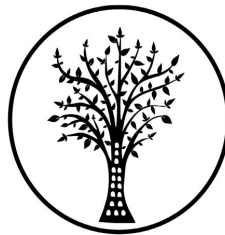


HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for a
Proposed development of water pipelines near Noenieput,
Northern Cape

Prepared by



CTS HERITAGE

In Association with

EnviroWorks Environmental Services

January 2020



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THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I, Jenna Lavin, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Jenna Lavin

Signature of the specialist

CTS Heritage

Name of company

January 2020

Date



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EXECUTIVE SUMMARY

The Kalahari- East Users Association proposes the construction of a portable water supply pipeline (approximately 25km) in Noenieput, Northern Cape Province. The connection point will be at Noenieput where the water supply pipeline that is currently under construction terminates. The water will flow from the connection point at Noenieput to Swartkopdam. Connection points will be provided for small and commercial farmers along the pipeline route. The approximate usage per month is 0.9l/s at peak summer demand. The pipeline material is UPVC of various pipe classes and diameters. The pipeline shall be installed in a trench with at least 600mm cover above the pipe. At the two crossings of the Molopo River the pipe cover will be 1.2 meters. Noenieput is located approximately 160km northwest of Upington within the ZF Mgqawu District Municipality in the Northern Cape Province.

The project proposes two alternative pipelines to run water from Noenieput to Swartkop Dam. The Noenieput (east) line is approximately 23km long and follows a main road for its northern section while the Swartkopdam (west) line is approximately 26km long and follows service roads for its entire length.

- ***Swartkopdam (west) alignment: Preferred***

This alignment is preferred in terms of other environmental indicators and is preferred in terms of impacts to archaeological heritage resources as the archaeological resources identified along this alignment are of moderate and low local significance (Grade IIIB and IIIC), and impacts to these resources can be mitigated.

However, this alignment has very HIGH sensitivity in terms of impacts to significant palaeontological heritage with chances of poorly known Cambrian trace fossils in the Nababis Formation and such, is not preferred in terms of impacts to palaeontology.

- ***Noenieput (east) alignment: Alternative***

This alternative alignment is not preferred in terms of impacts to archaeological heritage. The field assessment identified a number of significant archaeological resources of high local significance (Grade IIIA) within this alignment which must not be impacted by the proposed development.

However, this alignment has LOW to MODERATE sensitivity for impacts to palaeontological heritage with a low chance of fossil remains in the Dwyka Tillites and a high chance of these being metamorphosed.

On the balance of impacts to significant heritage resources, the Swartkopdam alignment is preferred as this avoids the significant Grade IIIA sites identified in the field assessment. However, the likelihood of impacting Grade IIIB and Grade IIIC sites along this alignment is high. Furthermore, this alignment is very sensitive for impacts to significant palaeontological heritage.

As such, there is no objection to the proposed development on condition that:

1. The Swartkopdam alignment is preferred in terms of impacts to heritage resources
2. A palaeontological field assessment is required around the southern section of the line to search for trace fossils before excavation commences within possible Nababis Formation exposure. See Appendix 1 of the Desktop PIA for fossil examples.



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3. The proposed Swartkopdam pipeline route alignment must be amended to adhere to a no-go buffer of 50m around the sites that have been graded as IIIB: WTK002 (003), WTK003 (013) and ABQ002 (005) - see Table 1 and Figure 5.1
4. All of the dunes within this area must be treated as highly sensitive for impacts to significant archaeological heritage and may not be impacted by the proposed development.
5. The construction of the proposed pipeline is monitored by a qualified specialist to mitigate the impacts to heritage resources that may be uncovered during excavation activities.
6. Both the Noenieput and Swartkopdam cemeteries may not be impacted in any way by the proposed development.
7. Should any heritage resources or human remains be uncovered during construction activities, work must cease and the SAHRA APM Unit must be contacted regarding a way forward.



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1. INTRODUCTION

1.1 Background Information on Project

The Kalahari- East Users Association proposes the construction of a portable water supply pipeline (approximately 25km) in Noenieput, Northern Cape Province. The connection point will be at Noenieput where the water supply pipeline that is currently under construction terminates. The water will flow from the connection point at Noenieput to Swartkopdam. Connection points will be provided for small and commercial farmers along the pipeline route. The approximate usage per month is 0.9l/s at peak summer demand. The pipeline material is UPVC of various pipe classes and diameters. The pipeline shall be installed in a trench with at least 600mm cover above the pipe. At the two crossings of the Molopo River the pipe cover will be 1.2 meters. Noenieput is located approximately 160km northwest of Upington within the ZF Mgcawu District Municipality in the Northern Cape Province.

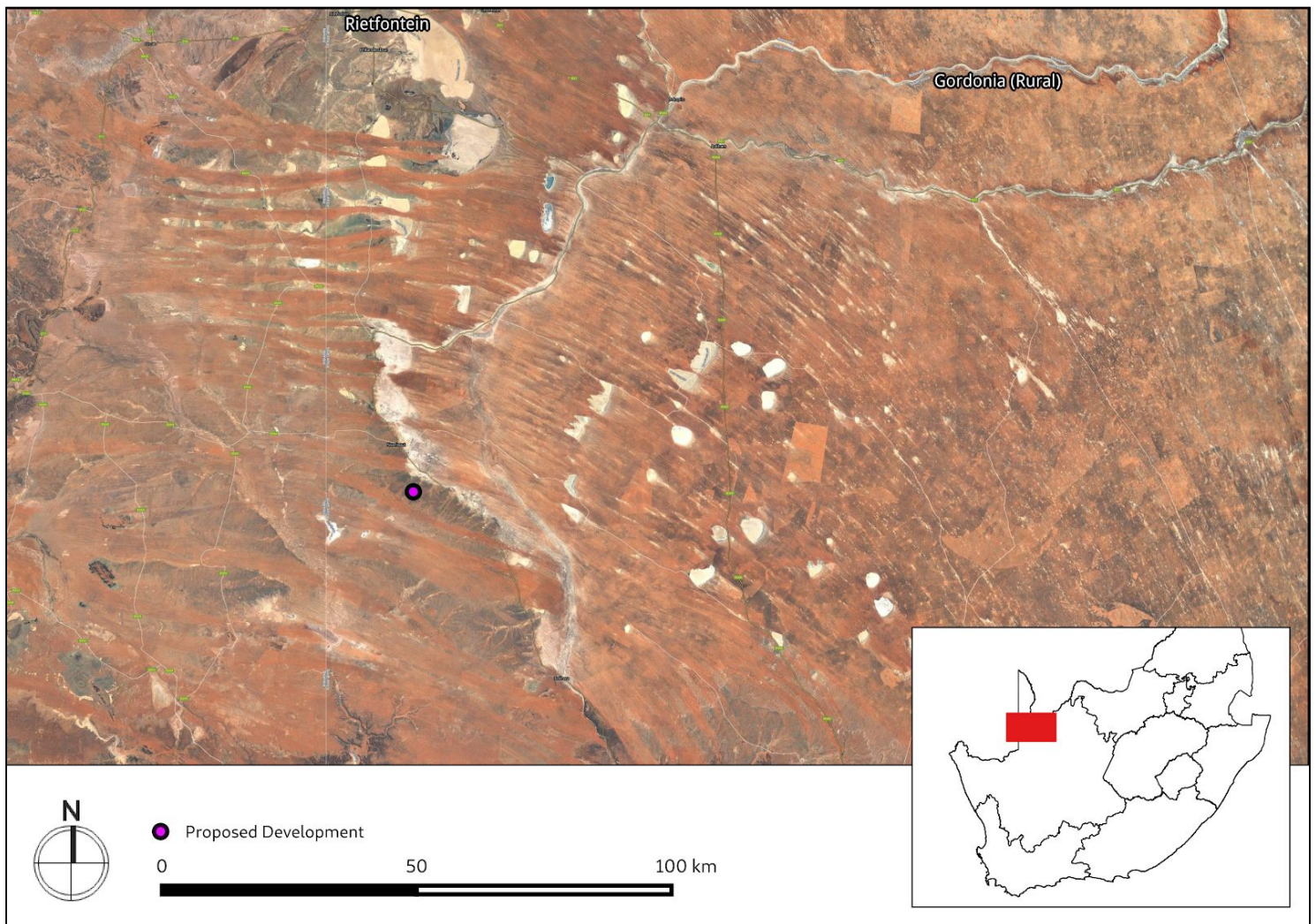


Figure 1.1: Google Earth© satellite image of the proposed development area



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1.2 Description of Property and Affected Environment

The landscape of the study area is typical Kalahari Karroid Shrubland belts alternating with belts of *Gordonia* Duneveld and interspersed with Southern Kalahari Salt Pans (Mucina & Rutherford 2006). There are calcrete and Dwyka Group tillites outcrops, with red-yellow apedal sand, fixed parallel dunes, and intermittent superficial deposits of gravels, clays, sandstone, silcrete, calcrete, shale, mudstones and quartzite. Various types of vegetation like Camel Thorn trees (*Acacia erioloba*), Black Thorn trees (*Acacia mellifera*), Three Thorn/Driedoring (*Rhigozum trichotomum*), Skaapbossie (*Aizoon schellenbergii*), Shepherd tree (*Boscia albitrunca*), Suurgras (*Enneapogon desvauxii*), Wild Basil (*Ocimum americanum*), Honey Locust (*Prosopis glandilosa*), Tall Bushman grass (*Stipagrostis hirtigluma*), Silky Bushman grass (*Stipagrostis uniplumis*), Kortbeen Boesmangras (*Stipagrostis obtuse*), Kalahari dune Bushman grass (*Stipagrostis amabilis*) is visible across the development footprint. Several dry river beds are present on the site flowing from north to south and from west to east.

The development footprint is bound in the north by Noenieput settlement, in the south by open field and the border fence between the farms Lemoenkolk No. 346, Witkop No. 350, and Abiquas Aar No. 352. Towards the west, the development footprint is bounded by a servitude road running from Noenieput to Swartkopdam settlement, and in the east, by the main secondary gravel road running from Noenieput towards Upington. Anthropogenic disturbances occur predominantly along existing servitude roads within the development footprint, especially along the Swartkopdam alignment.

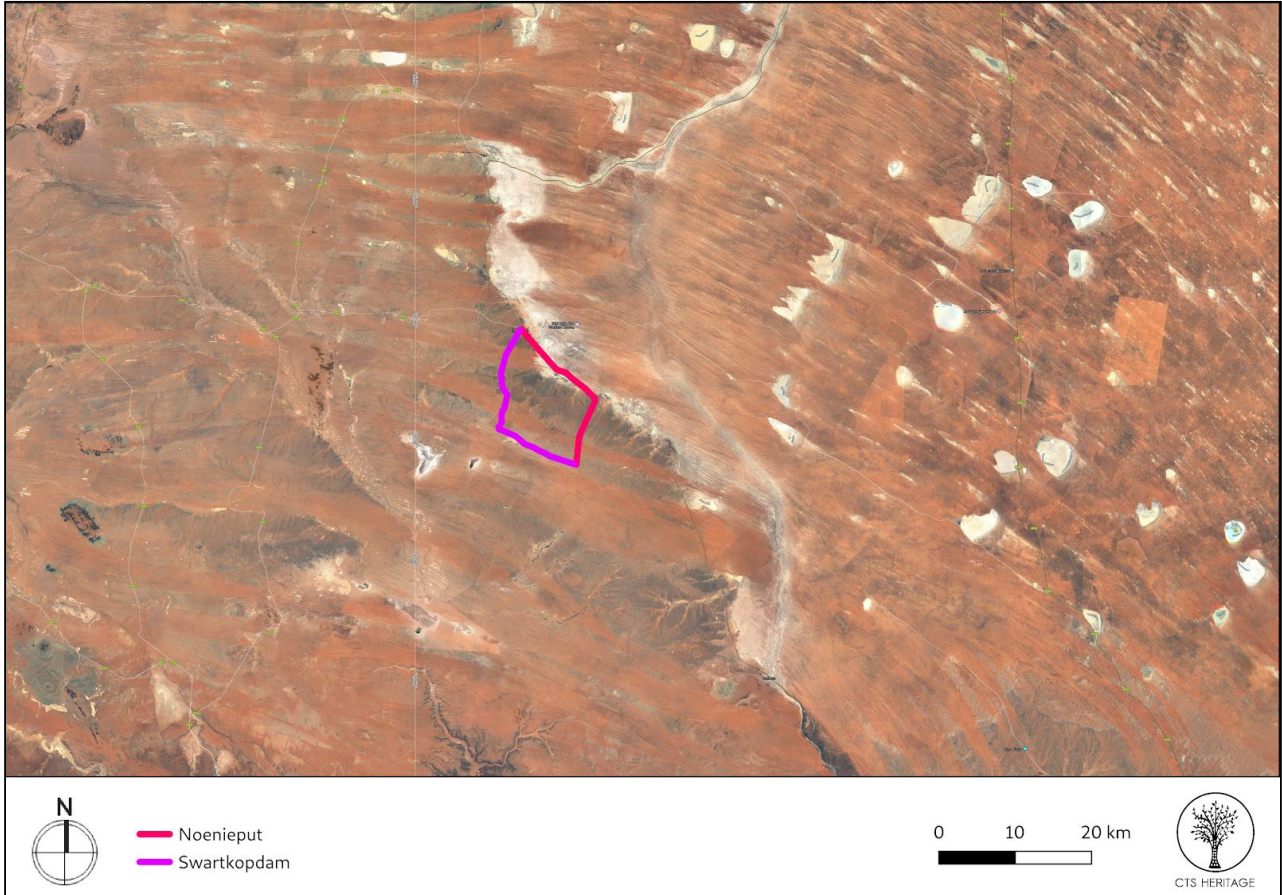


Figure 1.2: Close up satellite image indicating proposed location of development



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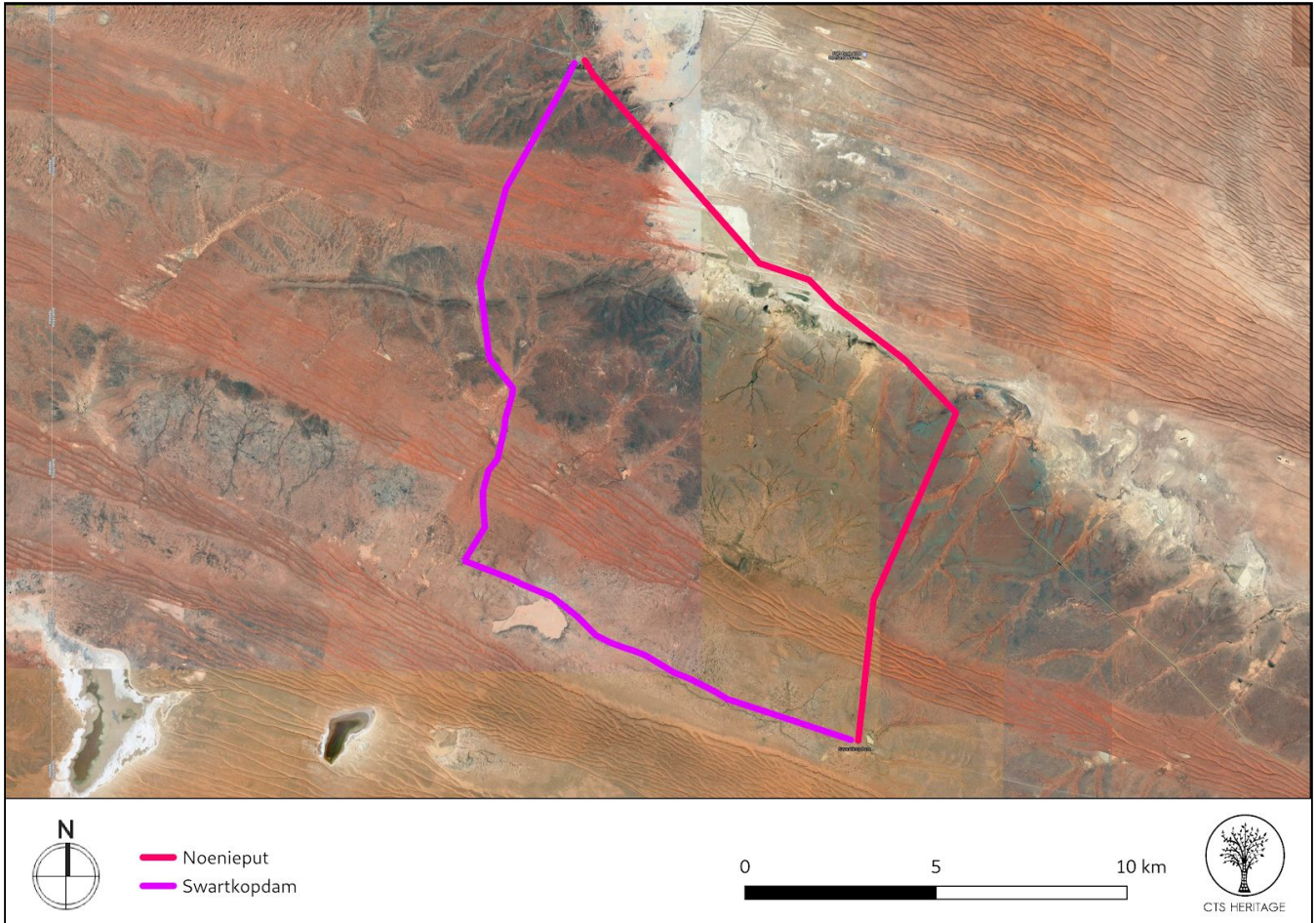


Figure 1.3: Close up satellite image indicating proposed location of development

2. METHODOLOGY

2.1 Purpose of HIA

The Desktop Heritage Screening Assessment for this proposed development (Appendix 3) identified the likelihood that this proposed development would negatively impact on significant heritage resources and recommended that an HIA be completed that assesses impacts to archaeological and palaeontological heritage. Furthermore the proposed development is undergoing an authorisation process in terms of NEMA and therefore triggers section 38(8) of the NHRA. This HIA is therefore completed to satisfy the requirements of section 38(3) of the NHRA.

2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs on 20 and 21 January 2020 to determine what archaeological resources are likely to be impacted by the proposed development.
- A Desktop Palaeontological Assessment was completed
- The identified resources were assessed to evaluate their heritage significance in terms of the grading system outlined in section 3 of the NHRA (Act 25 of 1999).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner.



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3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

According to Beaumont (2007), “Swartkopdam is a small Kalahari settlement comprising a few dozen families of which the menfolk are mainly employed on farms in this region. Homes, mainly galvanized iron, and each with its own nearby rubbish midden, were randomly scattered on communally - held (Congregational Church) land.” The Mier Municipality is named after the Mier settlement where the descendants of indigenous groups from de Tuin near Kenhardt who were denied land in Bushmanland by the government in mid19th century crossed the Orange River and settled others of the same remnant groups settled further north at Rehoboth in Namibia (Kaplan 2013).

According to SAHRIS, there are no known heritage resources within a 50km radius of the proposed development area (Map 3). However, according to Beaumont (2007); “The closest recorded archaeological occurrence (to Swartkopdam) is Eensaamheid Pan, some 40 km to the east, where what seems to be an ancient strand line terrace is covered by a fair density of Fauresmith or Late Acheulean material based on exotic rocks”. Additionally, according to Kaplan (2013), “During the 1980s archaeological surveys were done in the region of Rietfontein (Smith 1995). The survey revealed a number of surface sites, most of them on dune surfaces. A concentration was noted on a dune above the town 8 km on the northeast road. All the flattened hollows on this dune had cultural material. One square metre sample was collected. Pottery sherds were present; 24 quartz flakes, 10 quartzite, 5 silcrete and 11 shale; cores 3 miscellaneous segments and chunks; and 1 lithic manuport. Around the dry pans in the area similar stone assemblages were located.” In his assessment of the area, Beaumont (2007) identified occasional stone artefacts and certainly no sites, fossil bones or graves. However, on the rubble-strewn flats flanking the road to the settlement, and, to a lesser extent, at its upper end, near the school, a modest number of associated fresh-weathered artefacts occur. The fresh fraction included a blade and a small 5 cm - long handaxe, both of quartzite, and best ascribed to the Fauresmith, but the older material, with prepared cores, is probably Middle Acheulean. Based on the information available for the proposed development area, it is therefore likely that the proposed pipeline development will negatively impact on significant archaeological resources.

Beaumont (2007) describes the superficial geology of the area as “Surface silts overlies Karoo shale in the inspected swale area, whereas subangular - subrounded exotic (often quartzite) clasts were seen to cover the abutting plains to the east. These could be Dwyka tillite vestiges and, if so, a nearby (but not visited) low outcrop of black rock, perhaps the source of the settlement name (Swartkopdam), may show smoothing or plucking as a result of ice action at that time, about 300 million years ago.” According to the SAHRIS Palaeosensitivity map (Figure 4), most of the area proposed for development is underlain by sediments of moderate palaeontological sensitivity. These sediments are primarily sands of the Gordonia Formation. Additionally, according to the SAHRIS Palaeosensitivity map, the eastern extent of the proposed Swartkopdam alignment is likely to impact sediments of high palaeontological sensitivity of the Mokalanen Formation. Both the Gordonia Formation and the Mokalanen Formations form part of the Kalahari Group of sediments which are known to preserve palynomorphs, root casts (rhizomorphs) and burrows (eg termitaria), rare vertebrate remains (mammals, fish, ostrich egg shell *etc*), diatom-rich limestones, freshwater stromatolites, freshwater and terrestrial shells (gastropods, bivalves), ostracods and charophytes. As such, the proposed pipelines may negatively impact on significant palaeontological heritage.



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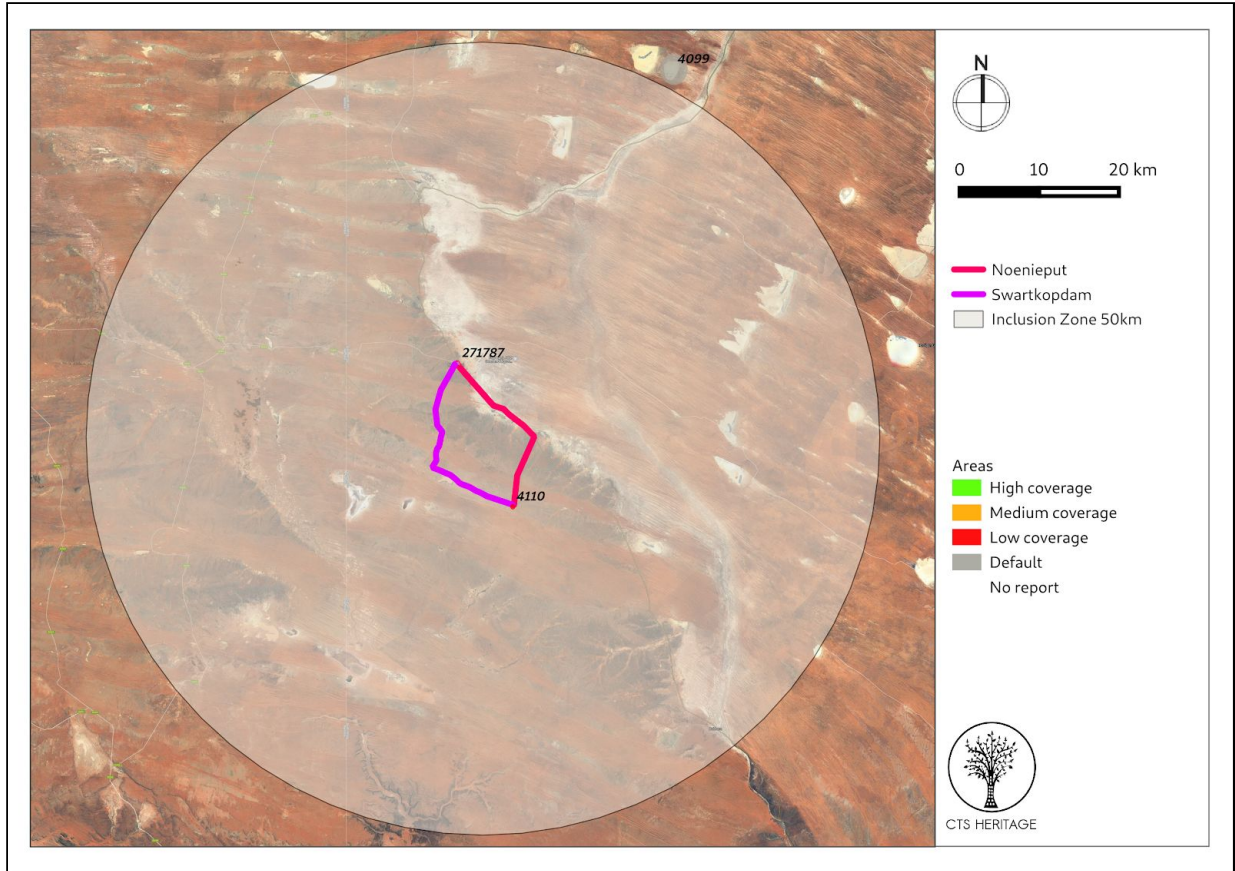


Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

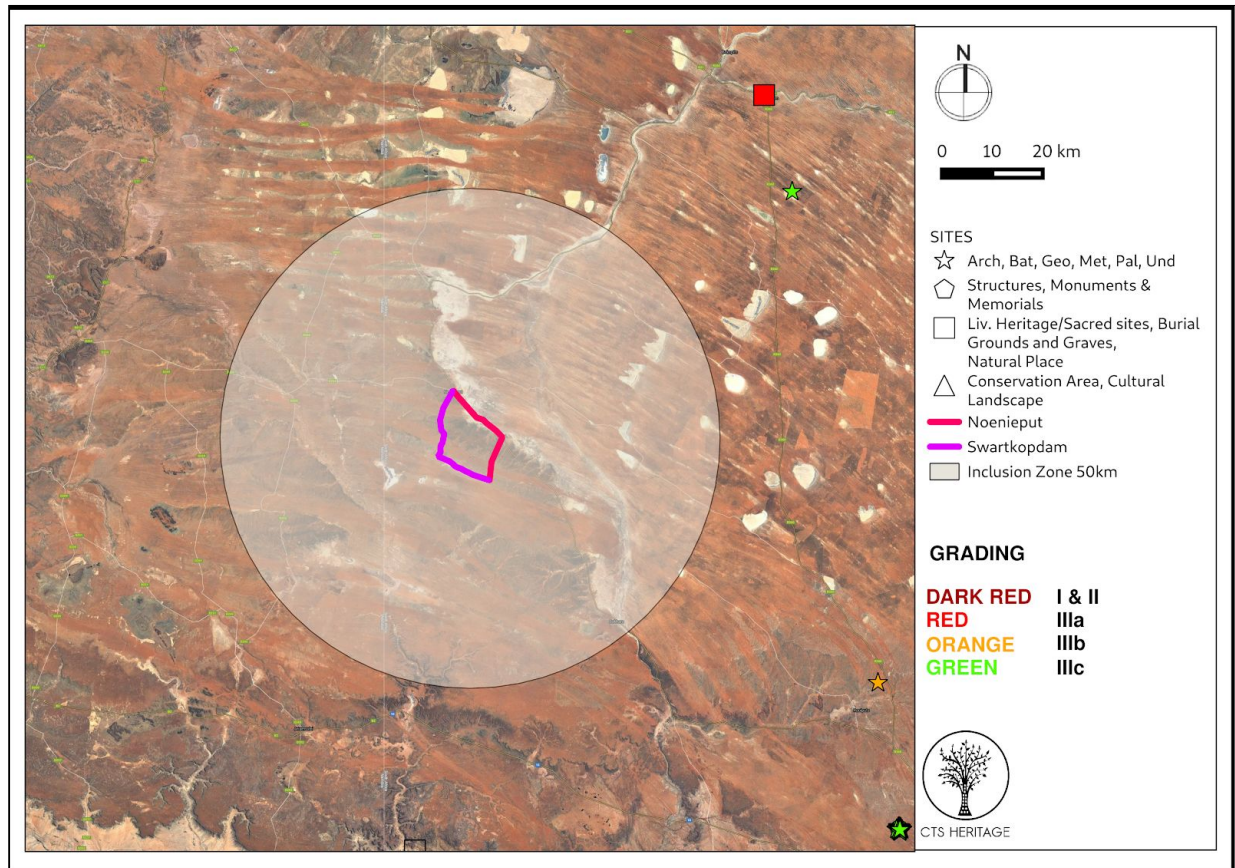


Figure 3.1. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated (see attached screening assessment for insets)



4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of specialist findings

Archaeology

Stone Age artefacts are quite densely scattered throughout the landscape. Sporadic scatters of LSA material are located along servitude roads, along the route of the proposed pipeline development, but it is out of context and primarily scattered on previously disturbed areas disturbed by previous road construction. Material resembling Stone Age artefacts are also present but might be the product of construction machinery during road construction. Undisturbed dunes are very sensitive in terms of Stone Age sites and should be avoided at all costs. The dunes along and beside the servitude road located on private land are also very sensitive in terms of Stone Age material and should be avoided.

Sites located at Waypoint 008 and 009 (ABQ006) is a typical Later Stone Age type site where major knapping activities are evident. Local thin-walled, low fired and undecorated local ceramics are also present on these sites possibly indicating a longer time of settlement and possible Khoi influence. The entire site consists of approximately 1,5 to 2 ha and is located within the route of the proposed pipeline development. Ostrich Egg Shell fragments are scattered throughout the site and it is evident that this site was a prominent workshop/ knapping or hxaro site as Noenieput and surrounding areas are historically known for its Khoi-San origins..

Artefacts from the Colonial period were located at one location at Waypoint 006 (ABQ003). Artefacts vary from glass, European industrial ware ceramics and soldered tins. Noenieput also has extensive colonial history in terms of agriculture, the school and hostel located in Noenieput which served the surrounding European people from the region as well as from Namibia when it was known as South West Africa (SWA) and was still part of the RSA. According to oral history, the settlement developed around a water well located beside a large !Nxuni Tree (Swarthaak) as water was the main reason to sustain life and agriculture during historical times. The word !Nxuni has Khoi origins.

No graves were recorded within the proposed development footprints, but there are cemeteries situated outside the settlements at Swartkopdam and Noenieput. The Noenieput cemetery (015) is located less than 300m west of the Swartkopdam alignment towards the southwest of the Noenieput settlement, and the Swartkopdam cemetery is located less than 100m west of the Noenieput alignment, north of the Swartkopdam settlement. Their proximity to the proposed pipeline routes should be noted.

Palaeontology

Although mainly traversing the Kalahari Group which has a sparse fossil record, the Swartkopdam pipeline is planned to cross a significant amount of Nama Group outcrop (Cambrian period Nababis Formation). Outcrops of this group are rare and poorly understood. There is a high probability of this outcrop yielding trace fossils (See table 1 for summary of area).



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The Noenieput pipeline is planned to only traverse the Kalahari Group, Jurassic period intrusive Dykes and Dwyka Group outcrop. The latter seems to be exposed in association with the Jurassic igneous dolerites and there is therefore a high chance of localised but extensive metamorphosis of the primary sedimentary structures, including any preserved ichnological record. Both the Dwyka and Kalahari Groups have a sparse and low diversity fossil record. In the southern part, the East pipeline also passes close to Nababis exposures.

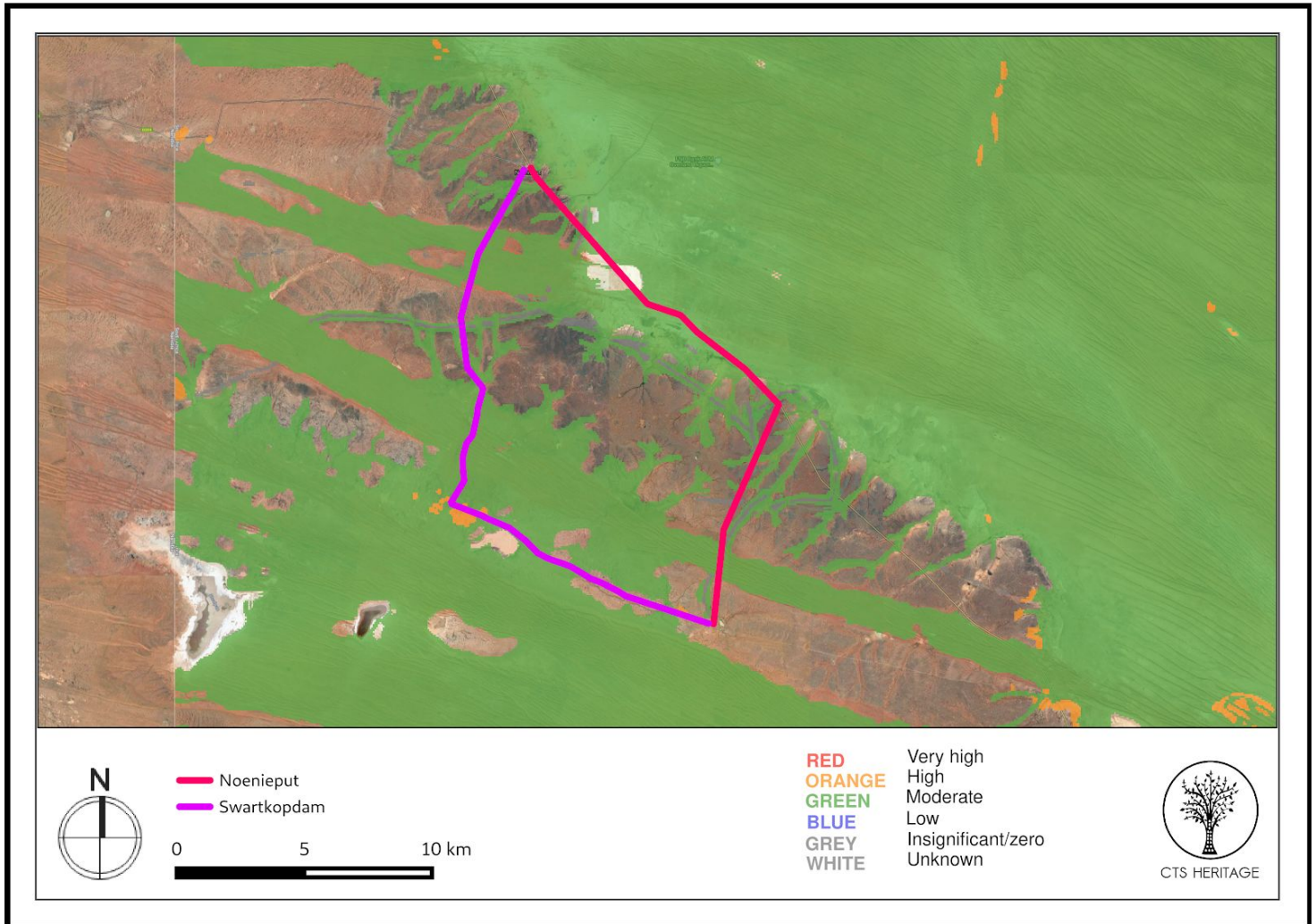


Figure 4: Palaeosensitivity Map. Indicating Unknown to Moderate to High fossil sensitivity underlying the study area.



4.2 Heritage Resources identified

Archaeology

Table 1: Archaeological and heritage resources identified along each alignment (Swartkopdam - Purple, Noenieput - Pink). Please see the full AIA in Appendix 1 for more detailed information. Sites mapped in Figure 3.2 below

Point ID	Site No.	Site Name	Description	Grading	Mitigation
002	WTK001	Witkop No. 350/3-001	Surface scatter (n=8 /100 m ²) of chunks, chips, flakes and small cores made of quartzite, dolerite and BIF. Possible micro knapping site with knapping debris.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
003	WTK002	Witkop No. 350/3-002	Possible knapping site surface scatter (n=10/1 m ²) with chunks, flakes, chips, upper grinders, small cores, and knapping debris. Raw materials include quartzite, dolerite, hornfels, basalt, chert and CCS.	IIIB	The site should be included in the heritage register and may be mitigated (high/ medium significance). <i>A 50m no-go buffer must be implemented around this site</i>
004	ABQ001	Abiquas Aar No. 352/0-001	Possible LSA knapping site surface scatter (n=10/20 m ²) with chunks, chips, cores, upper grinder and flakes made from quartzite, hornfels, dolomite, dolerite, and CCS.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
005	ABQ002	Abiquas Aar No. 352/0-002	Possible LSA knapping site/workshop/temporary settlement site. Surface scatter (n=20/10 m ²) with chunks, scrapers, flakes, chips, cores, points and OES fragments. Raw materials include quartzite, dolerite, hornfels and CCS.	IIIB	The site should be included in the heritage register and may be mitigated (high/ medium significance). <i>A 50m no-go buffer must be implemented around this site</i>
006	ABQ003	Abiquas Aar No. 352/0-003	Surface scatter of colonial period debris. Vent-hole (1900-1980) and machine-soldered side seam (>1880) cans, historic glass (diagnostic black glass fragments 1840-1880; cobalt blue glass fragments 1840-1930), and European ceramics.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
007	ABQ004	Abiquas Aar No. 352/0-004	Low-density surface scatter (n=5/100 m ²) with quartzite, dolerite, hornfels flakes and chunks.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
008/009	ABQ006	Abiquas Aar No. 352/1-006	High-density surface scatter (n=50-100/10 m², some places n=250-500/10 m²) consisting of flakes, chunks, points, cores, blades, chips, OES fragments, local low-fired ceramics, upper and lower grinders. Raw	IIIA	The site should be included in the heritage register and not be mitigated (high significance)



			materials include quartzite, BIF, dolomite, dolerite, basalt, chert, hornfels, CCS. Possible LSA knapping/temporary settlement or Hxaro site.		
010	WTK004	Witkop No. 350/4-004	Isolated occurrence of stone tool (n=1/100 m ²). Hornfels blade, or retouched flake.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
013	WTK003	Witkop No. 350/5-003	Possible LSA knapping site with surface scatter (n=10/20 m ²) of chunks, cores, chips, flakes, a scraper, and upper and lower grinder. Raw materials include quartzite, dolerite and CCS.	IIIB	The site should be included in the heritage register and may be mitigated (high/ medium significance). <i>A 50m no-go buffer must be implemented around this site</i>
014	ABQ005	Abiquas Aar No. 352/0-005	Low-density surface scatter (n=6/50 m ²) with cores, chips, chunks, flakes of quartzite and dolerite.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
016	ABQ007	Abiquas Aar No. 352/1-007	Low-density surface scatter (n=6/100 m ²) with flakes, chips, and scraper. Raw materials include hornfels, basalt, CCS, quartzite and dolerite.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
017	ABQ008	Abiquas Aar No. 352/1-008	Low-density surface scatter (n=8/100 m ²) with retouched flakes and scraper. Raw materials include quartzite, CCS, and dolerite.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
018	ABQ009	Abiquas Aar No. 352/1-009	Low-density surface scatter (n=5/100 m ²) with retouched flakes and scraper. Raw materials include quartzite and dolerite.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
019	ABQ010	Abiquas Aar No. 352/1-010	Low-density surface scatter (n=4/100 m ²) with flakes and chunks of quartzite, hornfels, chert, and CCS.	IIIC	Phase 1 is seen as sufficient recording, and it may be demolished (low significance)
020	ABQ011	Abiquas Aar No. 352/1-011	Outcrop of dolomite with graffiti and percussion marks. Could be rock gongs.	IIIA	The site should be included in the heritage register and not be mitigated (high significance)



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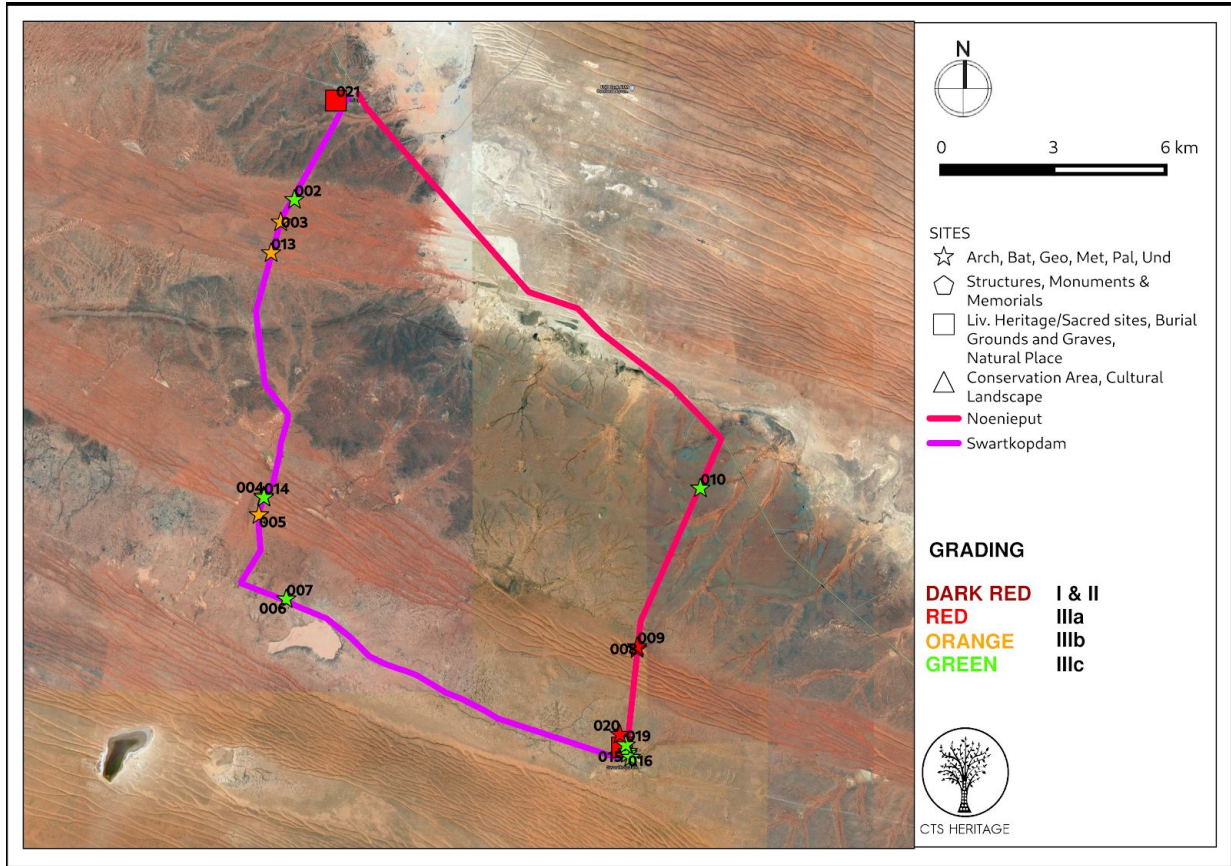


Figure 5.1. Heritage Resources Map. Heritage Resources identified during the field assessment

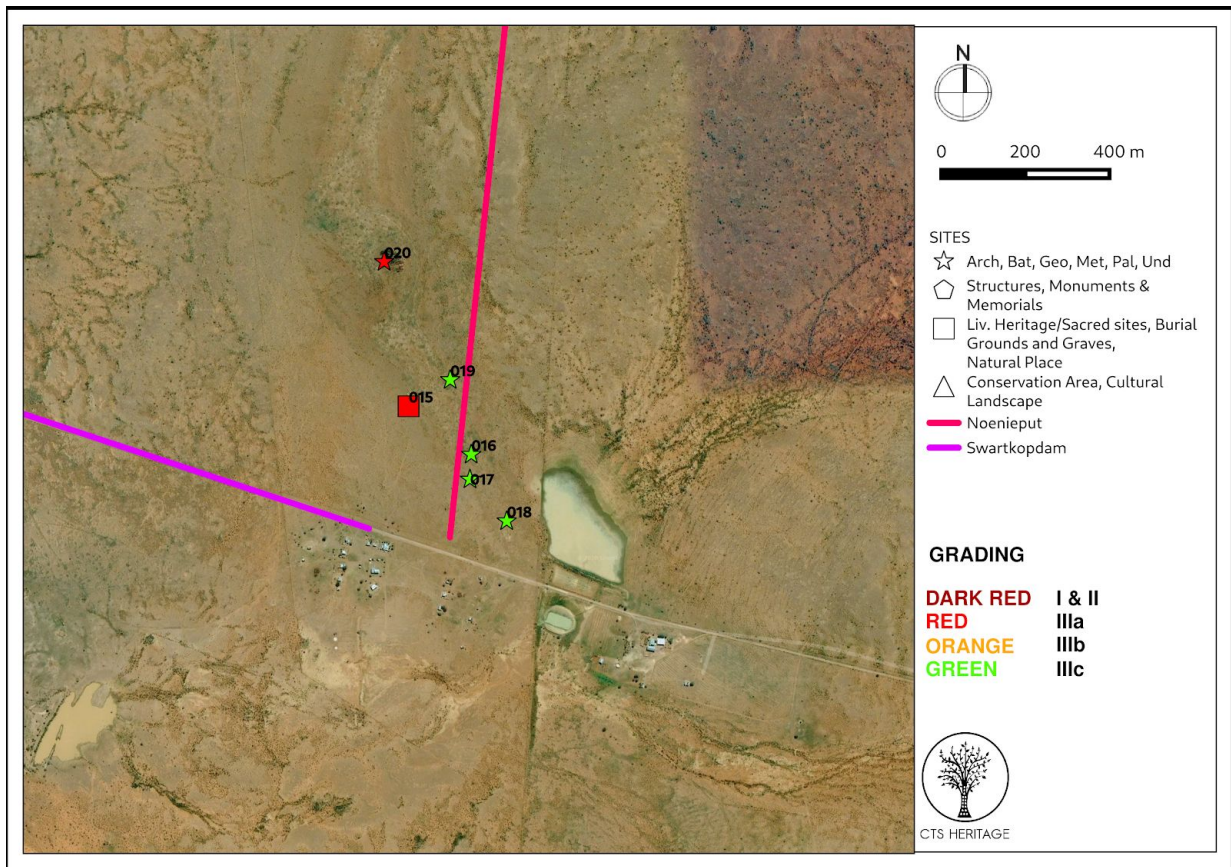
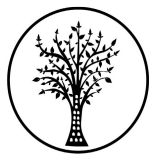


Figure 5.2. Heritage Resources Map. Heritage Resources identified during the field assessment



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Figure 6.1: Noenieput Cemetery



Figure 6.2: Swartkopdam Cemetery



Figure 6.3: Site ABQ011 - Dolomite outcrops with graffiti and percussion marks

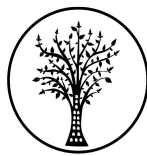


Figure 6.4: Sample of artefacts identified (see attached archaeology report for more information)

Palaeontology

Table 2: Geology and fossil heritage of the Noeniput pipeline area, Northern Cape. Palaeontological sensitivity (Almond and Pether (2008) indicated by colour: Red - Very High, Orange - High, Green - Moderate, Blue - Low, Grey - Insignificant, Clear - Unknown)

Geological Unit	Age	Lithology	Symbol Fig. 5	Fossil Heritage	Mitigation
Kalahari Group	66mya to 0mya	Fluvial gravels, sands, lacustrine and pan	Q9, Qr, T-Qm	Calcretised insect burrows (including termites) and root casts (rhizoliths), ostrich egg shells (Struthio), shells of land snails (e.g. Trigonephrus), bivalves and gastropods (e.g. Corbula, Unio) and snails, ostracods (seed shrimps), charophytes (stonewort algae), diatoms, stromatolites, Mammalian ichnofossils	No action required (any fossil finds to be reported by developer)
Gordonia Formation	2,6mya to 0mya	Mudrocks, diatomites and diatomaceous			
Mokalanen Formation	5,3mya to 0mya	Limestones, evaporites, consolidated to unconsolidated aeolian sands, pedocretes (especially calcrete)			
Jurassic dolerite	200mya	Intrusive dolerite	Jd	None	No action
Dwyka Group	320mya to 290mya	Tillite, sandstone, mudstone, shale	C-Pd	Glossopteris, marine Invertebrates, fish, arthropods and fish trace fossils	No action required (any fossil finds to be reported by developer)
Nama Group, Fish River Subgroup, Nababis Formation	541mya to 485,4mya	Braided river and shallow marine, cross-bedded sandstones with minor shale intercalations; Cross-bedded fine- to medium-grained sandstones; alternation of shales and fine-Grained sandstones	Nn	Trace fossils including <i>Skolithos</i> -type vertical tubes, <i>Trichophycus tripleurum</i> and <i>Helminthodichnites</i> .	Field scoping study recommended before excavation takes place

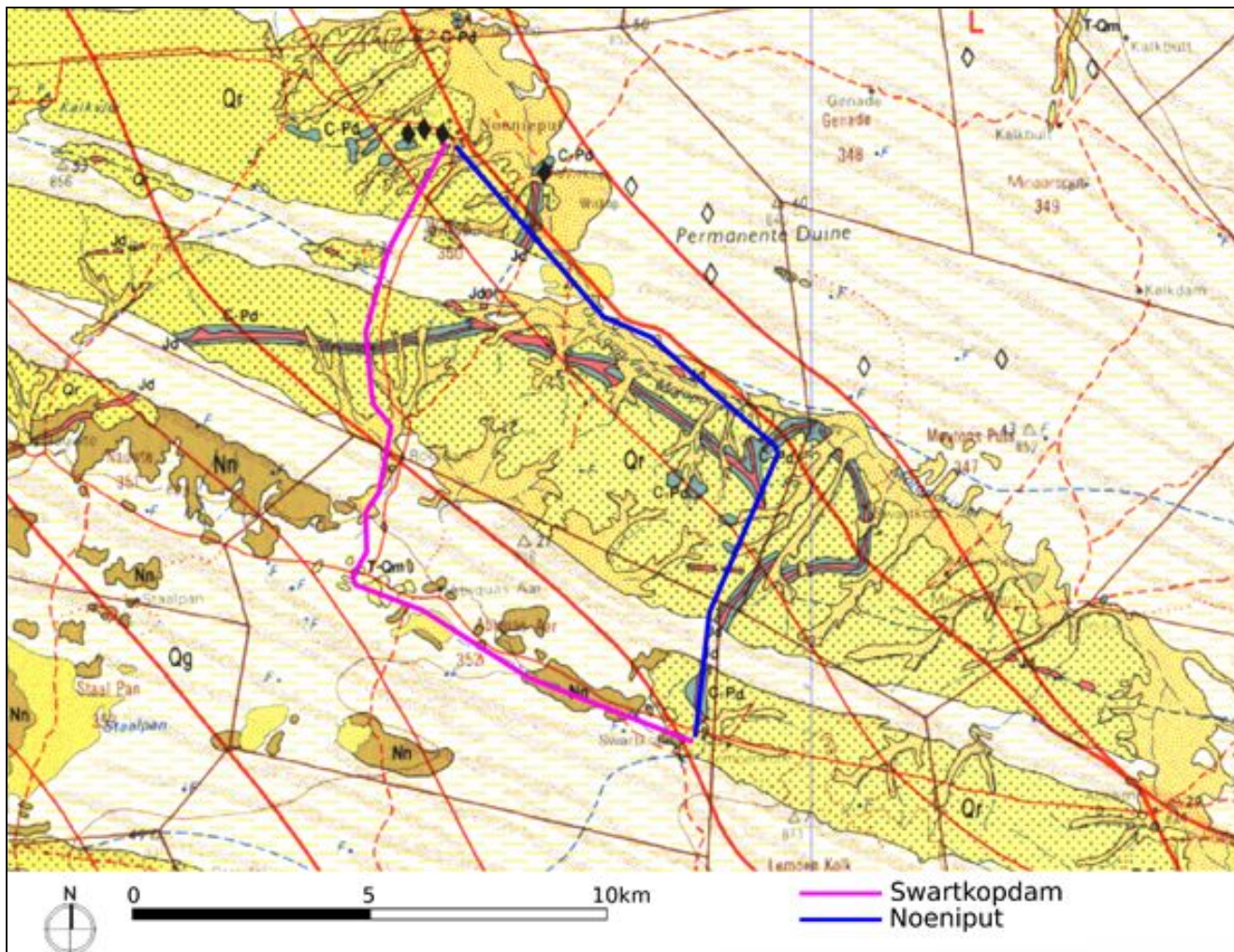


Figure 7: Geology Map. Indicating the underlying geology across the study area by overlaying the geology maps from the CGS series 2720 Noenieput.

4.3 Selected photographic record

See attached Specialist Archaeology Assessment for additional photographs



Figure 8.1: Contextual Images: View over proposed pipeline route



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Figure 8.2: Contextual Images: View over proposed pipeline route



Figure 8.3: Contextual Images: View over proposed pipeline route



Figure 8.4: Contextual Images: View over proposed pipeline route



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Figure 8.5: Contextual Images: View over proposed pipeline route



Figure 8.6: Contextual Images: View over proposed pipeline route



Figure 8.7: Contextual Images: View over proposed pipeline route



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Figure 8.8: Contextual Images: View over proposed pipeline route



Figure 8.9: Contextual Images: View over proposed pipeline route



Figure 8.10: Contextual Images: View over proposed pipeline route



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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

Archaeology

The proposed development will have a negative impact on the heritage resources situated on the two different route alternatives proposed for the water supply pipeline project. Sites along the Swartkopdam alignment marked as IIIB can and should be mitigated before they can be destroyed, while those graded as IIIC have been sufficiently recorded through the Phase 1 field survey. The cemeteries and sites classified as IIIA must be avoided.

Palaeontology

Based on the geology of the proposed development area as well as the current palaeontological record, it is anticipated that the impact of the development will HIGH for the Swartkopdam line (with chances of poorly known Cambrian trace fossils in the Nababis Formation) and LOW to MODERATE for the Noenieput line (with a low chance of fossil remains in the Dwyka Tillites and a high chance of these being metamorphosed).

5.2 Sustainable Social and Economic Benefit

Swartkopdam depends solely on groundwater supply from boreholes in the vicinity and water carted with tanker trucks by the municipality to the village. The village is also surrounded by commercial and small farmers which face the same challenge in terms of sustainable water availability for farming purposes. Therefore the proposed project will contribute to basic service delivery of potable water from Noenieput to Swartkopdam. This proposed project is anticipated to create approximately 20 employment opportunities during the construction and operational phases of the development.

5.3 Proposed development alternatives

The project proposes two alternative pipelines to run water from Noenieput to Swartkop Dam. The Noenieput (east) line is approximately 23km long and follows a main road for its northern section while the Swartkopdam (west) line is approximately 26km long and follows service roads for its entire length.

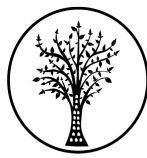
- ***Swartkopdam (west) alignment: Preferred***

This alignment is preferred in terms of other environmental indicators and is preferred in terms of impacts to archaeological heritage resources as the archaeological resources identified along this alignment are of moderate and low local significance (Grade IIIB and IIIC), and impacts to these resources can be mitigated.

However, this alignment has very HIGH sensitivity in terms of impacts to significant palaeontological heritage with chances of poorly known Cambrian trace fossils in the Nababis Formation and such, is not preferred in terms of impacts to palaeontology.

- ***Noenieput (east) alignment: Alternative***

This alternative alignment is not preferred in terms of impacts to archaeological heritage. The field assessment identified a number of significant archaeological resources of high local significance (Grade IIIA) within this alignment which must not be impacted by the proposed development.



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However, this alignment has LOW to MODERATE sensitivity for impacts to palaeontological heritage with a low chance of fossil remains in the Dwyka Tillites and a high chance of these being metamorphosed.

On the balance of impacts to significant heritage resources, the Swartkopdam alignment is preferred as this avoids the significant Grade IIIA sites identified in the field assessment. However, the likelihood of impacting Grade IIIB and Grade IIIC sites along this alignment is high. Furthermore, this alignment is very sensitive for impacts to significant palaeontological heritage.

6. RESULTS OF PUBLIC CONSULTATION

As this HIA forms part of a section 38(8) process, the public consultation process for this project will be undertaken by the EAP.

7. CONCLUSION AND RECOMMENDATIONS

The area proposed for the development of the Noenieput Pipelines along both proposed alignments is very sensitive for impacts to heritage resources. The archaeological field assessment identified a number of significant sites ranging in significance. In terms of impacts to archaeological heritage, the Swartkopdam route is preferred as this avoids impacts to the significant Grade IIIA sites identified.

Based on the geology and fossil record, there is very little chance of significant fossil finds being made in the loose Kalahari Group sediments. However, the Swartkopdam alignment has very HIGH sensitivity in terms of impacts to significant palaeontological heritage with chances of poorly known Cambrian trace fossils in the Nababis Formation. However, impacts to significant palaeontological heritage along the Swartkopdam alignment can be mitigated through a field assessment around the southern section of the line to search for trace fossils before excavation commences within possible Nababis Formation exposure. See Appendix 1 of the Desktop PIA for fossil examples.

As such, there is no objection to the proposed development on condition that:

8. The Swartkopdam alignment is preferred in terms of impacts to heritage resources
9. A palaeontological field assessment is required around the southern section of the line to search for trace fossils before excavation commences within possible Nababis Formation exposure. See Appendix 1 of the Desktop PIA for fossil examples.
10. The proposed Swartkopdam pipeline route alignment must be amended to adhere to a no-go buffer of 50m around the sites that have been graded as IIIB: WTK002 (003), WTK003 (013) and ABQ002 (005) - see Table 1 and Figure 5.1
11. All of the dunes within this area must be treated as highly sensitive for impacts to significant archaeological heritage and may not be impacted by the proposed development.
12. The construction of the proposed pipeline is monitored by a qualified specialist to mitigate the impacts to heritage resources that may be uncovered during excavation activities.



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13. Both the Noenieput and Swartkopdam cemeteries may not be impacted in any way by the proposed development.
14. Should any heritage resources or human remains be uncovered during construction activities, work must cease and the SAHRA APM Unit must be contacted regarding a way forward.



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8. REFERENCES

Impact Assessment References				
Nid	Report Type	Author/s	Date	Title
4110	HIA	Peter Beaumont	24/10/2007	Phase 1 Heritage Impact Assessment Report on a Proposed Waste Disposal Site at the Swartkopdam Settlement near Noenieput, North-West of Upington, in the Siyanda District Municipality of the Northern Cape Province
271787	HIA	Jonathan Kaplan	30/10/2013	Heritage Impact Assessment Report Proposed Low Income Housing Project Noenieput, Groot Mier Municipality, Northern Cape.



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APPENDICES

APPENDIX 1: Archaeology Impact Assessment



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APPENDIX 2: Desktop Palaeontological Assessment



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APPENDIX 3: Heritage Screening Assessment