineral Mine in Nampula Province, Mozambique. This was to IFC Standards.
13. 2017: Ecological Survey for the Megaruma Mining Limitada Ruby Mine Exploration License, Cabo Delgado, Mozambique.
14. 2016: Undertook the botanical baseline survey and impact assessment, wrote an alien invasive management plan and co-



**TARRYN MARTIN**  
*Curriculum Vitae*



- authored the biodeiversity monitoring plan for this farm. The project was located in Zambezia Province, Mozambique.
15. 2015-2016: Conducted the Triton Minerals Nicanda Hills Graphite Mine Botanical Survey and Impact Assessment. Was also the project manager and specialist co-ordinator for this project. The project was located in Cabo Delgado Province, Mozambique.
  16. 2015: Was part of the team that undertook a Critical Habitat Assessment for the Nhangonzo Coastal Stream site at Inhassora in Mozambique that Sasol intend to establish drill pads at. This project needed to meet the IFC standards.
  17. 2014: Lurio Green Resources Wood Chip Mill and Medium Density Fibre-board Plant, Project Manager and Ecological Specialist, Nampula Province, Mozambique. 2014-2015.
  18. 2013-2014: LHDA Botanical Survey, Baseline and Impact assessment, Lesotho.
  19. 2014: Biotherm Solar Voltaic Ecological Assessment, Zambia.
  20. 2013-2014: Lurio Green Resources Plantation Botanical Assessment, Vegetation and Sensitivity Mapping, Specialist Co-ordination, Nampula Province, Mozambique.
  21. 2013: Syrah Resources Botanical Baseline Survey and Ecological Assessment., Cabo Delgado Mozambique.
  22. 2013-2014: Baobab Mining Ecological Baseline Survey and Impact Assessment, Tete, Mozambique.

**South African Projects**

23. 2019: Ecological Assessment for a wind farm EIA, Kleinzee, Northern Cape
24. 2019: Ecological Assessment for construction of satellite antennae, Matjiesfontein, Western Cape
25. 2019: Ecological Assessment for two housing developments in Zeerust, North West Province
26. 2019: Botanical Assessment in Retreat, Cape Town for the DRDLR land claim.
27. 2019: Cape Agulhas Municipality Botanical Assessment for the expansion of industrial zone, Western Cape, South Africa, 2019.
28. 2018: Ecological Assessment for the construction of a farm dam in Greyton, Western Cape.
29. 2018: Conducted the Ecological Survey for a housing development in Noordhoek, Cape Town
30. 2018: Conducted the field survey and developed an alien invasive management plan for the Swartland Municipality, Western Cape.
31. 2017: Undertook the field survey and co-authored a coastal dune study that assesses the impacts associated with the proposed rezoning and subdivision of Farm Bookram No. 30 to develop a resort.
32. 2017: Project managed and co-authored a risk assessment for the use of Marram Grass to stabilise dunes in the City of Cape Town.
33. 2015-2016: iGas Saldanha to Ankerlig Biodiversity Assessment Project Manager, Saldanha.
34. 2015: Innowind Ukomoleza Wind Energy Facility Alien Invasive Management Plan, Eastern Cape Province, South Africa.

**TARRYN MARTIN**  
*Curriculum Vitae*

35. 2015: Savannah Nxuba Wind Energy Facility Powerline Ecological Assessment, ground truthing and permit applications, Eastern Cape South Africa.
36. 2014: Cob Bay botanical groundtruthing assessment, Eastern Cape, South Africa.
37. 2013-2016: Dassiesridge Wind Energy Facility Project Manager, Eastern Cape, South Africa.
38. 2013: Harvestvale botanical groundtruthing assessment, Eastern Cape, South Africa.
39. 2012: Tsitsikamma Wind Energy Facility Community Power Line Ecological Assessment, Eastern Cape, South Africa.
40. 2012: Golden Valley Wind Energy Facility Power Line Ecological Assessment, Eastern Cape, South Africa.
41. 2012: Middleton Wind Energy Facility Ecological Assessment and Project Management, Eastern Cape, South Africa.
42. 2012: Mossel Bay Power Line Ecological Assessment, Western Cape, South Africa.
43. 2012: Groundtruthing the turbine sites for the Waainek Wind Energy Facility, Eastern Cape, South Africa.
44. 2012: Toliara Mineral Sands Rehabilitation and Offset Strategy Report, Madagascar.

**CERTIFICATION**

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Tarryn Martin

Date: 19 February 2020



## 10.2 APPENDIX B2 – ENVIROSS CC (2010) ECOLOGICAL IMPACT ASSESSMENT