



PHASE 1 HERITAGE IMPACT ASSESSMENT

for the Proposed NTT Witwater Airfield on the Farm 948 KR near
Vaalwater, Limpopo Province

For:

Elemental Sustainability (Pty) Ltd

Project Ref:

NTT Witwater Airfield

Date:

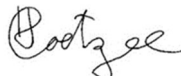
26/08/2023

**Phase 1 Heritage Impact Assessment for the Proposed NTT Witwater Airfield on the Farm 948 KR near
Vaalwater, Limpopo Province**

Project Ref: NTT Witwater Airfield
 Report No: ES-2608231
 Report Version: 1

I, Tobias Coetzee, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed NTT Witwater Airfield in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, regulations and any guidelines that have relevance to the proposed activity;
- I have not, 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 declaration are true and correct.

Author	Qualification	Email	Date	Signature
Tobias Coetzee	MA (Archaeology – UP)	tcoetzee.heritage@gmail.com	26/08/2023	



Executive Summary

Agri Civils Geo-Tech & Heritage was appointed by Elemental Sustainability (Pty) Ltd to undertake a Phase 1 Heritage Impact Assessment for the proposed NTT Witwater Airfield on the Farm 948 KR near Vaalwater in the Limpopo Province. The aim of the study is to determine the scope of archaeological resources that could be impacted by the proposed construction of the airfield.

The area inspected for the proposed NTT Witwater Airfield measures approximately 9.6 ha. The majority of the northern half of the demarcated area used to be cultivated, while the entire area currently consists of open land. Also, the demarcated area is located within 500 m of a non-perennial river, an area generally considered to be potentially sensitive from a heritage perspective. No potential heritage sites, however, were observed on historical aerial images, topographical maps, or during the pedestrian survey. The demarcated area is therefore considered to be partially disturbed and not sensitive from a heritage perspective.

Subject to adherence to the recommendations and approval by the South African Heritage Resources Agency, the proposed NTT Witwater Airfield on the Farm 948 KR as per the demarcated boundary may continue. Should skeletal remains be exposed during the project, all activities must be suspended, and the relevant heritage resources authority must be contacted (See National Heritage and Resources Act, 1999 (Act No. 25 of 1999 section 36 (6))). Also, should culturally significant material be discovered during the course of the said development, all activities must be suspended pending further investigation by a qualified archaeologist.



List of Abbreviations

CRM – Cultural Resource Management

DMRE – Department of Mineral Resources and Energy

EIA – Environmental Impact Assessment

ESA – Early Stone Age

ha – Hectare

HIA – Heritage Impact Assessment

km – Kilometre

LIA – Late Iron Age

LSA – Later Stone Age

m – Metre

MASL – Metres Above Sea Level

MEC – Member of the Executive Council

MSA – Middle Stone Age

NHRA – National Heritage Resources Act

SAHRA – South African Heritage Resources Agency

SAHRIS – South African Heritage Resources Information System



NEMA Appendix 6

NEMA Specialist reports	
Item	Section / Page No
1. (1) A specialist report prepared in terms of these Regulations must contain—	
(a) details of-	
(i) the specialist who prepared the report; and	P2
(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	P2
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	P2
(c) an indication of the scope of, and the purpose for which, the report was prepared;	1.1, 2.2
(cA) an indication of the quality and age of base data used for the specialist report;	2.1, 3
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	2
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	3
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	3
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	5, 7.1
(g) an identification of any areas to be avoided, including buffers;	7
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	P33
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	3.2
(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] or activities;	5 – 7
(k) any mitigation measures for inclusion in the EMPr;	7.2, Appendix B
(l) any conditions for inclusion in the environmental authorisation;	7.2, Appendix B
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	7.2, Appendix B
(n) a reasoned opinion—	
(i) [as to] whether the proposed activity, activities or portions thereof should be authorised	7.2
(iA) regarding the acceptability of the proposed activity or activities; and	7.2
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	7.2, Appendix B
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	3.1.3



NEMA Specialist reports	
Item	Section / Page No
(p)a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
(q)any other information requested by the competent authority.	Nothing received to date
(2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	Noted



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1. Project Background

1.1 Introduction

Elemental Sustainability (Pty) Ltd appointed Agri Civils Geotech & Heritage to undertake a Phase 1 Heritage Impact Assessment (HIA) for the proposed NTT Witwater Airfield on the Farm 948 KR near Vaalwater in the Limpopo Province (**Figure 1 & Table 1**). The purpose of this study is to examine the area demarcated for the construction of the airfield in order to determine if any archaeological resources of heritage value will be impacted by the proposed development, as well as to archaeologically contextualise the general study area. The aim of this report is to provide the developer with information regarding the location and sensitivity of heritage resources within the demarcated footprint.

In the following report, the implications for the proposed NTT Witwater Airfield with regard to heritage resources are discussed: A demarcated portion located on the Farm 948 KR. The legislation section included serves as a guide towards the effective identification and protection of heritage resources and will apply to any such material unearthed during the course of the project.



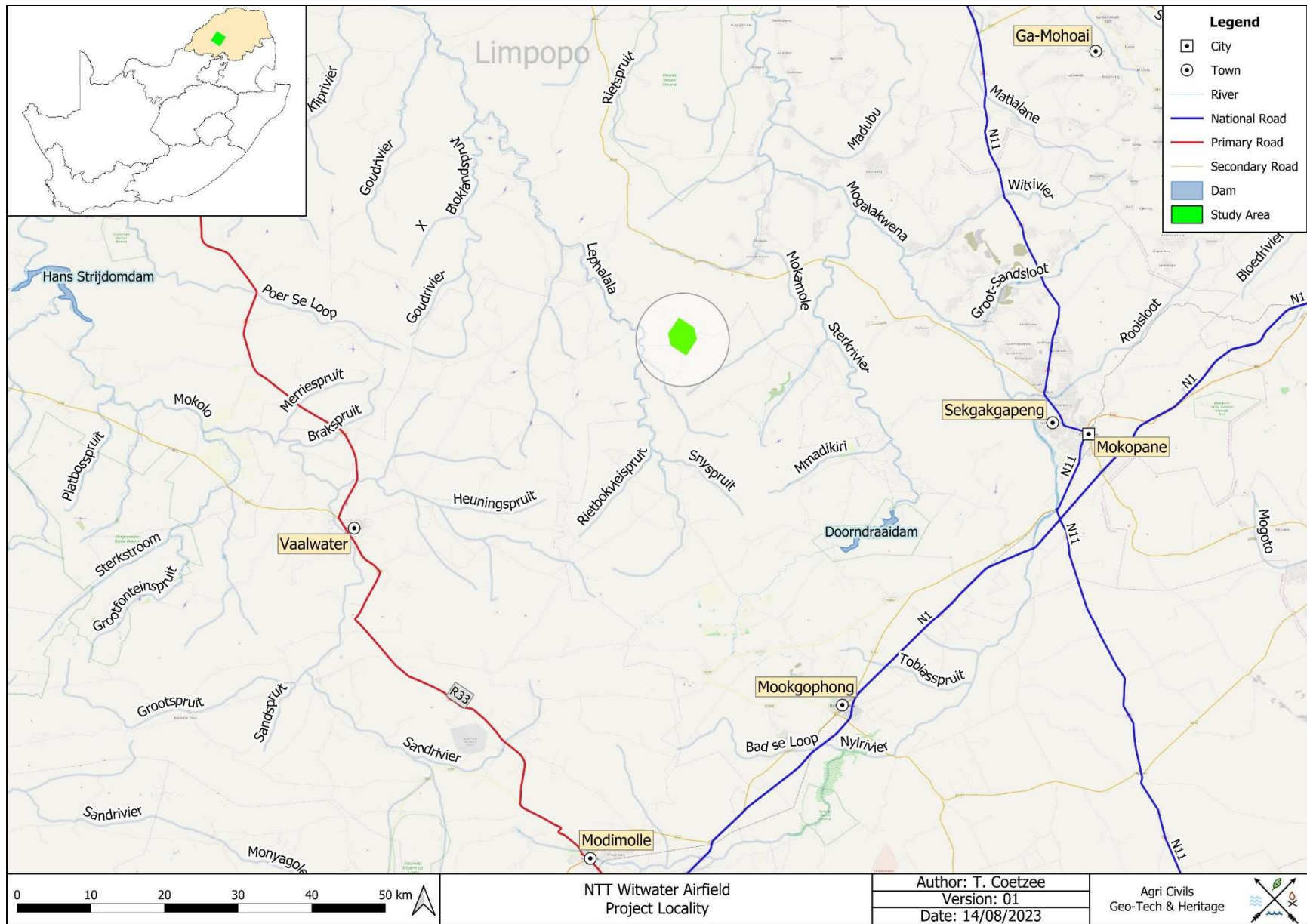


Figure 1: Regional and Provincial location of the study area.



1.2 Legislation

The South African Heritage Resources Agency (SAHRA) aims to conserve and control the management, research, alteration and destruction of cultural resources of South Africa and to prosecute if necessary. It is therefore crucially important to adhere to heritage resource legislation contained in the Government Gazette of the Republic of South Africa (Act No.25 of 1999), as many heritage sites are threatened daily by development. Conservation legislation requires an impact assessment report to be submitted for development authorisation that must include an HIA if triggered.

Heritage Impact Assessments (HIAs) should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources that might occur in areas of development and (b) make recommendations for protection or mitigation of the impact of the sites.

1.2.1 The Environmental Impact Assessment (EIA) and HIA processes

Phase 1 Heritage Impact Assessments generally involve the identification of sites during a field survey with assessment of their significance, the possible impact that the development might have, and relevant recommendations.

All Heritage Impact Assessment reports should include:

- a. Location of the sites that are found;
- b. Short descriptions of the characteristics of each site;
- c. Short assessments of how important each site is, indicating which should be conserved and which mitigated;
- d. Assessments of the potential impact of the development on the site(s);
- e. In some cases a shovel test, to establish the extent of a site, or collection of material, to identify the associations of the site, may be necessary (a pre-arranged SAHRA permit is required); and
- f. Recommendations for conservation or mitigation.

This HIA report is intended to inform the client about the legislative protection of heritage resources and their significance and make appropriate recommendations. It is essential to also provide the heritage authority with sufficient information about the sites to enable the authority to assess with confidence:

- a. Whether or not it has objections to a development;
- b. What the conditions are upon which such development might proceed;
- c. Which sites require permits for mitigation or destruction;



- d. Which sites require mitigation and what this should comprise;
- e. Whether sites must be conserved and what alternatives can be proposed to relocate the development in such a way as to conserve other sites; and
- f. What measures should or could be put in place to protect the sites which should be conserved.

When a Phase 1 HIA is part of an EIA, wider issues such as public consultation and assessment of the spatial and visual impacts of the development may be undertaken as part of the general study and may not be required from the archaeologist. If, however, the Phase 1 project forms a major component of an HIA it will be necessary to ensure that the study addresses such issues and complies with Section 38 of the National Heritage Resources Act.

1.2.2 Legislation regarding archaeology and heritage sites

National Heritage Resource Act No.25 of April 1999

Buildings are among the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Farming Community settlements. The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects, meteorites and rare geological specimens;
- visual art objects;
- military objects;
- numismatic objects;
- objects of cultural and historical significance;
- objects to which oral traditions are attached and which are associated with living heritage;
- objects of scientific or technological interest;
- books, records, documents, photographic positives and negatives, graphic material, film or video or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996), or in a provincial law pertaining to records or archives;
- any other prescribed category.



With regards to activities and work on archaeological and heritage sites this Act states that:

“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.” (34. [1] 1999:58)

and

“No person may, without a permit issued by the responsible heritage resources authority:

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.”(35. [4] 1999:58)*

and

“No person may, without a permit issued by SAHRA or a provincial heritage resources authority:

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals.” (36. [3] 1999:60)*

On the development of any area the gazette states that:

“...any person who intends to undertake a development categorised as:

- (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m in length;*
- (c) any development or other activity which will change the character of a site-*



- i. *exceeding 5000m² in extent; or*
 - ii. *involving three or more existing erven or subdivisions thereof; or*
 - iii. *involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - iv. *the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) *the re-zoning of a site exceeding 10000m² in extent; or*
- (e) *any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.” (38. [1] 1999:62-64)*

and

“The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

- (a) *The identification and mapping of all heritage resources in the area affected;*
- (b) *an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (c) *an assessment of the impact of the development on such heritage resources;*
- (d) *an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (e) *the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (f) *if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (g) *plans for mitigation of any adverse effects during and after the completion of the proposed development.” (38. [3] 1999:64)*



The Human Tissues Act (65 of 1983) and Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) protects graves younger than 60 years. These fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial Member of the Executive Council (MEC) as well as the relevant Local Authorities. Graves 60 years or older fall under the jurisdiction of the National Heritage Resources Act as well as the Human Tissues Act, 1983.

2. Study Area and Project Description

2.1 Location & Physical Environment

The demarcated NTT Witwater Airfield study area is situated to the northeast of Vaalwater. The associated farm portion is listed in **Table 1**.

Table 1: Proposed Pits & Land Parcels.

Study Area	Farm Portion	Parent Farm	Lat	Lon	Map Reference (1:50 000)	Extent
Airfield & associated infrastructure	0/948	948 KR	-24.064746	28.521371	2428 BA	± 9.6 Ha

The project area is located 50 km northeast of Vaalwater, while Mokopane is located roughly 56 km to the east-southeast, and Mookgophong 55 km to the south-southeast (**Figure 1**). The study area falls within the Waterberg District Municipality and the Modimolle/Mookgophong Local Municipality in the Limpopo Province. In terms of vegetation, the study area falls within the Savanna Biome and the Central Bushveld Bioregion. On a local scale, the vegetation is classified as Waterberg Mountain Bushveld (Mucina & Rutherford 2006).

Waterberg Mountain Bushveld is found in the Limpopo Province and occurs on the Waterberg Mountains, including the foothills and tablelands south of the line between Lephalale and Marken and north of Bela-Bela and west of Mokopane. Outliers are also found to the southwest such as the Boshofsberge and Vlieëpoortberge near Thabazimbi. In terms of conservation, Waterberg Mountain Bushveld is considered to be least threatened with a conservation target of 24%. About 9% is statutorily conserved in the Marakele National Park and Moepel Nature Reserve. Cultivation transformed more than 3% of the vegetation unit and erosion generally varies between very low and low (Mucina & Rutherford 2006).

The average elevation for Waterberg Mountain Bushveld varies between 1000 and 1600 MASL (metres above sea level). The average elevation of the project area is 1389 MASL and slopes from the lower northern side to the higher southern section.



The study area falls within the summer rainfall region with an average annual rainfall of roughly 531 mm. The average annual temperature is 19.1 °C, while the summer temperature averages 22.6 °C and the winter temperature 12.8 °C (Climate-data.org accessed 23/08/2023).

The study area falls within the A62A Quaternary Catchment that forms part of the Limpopo Water Management Area (WMA). The closest perennial rivers to the project area are the Lephalala River that flows 5.2 km to the west and Jonkmansdrifspuit 5 km to the southwest. A non-perennial stream/river also flows directly to the west of the demarcated study area. The Doorndraai Dam is located 35 km to the southeast.

When the surrounding environment is considered, the region is associated game farming and to a lesser extent with crop cultivation. Access to the study area is via a local gravel road turning from tertiary road R518 to the north of the project area (**Figures 2 & 3**). On a local scale, the demarcated study area is currently characterised by open land, while two sections on the northern half were cultivated in the past.



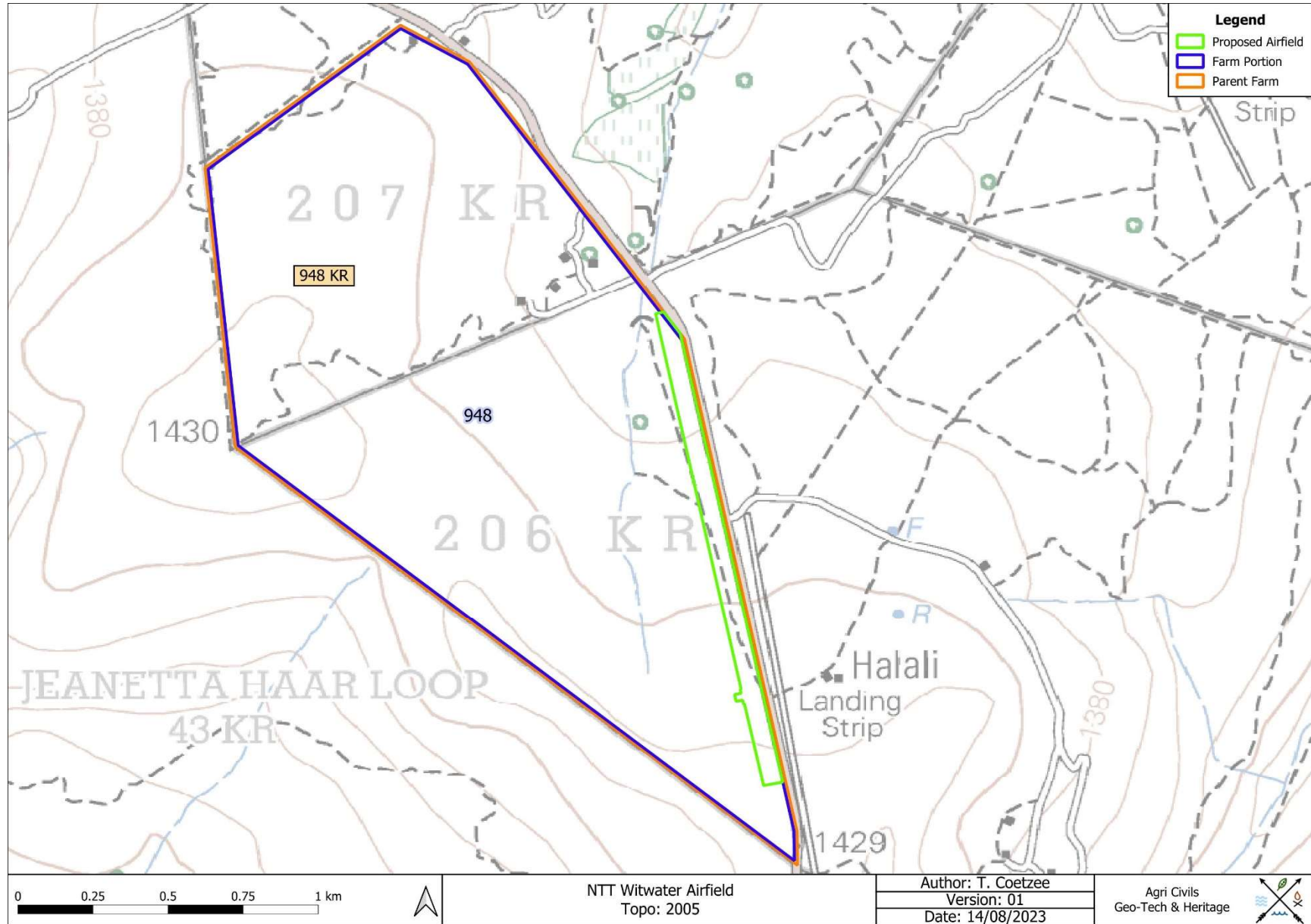


Figure 2: Segment of SA 1: 50 000 2428 BA indicating the study area.



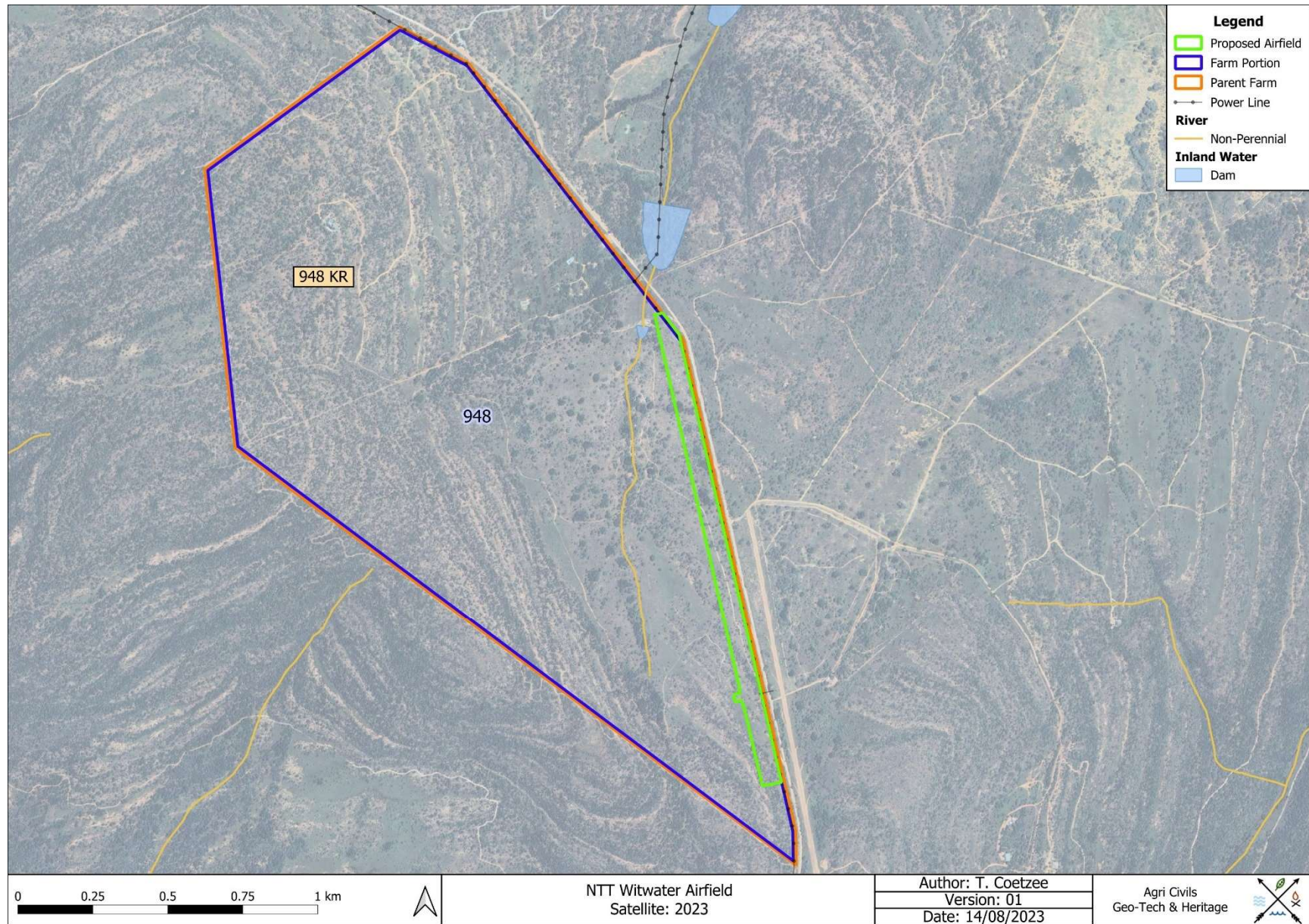


Figure 3: Study area portrayed on a 2023 satellite image.



2.2 Project Description

An airfield is proposed on the Farm 948 KR. The proposed asphalt paved runway will be 1400 m in length with 100 m gravel surfacing at either end. The development will include a hangar measuring 25 m X 25 m and a hardstand in front of the hangar (**Figure 4**).



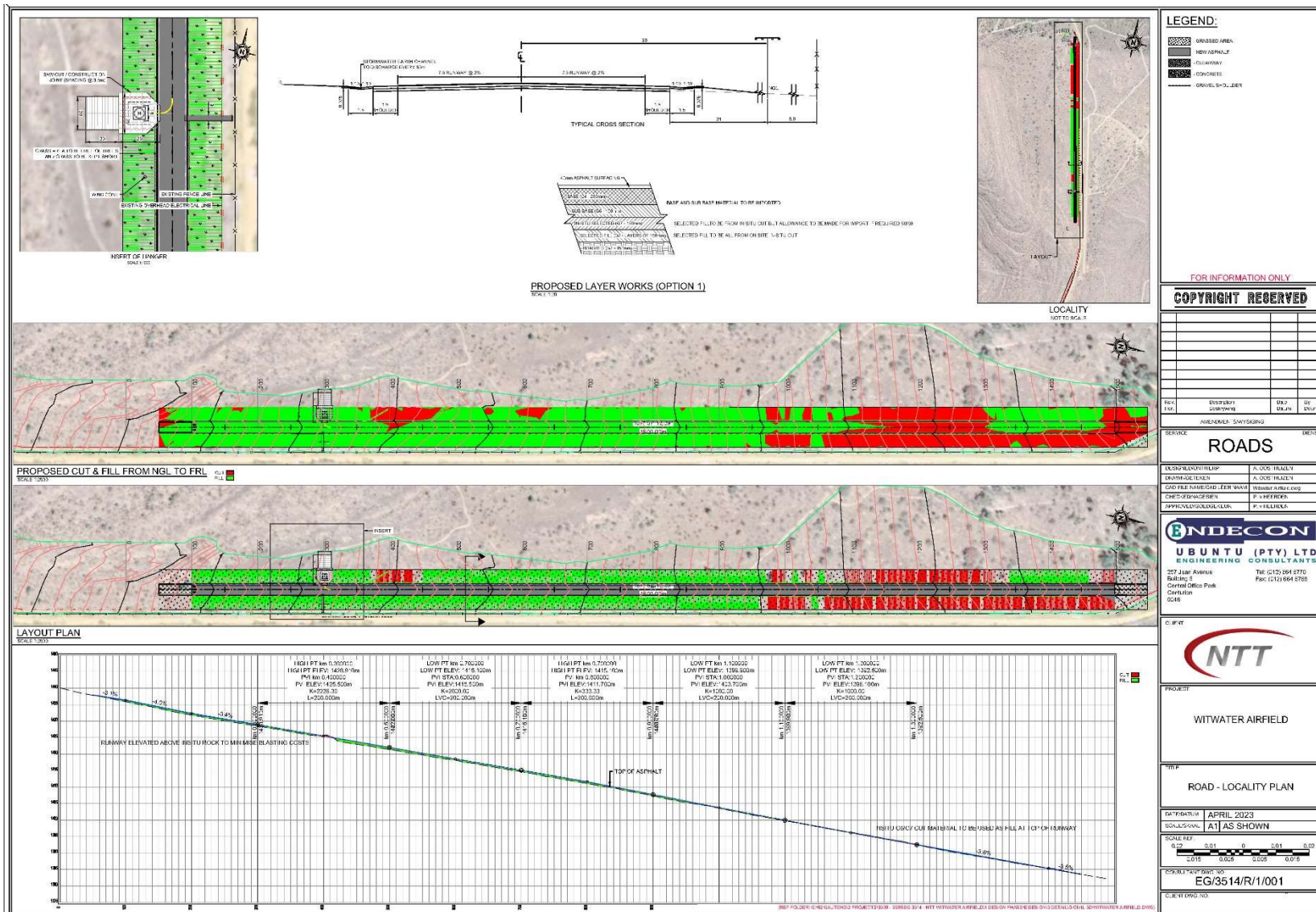


Figure 4: NTT Witwater Airfield – Proposed Layout (supplied by Elemental Sustainability 2023).



3. Methodology

Archaeological reconnaissance of the demarcated study area was conducted during August 2023 through a systematic pedestrian survey (**Figure 5**). General site conditions were recorded via photographic record (**Figures 6 – 10**). Also, the project area was inspected on Google Earth, historical topographical maps, and historical aerial imagery in order to identify potential heritage remains (**Appendix A**). The historical topographical maps dating to 1969, 1981 and 2005, as well as the historical aerial images dating to 1953, 1965, 1972, 1987, and 2006, proved useful in terms of locating potential heritage sites and past land uses associated with the demarcated study area. However, no potential sites were identified on historical topographical maps, aerial images, contemporary satellite imagery, or during the pedestrian survey (**Figure 5**). The total area inspected was approximately 9.6 ha. Since heritage resources are often associated with perennial and non-perennial rivers, the rivers and streams located within close proximity of the study area were buffered by a distance of 500 m. Additionally, the areas that have been disturbed by cultivation were plotted using topographical maps and historical aerial imagery, indicating areas that are considered to be less sensitive from a heritage perspective (**Figure 15**).

The reconnaissance of the area under investigation served a twofold purpose:

- To obtain an indication of heritage material found in the general area as well as to identify or locate archaeological sites within the areas demarcated for development. This was done in order to establish a heritage context and to supplement background information that would benefit developers through identifying areas that are sensitive from a heritage perspective.
- All archaeological and historical events have spatial definitions in addition to their cultural and chronological context. Where applicable, spatial recording of these definitions were done by means of a handheld Global Positioning System (GPS) during the site visit, as well as by plotting the boundaries from aerial imagery, satellite imagery and topographical maps.



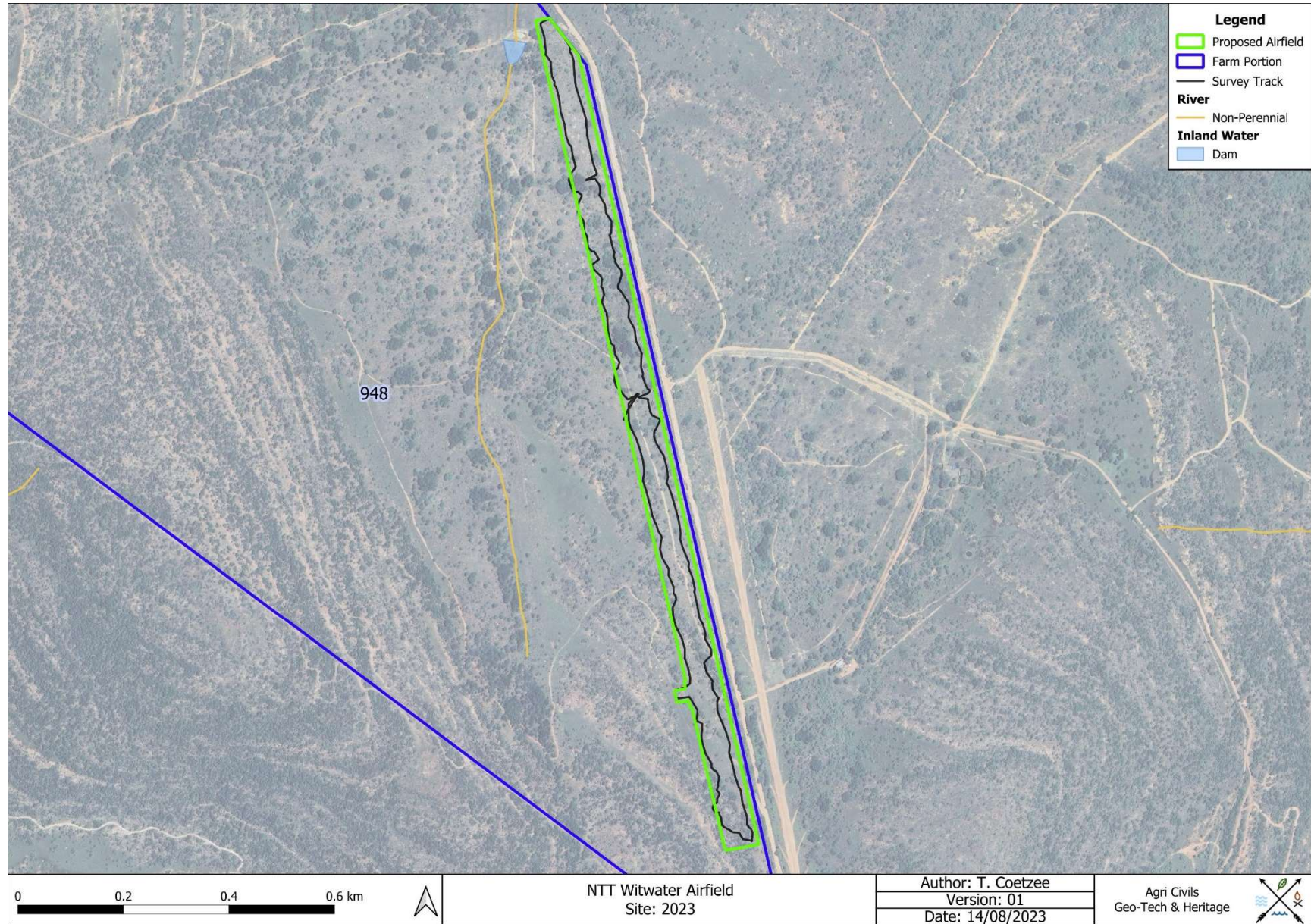


Figure 5: Study area with survey track portrayed on a 2023 satellite image.





Figure 6: Study area viewed from the north-eastern corner.



Figure 7: Study area viewed from the south-eastern corner.



Figure 8: Study area viewed from the south-western corner.





Figure 9: Study area viewed from the north-western corner.



Figure 10: Environment at the centre of the study area.

3.1 Sources of information

At all times during the survey, standard archaeological procedures for the observation of heritage resources were followed. As most archaeological material occur in single or multiple stratified layers beneath the soil surface, special attention was paid to disturbances; both man-made such as roads and clearings, and those made by natural agents such as burrowing animals and erosion. Locations associated with archaeological material remains, as well as general environmental conditions, were recorded by means of a Garmin Oregon 750 GPS and were photographed with a Samsung A71 mobile phone.

Additional sources consulted include an inspection of historical aerial images and historical topographical maps, previous heritage studies conducted in the general area, and the South African Heritage Resources Information System (SAHRIS) database.



3.1.1 Previous Heritage Studies

Delagoa Eco Estate

A Heritage Impact Assessment was conducted for the development of the Delagoa Eco Estate on the Farm Delagoa 809 LR. The demarcated project area is located roughly 24 km east-northeast of the proposed NTT Witwater Airfield. Roodt (2008) surveyed the study area and located no potential heritage sites.

Groothoek, Nyhoffsbult and Zwartkop

A heritage assessment of the Farms Groothoek 220 KR, Nyhoffsbult 231 KR and Zwartkop 219 KR was conducted by Küsel (2007). The demarcated farms are located approximately 8 km southeast of the proposed NTT Witwater Airfield. The study recorded eight heritage sites. These sites include one LIA site, two rock art sites, an initiation cairn and four grave/cemetery sites. The LIA site is associated with stone terracing and one Moloko potsherd. One of the rock art sites is located against a large open rock face. More than 20 individual paintings consisting of a combination of antelope and human figurines were observed. Since potsherds, a grinding depression and a hut floor were also noted, the site appears to have been used by LIA people as well. Accordingly, it is likely that the site was used by LIA people as a rain making site. The second rock art site is located under an overhang and consists of several paintings on top of older paintings, as well as LIA white finger paintings. Some of the figures include human figurines, eland, warthog and rhino. A Later Stone Age deposit, possible LIA material and ostrich eggshell were noted in a crack in the shelter's floor. It was noted that some of the paintings have been damaged by school children. The initiation site consisted of a *Phiri* next to one of the farm roads. The four grave/cemetery sites consist of 45 graves in total. Küsel (2007) noted that according to the Rock Art Research Institute at the University of the Witwatersrand, these rock art sites are of the best-preserved sites in the Waterberg and also that C. van Riet Louw recorded the sites in the 1930's.

Waterberg Photovoltaic Plant

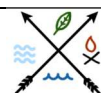
Van Schalkwyk (2010) conducted an HIA for the Waterberg Photovoltaic Plant on a portion of Portion 2 of the Farm Goedgevonden 104 KR. Based on the property description, the Waterberg Photovoltaic Plant project area is located roughly 72 km southwest of the proposed NTT Witwater Airfield. The Waterberg Photovoltaic Plant project area measured approximately 20 ha and no potential heritage sites were noted.

3.1.2 Historical topographical maps & aerial images

No potential heritage sites were noted on the historical aerial images and historical topographical maps.

1953 Aerial Image

The earliest aerial image of the project area dates to 1953 (**Appendix A: Figure 16**). The image shows a small cultivated section near the northern end of the inspected area, while the remaining area consisted of open land. A small path/road to the east of the study area is noted as well.



1965 Aerial Image

The 1965 aerial image (**Appendix A: Figure 17**) shows the expansion of cultivated land, while the remainder of the study area consisted of open land. The current gravel road directly to the east of the project area is shown as well.

1969 Topographical Map

The earliest topographical map of the project area dates to 1969 (**Appendix A: Figure 18**). The map shows that the demarcated area consisted of open land at the time.

1972 Aerial Image

The aerial image dating to 1972 (**Appendix A: Figure 19**) indicates no activity on the demarcated study area.

1981 Topographical Map & 1987 Aerial Image

The 1981 topographical map and the 1987 aerial image (**Appendix A: Figures 20 & 21**) reflect the same detail as in the 1972 aerial image (**Appendix A: Figure 19**).

2005 Topographical Map & 2006 Aerial Image

The 2005 topographical map and 2006 aerial image (**Appendix A: Figures 22 & 22**) show the same detail as observed on the 1981 topographical map and the 1987 aerial image with the addition of a footpath crossing the demarcated study area (**Appendix A: Figures 20 & 21**).

3.1.3 Personal Communication

Access to the study area was arranged through Mr Riaan Kotze. To Mr Kotze's knowledge, no graves, burial sites or any other potential heritage resources are located within the demarcated study area (Riaan Kotze, pers. comm. 2023)

3.1.4 SAHRIS Database

The databases containing the declared and graded heritage sites were exported from SAHRIS on 30/05/2023 and were plotted on the site map in order to determine the presence of previously recorded sites within the project area. Accordingly, no graded heritage sites are located within the demarcated project area, while the nearest declared heritage site, No.4 Borehole and Pullinger Shaft, is found to the north of Modimolle approximately 35 km to the south of the study area.

3.2 Limitations

The general environment is associated with relatively short grass cover that promoted visibility and free movement. The southernmost section, however, is characterised by slightly dense tree cover that prevented free movement to some extent (**Figure 11**).





Figure 11: Section of slightly dense tree cover near the southern border of the study area.

4. Archaeological Background

Southern African archaeology is broadly divided into the Early, Middle and Later Stone Ages; Early, Middle and Later Iron Ages; and Historical or Colonial Periods. This section of the report provides a general background to archaeology in South Africa.

4.1 The Stone Age

The earliest stone tool industry, the Oldowan, was developed by early human ancestors which were the earliest members of the genus *Homo*, such as *Homo habilis*, around 2.6 million years ago. It comprises tools such as cobble cores and pebble choppers (Toth & Schick 2007). Archaeologists suggest these stone tools are the earliest direct evidence for culture in southern Africa (Clarke & Kuman 2000). The advent of culture indicates the advent of more cognitively modern hominins (Mitchell 2002: 56, 57).

The Acheulean industry completely replaced the Oldowan industry. The Acheulian industry was first developed by *Homo ergaster* between 1.8 to 1.65 million years ago and lasted until around 300 000 years ago. Archaeological evidence from this period is also found at Swartkrans, Kromdraai and Sterkfontein. The most typical tools of the ESA (Early Stone Age) are handaxes, cleavers, choppers and spheroids. Although hominins seemingly used handaxes often, scholars disagree about their use. There are no indications of hafting, and some artefacts are far too large for it. Hominins likely used choppers and scrapers for skinning and butchering scavenged animals and often obtained sharp ended sticks for digging up edible roots. Presumably, early humans used wooden spears as early as 5 million years ago to hunt small animals.

Middle Stone Age artefacts started appearing about 250 000 years ago and replaced the larger Early Stone Age bifaces, handaxes and cleavers with smaller flake industries consisting of scrapers, points and blades. These artefacts roughly fall in the 40-100 mm size range and were, in some cases, attached to handles, indicating a



significant technical advance. The first *Homo sapiens* species also emerged during this period. Associated sites are Klasies River Mouth, Blombos Cave and Border Cave (Deacon & Deacon 1999).

Although the transition from the Middle Stone Age to the Later Stone Age did not occur simultaneously across the whole of southern Africa, the Later Stone Age ranges from about 20 000 to 2000 years ago. Stone tools from this period are generally smaller, but were used to do the same job as those from previous periods; only in a different, more efficient way. The Later Stone Age is associated with: rock art, smaller stone tools (microliths), bows and arrows, bored stones, grooved stones, polished bone tools, earthenware pottery and beads. Examples of Later Stone Age sites are Nelson Bay Cave, Rose Cottage Cave and Boomplaas Cave (Deacon & Deacon 1999). These artefacts are often associated with rocky outcrops or water sources.

4.2 The Iron Age & Historical Period

The Early Iron Age marks the movement of farming communities into South Africa in the first millennium AD, or around 2500 years ago (Mitchell 2002:259, 260). These groups were agro-pastoralist communities that settled in the vicinity of water in order to provide subsistence for their cattle and crops. Archaeological evidence from Early Iron Age sites is mostly artefacts in the form of ceramic assemblages. The origins and archaeological identities of this period are largely based upon ceramic typologies. Some scholars classify Early Iron Age ceramic traditions into different “streams” or “trends” in pot types and decoration, which emerged over time in southern Africa. These “streams” are identified as the Kwale Branch (east), the Nkope Branch (central) and the Kalundu Branch (west). Early Iron Age ceramics typically display features such as large and prominent inverted rims, large neck areas and fine elaborate decorations. This period continued until the end of the first millennium AD (Mitchell 2002; Huffman 2007). Some well-known Early Iron Age sites include the Lydenburg Heads in Mpumalanga, Happy Rest in the Limpopo Province and Mzonjani in Kwa-Zulu Natal.

The Middle Iron Age roughly stretches from AD 900 to 1300 and marks the origins of the Zimbabwe culture. During this period cattle herding appeared to play an increasingly important role in society. However, it was proved that cattle remained an important source of wealth throughout the Iron Age. An important shift in the Iron Age of southern Africa took place in the Shashe-Limpopo basin during this period, namely the development of class distinction and sacred leadership. The Zimbabwe culture can be divided into three periods based on certain capitals. Mapungubwe, the first period, dates from AD 1220 to 1300, Great Zimbabwe from AD 1300 to 1450, and Khami from AD 1450 to 1820 (Huffman 2007: 361, 362).

The Late Iron Age (LIA) roughly dates from AD 1300 to 1840. It is generally accepted that Great Zimbabwe replaced Mapungubwe. Some characteristics include a greater focus on economic growth and the increased importance of trade. Specialisation in terms of natural resources also started to play a role, as can be seen from the distribution of iron slag which tend to occur only in certain localities compared to a wide distribution during earlier times. It was also during the Late Iron Age that different areas of South Africa were populated, such as the interior of KwaZulu Natal, the Free State, the Gauteng Highveld and the Transkei. Another characteristic is



the increased use of stone as building material. Some artefacts associated with this period are knife-blades, hoes, adzes, awls, other metal objects as well as bone tools and grinding stones.

The Historical period mainly deals with Europe's discovery, settlement and impact on southern Africa. Some topics covered by the Historical period include Dutch settlement in the Western Cape, early mission stations, Voortrekker routes and the Anglo Boer War. This time period also saw the compilation of early maps by missionaries, explorers, military personnel, etc.

4.2.1 Study area archaeo-history

In terms of the general project area, groups present in the area at the beginning of the 19th Century include the Langa Ndebele and the Kekana Ndebele (Bergh 1999). Mokopane was originally named Pieter Potgietersrus when it was founded on 25 September 1858. The town was named after Commandant-General Pieter Potgieter who was killed at Makapansgat during a battle with the Kekana Ndebele of Mugombhane, who was also known as Mokôpane or Makapane (Bulpin 1986; Bergh 1999). The town was later renamed to Potgietersrus and in 2003 it was renamed to Mokopane.

5. Archaeological and Historical Remains

5.1 Stone Age Remains

No Stone Age archaeological remains were located within the demarcated study area.

These artefacts are often associated with rocky outcrops or water sources. **Figures 12 – 14** below are examples of stone tools often associated with the Early, Middle and Later Stone Age of southern Africa.

The heritage study conducted by Küsel (2007) on the farms Groothoek, Nyhoffsult and Zwartkop noted the presence an LSA deposit in a crack in the floor of a rock shelter.

According to Bergh (1999: 5) ESA and LSA sites are found closer to Mokopane, while several rock painting sites are found in the general vicinity of the study area.



Figure 12: ESA artefacts (Volman 1984).



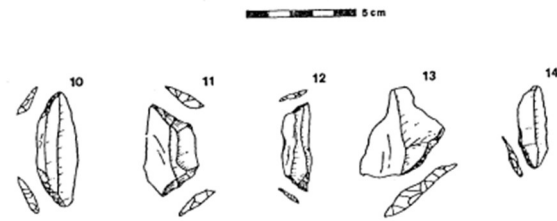


Figure 13: MSA artefacts (Volman 1984).



Figure 14: LSA scrapers (Klein 1984).

5.2 Iron Age Farmer Remains

No Iron Age Farmer remains were located within the demarcated study area.

Stone-walled sites are often detectable on satellite and aerial imagery. However, no such sites were noted on aerial and satellite imagery.

According to Bergh (1999), LIA sites are found along the Lephalala River to the west of the study area, as well as directly to the east of Mokopane.

According to Huffman (2007), the following ceramics are associated with the general study area:

- Icon facies of the Moloko Branch of the Urewe Tradition (AD 1300 to 1500)
- Madikwe facies of the Moloko Branch of the Urewe Tradition (AD 1500 to 1700)
- Bambata facies of the Benfica sub-branch of the Kalundu Tradition (AD 150 – 650; AD 350 – 650)

Küsel (2007) noted the presence of LIA pottery, stone terracing, a grinding stone, a hut floor and rock paintings to the southeast of the study area.

5.3 Historical Remains

No historical sites were located within the demarcated study area.

The heritage study conducted by Küsel (2007) recorded a *Phiri* indicating an initiation site likely dating to the 1940's or 1950's.



5.4 Contemporary Remains

No contemporary sites were located within the demarcated study area.

The heritage studies conducted in the surrounding areas did not record significant contemporary remains (see Küsel (2007), Roodt (2008), Van Schalkwyk (2010)).

5.5 Graves/Burial Sites

No burial sites or graves were observed during the pedestrian survey.

The heritage study conducted by Küsel (2007) recorded two cemeteries consisting of a total of 41 graves and two sites consisting of two graves each.

6. Evaluation

The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the NHRA (Act No. 25 of 1999), while other historical and cultural significant sites, places and features, are generally determined by community preferences.

A fundamental aspect in the conservation of a heritage resource relates to whether the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. There are many aspects that must be taken into consideration when determining significance, such as rarity, national significance, scientific importance, cultural and religious significance, and not least, community preferences. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and if appropriate mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed.

6.1 Field Ratings

All sites should include a field rating in order to comply with section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999). The field rating and classification in this report are prescribed by SAHRA.

Table 2: Prescribed Field Ratings.

Rating	Field Rating/Grade	Significance	Recommendation
National	Grade 1		National site
Provincial	Grade 2		Provincial site
Local	Grade 3 A	High	Mitigation not advised
Local	Grade 3 B	High	Part of site should be retained
General protection A	4 A	High/Medium	Mitigate site
General Protection B	4 B	Medium	Record site
General Protection C	4 C	Low	No recording necessary

*No potential heritage sites were observed.



7. Statement of Significance & Recommendations

7.1 Statement of Significance

The study area: The proposed NTT Witwater Airfield on the Farm 948 KR

The area demarcated for the proposed NTT Witwater Airfield has partially been disturbed by crop cultivation in the past. Although the study area is located within 500 m of a non-perennial river/stream, a zone that is generally associated with a higher heritage site probability, no potential heritage sites were noted on historical aerial imagery, historical topographical maps, or during the pedestrian survey. The demarcated study area is therefore not considered to be sensitive from a heritage perspective (**Figure 15**).



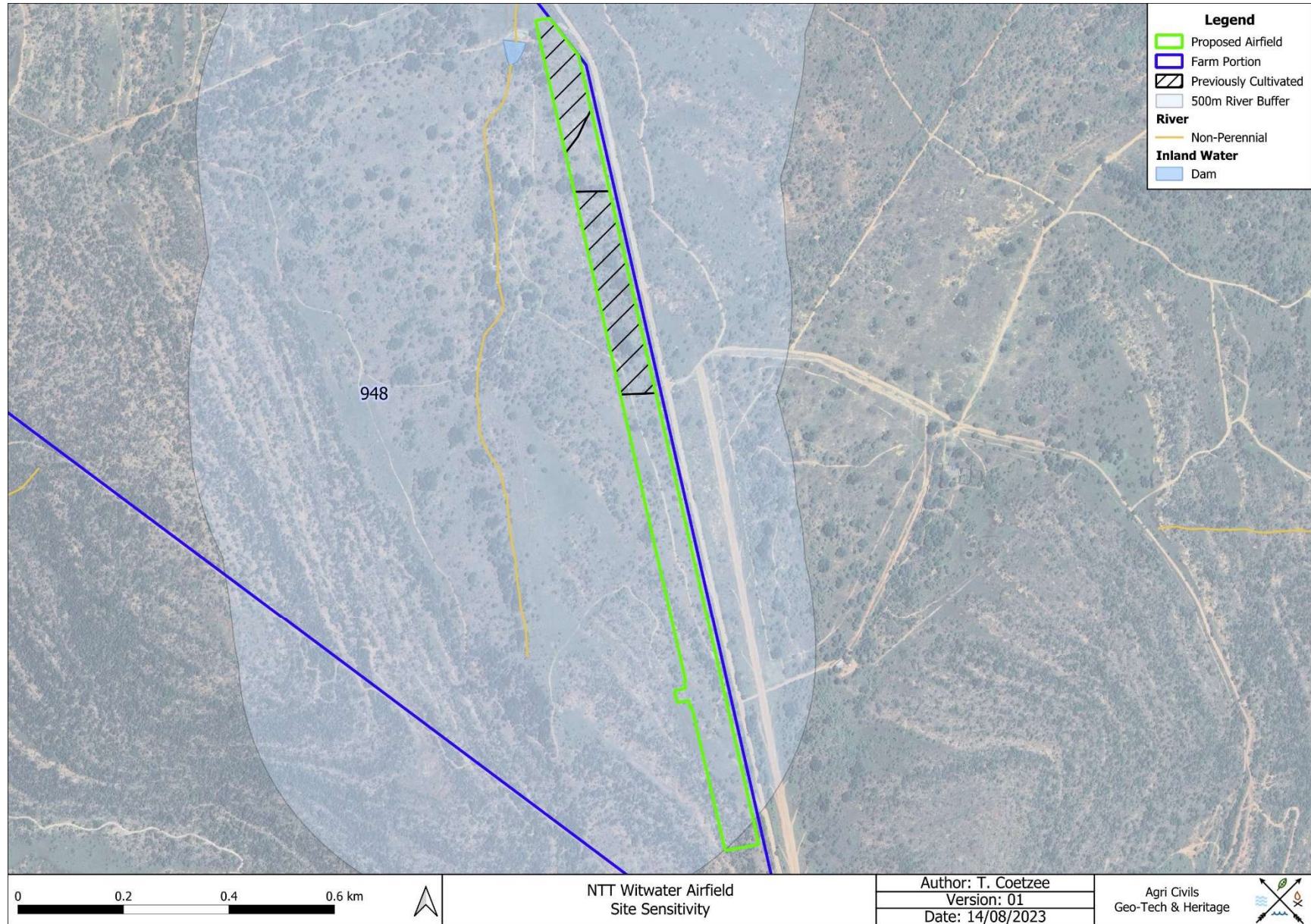


Figure 15: Study area and sensitive areas portrayed on a 2023 satellite image.



7.2 Recommendations

The following recommendations are made in terms with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) in order to avoid the destruction of heritage remains associated with the demarcated study area:

The area demarcated for the NTT Witwater Airfield

- A section of the demarcated study area used to be cultivated and although the area is located close to a non-perennial river, no potential heritage sites were observed. The demarcated area is therefore not considered to be sensitive from a heritage perspective.

General

- The recommendations are based on the specific project extent and planned activities as indicated by the figures in this report. Should the proposed project / impact areas be altered to include additional areas, a qualified archaeologist must amend the HIA accordingly.
- Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible.
- Since archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the proposed development, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during the project, all activities must be suspended and the relevant heritage resources authority must be contacted (See National Heritage Resources Act, 25 of 1999 section 36 (6)).
- From a heritage point of view, the construction of the proposed NTT Witwater Airfield may continue, subject to the abovementioned conditions, recommendations, and approval by the South African Heritage Resources Agency.

8. Conclusion

The proposed NTT Witwater Airfield consists of an impact area of approximately 9.6 ha. Two sections of the study area used to be cultivated and no potential heritage resources were noted within the demarcated boundary. Should the recommendations made in this study be adhered to and with the approval of the South African Heritage Resources Agency, the proposed NTT Witwater Airfield project as per the indicated boundary may proceed.



9. Addendum: Terminology

Archaeology:

The study of the human past through its material remains.

Artefact:

Any portable object used, modified, or made by humans; e.g. pottery and metal objects.

Assemblage:

A group of artefacts occurring together at a particular time and place, and representing the sum of human activities.

Context:

An artefact's context usually consist of its immediate *matrix* (the material surrounding it e.g. gravel, clay or sand), its *provenience* (horizontal and vertical position within the matrix), and its *association* with other artefacts (occurrence together with other archaeological remains, usually in the same matrix).

Cultural Resource Management (CRM):

The safeguarding of the archaeological heritage through the protection of sites and through salvage archaeology (rescue archaeology), generally within the framework of legislation designed to safeguard the past.

Excavation:

The principal method of data acquisition in archaeology, involving the systematic uncovering of archaeological remains through the removal of the deposits of soil and other material covering and accompanying it.

Feature:

An irremovable artefact; e.g. hearths or architectural elements.

Ground Reconnaissance:

A collective name for a wide variety of methods for identifying individual archaeological sites, including consultation of documentary sources, place-name evidence, local folklore, and legend, but primarily actual fieldwork.

Matrix:

The physical material within which artefacts is embedded or supported, i.e. the material surrounding it e.g. gravel, clay or sand.

Phase 1 Assessments:

Scoping surveys to establish the presence of and to evaluate heritage resources in a given area.

Phase 2 Assessments:

In-depth culture resources management studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required.

Sensitive:

Often refers to graves and burial sites although not necessarily a heritage place, as well as ideologically significant sites such as ritual / religious places. *Sensitive* may also refer to an entire landscape / area known for its significant heritage remains.



Site:

A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity.

Surface survey:

There are two kinds: (1) unsystematic and (2) systematic. The former involves field walking, i.e. scanning the ground along one's path and recording the location of artefacts and surface features. Systematic survey by comparison is less subjective and involves a grid system, such that the survey area is divided into sectors and these are walked ally, thus making the recording of finds more accurate.

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Human Tissue Act No. 65 of 1983, Government Gazette, Cape Town

National Heritage Resource Act No.25 of 1999, Government Gazette, Cape Town

Removal of Graves and Dead Bodies Ordinance No. 7 of 1925, Government Gazette, Cape Town



Appendix A: Historical Aerial Imagery & Topographical Maps



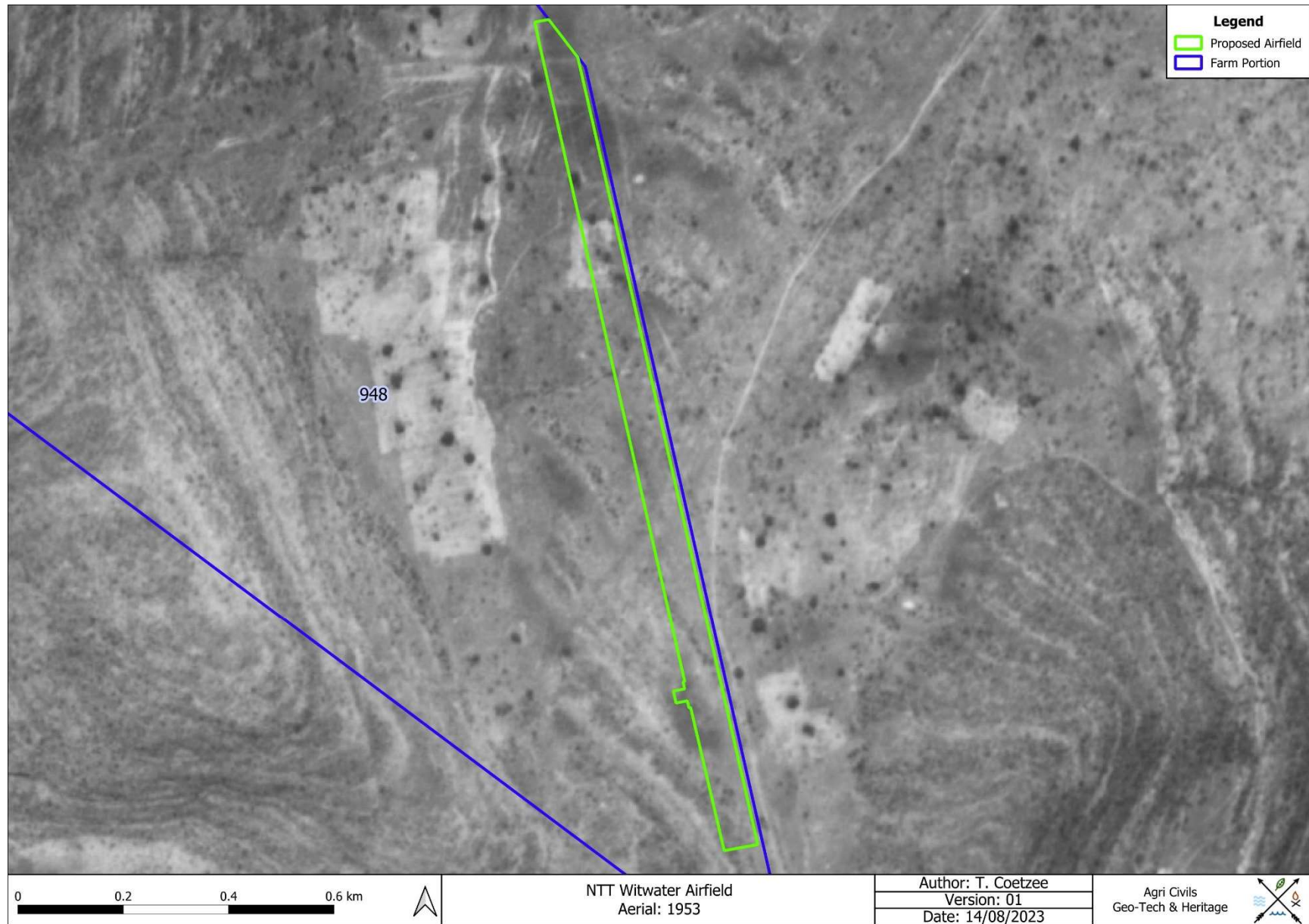


Figure 16: Study area superimposed on a 1953 aerial image.



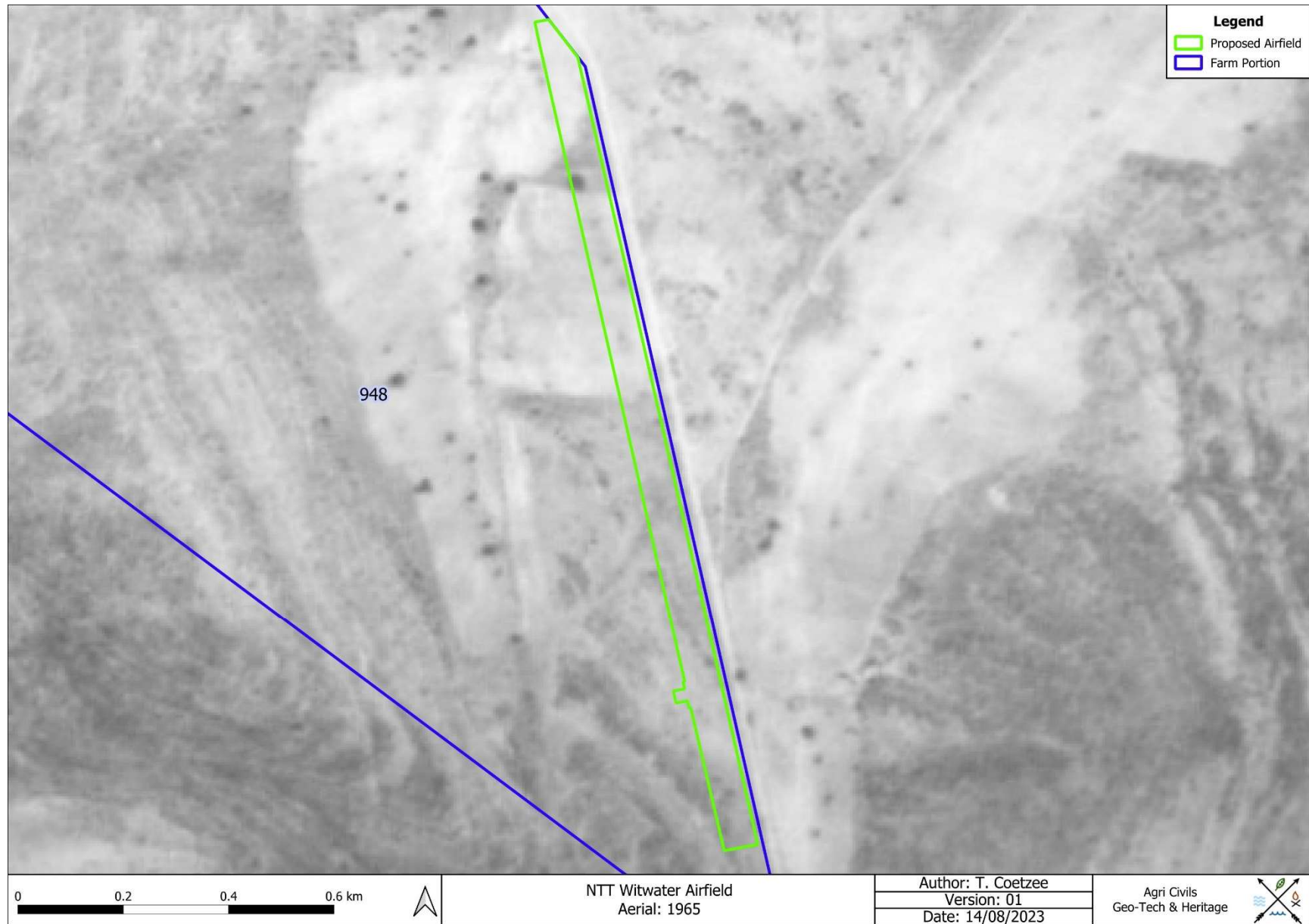


Figure 17: Study area superimposed on a 1965 aerial image.



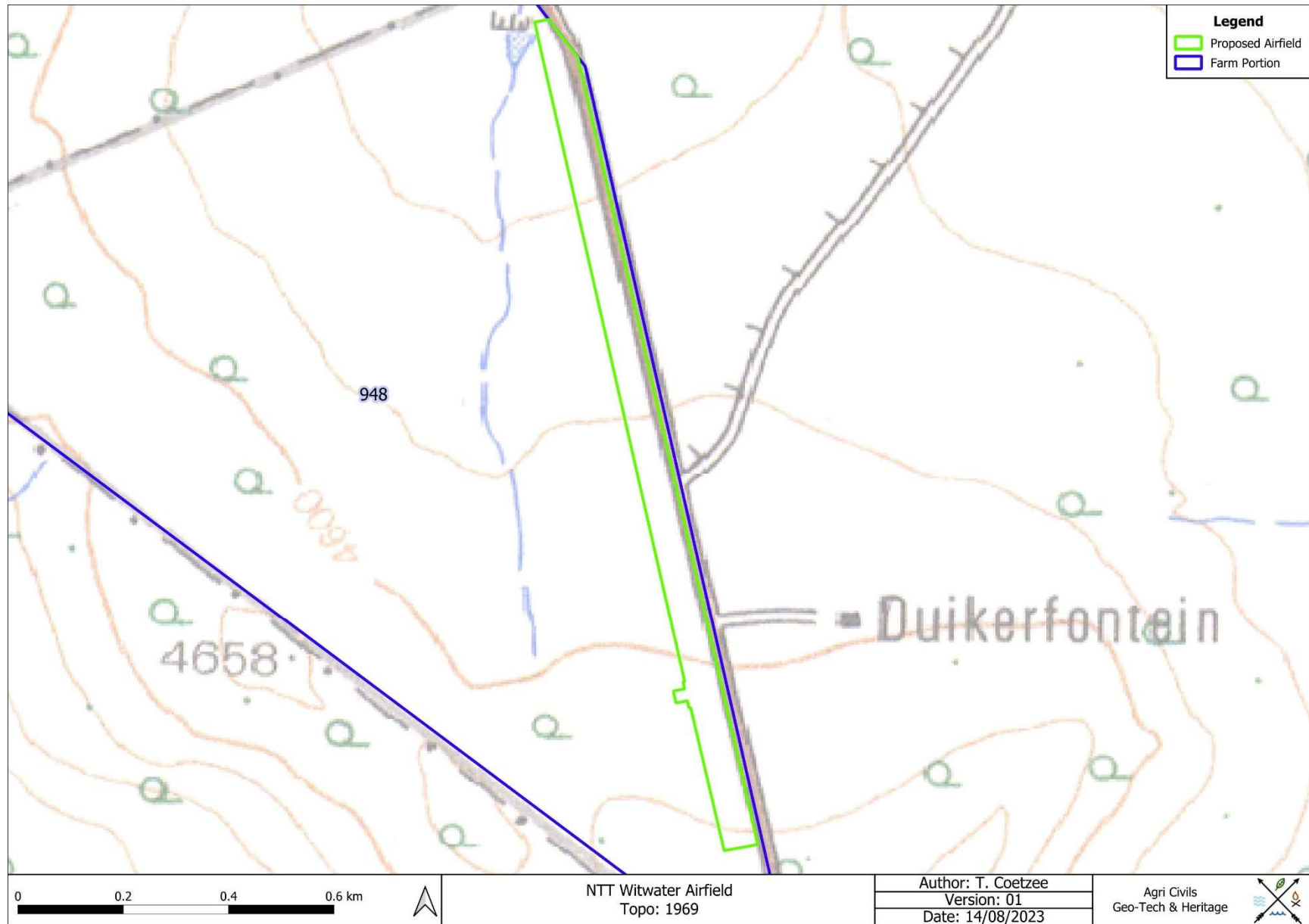


Figure 18: Study area superimposed on a 1969 topographical map.



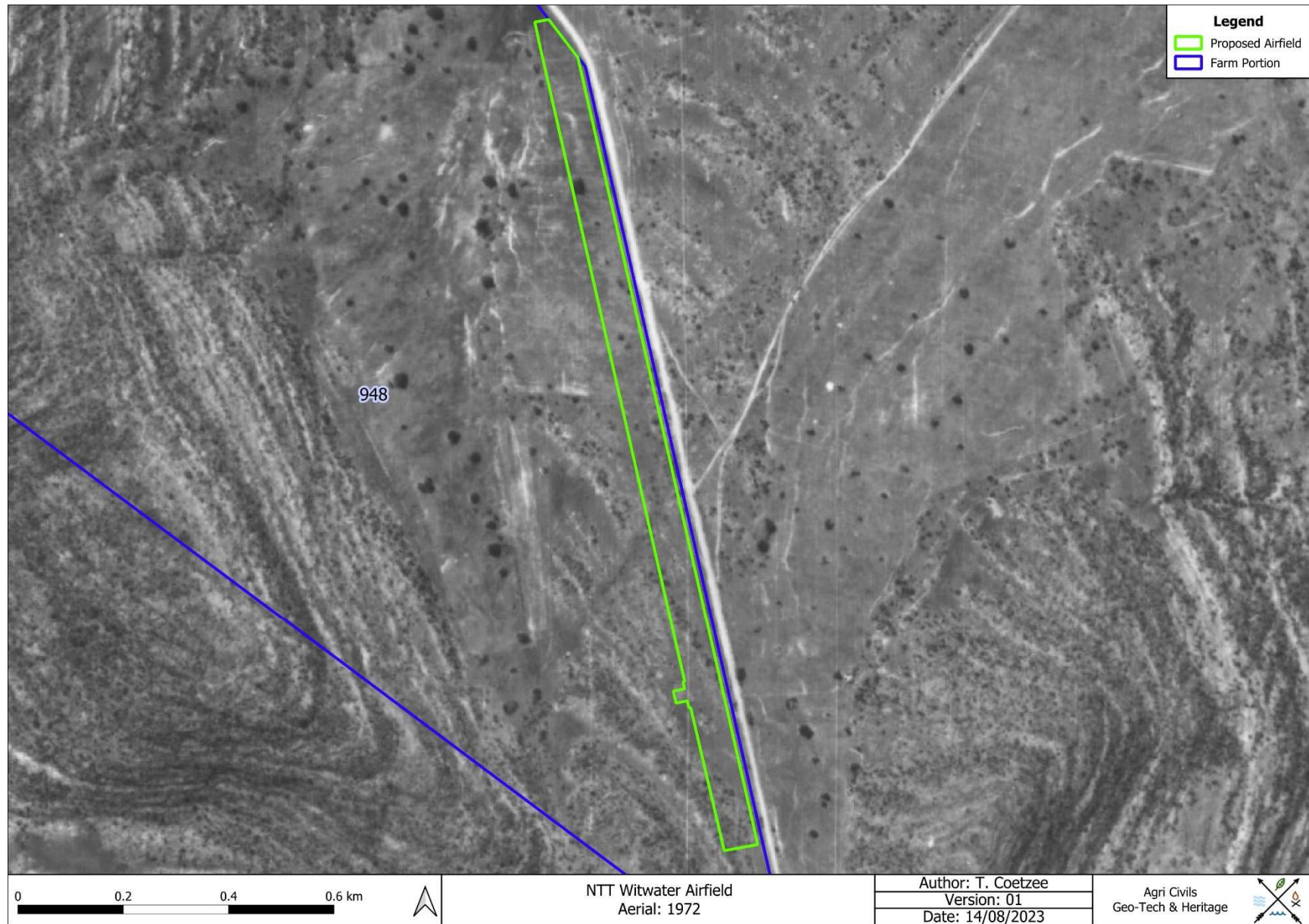


Figure 19: Study area superimposed on a 1972 aerial image.



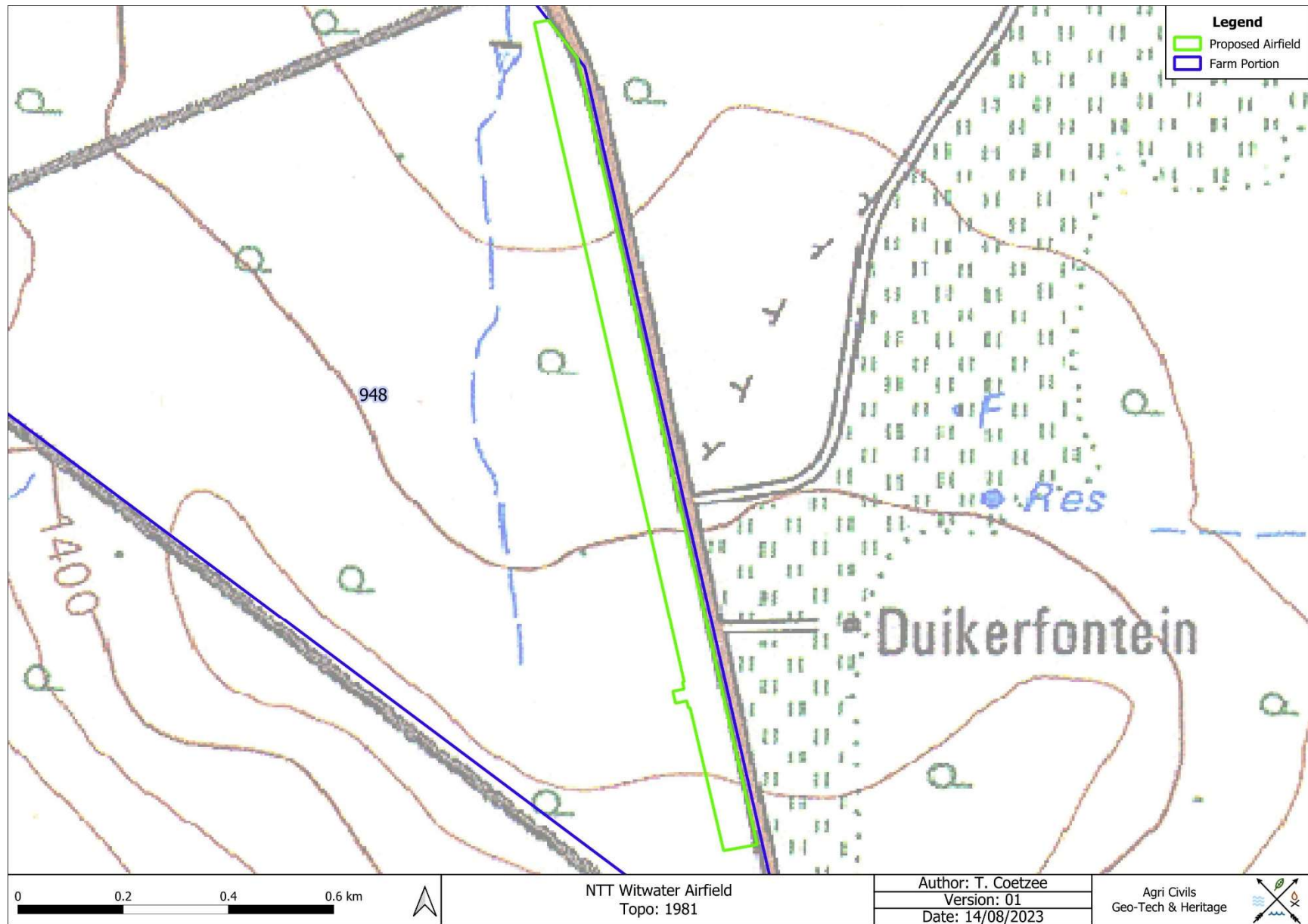


Figure 20: Study area superimposed on a 1981 topographical map.



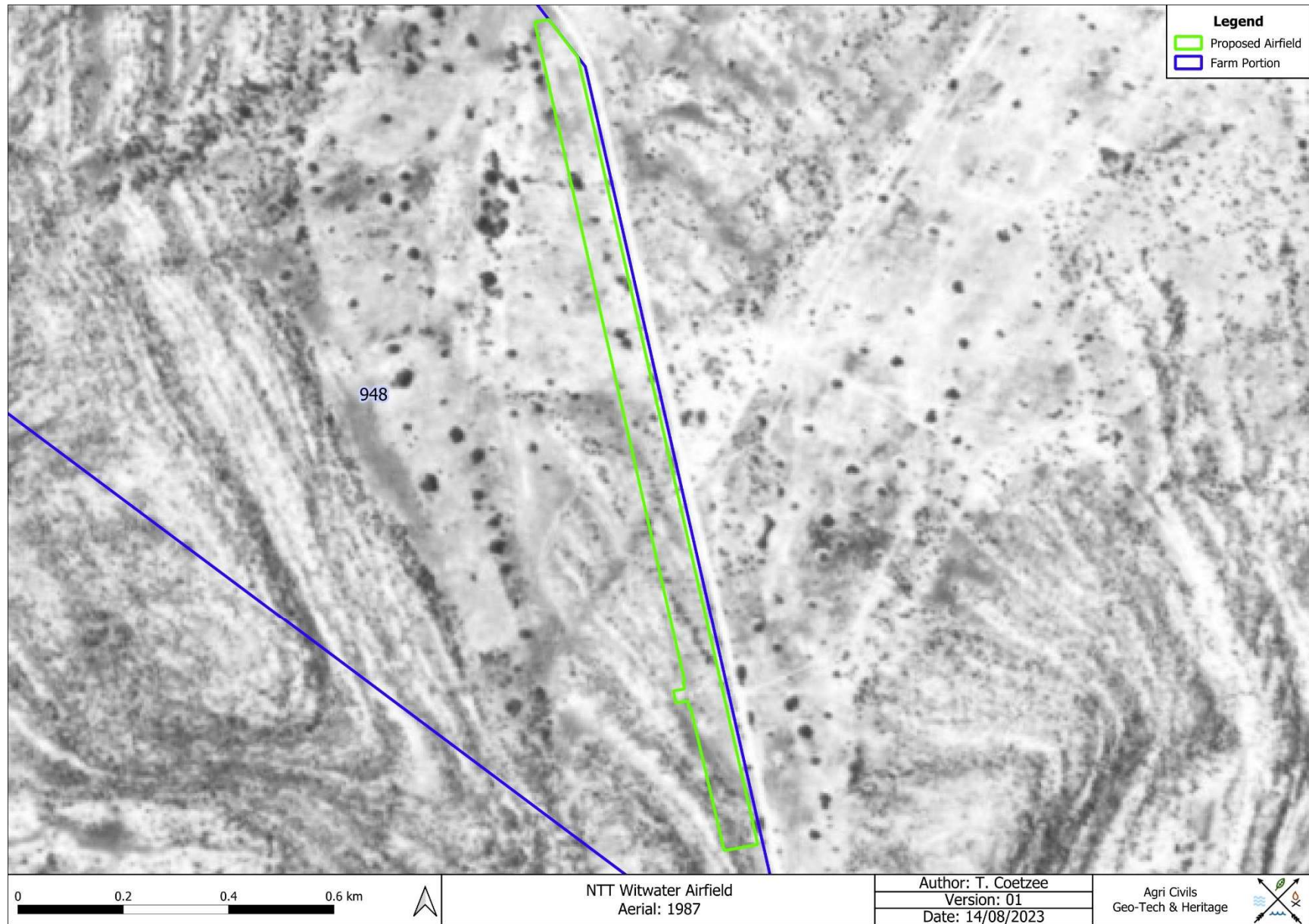


Figure 21: Study area superimposed on a 1987 aerial image.



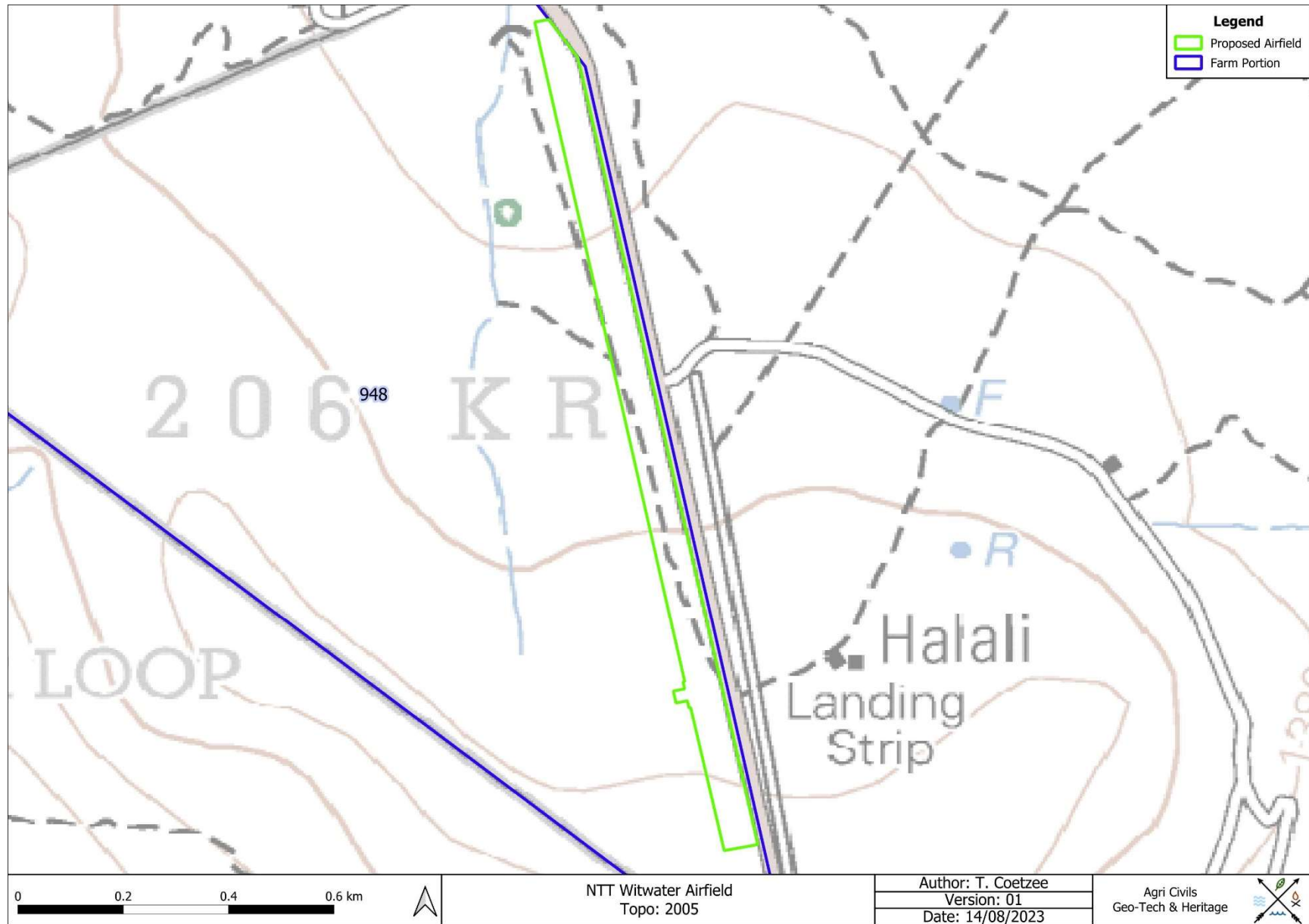


Figure 22: Study area superimposed on a 2005 topographical map.



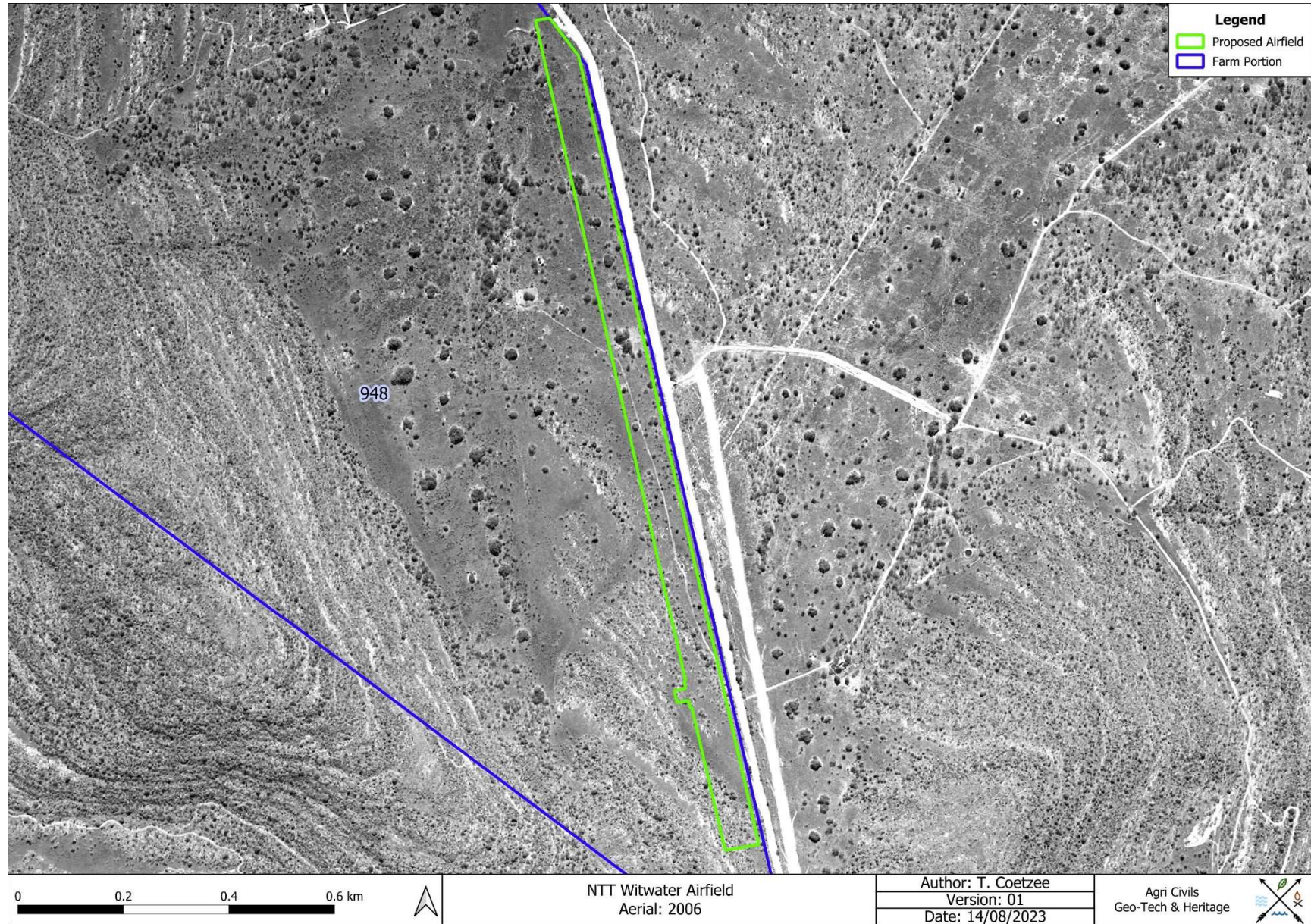


Figure 23: Study area superimposed on a 2006 aerial image.



Appendix B: NEMA Risk Assessment Methodology

1.1 RISK ASSESSMENT

The first stage of impact assessment is the identification of environmental activities, aspects and impacts. The receptors and resources are also identified, which allows for an understanding of the impact pathway and assessment of the sensitivity to change.

The purpose of the rating is to develop a clear understanding of influences and processes associated with each impact. The values for the likelihood and consequence (severity, spatial scope and duration) of the impact are then used to determine whether mitigation is necessary.

1.1.1 Methodology used in Determining the Significance of Environmental impacts

The Environmental Impact Assessment (EIA) 2014 Regulations [as amended] promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), requires that all identified potential impacts associated with the project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

The impact assessment methodology used to determine the significance of impacts prior and after mitigation is presented below



Extent of the impact		
The EXTENT of an impact is the physical extent/area of impact or influence.		
Score	Extent	Description
1	Footprint	The impacted area extends only as far as the actual footprint of the
2	Site	activity. The impact will affect the entire or substantial portion of the site/property.
3	Local	The impact could affect the area including neighbouring properties and transport routes.
4	Region	Impact could be widespread with regional implication.
5	National	Impact could have a widespread national level implication.
Duration of the impact		
The DURATION of an impact is the expected period of time the impact will have an effect.		
Score	Duration	Description
1	Short term	The impact is quickly reversible within a period of less than 2 y limited to the construction phase, or immediate upon the commencement of floods.
2	Short to medium term	The impact will have a short term lifespan (2–5 years).
3	Medium term	The impact will have a medium term lifespan (6 – 10 years)
4	Long term	The impact will have a medium term lifespan (10 – 25 years)
5	Permanent	The impact will be permanent beyond the lifespan of the development
Intensity of the impact		
The INTENSITY of an impact is the expected amplitude of the impact.		
Score	Intensity	Description
1	Minor	The activity will only have a minor impact on the affected environment in a way that the natural processes or functions are not affected.
2	Low	The activity will have a low impact on the affected environment.
3	Medium	The activity will have a medium impact on the affected environment function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment which be disturbed to the extent where it temporarily or permanently ceases
5	Very High	The activity will have a very high impact on the affected environment may be disturbed to the extent where it temporarily or permanently ce



Reversibility of the impact

The REVERSIBILITY of an impact is the severity of the impact on the ecosystem structure

Score	Reversibility	Description
1	Completely reversible	The impact is reversible without any mitigation measures and management measures
2	Nearly completely reversible	The impact is reversible without any significant mitigation management measures. Some time and resources required.
3	Partly reversible	The impact is only reversible with the implantation of mitigation management measures. Substantial time and resources required.
4	Nearly irreversible	The impact is can only marginally be reversed with the implantation significant mitigation and management measures. Significant time resources required to ensure impact is on a controllable level.
5	Irreversible	The impact is irreversible.

Probability of the impact

The PROBABILITY of an impact is the severity of the impact on the ecosystem structure

Score	Probability	Description
1	Improbable	The possibility of the impact occurring is highly improbable (less than of impact occurring).
2	Low	The possibility of the impact occurring is very low, due either to circumstances, design or experience (5% to 30% of impact occurring)
3	Medium	There is a possibility that the impact will occur to the extent that provision must be made therefore (30% to 60% of impact occurring).
4	High	There is a high possibility that the impact will occur to the extent t provision must be made therefore (60% to 90% of impact occurring).
5	Definite	The impact will definitely take place regardless of any prevention plan and there can only be relied on migratory actions or contingency plan to contain the effect (90% to 100% of impact occurring).

Calculation of Impacts – Significance Rating of Impact






Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact.

The significance of an impact is rated according the scores a presented below:

Equation 1:

$$\text{Significance} = \text{Irreplaceability (Reversibility + Intensity + Duration + Extent)} \times \text{Probability}$$



Significance Rating		
Score	Significance	Colour Code
1 to 20	Very low	
21 to 40	Low	
41 to 60	Medium	
61 to 80	High	
81 to 100	Very high	
Mitigation Efficiency		
<p>Degree to which the impact can be mitigated: <i>The effect of mitigation measures on the impact and its degree of effectiveness:</i></p> <p><i>Equation 2:</i></p> $\text{Significance Rating} = \text{Significance} \times \text{Mitigation Efficiency}$		
High		0,2
Medium to High		0,4
Medium		0,6
Low to Medium		0,8
Low		1,0

Confidence rating: *Level of certainty of the impact occurring.*

- **Certain**
- **Sure**
- **Unsure**

Cumulative impacts: *The effect the combination of past, present and “reasonably foreseeable” future actions have on aspects.*

- Very Low cumulative impact
- Low cumulative impact
- Medium cumulative impact
- High cumulative impact



Appendix C: Monitoring – Heritage

Site	Impact	Applicable Phase	Action	Frequency	Responsible person
All surface impacts	Potential damage to subsurface culturally significant material	Construction / Development	Chance finds procedure	Duration of construction / development	ECO

