

PHASE 1 PALAEOONTOLOGICAL AND HERITAGE IMPACT ASSESSMENT FOR BULK WATER RETICULATION IN WARRENTON, NORTHERN CAPE PROVINCE.



Report prepared for

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Specialist Info

Lloyd Rossouw previously led the Archaeology and Florisbad Quaternary Research Departments at the National Museum in Bloemfontein and has more than 30 years of fieldwork experience in South African archaeology and Quaternary palaeontology. He earned a BA degree in Archaeology, completed an Honours programme in Stone Age Archaeology at the University of Stellenbosch, and received training in osteology and Quaternary palaeontology for his MSc at the Bernard Price Institute of Palaeontology (Wits). He also undertook instruction in human anatomy at Duke University in Durham, North Carolina, USA. For his PhD at the University of the Free State, he developed a palaeobotanical method that uses plant silica remains to reconstruct past environmental conditions. His fieldwork includes participation in various excavations and surveys, such as historical built environments and farmsteads (including Keerweder, Zomerlust, Boekenhoutskloof, Bien Donne, Sterhuis, Fredericksberg, Aurora), rock art surveys (Ceres, Vanrhynsdorp, Clanwilliam, Piketberg), industrial projects (coastal section for Mossgas Pipeline Project, Molenaars River crossing for Du Toitskloof Pass Tunnel Project), Stone Age sites (Hoedjiespunt, Klasies River Mouth, Erfkroon, Damvlei, Thyspunt, Sunnyside, Baden Baden, Florisbad, Cornelia), and palaeontological localities (Langebaanweg, Zwartklip, Besaansklip, Boesmansfontein, Spitskop, Cango Valley, Braamhoek, Gladysvale, Taung). He has surveyed and mapped multiple open sites in the central interior region, including the northern Karoo, lower Orange, Vaal, Modder, Vet and Sand River basins as well as the central Makgadikgadi basin.

Declaration of Independence

Paleo Field Services remains financially independent, with no vested interest in project activities or outcomes except for professional fees. Its sole remuneration comes from agreed-upon services for each project. Paleo Field Services accepts client-provided information as accurate.

Yours truly,

A handwritten signature in blue ink, appearing to read "L Rossouw".

April 2026

SUMMARY

A Phase 1 Palaeontological and Heritage Impact Assessment (PIA/HIA) was undertaken for the proposed bulk water reticulation project in Warrenton, Northern Cape Province. The development includes a new wastewater treatment works (WWTW) and associated Pumping Main, Gravity Line, and Rising Main pipeline infrastructure intended to support essential municipal service delivery and water reuse for irrigation and community purposes. The study area is underlain predominantly by Ventersdorp Supergroup basalts and andesites, which are palaeontologically insignificant, and is locally mantled by late Quaternary aeolian sands (Kalahari Group) and Quaternary, river-terrace gravels along the Vaal River. Although such gravels elsewhere in the region are known to yield fossil remains at depth, no palaeontological resources or fossil-bearing horizons were identified during the field survey. Consequently, the overall palaeontological sensitivity of the development footprint is assessed as low, with a low residual risk limited to deeply buried and localized materials within terrace gravels. No pre-construction mitigation is required, provided a chance finds protocol for fossil finds is implemented during excavation into river gravel deposits. From an archaeological and heritage perspective, the project area lies within a landscape of long-term human occupation and extensive historic development but is largely transformed by agriculture, infrastructure, and urban expansion. The survey identified a single isolated Early Stone Age (ESA) large cutting tool within reworked river-terrace gravels, assessed as low to moderate significance due to its secondary context and lack of associated material. In this case, no pre-construction mitigation is required, provided a chance finds protocol for Stone Age artefacts is implemented during excavation activities. More sensitive heritage resources occur adjacent to parts of the Gravity Line alignment, including a Muslim cemetery protected under Section 36 of the NHRA, and a stretch of buildings along Van Wyk Street that may pre-date 1965 and thus fall under Section 34 protection. The key heritage constraint relates to the cemetery, for which a feasible alternative alignment is recommended to avoid direct and indirect impacts. With this (1) rerouting, (2) appropriate construction controls near potentially protected buildings, and (3) the implementation of archaeological chance-finds procedures, the residual heritage impacts are assessed as low. The study concludes that there are no palaeontological or archaeological grounds to prevent the proposed development, provided the recommended avoidance and mitigation measures are implemented.

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INTRODUCTION

A Phase 1 Palaeontological and Heritage Impact Assessment (PHIA/HIA) was undertaken for the proposed development comprising a new wastewater treatment works and associated Pumping Main, Gravity Line, and Rising Main pipeline footprints in Warrenton, Northern Cape Province (**Fig. 1**). The proposed project involves the construction of a new Wastewater Treatment Works (WWTW) to serve the town of Warrenton. Treated wastewater (effluent) generated by the facility will be primarily reused for irrigation purposes. The effluent will be applied for non-potable uses, including the irrigation of agricultural crops on adjacent farmland, as well as the maintenance of sports fields and landscaped public open spaces at local schools within the local community. The proposed development infrastructure comprises several discrete pipeline components, including the WWTW site, a pumped main conveying treated effluent to irrigation pivots and selected schools in Warrenton and Ikhutseng, a gravity pipeline, and two rising main sections (**Fig. 2**)

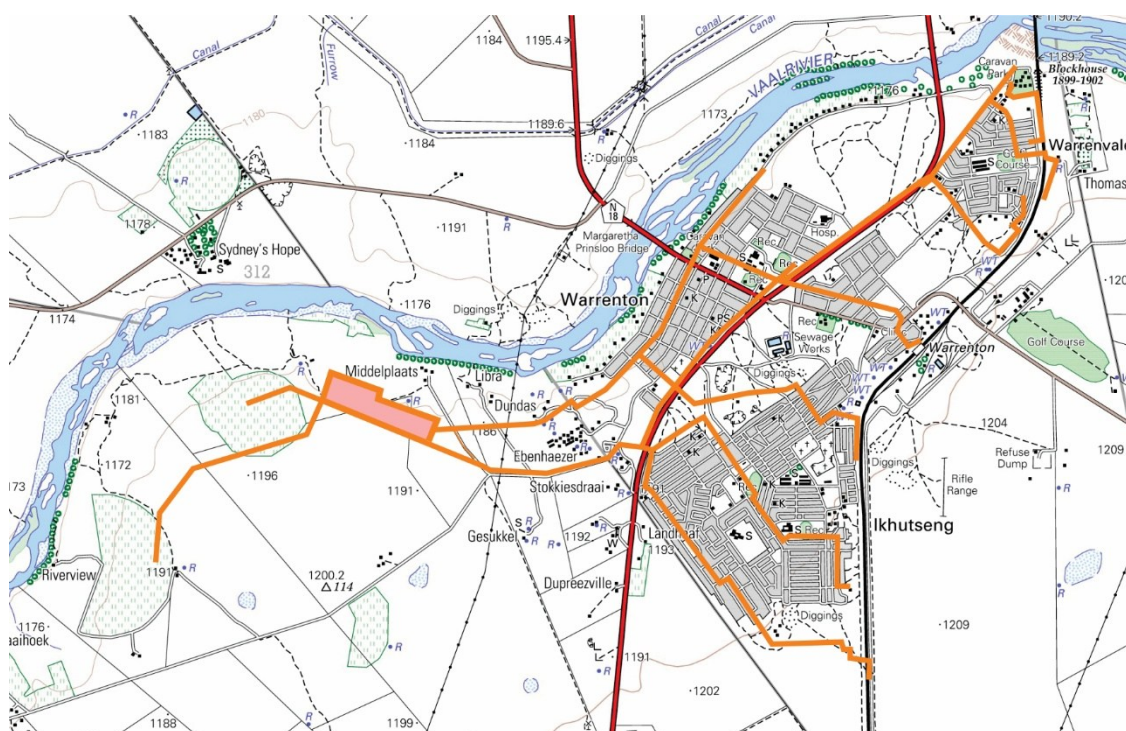


Figure 1. Development footprint marked by orange lines on portion of 1:50 000 scale topographic map 2824BB Warrenton.

Map Reference: 1:50 000 scale topographic map 2824BB Warrenton and 1:250 000 scale geological map 2824 Kimberley.

GPS midpoint Coordinates (Fig 2):

- 1) 28° 7'37.05"S 24°48'17.71"E
- 2) 28° 7'15.96"S 24°49'12.39"E
- 3) 28° 7'13.54"S 24°50'22.41"E
- 4) 28° 7'53.39"S 24°51'7.23"E
- 5) 28° 7'35.22"S 24°51'27.21"E
- 6) 28° 6'37.02"S 24°50'51.42"E
- 7) 28° 6'57.47"S 24°51'56.28"E
- 8) 28° 6'14.50"S 24°52'21.04"E

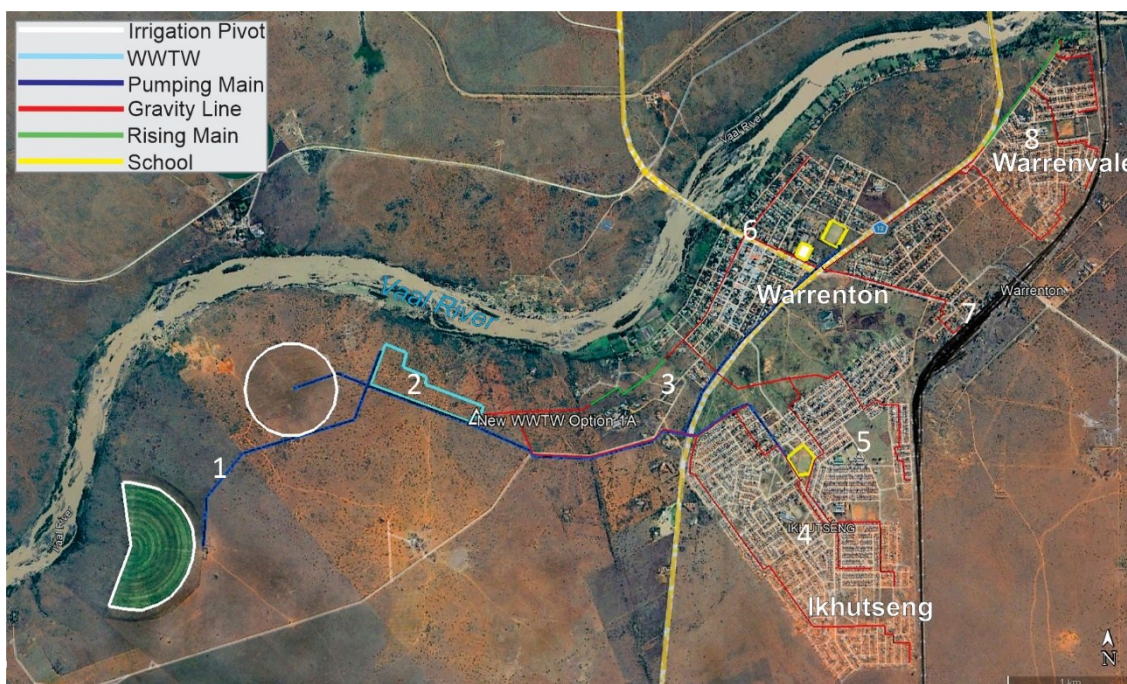


Figure 2. Aerial view of the proposed development footprint.

LEGAL FRAMEWORK

The assessment is required as a prerequisite for new development in terms of the National Heritage Resources Act (NHRA) 25 of 1999. The NHRA identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. The NHRA prescribes a system of grading of places/objects via Section 7 and makes provision for the general protection of heritage resources via Sections 34, 35, 36, and 37 (in respect of the built environment, archaeology/palaeontology, burial grounds/graves and monuments/memorials, respectively), while

Section 38 sets out guidelines under which heritage impact assessments are required when new developments may impact upon heritage resources.

Section 38(1) applies when a development triggers heritage assessment requirements but does not require an environmental authorisation from another regulatory authority, including:

1. Construction of a road, powerline or pipeline, canal or other similar form of linear development or barrier longer than 300m.
2. Construction of a bridge or similar structure exceeding 50 m.
3. Development exceeding 5,000 m².
4. Rezoning of land exceeding 10,000 m², or
5. Any development that may impact recognized heritage resources (e.g., archaeological sites, graves, buildings older than 60 years).

Section 38(3) of the NHRA sets the minimum information requirements for a Heritage Impact Assessment report: the responsible heritage resources authority must ensure that any report submitted includes, at least, the core elements listed in Section 38(3)(a)–(g), namely identification and mapping of heritage resources, significance assessment, impact assessment, evaluation against socio-economic benefits, consultation outcomes, consideration of alternatives (where impacts occur), and mitigation planning.

DISCLAIMER, ASSUMPTIONS AND LIMITATIONS

Information provided by the Client and/or Environmental Assessment Practitioner (EAP) was assumed to be accurate and complete for the purposes of this assessment. Observations presented in this report are based solely on aboveground visibility of features and outcrops as encountered during field survey. The reliability and completeness of these observations are subject to several inherent limitations:

- Fossiliferous outcrops are often limited to exposed lithologies and may be obscured by colluvium, vegetation, or soil mantling; the degree of weathering affects the preservation and visibility of fossil material, with heavily weathered surfaces

potentially masking fossil content or fragmenting specimens; stratigraphic context is inferred from visible lithologies only; subsurface fossil-bearing horizons may remain undetected without trenching or coring; access limitations may restrict inspection of key geological exposures, particularly in rugged terrain or areas with restricted land access.

- The surface visibility of archaeological remains is variable and may be significantly reduced by vegetation cover, soil accumulation, or recent land disturbance (e.g., ploughing, erosion, construction); subsurface archaeological remains (e.g., buried structures, features, or artefact scatters) may not be detectable without excavation or remote sensing; weathering and exposure can obscure diagnostic features such as stone alignments, midden deposits, or low-relief structures, especially in areas with high sedimentation or seasonal vegetation growth; accessibility constraints (e.g., fenced properties, steep terrain, or dense bush).

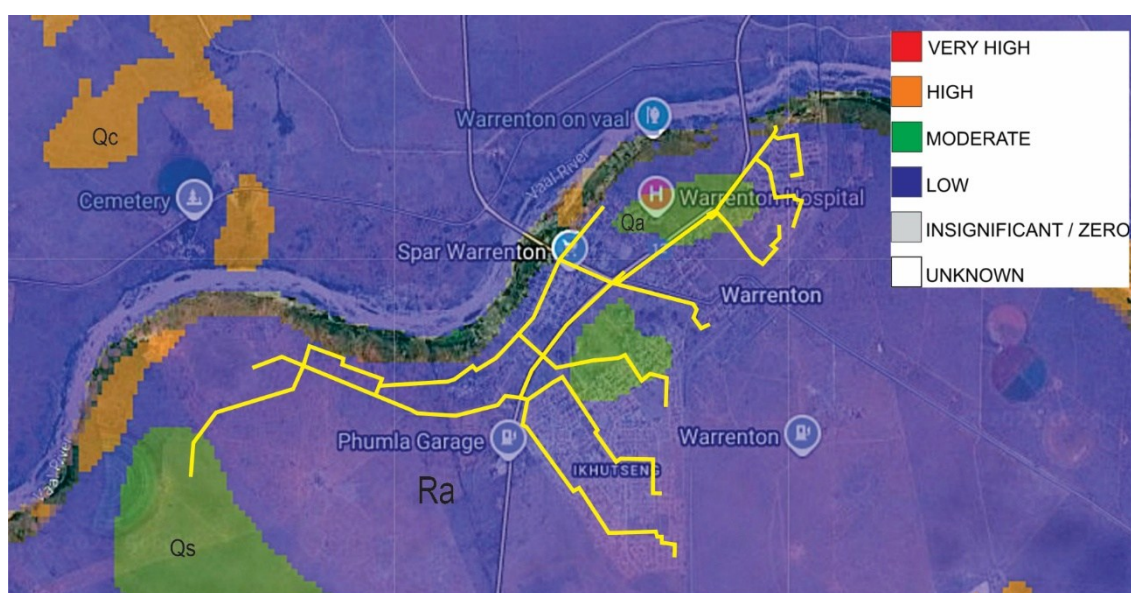


Figure 3. Footprint marked by yellow lines on portion of SAHRIS palaeosensitivity map.

METHODOLOGY

The site assessment was carried out in line with the the 2007 SAHRA Minimum Standards for Archaeological and Palaeontological Impact Assessments. Initial site ratings were based on existing field data, relevant databases, and published literature. Topographic, aerial and

geological maps were used for illustrative purposes and to identify potential fossil-bearing formations. Fieldwork involved direct observation through foot surveys, with vehicle access where possible. A Garmin eTrex Vista handheld GPS, configured to the WGS 84 geodetic datum, was used to spatially locate, record, and track the alignment of the proposed electrical grid infrastructure. Grid coordinates and observations were captured through a ground-based field survey, enabling accurate georeferencing of the powerline route and associated connection points. A digital camera was used to record spatial and visual data throughout the survey. GPS coordinates are presented in *Degrees, Minutes, Seconds* format in the report.

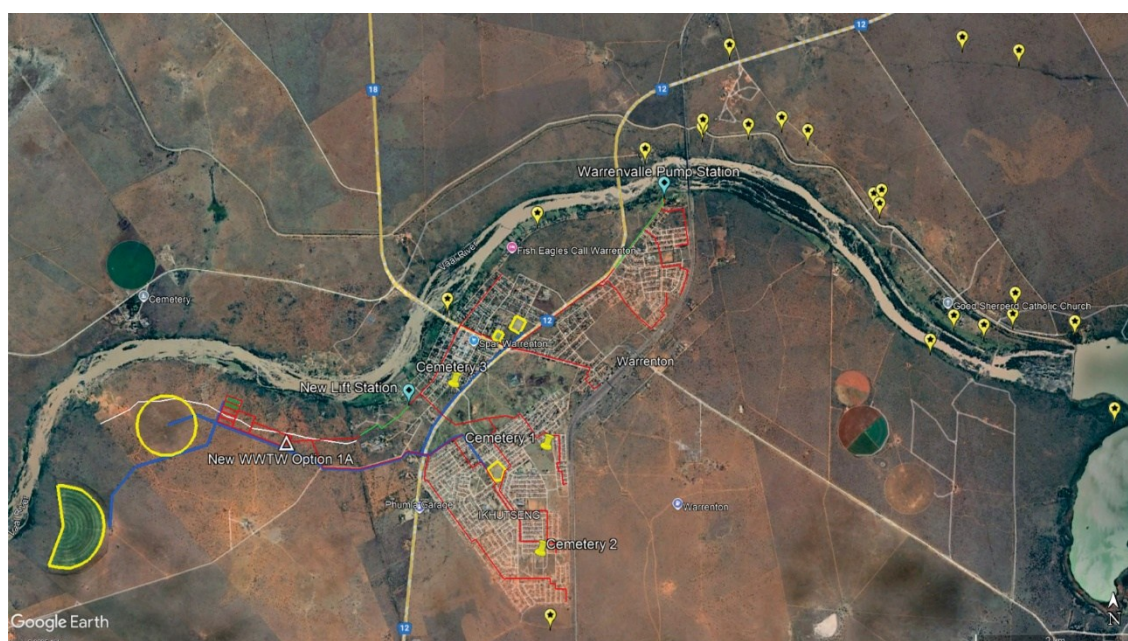


Figure 4. Previously recorded heritage sites / features (yellow star icons) located with a 5 km radius of the proposed development footprint.

TERMS OF REFERENCE

The Terms of Reference outlines the scope and objectives for assessing potential impacts on heritage resources—both tangible and intangible—arising from the proposed development, in accordance with relevant legislative standards.

1. Conduct a site investigation for a Palaeontological Impact Assessment (PIA) using the SAHRIS PalaeoSensitivity Map (**Fig. 3**), regardless of the sensitivity indicated on the *DESTEA National Web Based Environmental Screening Tool*. Identify and map fossils or exposures in the area and assess their significance. This is required as the

Department of Environmental Affairs does not guarantee the accuracy or completeness of the *palaeontology theme layer*.

2. Conduct site investigation for a Heritage *Impact Assessment (HIA)* to identify and map heritage sites and occurrences in the affected area(s) and provide an assessment of their significance (**Fig. 4**). This must be done regardless of the sensitivity indicated on the *DESTEA National Web Based Environmental Screening Tool*, as the Department of Environmental Affairs and its entities make no warranty—express or implied—regarding the accuracy, reliability, usefulness, or completeness of the *archaeological and cultural heritage theme layer*.
3. Assess impacts of the proposed development on heritage resources relative to the sustainable social and economic benefits to be derived from the development *if planned impacts will result in the loss of any resources*.
4. Provide a system of grading of places and objects which form part of the national estate, and which distinguishes between at least the categories as prescribed under Section 7 of the NHRA (**Table 1**).

Table 1. Description of Field Rating categories as prescribed in Section 7(1) of the NHRA where SAHRA must by regulation establish a system of grading of places and objects which form part of the national estate, and which distinguishes between at least the categories— (a) Grade 1: Heritage resources with qualities so exceptional that they are of special national significance; (b) Grade 2: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; (c) Grade 3: Heritage resources which can be considered to have special qualities which make them locally significant; and Generally Protected: Other heritage resources which may require mitigation before destruction.

Field Rating	Grade (NHRA No. 25 of 1999, Section 7)	Significance	Mitigation
National Significance (NS)	Grade 1	-	Conservation: national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation: provincial site nomination

Local Significance (LS)	Grade 3A	High significance	Conservation: mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A	-	High/medium significance	Mitigation before destruction
Generally Protected B	-	Medium significance	Recording before destruction
Generally Protected C	-	Low significance	Destruction

SITE SENSITIVITY CLASSIFICATION AS PER EIA SCREENING TOOL

In accordance with the requirements of the 2014 Environmental Impact Assessment (EIA) Regulations, the DESTEA National Web-Based Environmental Screening Tool identifies elevated sensitivity ratings for several environmental themes, including palaeontology and heritage resources. These ratings inform the requirement for specialist input and guide the scope and intensity of the heritage assessment.

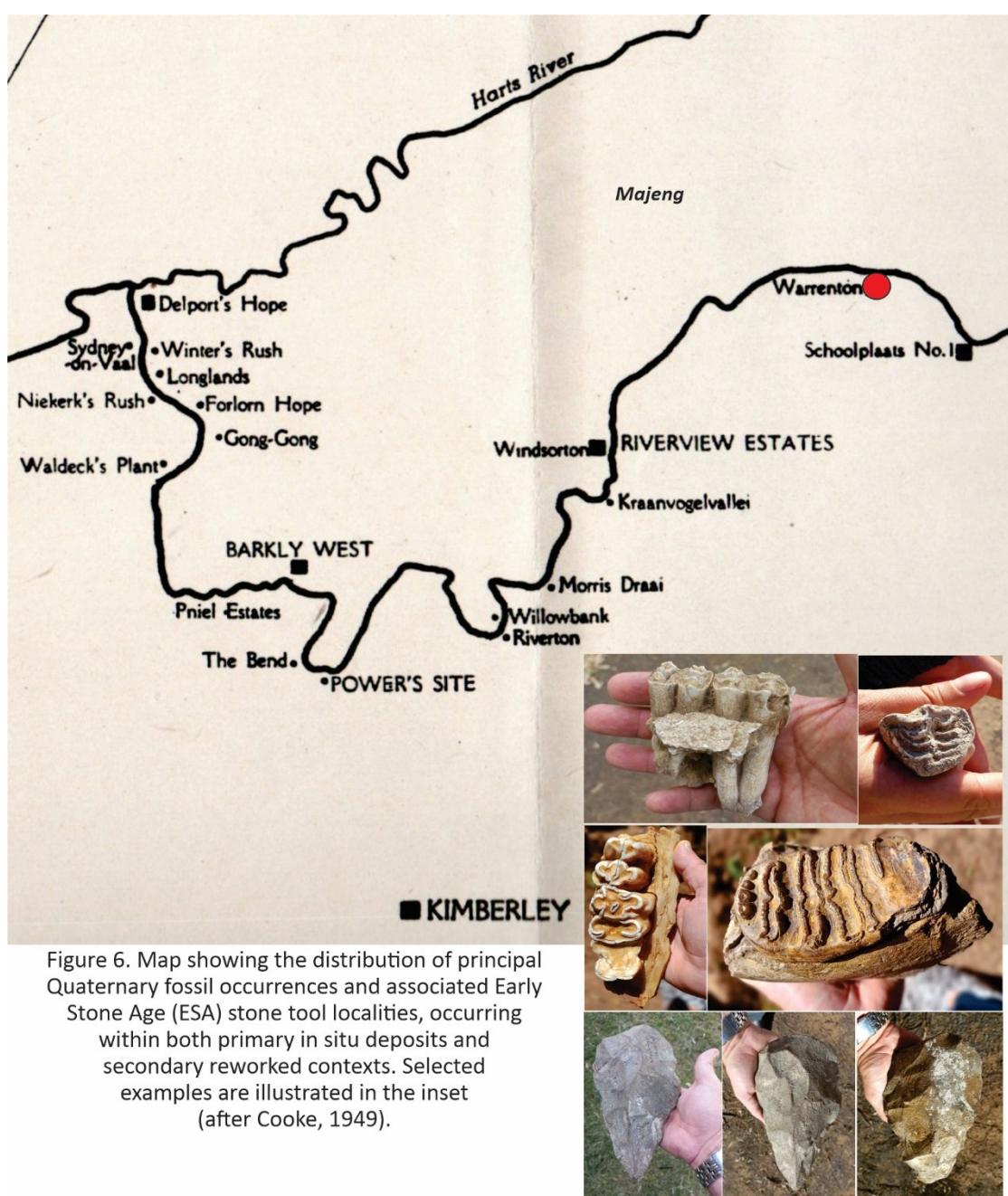
The Screening Tool classified the site's sensitivity as Very High for Archaeology and Cultural Heritage and Low for Palaeontology.



Figure 5. The proposed development footprint marked by orange lines on portion of 250 000 scale geological map Sheet 2824 Kimberley. According to the map the area around Warrenton is characterised by Quaternary aeolian sand (Qs), surface limestones (Qc) and localized alluvial terrace gravels (Qa), resting unconformably on a pre-Karoo basement of palaeontologically insignificant Ventersdorp Supergroup basalts and andesites (Ra).

PALAEONTOLOGICAL BACKGROUND

The 1:250 000 scale geological map 2824 Kimberley indicates that the lower Vaal River region near Warrenton is defined by broad, coalescent planar surfaces overlain by Quaternary surface sands (Qs), limestones (Qc) and localized river terrace gravels (Qa), which rest unconformably atop a pre-Karoo basement composed of palaeontologically insignificant Ventersdorp Supergroup basalts and andesites (Ra; Fig. 5).



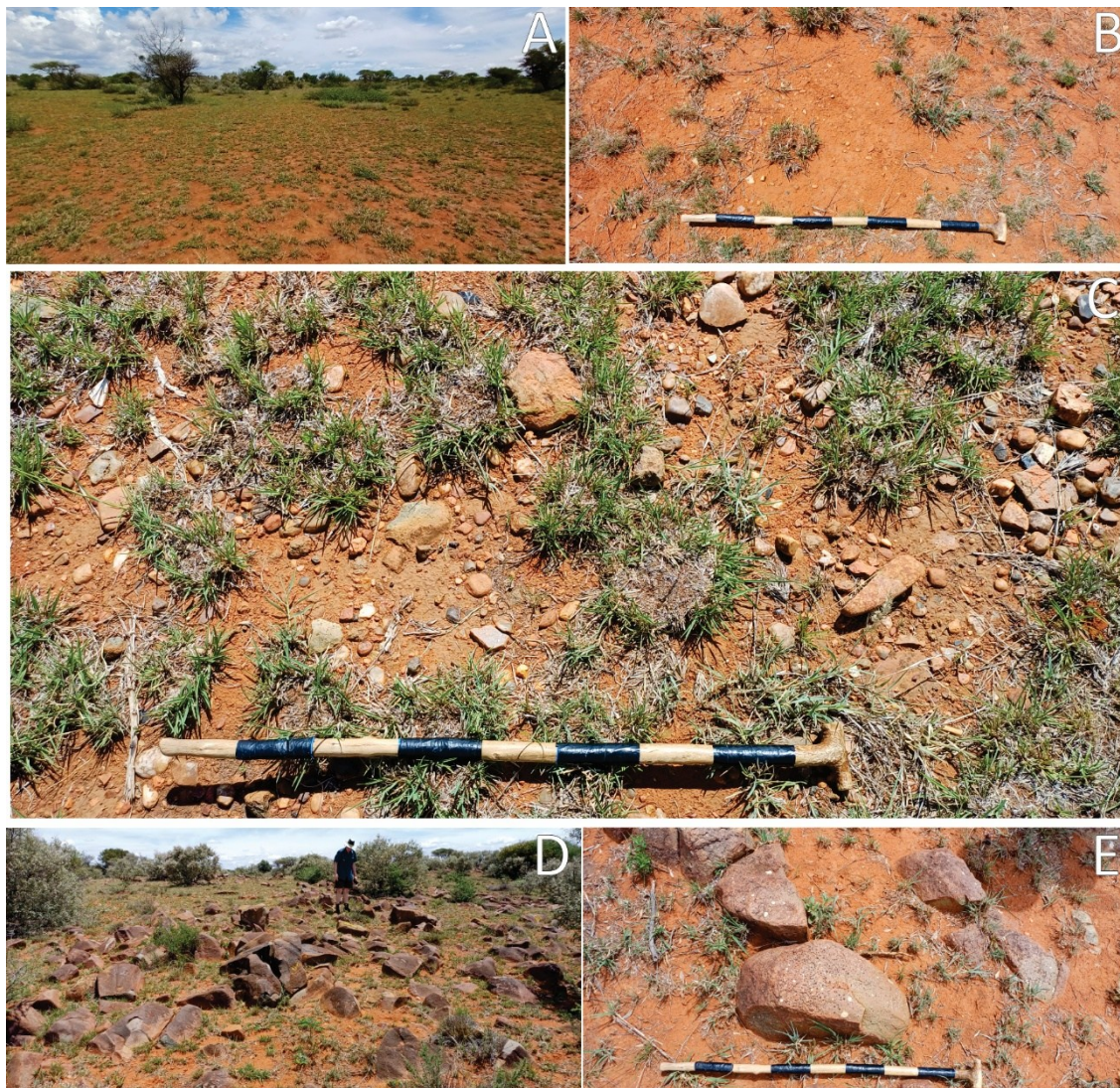


Figure 7. A Late Quaternary aeolian sand veneer (A, B) mantles fluvially derived gravel deposits in places (C), all of which are underlain by Ventersdorp Supergroup volcanic rocks (D, E). Scale 1 = 10 cm.

Extensive fossil faunal assemblages of indeterminate origin have been recovered from alluvial and terrace gravels located between Bloemhof and the Vaal–Orange confluence, underscoring the high preservation potential characteristic of fluvial depositional environments (**Fig. 6**). These gravels are noted for containing both reworked and *in situ* vertebrate fossils, with remains from large mammals such as proboscideans, bovids, equids, and extinct megafauna commonly identified. Fossil materials are typically found as isolated bones, teeth, or fragmentary elements rather than as articulated skeletons. The laterally extensive Pleistocene alluvial gravel deposits are preserved as elevated terrace remnants,

sometimes situated several tens of metres above the current Vaal River channel (Partridge & Brink 1949; Gibbon 2009a).



Figure 8. Aerial view of the development footprints highlighting areas where Quaternary river-terrace gravel exposures were observed (outlined in pink above).

Fossil distribution is uneven and largely confined to gravel bars and terrace deposits at depth, and documented fossil occurrences within the Warrenton area remain sparse. Notable finds from river silts near the Warrenton townlands include remains of plains zebra (*Equus burchelli*), spotted hyaena (*Crocota crocuta*), and the extinct giant buffalo (*Syncerus antiquus*), indicating the presence of diverse late Pleistocene fauna closely associated with riverine environments (Cooke 1949; Helgren 1977).

FIELD ASSESSMENT – PALAEOONTOLOGY

Where undisturbed, the pipeline footprints comprise a loose, unconsolidated sandy overburden, typical of late Quaternary wind-blown deposits (Kalahari Group) (Fig. 7A & B). The sandy overburden mantles gravel deposits in places and are predominantly composed of cobble-grade conglomerates with granular to pebbly clasts (Fig. 7 C- F). Basement rocks are made up of Ventersdorp Supergroup basalts and andesites (Fig. 7 G & H).

A systematic pedestrian survey of the proposed pipeline footprints resulted in the following observations:

- The alignments are underlain by volcanic rocks Ventersdorp Supergroup.
- In places, sections of the Gravity Line and Rising Main are unconformably capped by Quaternary river-terrace gravels, representing younger fluvial deposits with a potential (but variable) capacity to preserve vertebrate fossil material at depth (Fig. 8 & Fig. 9 A-E).
- No fossil-bearing gravels, bone fragments, or other diagnostic palaeontological indicators were identified in surface exposures during the survey.

PALAEOONTOLOGICAL IMPACT AND RECOMMENDATIONS (NHRA SECTION 38(3))

a) Identification and mapping of all palaeontological resources in the area affected.

The proposed Pumping Main, Gravity Line and Rising Main pipeline footprints traverse a geological succession dominated by Ventersdorp Supergroup basalts and andesites, locally

overlain by late Quaternary aeolian sands of the Kalahari Group and, in places, by Quaternary – aged river-terrace gravel deposits.

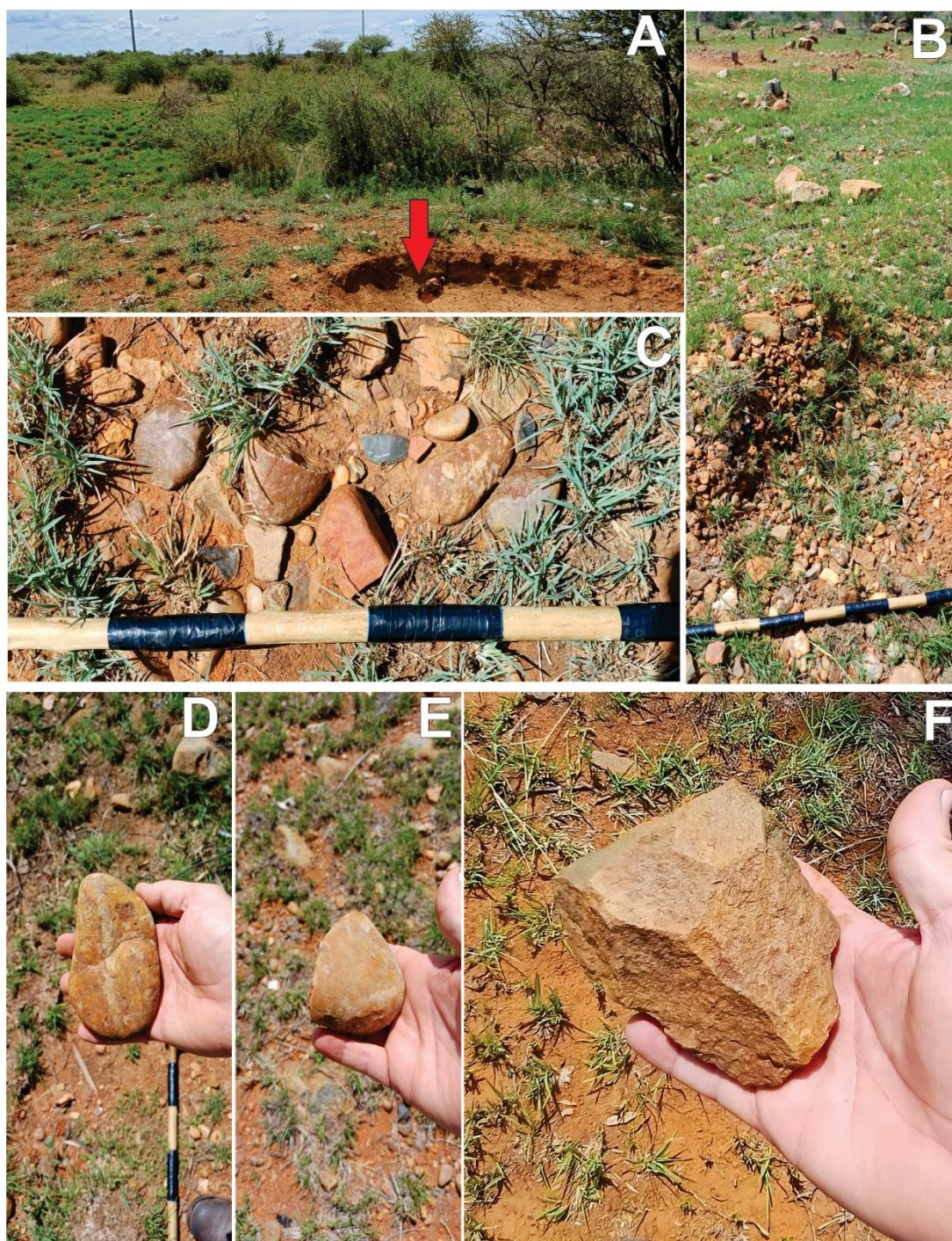


Figure 9. Cobbly gravel exposures composed of granular to pebbly clasts, interpreted as lag or reworked fluvial deposits. A single surface occurrence of an Early Stone Age (ESA) Large Cutting Tool (LCT) is shown at lower right. Scale 1 = 10 cm.

A systematic pedestrian survey of the entire pipeline alignment was undertaken, with attention to natural and artificial surface exposures. No palaeontological resources were identified or mapped within the development footprint. Specifically:

- No fossil bone, teeth, shell material or consolidated fossiliferous horizons were observed.
- No calcretised or fine-grained sedimentary units with signs of potential fossil preservation were exposed at surface.

As such, no in situ palaeontological resources were recorded during the field assessment.

b) Assessment of the significance of palaeontological resources

Based on observed geology and surface conditions:

- The Ventersdorp Supergroup volcanic rocks underlying most of the alignment are classified as palaeontologically insignificant, as these lithologies are non-fossiliferous.
- The overlying Kalahari Group aeolian sands are unconsolidated, late Quaternary in age, and generally of low fossil preservation potential, except where calcretised horizons or buried palaeosurfaces are present (none observed).
- Quaternary river-terrace gravels, where present, have a variable and generally low palaeontological significance, as vertebrate fossils—if present—are typically fragmented and occur in secondary depositional contexts. Any palaeontological material, should it occur, is most likely to be buried within the gravel package, localized, and potentially reworked rather than preserved in primary depositional context.

Accordingly, the overall palaeontological sensitivity of the affected area is assessed as low

c) Assessment of the mature and extent impact of the development

The proposed WWTW will affect Ventersdorp volcanics. The pipeline installation will involve shallow trenching within a landscape that is already extensively disturbed and underlain predominantly by non-fossiliferous volcanic substrates.



Figure 10. Extensive areas along the Pumping Main, Gravity Line and Rising Main footprints indicate long-term disturbance with much of the route following or intersecting existing tracks, gravel and paved roads, utility servitudes, and cleared corridors, resulting in a high degree of prior modification of the ground surface.

Potential palaeontological impacts are assessed as follows:

- No impact is anticipated where trenching affects Ventersdorp Supergroup volcanic rocks or unconsolidated aeolian sands without buried horizons.

- A low, residual impact potential exists where excavation intersects Quaternary, river-terrace gravel horizons, as these deposits may rarely contain deeply buried, isolated vertebrate remains.

Given the absence of surface indicators and the likelihood that any fossils would be localised, deeply buried and reworked, the anticipated impact on palaeontological heritage resources is assessed as low. No pre-construction mitigation is required, provided a chance finds protocol for fossil finds is implemented during excavation activities.

d) Consideration of alternatives to avoid or mitigate impacts on palaeontological resources.

No palaeontological avoidance alternatives are considered necessary due to:

- The overall predominance of low-sensitivity geological outcrops
- The absence of identified palaeontological resources in the footprint.

e) Assessment of the significance of the impacts relative to the sustainable social and economic benefits of the development.

The proposed pipeline infrastructure constitutes essential service delivery with demonstrable social and economic benefits. When weighed against the low palaeontological sensitivity of the affected formations and the absence of identified fossil resources, the residual palaeontological risks are considered acceptable

f) Specification of mitigation measures to avoid, minimise, or manage adverse impacts on palaeontological resources.

No mitigation or monitoring is required. The study area is assigned a **Generally Protected C** rating for palaeontology under Section 35 of the NHRA, conditional on implementation of a CFP and future activities remaining within the scope of the existing boundaries.

g) Consideration of consultation with communities and interested and affected parties.

No direct palaeontological consultation with communities or stakeholders is required, as no palaeontological resources were identified and because fossil heritage is regulated through statutory permitting.

In terms of legislative compliance, the proposed development fully aligns with the requirements of the National Heritage Resources Act (Act No. 25 of 1999). Section 35 of the Act is satisfied, as field assessments have confirmed the absence of significant palaeontological resources within the designated development footprints. On the basis of the observed geology and the absence of surface indicators, the overall palaeontological impact significance is assessed as low (see **Table 1**), provided that a chance-finds protocol is implemented for trenching/excavation, particularly where gravel horizons are intersected.

A chance fossil finds procedure should be applied during construction. If fossil bone/teeth are uncovered (especially in terrace gravels), works in the immediate vicinity should cease, the find should be secured and recorded, and a qualified palaeontologist should be notified to assess and, if necessary, undertake sampling or rescue mitigation.

ARCHAEOLOGICAL BACKGROUND

The archaeology of the Vaal River area near Warrenton represents a dynamic palimpsest landscape, shaped by repeated cycles of sediment accumulation and incision. From an archaeological perspective, these fluvial gravels are of high significance, as they have repeatedly yielded Early Stone Age (Acheulian) artefacts, including handaxes, cleavers, and core-axes, preserved in both primary and reworked contexts. The region also preserves a long sequence of Middle Stone Age to Later Stone Age occupation, largely expressed within deflated surface contexts (Sohnge et al. 1937; Mason 1967; Beaumont 1999; McNabb et al. 2004; Gibbon et al. 2009). Many of the older gravel formations along the Vaal River are covered by Hutton Sands, which are considered younger, late Quaternary wind-blown deposits from the Kalahari Group that blanket the regional landscape. The lower levels of these sands have produced high densities of Fauresmith artefacts, particularly blades. The Fauresmith is widely regarded as a technological transition between the Acheulian and Middle Stone Age, and its presence reflects continued occupation of the Vaal Basin following major phases of gravel aggradation. Stone Age artefacts are also widely distributed as open-air surface scatters across the Warrenton region. However, most of the artefacts are

preserved in secondary or palimpsest contexts, resulting from fluvial reworking, deflation, and terrace erosion rather than intact occupation surfaces.



Figure 11. Position of (A) a section of the proposed gravity pipeline situated adjacent to a Muslim cemetery and (B) extending through an established built-up area containing buildings that may pre-date 1965 (i.e., older than ± 60 years).

Rock engravings are documented within the broader Warrenton and lower Vaal River region, comprising motifs of human figures, animals, therianthropes, and geometric forms (Van Riet Lowe 1941). These engravings are predominantly situated on exposed Ventersdorp Supergroup andesite outcrops, particularly to the east of Warrenton, where these hard rock

surfaces have facilitated rock art preservation within the regional archaeological landscape (see Fig. 4).

The historical significance of Warrenton is closely linked to its location along the Vaal River, as well as to broader processes associated with nineteenth-century British colonial administration, diamond discoveries, and the Anglo-Boer War. Its strategic position near key river crossings made Warrenton an important node during the diamond rush period, when reliable transport routes between the interior of southern Africa and the diamond fields of Kimberley became increasingly critical (see Fig. 4). The town is named after Sir Charles Warren, a British military officer and colonial administrator who was active in southern Africa during the late nineteenth century, reflecting the influence of British imperial authority on the establishment and naming of the town (Raper 1984).

FIELD ASSESSMENT - ARCHAEOLOGY

The Pumping Main, Gravity Line and Rising Main pipeline footprints traverse a largely transformed landscape characterised by flat to gently undulating terrain capped by shallow red sandy soils, mantling river terrace gravels and volcanic rocks. A systematic pedestrian survey of the pipeline footprints resulted in the following observations with potentially sensitive heritage zones listed in **Table 2**.

- Extensive areas of exposed ground indicate of long-term surface disturbance that also includes two existing agricultural pivots. Much of the route follows or intersects existing access tracks, gravel and paved roads, utility servitudes, and cleared corridors, resulting in a high degree of prior modification of the ground surface (**Fig. 10**). Localised modern impacts are evident in the form of dumping, informal footpaths, and infrastructure such as powerlines, fencing, and modern structures. Towards the established residential areas, the pipeline footprint passes through modern residential and historic townscape settings, where surfaces are heavily altered and associated with standing structures.

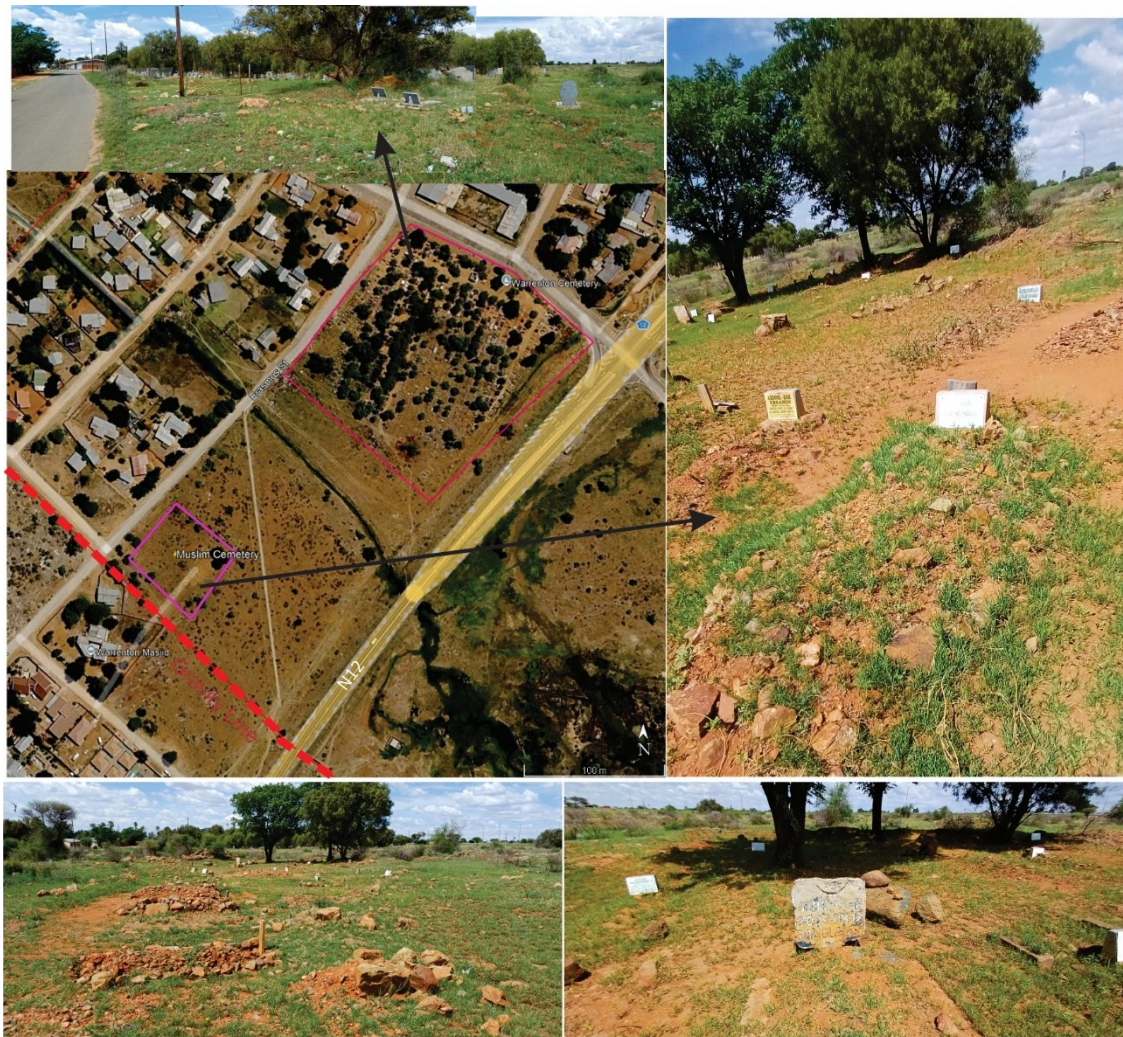


Figure 12. General view of the Muslim cemetery located between Erasmus St. and the N12.

- Sections of the Gravity Line and Rising Main traverse areas where the underlying substrate is locally mantled by Quaternary-aged river-terrace gravels. These younger fluvial deposits have a variable potential to contain Early Stone Age (ESA) Acheulean material, that may occur as lag or reworked components within gravel packages. A single surface occurrence of an ESA LCT was recorded (see **Fig. 9 F**). No additional diagnostic Stone Age indicators (e.g., cores, flakes, extensive knapping debris, or artefact scatters) were observed in the gravel surface exposures. On this basis, any Stone Age material that may be present is most likely to be localised and potentially reworked within the gravel body rather than preserved in primary depositional context.

- A ± 100 m portion of the proposed Gravity Line is routed immediately adjacent to a Muslim cemetery located between Erasmus St. and the N12, and approaches to within ~ 15 m of the burial ground boundary (red line in **Fig. 11 A & Fig. 12**). This places the pipeline section within a high heritage-sensitivity area, because burial grounds and graves are legally protected and may not be disturbed, damaged, altered, or otherwise impacted without authorisation from the relevant heritage resources authority.
- A ± 700 m section of the proposed Gravity Line runs through an established built-up area and parallels existing buildings in close proximity along Van Wyk Street (orange line in **Fig. 12 B & Fig. 13**). Based on visible architecture, some of these structures may pre-date 1965 (i.e., >60 years old) and would therefore fall under the general protection for structures older than 60 years in terms of Section 34 of the National Heritage Resources Act (NHRA), which requires a permit from the relevant Provincial Heritage Resources Authority for any alteration or demolition.

Table 2. Position and rating of heritage resources mapped during the survey.

#	Item	Coordinates	Field Rating
1	ESA Chopper, River Terrace Gravels	28° 7'12.63"S 24°50'23.17"E	Generally Protected B
2	Muslim Cemetery	28° 7'8.52"S 24°50'40.04"E	Local Significance (LS)
3	Cemetery	28° 7'4.01"S 24°50'46.63"E	Local Significance (LS)
4	Buildings >60 years, Van Wyk St	28° 6'57.32"S 24°50'39.95"E to 28° 6'37.21"S 24°50'51.25"E	Local Significance (LS)
5	Cemetery	28° 7'29.45"S 24°51'30.07"E	Local Significance (LS)
6	Cemetery	28° 8'10.67"S 24°51'27.48"E	Local Significance (LS)



Figure 13. General view of buildings in Van Wyk Street that may pre-date 1965 (i.e., older than ± 60 years) and are therefore of potential heritage significance. Position of pipeline footprint is indicated by the orange lines.

ARCHAEOLOGICAL IMPACT & RECOMMENDATIONS (NHRA S38(3))

a) Identification and mapping of all heritage resources in the area affected.

A systematic pedestrian survey was undertaken along the proposed Pumping Main, Gravity Line and Rising Main pipeline footprints. The survey identified a limited number of heritage resources, all of which were mapped and recorded using a handheld GPS.

Identified heritage resources within or adjacent to the development corridor include:

- A single Early Stone Age (ESA) large cutting tool (LCT) recorded as a surface find within Quaternary-aged river terrace gravels.
- A Muslim cemetery that falls under Section 36 protection.
- A group of standing buildings along Van Wyk Street that may exceed 60 years in age and potentially fall under Section 34 protection.

These resources are spatially discrete and occur within a broader landscape that has been extensively modified by agriculture, infrastructure development, roads, utility servitudes and urban expansion (see **Table 2** for locations).

b) Assessment of the significance of heritage resources.

The archaeological and heritage significance of the identified resources was assessed with reference to their age, integrity, contextual value and legal status:

- The ESA artefact is of low to moderate scientific significance, representing an isolated and likely reworked surface occurrence typical of secondary river terrace contexts, with no associated artefact scatter or primary context integrity.
- The Muslim cemetery is of high heritage significance, as burial grounds and graves are afforded strong protection under Section 36 of the NHRA regardless of age. It is recommended that the ± 100 m cemetery-adjacent segment of the Gravity Line be re-routed from the current red alignment to the yellow alignment shown in Figure 11 A, thereby any construction footprint within the cemetery's immediate buffer zone. If engineering constraints prevent full avoidance, then the project must initiate a Section 36 process (heritage authority engagement and consultation with affected communities/interest groups) prior to any works that could affect the cemetery or its immediate setting.
- The buildings along Van Wyk Street potentially older than 60 years are of moderate to potentially high heritage significance, depending on confirmation of their age, integrity and historical associations, and are provisionally protected under Section 34. Construction within this segment should be planned to avoid direct physical impacts (demolition, alteration or structural undermining) to adjacent buildings that may be protected under Section 34. Where works cannot avoid such structures, the age and heritage status must be verified, and the necessary PHRA permit process initiated prior to excavations.

c) Assessment of the nature and extent of potential impact.

The proposed pipeline development occurs largely within a highly transformed environment, and the overall archaeological impact is assessed as low, with the following qualifications:

- Impacts on *Stone Age archaeology* are expected to be minimal, as the single artefact recorded is isolated and any additional material is likely to be sparse and in secondary context within disturbed gravel horizons.
- A potential high impact would arise should construction activities encroach upon or disturb the adjacent cemetery, either directly or through alteration of its immediate setting.
- A low to moderate indirect impact may occur where pipeline construction runs immediately adjacent to potentially protected structures along Van Wyk Street, particularly if ground disturbance affects foundations or structural stability.

Without mitigation, the cemetery-adjacent pipeline segment represents the most sensitive component of the development.

d) Consideration of alternatives to avoid or mitigate impacts on heritage resources.

Avoidance represents the preferred mitigation option where heritage sensitivity is high. In this regard:

- A feasible alternative routing is available for the cemetery-adjacent section of the Gravity Line, whereby the alignment is shifted from the red route to the yellow route indicated as an option in Figure 11 A. This alternative increases separation from the burial ground and avoids impacts on the cemetery and its sensitive setting.
- For the Van Wyk Street section, caution in construction methods or minor re-routing can be used to minimise impacts on adjacent standing structures.
- No practical alternatives are required for areas with low archaeological sensitivity, provided that chance finds procedures are applied.

e) Significance of the impacts on heritage resources relative to the sustainable social and economic benefits of the development.

The proposed pipeline infrastructure provides essential municipal services and when weighed against the generally low archaeological sensitivity of the affected areas, the overall heritage impact is considered acceptable, provided that:

- The Muslim cemetery is avoided through re-routing or managed under a formal Section 36 process if avoidance is not feasible; and
- Adjacent potentially protected structures in Van Wyk Street are not directly altered or affected without appropriate authorisation.

With mitigation, the residual heritage impacts are low and do not outweigh the broader public benefits of the development.

f) Consideration of consultation with communities and interested and affected parties.

In this case, direct consultation requirements may arise in relation to burial grounds and graves and protected structures if these are to be impacted:

- If the proposed pipeline alignment near the Muslim cemetery cannot be fully avoided, a Section 36 consultation process with affected communities, religious authorities must be undertaken as part of the heritage permitting process.
- No additional community consultation was triggered by the archaeological findings, given the absence of significant or formal cultural sites within the development footprint.

g) Any other information required by the heritage resources authority to assess the impact of the development.

In accordance with Sections 35 and 38 of the NHRA, the following additional measures are required:

- A chance finds procedure must be implemented for all excavations. Should any archaeological material be uncovered during construction, work must cease locally and the responsible heritage resources authority must be notified immediately.
- No archaeological material may be further disturbed without the necessary permit issued under Section 35.

- Confirmation of the age and heritage status of structures adjacent to Van Wyk Street must be undertaken where construction could result in alteration or damage.

On the basis of the field assessment and available exposures, no significant archaeological remains were identified within the proposed pipeline footprints, and the likelihood of impacting intact, in situ archaeological deposits is assessed as low. Accordingly, there are no archaeological grounds to halt or refuse the proposed development, provided that the avoidance and mitigation measures set out in this report are implemented—specifically the route adjustment to avoid the Muslim cemetery, and the application of an archaeological chance-finds procedure during all excavation and trenching activities.

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APPENDIX 1 –CHANCE FINDS PROTOCOL FOR DEVELOPER

The process starts with noticing unusual or irregular shapes among exposed aeolian overburden / river gravels which helps in identifying possible fossil remains and archaeological artefacts in the field. Keep an eye out for fossil fragments that may look similar to contemporary long bones, horn cores, or teeth (see **Fig. 6**). The fluvial gravel terraces of the region are also considered to have high archaeological significance due to their well-documented association with Early Stone Age (Acheulian) occupations, where handaxes, cleavers, and core axes are frequently preserved in both primary depositional contexts and reworked gravel lag deposits (**Fig. 14 A – D**). Overlying aeolian sands and well-developed overbank sediments in the region form part of a broader landscape that records a long sequence of human occupation spanning the Middle Stone Age through to the Later Stone Age, typically expressed as deflated surface scatters rather than stratified deposits (**Fig. 14 E – H**). Where older gravel formations are mantled by these younger Hutton Sands of the Kalahari Group, there is an additional potential for Fauresmith-period material, including high densities of blade-based artefacts, particularly left behind on capped land surfaces.

Procedural Steps:

1. If fossils or artefact concentrations are encountered, halt all activity in the immediate area.
2. Notify the Environmental Control Officer (ECO) and appropriate heritage specialist.

3. Photograph the fossil remains / artefact(s), note GPS coordinates, and leave it undisturbed if possible.
4. Cover undisturbed material with a rigid object (box, bucket, or sheet) and mark a no-go buffer zone.
5. If removal is unavoidable, wrap artefacts in paper towels or heavy-duty tin foil. Do not wash or clean.
6. Await Specialist Confirmation
7. If material proves significant, a Phase 2 rescue operation may be required under SAHRA permit.
8. All decisions must be communicated to SAHRA and uploaded to the SAHRIS Case application.



Figure 14. Stone Age artefacts in the region are most commonly associated with fluvial gravel terraces (A–D) or occur buried beneath thick accumulations of unconsolidated aeolian sands (E–H). Older land surfaces sealed by this sand cover may preserve localized Stone Age artefact assemblages, including atypical or “odd-looking” stone flakes, points, and other knapped pieces similar to those illustrated above. Such materials may be inadvertently exposed during ground disturbance and should be regarded as potential indicators of underlying subsurface archaeological horizons.



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rural development and land reform .
NORTHERN CAPE PROVINCE
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Application for authorization in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014 as amended.

File Reference Number:
NEAS Reference Number:
Date Received:

(For official use only)

1. Project title:

Proposed Relocation of the Warrenton WWTW and Associated Bulk Infrastructure.

2. Details of the specialist:

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Trading name (if any):	L Rossouw		
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Professional affiliation (s) (if any)	ASAPA Reg no. 122		

3. Details of the consultant

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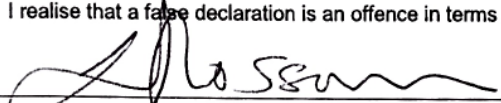
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4. Declaration by the specialist appointed in terms of the Environmental Impact Assessment Regulations, 2014 as amended.

I, Lloyd Rossouw, declare that --

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


Signature of the specialist:

Paleo Field Services
Name of company (if applicable):

08/06/26
Date:


Signature of the Commissioner of Oaths:

08/06/26
Date:

Professional Accountant
Designation:

Official stamp (below):

COMMISSIONER OF OATHS (RSA)
DALTON MAURITZ BAKKES
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