HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for the

Proposed Development Of The Proposed Edible Oil Pipeline For Wilmar Sa (pty) Ltd, From Berth 706 / 707 / 708 To Rb IDZ Phase 1a, Richards Bay

Prepared by

CTS HERITAGE

For

Savannah Environmental Consultants

March 2019

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EXECUTIVE SUMMARY

Wilmar Processing (Pty) Ltd (Wilmar) are proposing the development of vegetable oil pipeline that will consist of 4 x 216mm-wide pipes, that will extend for ~2.6km within the Richard's Bay Port. The proposed development will consist of four (4) pipelines stacked vertically or in double rows, running side by side (depending on support and space restrictions) and will comprise of the following dimensions:

- Width: 216mm
- Total Length: ~2.6km.

Archaeology and built environment

No archaeological or built environment heritage resources were identified during the field assessment. eThembeni have an intimate knowledge of the Richards Bay Harbour precinct, having conducted an HIA for auxiliary railway-lines to the coal terminal in 2004 and having compiled a Baseline Heritage Study for the proposed Richards Bay Port Expansion in 2013. Pertinent here too is the palaeontological monitoring conducted for the construction of the Berth 306 within the Port and the HIA conducted for the proposed expansions to the Port in 2009. All attest to the low sensitivity of heritage resources within the Richards Bay Harbour precinct.

Palaeontology

The oldest rocks are the basement rocks of the Barberton Greenstone Belt. Then there are ophiolites of oceanic affinity that were thrust northwards onto the southern flank of the Kaapvaal craton (Cornell et al., 2006). There are a number of plutons of the Namaqua-Natal Province along the coast from Margate to the Tugela River, for example the Tugela Group of the Tugela Terrane. These rocks are also highly metamorphosed. The Natal Group sediments were probably derived from the Pan-African orogenic belt in southern Mozambique and deposited in the Natal Trough during the Ordovician (ca 500-450 Ma ago) (Marshall, 2006). Palaeoenvironmental indications are that there were a series of cycles of uplift, erosion and uplift. Fluvial activity and debris flow processes would have been instrumental in the deposition of the various conglomerate members.

Conclusions

The entire area of the Richards Bay Harbour precinct, prior to establishment, comprised extensive *Phragmitis* swamplands and mangrove and swamp forests associated with the Mhlatuze estuary. This is an environment that would have been eschewed for human settlement. Consequently no archaeological residues are anticipated to be impacted by the proposed development. No buildings, equipment or structures of historical significance occur within the study area.

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the surface of the Bluff and Berea Formation, Maputaland Group, because they have been bioturbated in the past and recently by natural vegetation and urban development. However, there is a small chance that trace fossils may occur in the aeolianites and sands so a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

It is unlikely that the proposed development will impact on any significant heritage resources. There is no heritage objection to the proposed development. It is, however, recommended that a Fossil Chance Finds Procedure be implemented for all excavations activities.

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1. INTRODUCTION

1.1 Background Information on Project

Wilmar Processing (Pty) Ltd (Wilmar) are proposing the development of vegetable oil pipeline that will consist of 4 x 216mm-wide pipes, that will extend for ~2.6km within the Richard's Bay Port. The proposed development will consist of four (4) pipelines stacked vertically or in double rows, running side by side (depending on support and space restrictions) and will comprise of the following dimensions:

- Width: 216mm
- Total Length: ~2.6km.

Furthermore, the proposed development will include the following infrastructure:

- Steel pipes;
- Multiple duct access shafts;
- Overhead steel bridges;
- Site Offices and Maintenance Buildings, including workshop areas for maintenance;
- Temporary laydown areas;
- Fencing and access roads;
- and Security Offices.

Since the archaeological assessment was completed, the proposed development has been amended slightly. The reason for the amended route is Transnet is planning a future railyard which will require the pipeline to route overhead for this section as per the drawings attached in Appendix 4:

Project description and construction method for the pilling component through Transnet Railyard North
If you refer to the attached drawing in Appendix 4, a possible pile design could include the following:

- Main supports – 3 No., shown as tower trusses at the ends of the bridge and at the step down:
  Per pile cap: 4 x 250 mm diameter precast concrete piles each 12 m long, raked 10 to 15 degrees perpendicular to the bridge deck
- Intermediate supports – 8 No., shown as flat vertical trusses
  Per pile cap: 2 x 250 mm diameter precast concrete piles each 12 m long, raked 10 to 15 degrees perpendicular to the bridge deck

Construction Method

The construction method depends largely on the selected contractor's plant and materials that are available to him at the time of quoting and construction.

- The piles would most likely be made of precast concrete with a light cage of reinforcing steel, 250 mm diameter and 12 m to 18 m long
- The piles would be cast at a remote casting yard.
- The piles would be transported by truck and offloaded at the piling rig as and when required by means of a truck-mounted crane.
- Percussion driven piles are driven into the ground by ramming precast concrete piles with a large dropweight that is hoisted on a rig and then allowed to "hammer" the pile into the ground until it reaches a predetermined resistance such that it will support the imposed loads from the structure (dead weight plus imposed loads).
- Percussion driven piles are likely to be the preferred piling option owing to the relatively soft sands in the upper strata and the relatively shallow water table, as this method of piling doesn't require auger boring or any other form of excavation.
- If a pile needs to be driven deeper than the length of a standard pile in order to achieve the required resistance, it might be necessary to drive a second pile on top of the first pile.

Pile Caps

For preliminary purposes, we can assume the pile caps that will support the structural steel bridge will be as per the indicative drawings, namely:

- Main supports: (No 2 at the ends of the 12 m high bridge, plus 1 No at the end of the 5,5 m high bridge)
  3m wide
  1,7 m long
  0,7m below ground surface
  0,5 m above ground surface
- Intermediate supports: (2 No for the 12 m high bridge, 6 No for the 5,5 m high bridge)
  3m wide
  1,0 m long
  0,7m below ground surface
  0,5 m above ground surface

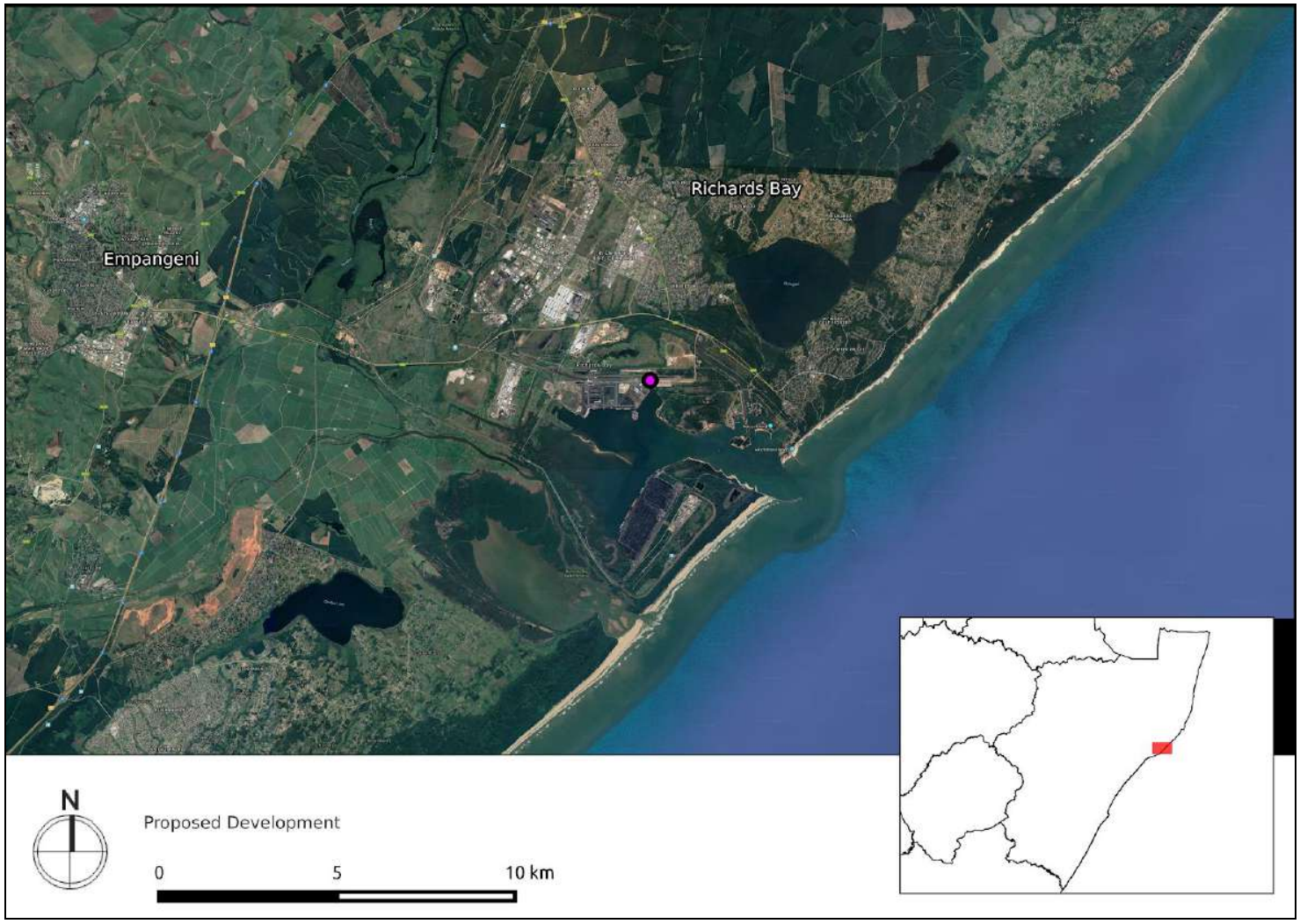

Figure 1.1: Satellite image indicating proposed location of development

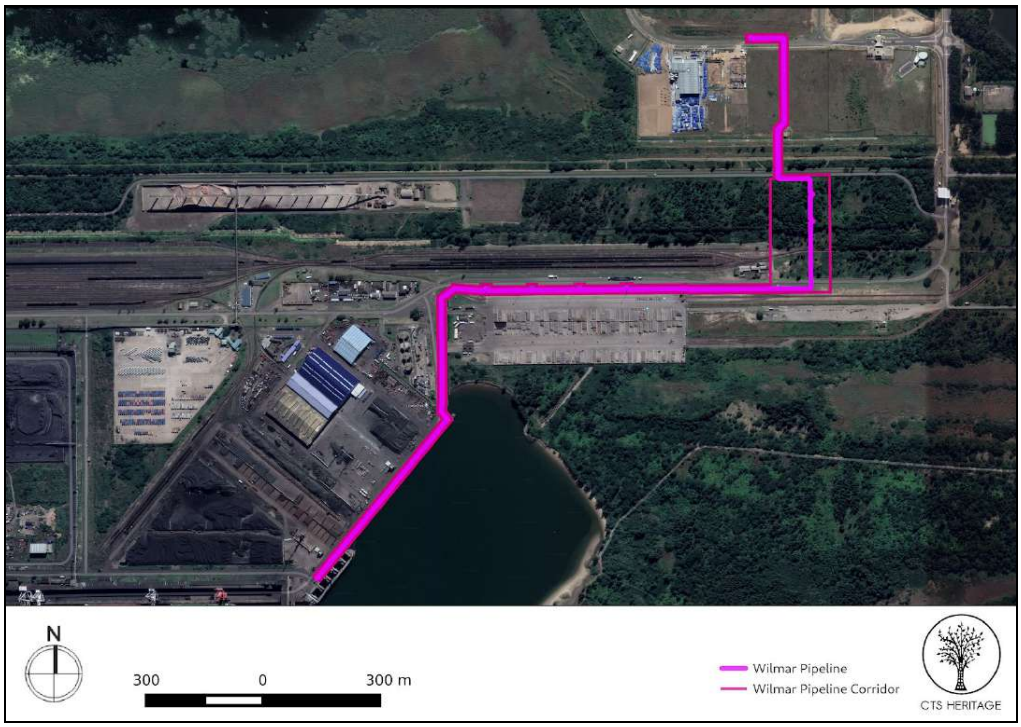

Figure 1.2: Close up satellite image indicating proposed original layout of development as assessed in the AIA

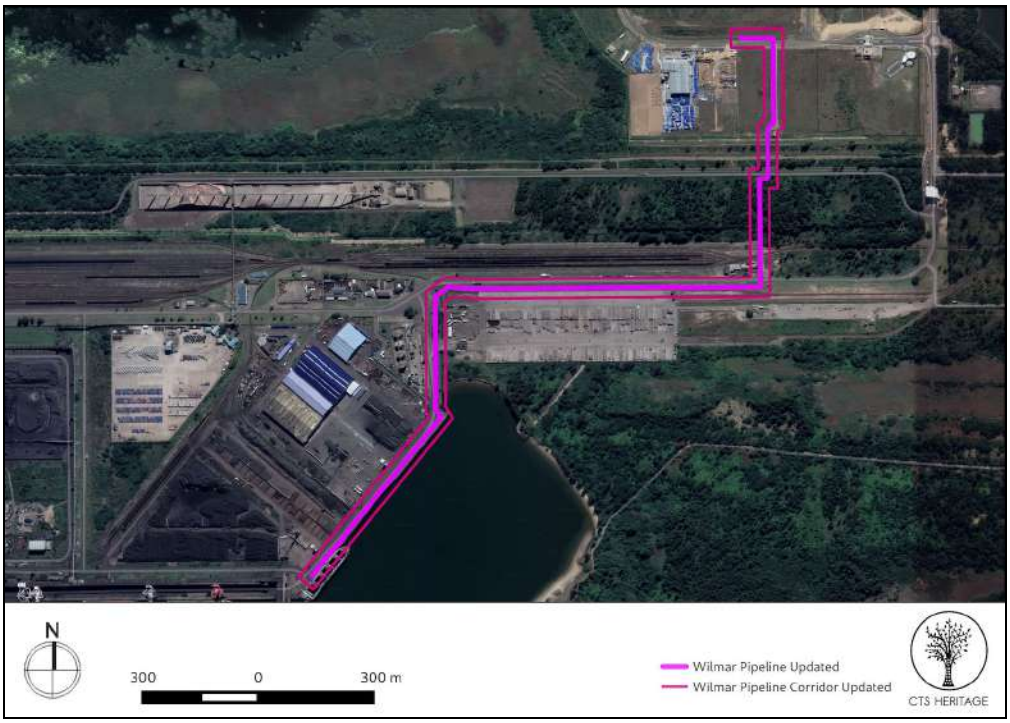

Figure 1.3: Close up satellite image indicating proposed amended layout of development

1.2 Description of Property and Affected Environment

Richards Bay Harbour area has been previously extensively developed. During the 20th Century, Richards Bay was primarily a recreational fishing destination until establishment of the harbour and adjacent township began in the early 1970's. Inception of dredging of the Mhlatuze Estuary for the new harbour began in 1972. In 1974 a berm wall was constructed from dredge spoils to effectively separate the harbour development area from the proclaimed Richards Bay Nature Reserve, thus conserving the sensitive estuarine habitat.

All dock-side infrastructure is located on reclaimed swamplands built up by harbour dredging spoils and imported fill materials.

The entire area of the Richards Bay Harbour precinct, prior to establishment, comprised extensive *Phragmitis* swamplands and mangrove and swamp forests associated with the Mhlatuze estuary. This is an environment that would have been eschewed for human settlement. Consequently no archaeological residues are anticipated. No buildings, equipment or structures of historical significance occur within the study area.

2. METHODOLOGY

2.1 Purpose of HIA

The purpose of this Heritage Impact Assessment (HIA) is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999).

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written
- An archaeologist and palaeontologist were contracted to conduct an assessment of archaeological and palaeontological resources likely to be disturbed by the proposed development. The archaeological site visit took place on 5 December 2018.
- The identified resources were assessed to evaluate their heritage significance
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and uncertainties

- The *significance* of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research

potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.

- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.

2.4 Constraints & Limitations

Although access to the area proposed for development is limited and highly managed for security reasons, no access constraints or limitations for this assessment were experienced.

Although the proposed layout of the development was slightly amended after the archaeological field assessment had already been completed, in our considered opinion, the assessment conducted is sufficient to accurately determine likely impacts to heritage resources by the proposed amended development layout.

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Previous Heritage Impact Assessments

Richard's Bay began as a makeshift harbour established during the Anglo-Zulu War of 1879. The town was laid out on the shores of the lagoon in 1954 and proclaimed a town in 1969. In 1976 Richards Bay harbour was converted into a deep water harbour with railway and an oil/gas pipeline linking the port to Johannesburg. In 1965 the South African Government decided to build a deep-sea harbour at Richard's Bay which was completed on 1 April 1976. According to Anderson (2009, SAHRIS NID 309928), "Port Durnford had been used since the 1870s as a regular port by the British Navy. The Richards Bay Harbour is north of this port that was originally envisaged in 1902. The environment surrounding the harbour has been heavily impacted by the original harbour construction in the early 1970s. The harbour dredged the deep Thulazihleka Lake and cleared areas to create a harbour entrance at the Mhlatuze River mouth. The lake was divided into two parts with the southern part of the lake becoming a sanctuary with its own newly created river mouth south of the harbour entrance… Subsequent to the harbour being built, the wetlands to the south of the harbour increased and large drainage canals have also been built.

Some of these canals are part of the original rivers. There has also been a lot of industrial activity in the general area. The rest of the study area is under sugarcane agriculture with electrical, rail, gas pipeline, and vehicle servitudes. The general study area has been severely impacted by other activities."

Further, according to Anderson (2009), "Several archaeological and palaeontological sites have been recorded in the surrounding area: both inland and along the coast, and within a 10km radius of the development area. The archaeological surveys for Richards Bay Minerals clearly show that the coastal dune system is very sensitive in terms of archaeological sites (over 350 sites have been recorded in the mining lease). The construction of the Berth 306 revealed an important Cretaceous Layer in the harbour area." Anderson (2009) completed a thorough field assessment of the proposed Richard's Bay Harbour expansion area. He identified 9 archaeological sites, 7 of low significance, one of low-moderate significance and one fossil site of high significance. The proposed pipeline does not impact on any of these identified sites (Figure 3). In addition, the area proposed for development does fall within Anderson's (2009) identified locations of sensitive archaeological areas that require monitoring, sampling and/or excavations.

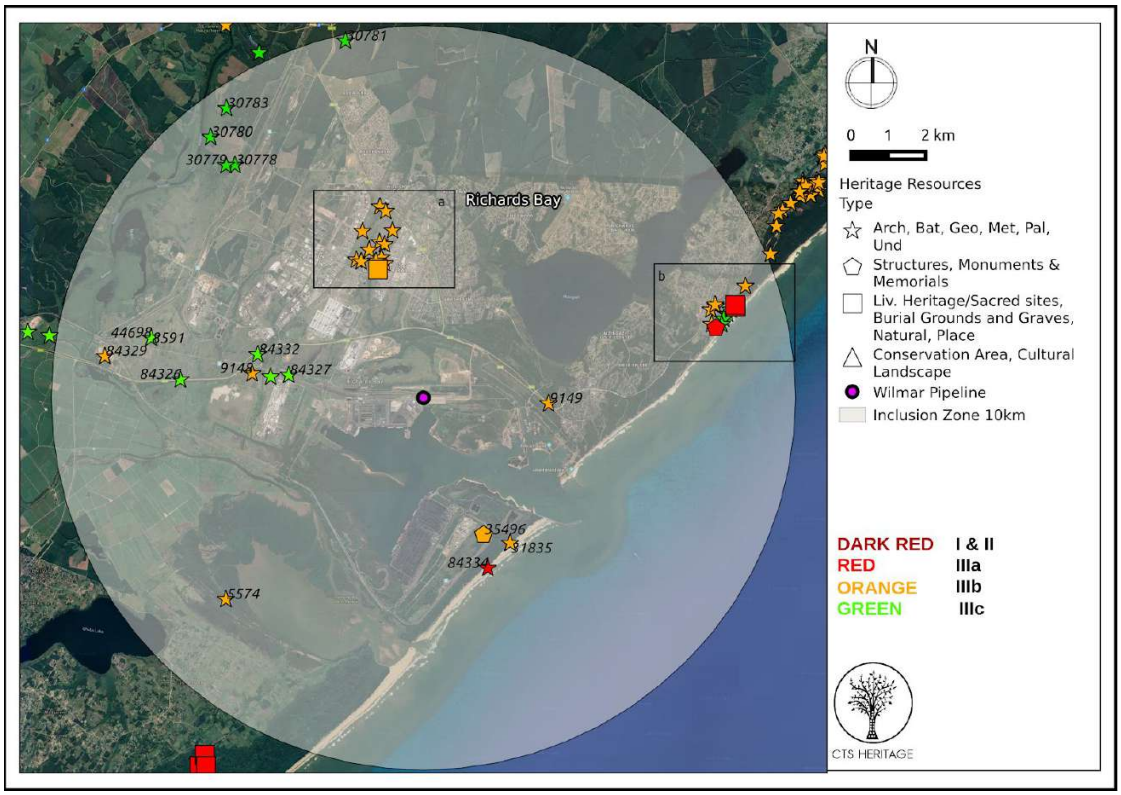

Figure 2: Spatialisation of heritage assessments conducted in proximity to the proposed development (see Appendices for insets)

Palaeontology

The underlying lithology of the Richards Bay Harbour comprises Tertiary and Cretaceous successions of the KwaZulu-Natal Maputaland Group (Late Caenozoic Era). These are paleontologically significant strata that have been extensively described by Klinger (2005) and latterly by Kennedy and Klinger (2011). However these strata lie some 14 m below m.s.l and have only been exposed during deep dredging and excavation (see Figure 5).

The area proposed for development falls within an area of moderate palaeontological sensitivity according to the SAHRIS Palaeosensitivity Map (Figure 4). This area is underlain by Alluvial sediments. However, previous palaeontological work has identified significant fossil material in this area. According to Anderson (2009), "A palaeontological monitoring program was set up during the construction of Berth 306 in 2006. Umlando and Mr A. van Jaarsveld were involved in the project. Several Cretaceous period fossils were excavated, sampled and rescued during this program. In addition to this Palaeocene, Miocene and Pleistocene sediments were also noted, and these contained diverse macrofaunal assemblages. The Cretaceous layers began at ~10m below the current surface at Berth 306. Just over 100 fossils were sampled from this excavation."

Figure 3. Excavations at Berth 306, Richards Bay Harbour. Exposure of Cretaceous horizons at 14m below m.s.l.

Figure 3: Palaeontological sensitivity of the proposed development area with updated alignment

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology and built environment

No archaeological or built environment heritage resources were identified during the field assessment. eThembeni have an intimate knowledge of the Richards Bay Harbour precinct, having conducted an HIA for auxiliary railway-lines to the coal terminal in 2004 and having compiled a Baseline Heritage Study for the proposed Richards Bay Port Expansion in 2013. Pertinent here too is the palaeontological monitoring conducted for the construction of the Berth 306 within the Port and the HIA conducted for the proposed expansions to the Port in 2009. All attest to the low sensitivity of heritage resources within the Richards Bay Harbour precinct.

Palaeontology

The oldest rocks are the basement rocks of the Barberton Greenstone Belt. Then there are ophiolites of oceanic affinity that were thrust northwards onto the southern flank of the Kaapvaal craton (Cornell et al., 2006). There are a number of plutons of the Namaqua-Natal Province along the coast from Margate to the Tugela River, for example the Tugela Group of the Tugela Terrane. These rocks are also highly metamorphosed. The Natal Group sediments were probably derived from the Pan-African orogenic belt in southern Mozambique and deposited in the Natal Trough during the Ordovician (ca 500-450 Ma ago) (Marshall, 2006). Palaeoenvironmental indications are that there were a series of cycles of uplift, erosion and uplift. Fluvial activity and debris flow processes would have been instrumental in the deposition of the various conglomerate members.

The Dwyka Group sediments unconformably overlie the Natal Group rocks (Johnson et al., 2006). This group comprises a number of different facies (massive diamictites, stratified diamictites, conglomerates, sandstones, mudrocks) and represent a series of ice formation and melts (Isbell et al,. 2012) that occurred throughout Gondwana during the Carboniferous to Early Permian when the polar ice sheets formed and melted.

Emakwazini Formation shales and mudrocks represent a fluvio-deltaic deposit formed by meandering rivers and different deltaic environments (Johnson et al., 2006; Bordy and Prevec, 2008). Coals are known to occur in this formation.

The project site lies on the youngest rocks in the area, the Quaternary aeolianites, sand, clay and limestone of the Bluff and Berea Formations of the Maputaland Group and they extend for many kilometres along the coast from Scottburgh to southern Mozambique.

Table 1: Geology in proximity to the proposed development area

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Neogene, ca 25 Ma to present
Qb	Bluff, Berea Fm, Maputaland Group, Quaternary	Aeolianite, sand, clay, limestone	Mio-Plio-Pleistocene Ca last 25 Ma
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pem	Emakwazini Fm, Beaufort Group, Karoo Supergroup	Shales	Early Permian, Early Ecca, ca 240 Ma
C-Pd	Dwyka	Tillite, sandstone, mudstone shale	Late Carboniferous – Early Permian
Ntu	Tugela Group, Tugela Terrane	Amphibolite, gneiss, schist	Ca 1250 – 1135 Ma
ZB	Basement complex	Potassic granite, granodiorite	>3200 Ma

4.2 Heritage Resources identified

Archaeology

No archaeological or other heritage resources of any significance were identified during the field assessment.

Palaeontology

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks could possibly contain invertebrate trace fossils but these are likely to have been disturbed by the vegetation and construction of the harbour in the 1970s. This applies to all the other fossil forms. Since there is a small chance that fossils from the Maputaland Group could occur here a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low. None has been reported from this site to date.

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

As no heritage resources were identified during the field assessment, and as the overall heritage sensitivity of the Richards Bay Harbour precinct is LOW, it is unlikely that the proposed development of the Wilmar Pipeline will impact on any significant heritage resources.

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the calcareous sands, aeolianites, lignites, sandstones and sands are typical for the country and could contain trace fossils, fossil plant, insect, invertebrate and vertebrate material. As the area is heavily vegetated in parts and disturbed in other parts by urban development, construction of the harbour and dredging of the bay to build the harbour, fossils would not be visible or well preserved on the surface. They may be present below the surface and would only become evident once excavations begin.

Table 4: Impacts to heritage resources

NATURE: No heritage resources of significance were identified during the field assessments for archaeology and palaeontology within the development footprint				
		Archaeology		**Palaeontology**
MAGNITUDE	**L**	No archaeological resources were identified within the development area	**L**	There is a small chance that trace fossils (burrows), vertebrates, invertebrates or plants could occur in the Bluff Formation in the sands along the coast but would be difficult to find in the heavily vegetated or disturbed areas. The impact would be very unlikely.
DURATION	**H**	Where manifest, the impact will be permanent.	**H**	Where manifest, the impact will be permanent.
EXTENT	**L**	Localised within the site boundary	**L**	Since the only possible fossils within the area would be trace fossils, invertebrates, vertebrates or plants buried in the sands, the spatial scale will be localised within the site boundary.
PROBABILITY	**L**	It is extremely unlikely that any significant archaeological resources will be impacted	**L**	It is extremely unlikely that any trace fossils would be found intact in the vegetated site and constructed site. Other fossils may be exposed when excavations commence but would not be visible on the disturbed surface. Nonetheless a chance find protocol should be added to the eventual EMPr
SIGNIFICANCE	**L**	(2+5+1)x1=8	**L**	(2+5+1)x1=8
STATUS		Neutral		Neutral
REVERSIBILITY	**L**	Any impacts to heritage resources that do occur are irreversible	**L**	Any impacts to heritage resources that do occur are irreversible
IRREPLACEABLE LOSS OF RESOURCES?	**L**	Unlikely	**L**	Unlikely
CAN IMPACTS BE MITIGATED		NA		NA
MITIGATION: No impacts are anticipated and as such, no mitigation is required. A Chance Finds Protocol must be implemented to mitigate impacts to sub-surface fossils				
RESIDUAL RISK: NA				

5.2 Sustainable Social and Economic Benefit (from Basic Social Impact Report)

The project will lead to the creation of both direct and indirect job which will have a positive economic benefit within the region. In this regard there are 50 jobs associated with the construction phase of the project and 250 with the operational phase including the IDZ factory or processing plant. Many of the beneficiaries are likely to be historically disadvantaged members of the community and the project will provide opportunities to develop skills amongst these people. It is estimated that both the direct and indirect jobs that will be generated during construction are likely to amount to 360 and that the labour costs of the project will amount to R 6 million.

5.3 Proposed development alternatives

The route has been specifically identified to reach the RBIDZ site from the allocated Transnet berths having taken into account future Transnet developments and no alternative routes, layout and technological alternatives were considered.

6. RESULTS OF PUBLIC CONSULTATION

The public consultation process will be undertaken by the EAP during the EIA.

7. CONCLUSION

The entire area of the Richards Bay Harbour precinct, prior to establishment, comprised extensive *Phragmitis* swamplands and mangrove and swamp forests associated with the Mhlatuze estuary. This is an environment that would have been eschewed for human settlement. Consequently no archaeological residues are anticipated to be impacted by the proposed development. No buildings, equipment or structures of historical significance occur within the study area.

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the surface of the Bluff and Berea Formation, Maputaland Group, because they have been bioturbated in the past and recently by natural vegetation and urban development. However, there is a small chance that trace fossils may occur in the aeolianites and sands so a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

8. RECOMMENDATIONS

It is unlikely that the proposed development will impact on any significant heritage resources. There is no heritage objection to the proposed development. It is, however, recommended that a Fossil Chance Finds Procedure be implemented for all excavations activities.

9. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
114493	Archaeological Specialist Reports	Gavin Anderson, Louise Anderson	21/01/2013	The Archaeological Survey of the Zulti North Mining Lease for Richards Bay Minerals, 2012 Annual Report
124672	HIA Phase 1		01/03/2013	HIA Mandlazini Agric-Village Sewer Network Installation
134665	HIA Letter of Exemption	Len van Schalkwyk, Elizabeth Wahl	20/06/2013	Application for Exemption from a Phase 1 Heritage Impact Assessment of the Proposed Widening of Medway Road and Associated Interchanges within Richards Bay, KwaZulu-Natal
138084	Archaeological Specialist Reports	Gavin Anderson	03/07/2012	Heritage Survey of the Proposed Aquadene Housing Project, Kwa-Zulu Natal
151204	HIA Letter of Exemption	Gavin Anderson		
162098	HIA Phase 1	Johnny Van Schalkwyk	01/09/2013	Cultural heritage impact assessment for THE PROPOSED SWAZILAND RAIL LINK, WESTERN SECTION, MPUMALANGA REGION
164094	Built Environment and Cultural Landscapes	Deshni Naicker	17/07/2015	DRAFT EIA REPORT: PROPOSED RICHARDS BAY PORT EXPANSION PROGRAMME WITHIN UMHLATHUZE LOCAL MUNICIPALITY IN KWA-ZULU NATAL PROVINCE
164257	Palaeontological Specialist Reports	Gideon Groenewald	15/02/2014	Paleontological desktop assessment for the proposed upgrade of the Davel to Nerston Rail Line in the Mpumalanga Province
164316	Palaeontological Specialist Reports	Gideon Groenewald	16/02/2014	Palaeontological Desktop Assessment for the proposed upgrade of the Golela to Nsezi Line in KwaZulu - Natal Province.
182105	HIA Letter of Exemption	Elizabeth Wahl	18/11/2014	Application for Exemption from a Phase 1 Heritage Impact Assessment of Proposed Decommissioning of the Legacy Landfills at The Bayside Aluminium Smelter, Richards Bay, KwaZulu-Natal, South Africa
270553	Heritage Impact Assessment Specialist Reports		24/04/2015	Heritage Screener for the Proposed 60MW Biomass Plant within the Ricahrds Bay IDZ, Umhlautze Local Munucipality, KwaZulu-Natal
274130	HIA Phase 1	Gavin Anderson	14/04/2015	RICHARDS BAY-NSEZI ACCESS ROAD, RICHARDS BAY, KWAZULU-NATAL
303819	AIA Phase 1	Gavin Anderson	09/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED ALTON SEWER PIPE UPGRADE
303885	AIA Phase 1	Gavin Anderson, Louise Anderson	01/09/2004	The Archaeological Survey Of The Richards Bay Minerals Mining Lease: August 2004
304138	AIA Phase 1	Gavin Anderson	13/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED BIRDSWOOD PRIMARY SCHOOL
305186	AIA Phase 1	Gavin Anderson	13/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED EAST CENTRAL ARTERIAL
305311	AIA Phase 1	Gavin Anderson	06/11/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED BOUBLING OF THE NORTH CENTRAL ARTERIAL, RICHARDS BAY

305321	HIA Phase 1	Gavin Anderson	16/05/2010	HERITAGE SURVEY OF THE PROPOSED RICHARDS BAY CENTRAL INDUSTRIAL AREA
305351	AIA Phase 1	Gavin Anderson	16/11/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED NEW INFRASTRUCTURE AT THE ARRIVAL YARD AT THE RICHARDS BAY COAL TERMINAL
309638	HIA Phase 1	Gavin Anderson	28/04/2009	HERITAGE SURVEY OF THE PROPOSED BIRDSWOOD SHOPPING CENTRE FOR MSA ENVIRONMENTAL, LEGAL & MINING SERVICES
309928	HIA Phase 1	Gavin Anderson, Louise Anderson	01/06/2009	HERITAGE SURVEY OF THE PROPOSED EXPANSION TO THE TRANSNET NATIONAL PORTS AUTHORITY, RICHARDS BAY.

SAHRIS: Baseline Heritage Study: Proposed Richards Bay Port Expansion. Prepared for AECOM. eThembeni. 2013

See SAHRIS: Construction of Berth 306 at the Port of Richards Bay: Removal of Ammonites from the Upper Maastrichtian (Cretaceous) Layer. A. van Jaarsveld. 2006.

See SAHRIS: Heritage Survey of the Proposed Expansion to the Transnet National Ports Authority, Richards Bay. Umlando, 2009.

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Groenewald. G. 2012. Unpublished Palaeotechnical Report for Amafa KwaZulu-Natali. Pietermaritzburg.

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Ovechkina, M. N 2012. Palaeontological Impact Assessment desktop study for the Richards Bay Port Expansion Programme. Unpublished report submitted to eThembeni Cultural Heritage.

The first record of Ostrea ungulata (von Schlotheim, 1813) (Bivalvia: Ostreoidea) from the Upper Maastrichian of KwaZulu, South Africa. African Natural History 4. 2005

Cretaceouss faunas from Zululand and Natal, South Africa. The ammonite subgenus Haviericeras (Gardeniceras) Matsumoto & Obata. 1955. Palaeont.afr. 2011.46:43-58.

Construction of Berth 306 at the Port of Richards Bay: Removal of Ammonites from the Upper Maastrichtian (Cretaceous) Layer. A. van Jaarsveld. 2006.

Bews, Neville. March 2019. PROPOSED WILMAR PROCESSING VEGETABLE OIL PIPELINE PORT OF RICHARDS BAY KWA ZULU-NATAL - BASIC SOCIAL IMPACT ASSESSMENT REPORT. Unpublished.

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APPENDICES

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APPENDIX 1: Archaeological Impact Assessment

Archaeological Impact Assessment

In terms of Section 38(8) of the NHRA for a

Proposed Development Of The Proposed Edible Oil Pipeline For Wilmar SA (Pty) Ltd, From Berth 706 / 707 / 708 To Rb IDZ Phase 1a, Richards Bay

Prepared by

CTS HERITAGE

In Association with

Savannah

And

eThembeni Heritage Consultants

March 2019

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

I Jenna Lavin and Len van Schalkwyk, as the appointed independent specialists hereby declare that wel:

• 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 and Len van Schalkwyk
Signature of the specialist

CTS Heritage and eThembeni Heritage Consultants
Name of company

1 March 2019
Date

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EXECUTIVE SUMMARY

The entire area of the Richards Bay Harbour precinct, prior to establishment, comprised extensive *Phragmitis* swamplands and mangrove and swamp forests associated with the Mhlatuze estuary. This is an environment that would have been eschewed for human settlement. Consequently no archaeological residues are anticipated. No buildings, equipment or structures of historical significance occur within the study area.

It is unlikely that the proposed development will impact on any significant heritage resources. There is no heritage objection to the proposed development.

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CONTENTS

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1. INTRODUCTION

1.1 Background Information on Project

Wilmar Processing (Pty) Ltd (Wilmar) are proposing the development of vegetable oil pipeline that will consist of 4 x 216mm-wide pipes, that will extend for ~2.6km within the Richard's Bay Port. The proposed development will consist of four (4) pipelines stacked vertically or in double rows, running side by side (depending on support and space restrictions) and will comprise of the following dimensions:

- Width: 216mm
- Total Length: ~2.6km.

Furthermore, the proposed development will include the following infrastructure:

- Steel pipes;
- Multiple duct access shafts;
- Overhead steel bridges;
- Site Offices and Maintenance Buildings, including workshop areas for maintenance;
- Temporary laydown areas;
- Fencing and access roads;
- and Security Offices.

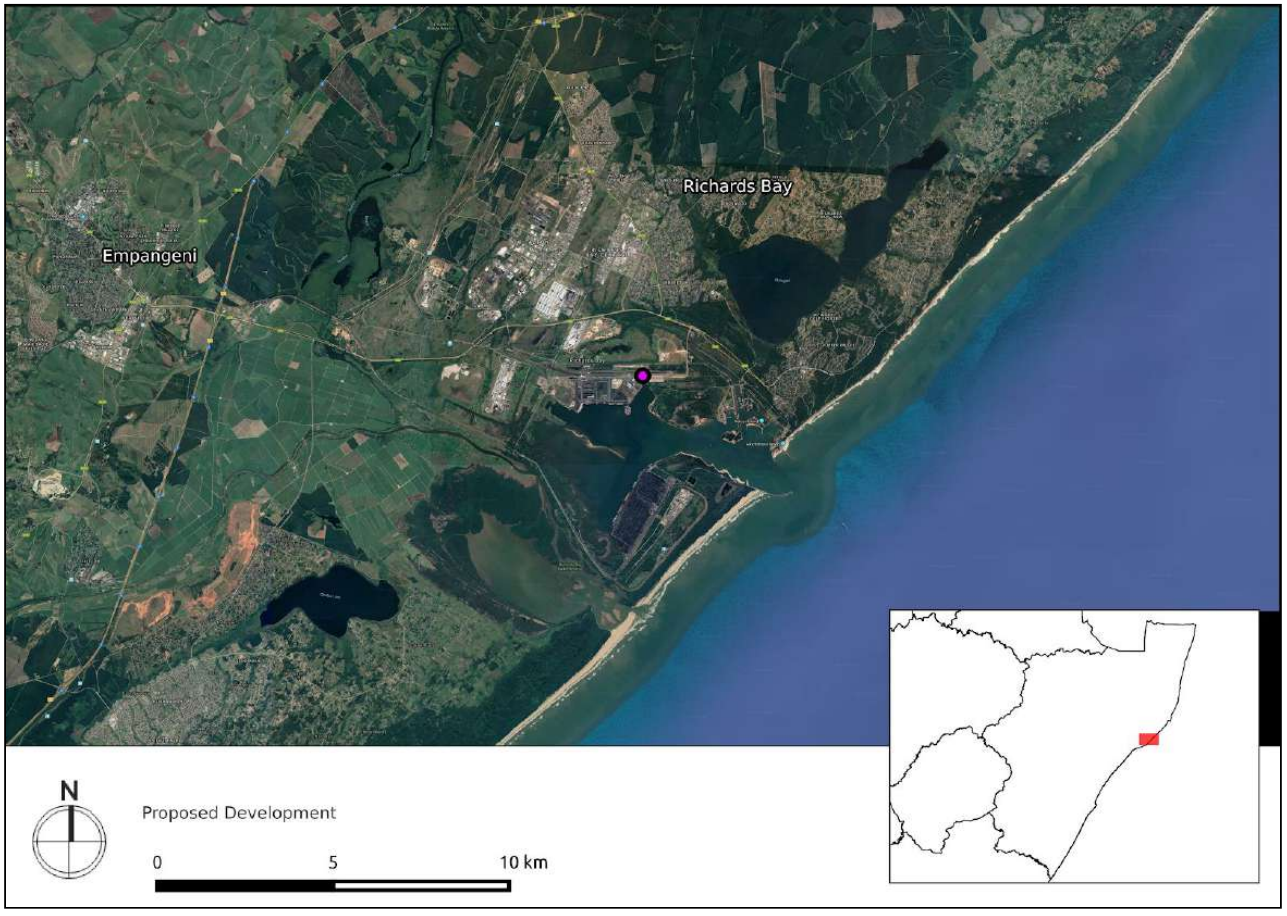

Figure 1.1: Satellite image indicating proposed location of development

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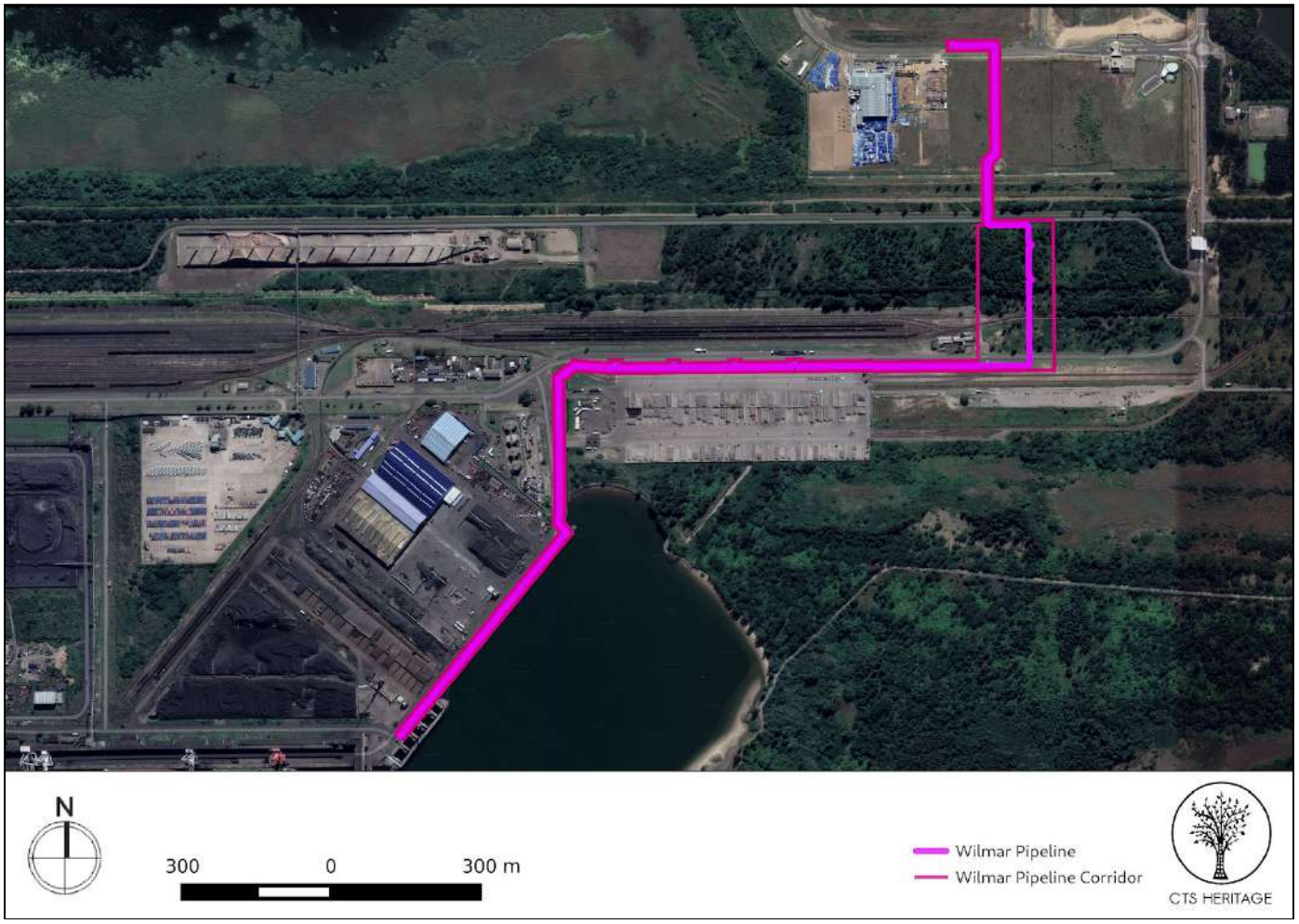

Figure 1.2: Close up satellite image indicating proposed location of development

1.2 Description of Property and Affected Environment

Richards Bay Harbour area has been previously extensively developed. During the 20th Century, Richards Bay was primarily a recreational fishing destination until establishment of the harbour and adjacent township began in the early 1970's. Inception of dredging of the Mhlatuze Estuary for the new harbour began in 1972. In 1974 a berm wall was constructed from dredge spoils to effectively separate the harbour development area from the proclaimed Richards Bay Nature Reserve, thus conserving the sensitive estuarine habitat.

All dock-side infrastructure is located on reclaimed swamplands built up by harbour dredging spoils and imported fill materials.

The entire area of the Richards Bay Harbour precinct, prior to establishment, comprised extensive *Phragmitis* swamplands and mangrove and swamp forests associated with the Mhlatuze estuary. This is an environment that would have been eschewed for human settlement. Consequently no archaeological residues are anticipated. No buildings, equipment or structures of historical significance occur within the study area.

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2. METHODOLOGY

2.1 Purpose of Archaeological Study

The purpose of this archaeological study is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) in terms of impacts to archaeological resources.

2.2 Summary of steps followed

- An archaeologist conducted a survey of the site and its environs on 5 December 2018 to determine what archaeological resources are likely to be impacted by the proposed development.
- 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.

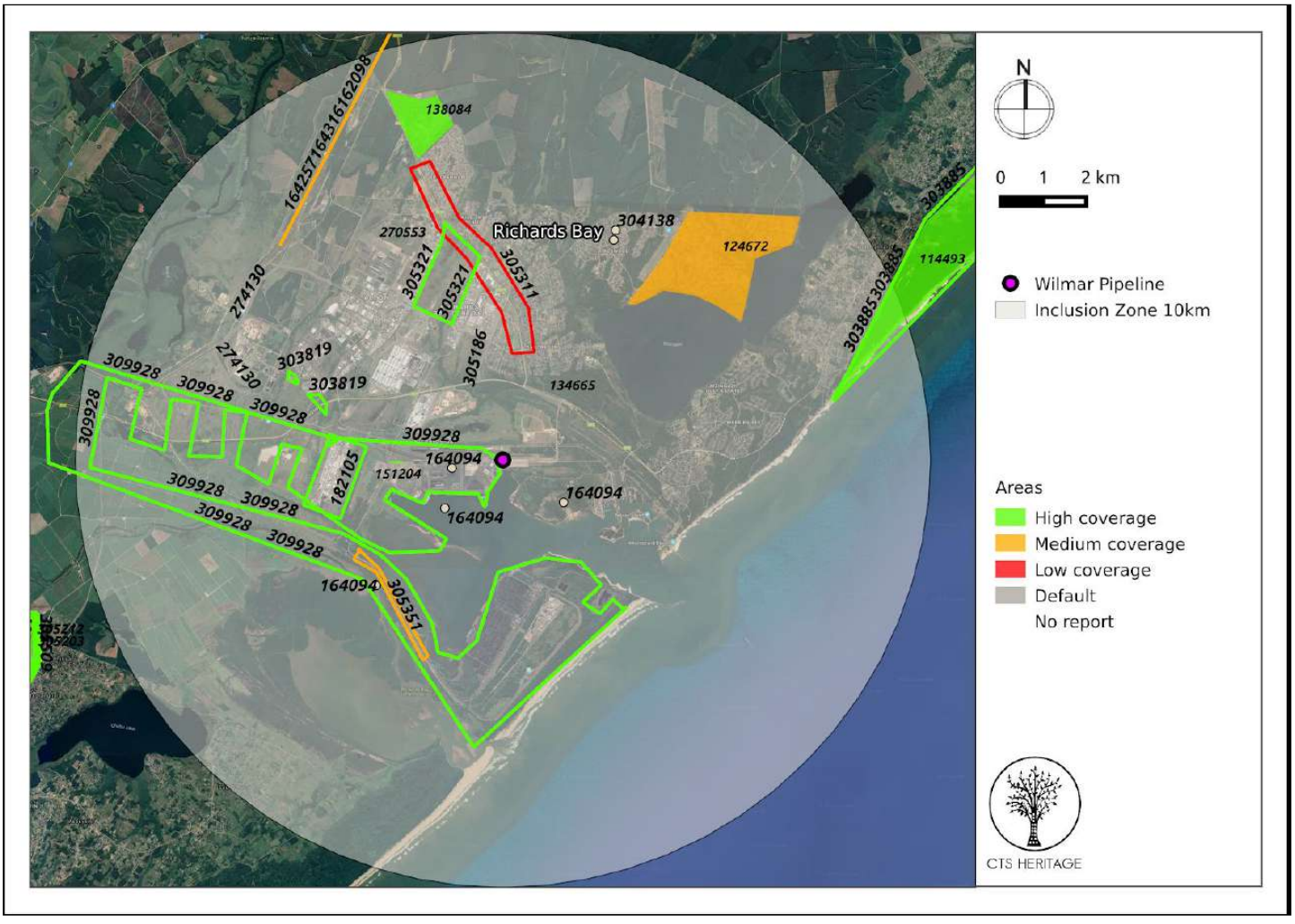

Figure 2: Close up satellite image indicating proposed location of development in relation to heritage studies previously conducted

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2.3 Constraints & Limitations

Although access to the area proposed for development is limited and highly managed for security reasons, no constraints or limitations for this assessment were experienced.

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

Richard's Bay began as a makeshift harbour established during the Anglo-Zulu War of 1879. The town was laid out on the shores of the lagoon in 1954 and proclaimed a town in 1969. In 1976 Richards Bay harbour was converted into a deep water harbour with railway and an oil/gas pipeline linking the port to Johannesburg. In 1965 the South African Government decided to build a deep-sea harbour at Richard's Bay which was completed on 1 April 1976. According to Anderson (2009, SAHRIS NID 309928), "Port Durnford had been used since the 1870s as a regular port by the British Navy. The Richards Bay Harbour is north of this port that was originally envisaged in 1902. The environment surrounding the harbour has been heavily impacted by the original harbour construction in the early 1970s. The harbour dredged the deep Thulazihleka Lake and cleared areas to create a harbour entrance at the Mhlatuze River mouth. The lake was divided into two parts with the southern part of the lake becoming a sanctuary with its own newly created river mouth south of the harbour entrance… Subsequent to the harbour being built, the wetlands to the south of the harbour increased and large drainage canals have also been built. Some of these canals are part of the original rivers. There has also been a lot of industrial activity in the general area. The rest of the study area is under sugarcane agriculture with electrical, rail, gas pipeline, and vehicle servitudes. The general study area has been severely impacted by other activities."

Further, according to Anderson (2009), "Several archaeological and palaeontological sites have been recorded in the surrounding area: both inland and along the coast, and within a 10km radius of the development area. The archaeological surveys for Richards Bay Minerals clearly show that the coastal dune system is very sensitive in terms of archaeological sites (over 350 sites have been recorded in the mining lease). The construction of the Berth 306 revealed an important Cretaceous Layer in the harbour area." Anderson (2009) completed a thorough field assessment of the proposed Richard's Bay Harbour expansion area. He identified 9 archaeological sites, 7 of low significance, one of low-moderate significance and one fossil site of high significance. The proposed pipeline does not impact on any of these identified sites (Figure 3). In addition, the area proposed for development does fall within Anderson's (2009) identified locations of sensitive archaeological areas that require monitoring, sampling and/or excavations.

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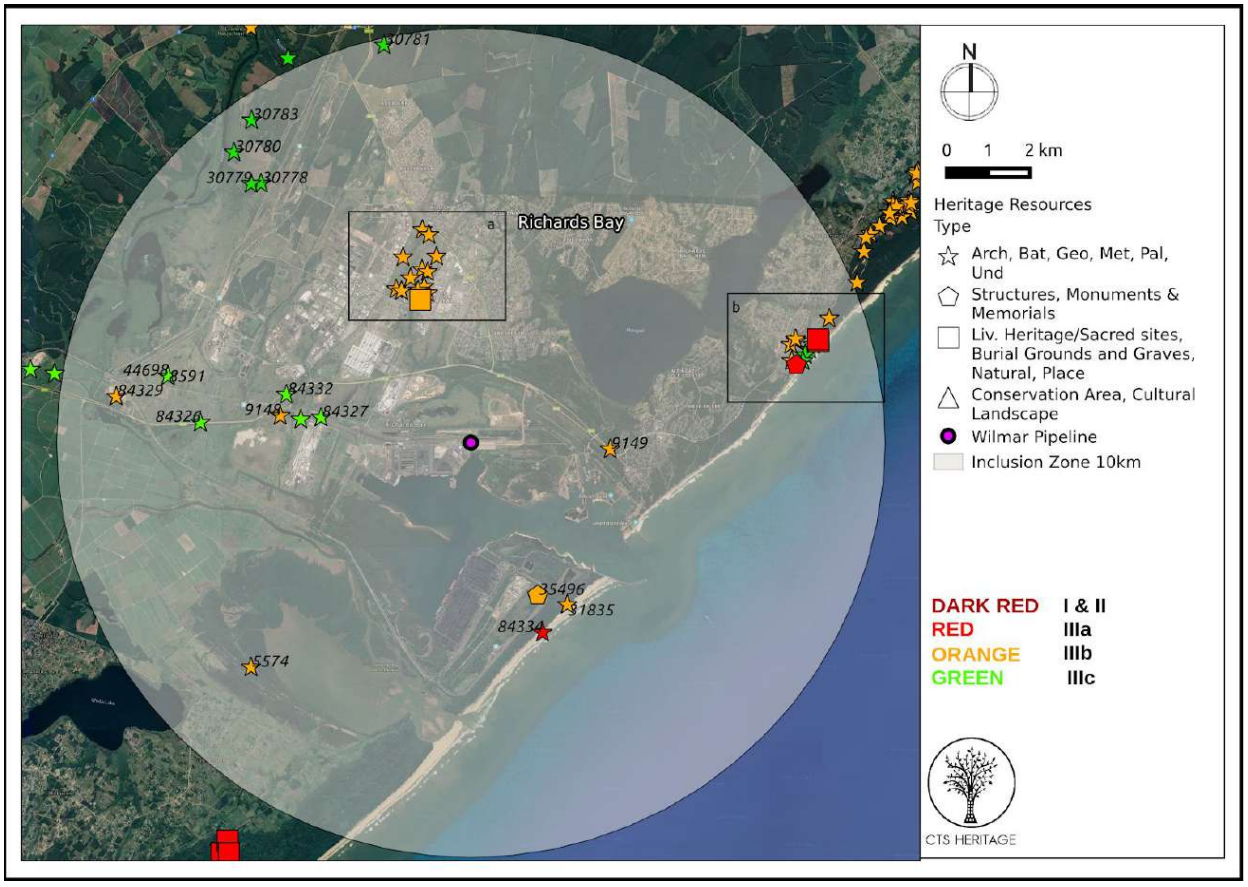

Figure 4. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated

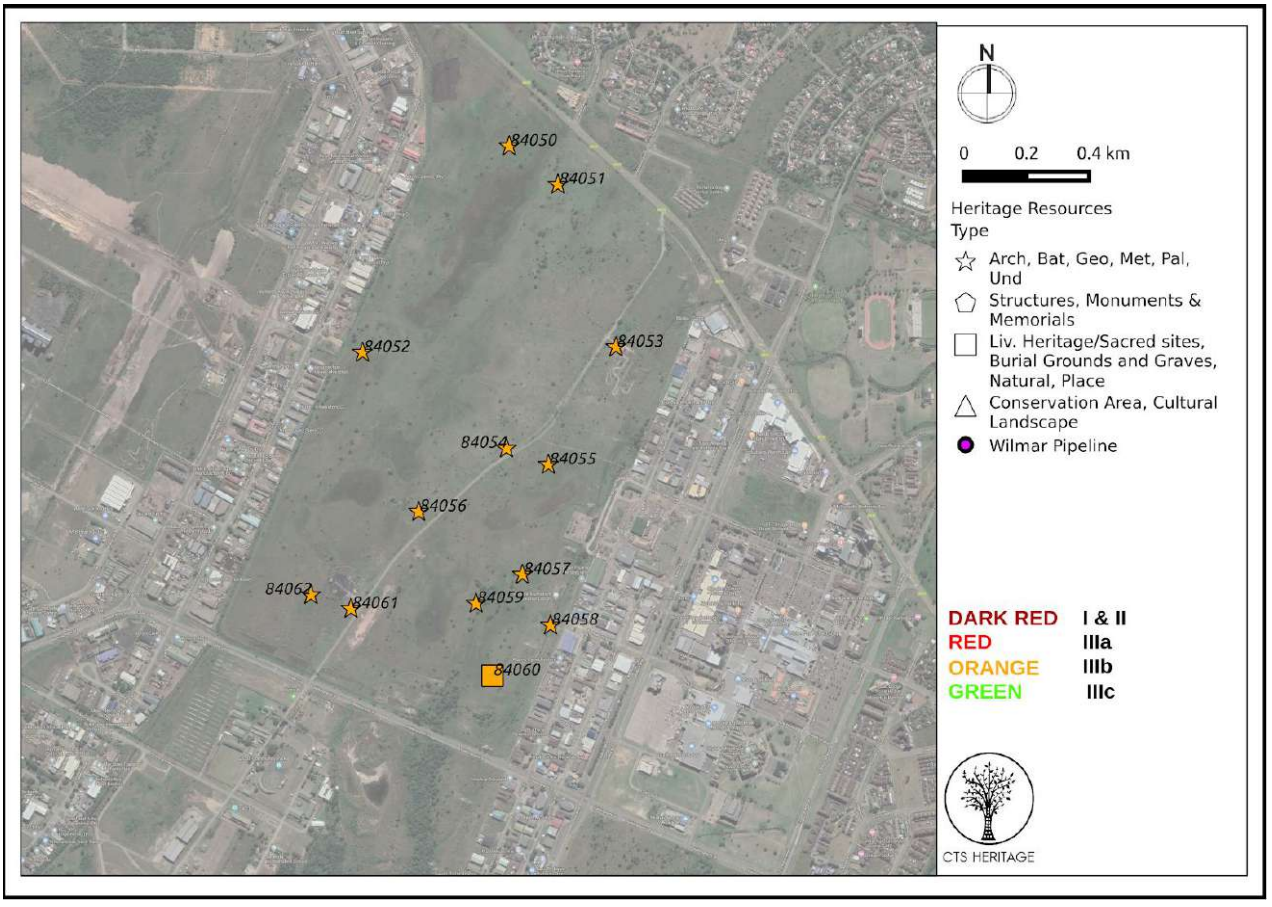

Figure 4a. Inset

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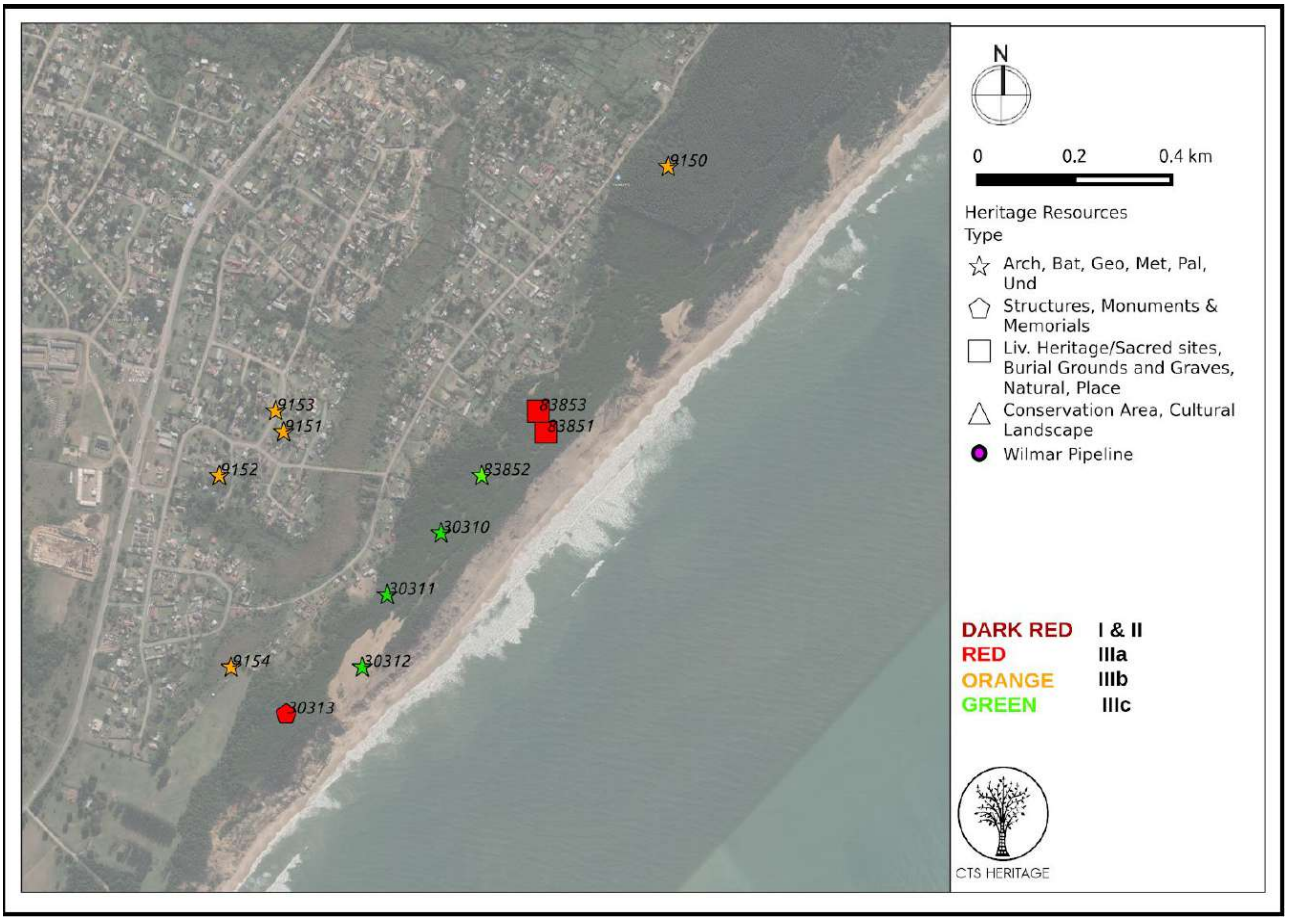

Figure 4b. Inset

4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Field Assessment

eThembeni have an intimate knowledge of the Richards Bay Harbour precinct, having conducted an HIA for auxiliary railway-lines to the coal terminal in 2004 and having compiled a Baseline Heritage Study for the proposed Richards Bay Port Expansion in 2013. Pertinent here too is the palaeontological monitoring conducted for the construction of the Berth 306 within the Port and the HIA conducted for the proposed expansions to the Port in 2009. All attest to the low sensitivity of heritage resources within the Richards Bay Harbour precinct.

No heritage resources were identified during the field assessment.

4.2 Archaeological Resources identified

No archaeological or other heritage resources of any significance were identified during the field assessment.

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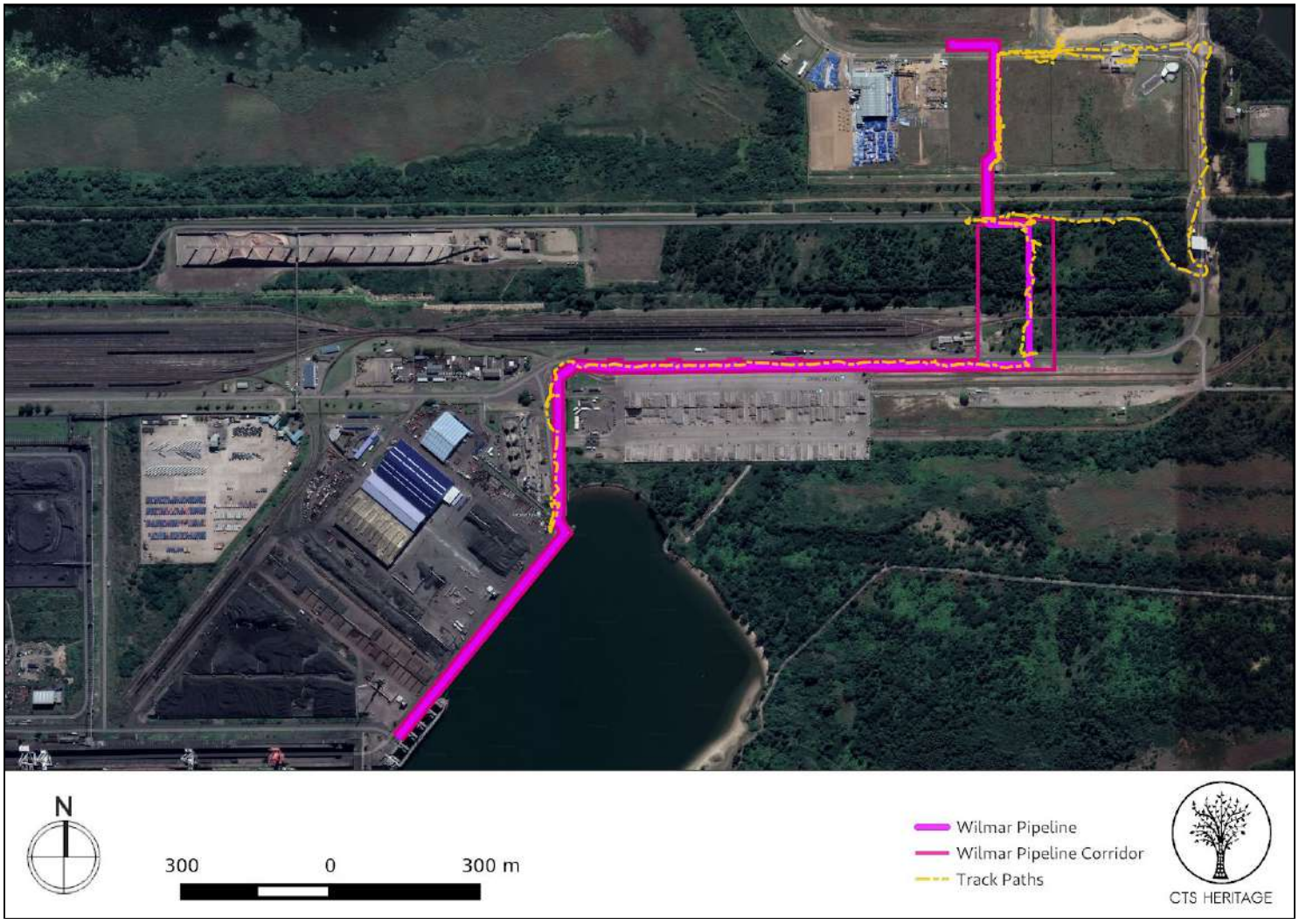

Figure 6: Overall track paths of foot survey

4.3 Selected photographic record

Figure 7.1 Hygrophilous grasslands re-established over dredge spoil

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Figure 7.2 Infrastructure layout on grasslands. Note emerging pioneer Casuarina trees on disturbed basement.

Figure 7.3 V drain channels to drain previous swampland.

Figure 7.4 Fern thicket below *Pinus* and *Casuarina* trees planted to drain swampland

Figure 7.5 *Chrythsanthimoides monilifera* and *Casuarina* pioneer thicket on previous dredge spoil

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Figure 7.6 Tracks across hygrophilous grassland and Figure 7.7 Dredge spoil showing marine shells from dredge and fill actions during establishment of harbour c. 1970's

Figure 7.8 Aeolian dune sand substrate fringing original Umhlathuze estuary.

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Figure 7.9 Existing infrastructure along pipeline route

Figure 7.10 Existing infrastructure along pipeline route

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Figure 7.11 Existing infrastructure along pipeline route

Figure 7.12 Existing infrastructure along pipeline route

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Figure 7.13 Pipeline route along existing quaysides

Figure 7.14 Pipeline route along existing quaysides

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5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Archaeological Resources

As no heritage resources were identified during the field assessment, and as the overall heritage sensitivity of the Richards Bay Harbour precinct is LOW, it is unlikely that the proposed development of the Wilmar Pipeline will impact on any significant heritage resources.

6. CONCLUSION AND RECOMMENDATIONS

The entire area of the Richards Bay Harbour precinct, prior to establishment, comprised extensive *Phragmitis* swamplands and mangrove and swamp forests associated with the Mhlatuze estuary. This is an environment that would have been eschewed for human settlement. Consequently no archaeological residues are anticipated. No buildings, equipment or structures of historical significance occur within the study area.

The proposed pipeline is seated at current ground level or will be sub-surfaced within dredge spoil and will consequently have no impact on the fossil bearing strata below. As no excavation of trenches is planned and the pipe is to be above ground except under roads and rail lines, it is very unlikely that significant palaeontological heritage will be impacted by the proposed development. It is, however, recommended that a Chance Finds Procedure be implemented for all excavations activities.

It is unlikely that the proposed development will impact on any significant heritage resources. There is no heritage objection to the proposed development.

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7. REFERENCES

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
114493	Archaeological Specialist Reports	Gavin Anderson, Louise Anderson	21/01/2013	The Archaeological Survey of the Zulti North Mining Lease for Richards Bay Minerals, 2012 Annual Report
124672	HIA Phase 1		01/03/2013	HIA Mandlazini Agric-Village Sewer Network Installation
134665	HIA Letter of Exemption	Len van Schalkwyk, Elizabeth Wahl	20/06/2013	Application for Exemption from a Phase 1 Heritage Impact Assessment of the Proposed Widening of Medway Road and Associated Interchanges within Richards Bay, KwaZulu-Natal
138084	Archaeological Specialist Reports	Gavin Anderson	03/07/2012	Heritage Survey of the Proposed Aquadene Housing Project, Kwa-Zulu Natal
151204	HIA Letter of Exemption	Gavin Anderson		
162098	HIA Phase 1	Johnny Van Schalkwyk	01/09/2013	Cultural heritage impact assessment for THE PROPOSED SWAZILAND RAIL LINK, WESTERN SECTION, MPUMALANGA REGION
164094	Built Environment and Cultural Landscapes	Deshni Naicker	17/07/2015	DRAFT EIA REPORT: PROPOSED RICHARDS BAY PORT EXPANSION PROGRAMME WITHIN UMHLATHUZE LOCAL MUNICIPALITY IN KWA-ZULU NATAL PROVINCE
164257	Palaeontological Specialist Reports	Gideon Groenewald	15/02/2014	Paleontological desktop assessment for the proposed upgrade of the Davel to Nerston Rail Line in the Mpumalanga Province
164316	Palaeontological Specialist Reports	Gideon Groenewald	16/02/2014	Palaeontological Desktop Assessment for the proposed upgrade of the Golela to Nsezi Line in KwaZulu - Natal Province.
182105	HIA Letter of Exemption	Elizabeth Wahl	18/11/2014	Application for Exemption from a Phase 1 Heritage Impact Assessment of Proposed Decommissioning of the Legacy Landfills at The Bayside Aluminium Smelter, Richards Bay, KwaZulu-Natal, South Africa
270553	Heritage Impact Assessment Specialist Reports		24/04/2015	Heritage Screener for the Proposed 60MW Biomass Plant within the Ricahrds Bay IDZ, Umhlautze Local Munucipality, KwaZulu-Natal
274130	HIA Phase 1	Gavin Anderson	14/04/2015	RICHARDS BAY-NSEZI ACCESS ROAD, RICHARDS BAY, KWAZULU-NATAL
303819	AIA Phase 1	Gavin Anderson	09/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED ALTON SEWER PIPE UPGRADE
303885	AIA Phase 1	Gavin Anderson, Louise Anderson	01/09/2004	The Archaeological Survey Of The Richards Bay Minerals Mining Lease: August 2004
304138	AIA Phase 1	Gavin Anderson	13/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED BIRDSWOOD PRIMARY SCHOOL
305186	AIA Phase 1	Gavin Anderson	13/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED EAST CENTRAL ARTERIAL
305311	AIA Phase 1	Gavin Anderson	06/11/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED BOUBLING OF THE NORTH CENTRAL ARTERIAL, RICHARDS BAY
305321	HIA Phase 1	Gavin Anderson	16/05/2010	HERITAGE SURVEY OF THE PROPOSED RICHARDS BAY CENTRAL INDUSTRIAL AREA
305351	AIA Phase 1	Gavin Anderson	16/11/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED NEW INFRASTRUCTURE AT THE ARRIVAL YARD AT THE RICHARDS BAY COAL TERMINAL
309638	HIA Phase 1	Gavin Anderson	28/04/2009	HERITAGE SURVEY OF THE PROPOSED BIRDSWOOD SHOPPING CENTRE FOR MSA ENVIRONMENTAL, LEGAL & MINING SERVICES
309928	HIA Phase 1	Gavin Anderson,	01/06/2009	HERITAGE SURVEY OF THE PROPOSED EXPANSION TO THE TRANSNET NATIONAL PORTS AUTHORITY, RICHARDS BAY.

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		Louise Anderson		

SAHRIS: Baseline Heritage Study: Proposed Richards Bay Port Expansion. Prepared for AECOM. eThembeni. 2013

See SAHRIS: Construction of Berth 306 at the Port of Richards Bay: Removal of Ammonites from the Upper Maastrichtian (Cretaceous) Layer. A. van Jaarsveld. 2006.

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AdV Minnaar. History of Richards Bay. HSRC Research Note No.17. 1985. Pretoria.

Groenewald. G. 2012. Unpublished Palaeotechnical Report for Amafa KwaZulu-Natali. Pietermaritzburg.

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Ovechkina, M. N 2012. Palaeontological Impact Assessment desktop study for the Richards Bay Port Expansion Programme. Unpublished report submitted to eThembeni Cultural Heritage.

The first record of Ostrea ungulata (von Schlotheim, 1813) (Bivalvia: Ostreoidea) from the Upper Maastrichian of KwaZulu, South Africa. African Natural History 4. 2005

Cretaceouss faunas from Zululand and Natal, South Africa. The ammonite subgenus Hauericeras (Gardeniceras) Matsumoto & Obata. 1955. Palaeont.afr. 2011.46:43-58.

Construction of Berth 306 at the Port of Richards Bay: Removal of Ammonites from the Upper Maastrichtian (Cretaceous) Layer.
A. van Jaarsveld. 2006.

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APPENDIX 2: Desktop Palaeontological Assessment

Palaeontological Impact Assessment for the proposed edible oil pipeline, Savannah-Wilmar, Richards Bay, KwaZulu Natal

Desktop Study

For

CTS Heritage

12 March 2019

Prof Marion Bamford
Palaeobotanist
P Bag 652, WITS 2050
Johannesburg, South Africa
Marion.bamford@wits.ac.za

Expertise of Specialist

The Palaeontologist Consultant is: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 30 years research; 22 years PIA studies

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by CTS Heritage, Cape Town, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

Executive Summary

A palaeontological Impact Assessment was requested for the proposed construction of To comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed project.

The proposed site lies on the aeolianites and sands of the Maputaland Group, most likely the Port Durnford, Berea or Bluff Formations of Pleistocene age. There is a small chance that below the surface (not on the disturbed or vegetated surface) fossils could occur. The fossils could be trace fossils, invertebrates such as shells, vertebrate bones or plant fossils such as wood or pollen. Once excavations commence a Chance Find Protocol should be followed and if any fossils are recovered then the responsible person must contact a professional palaeontologist to assess the significance of the fossils. Based on this information it is recommended that no palaeontological site visit is required and the proposed project can proceed.

Table of Contents

1. Background

A palaeontological Impact Assessment was requested for the proposed development of an edible oil pipeline for Wilmar SA (Pty) Ltd, from Berth 706 / 707 / 708 to Richards Bay IDZ, Phase 1a, Richards Bay, KwaZulu Natal.

Information on Project:
Wilmar Processing (Pty) Ltd (Wilmar) are proposing the development of a vegetable oil pipeline that will consist of 4 x 216mm-wide pipes that will extend for ~2.6km within the Richard's Bay Port. The proposed development will consist of four pipelines stacked vertically or in double rows, running side by side (depending on support and space restrictions) and will comprise of the following dimensions:

Width: 216mm
Total Length: ~2.6km.

Furthermore, the proposed development will include the following infrastructure:

Steel pipes;
Multiple duct access shafts;
Overhead steel bridges;
Site Offices and Maintenance Buildings, including workshop areas for maintenance;
Temporary laydown areas;
Fencing and access roads;
and Security Offices.

Property and Affected Environment:
Richards Bay Harbour area has been previously extensively developed. During the 20th Century, Richards Bay was primarily a recreational fishing destination until the establishment of a harbour and adjacent township began in the early 1970's. Inception of dredging of the Mhlatuze Estuary for the new harbour began in 1972. In 1974 a berm wall was constructed from dredge spoils to effectively separate the harbour development area from the proclaimed Richards Bay Nature Reserve, thus conserving the sensitive estuarine habitat. All dock-side infrastructure is located on reclaimed swamplands built up by harbour dredging spoils and imported fill materials.

The entire area of the Richards Bay Harbour precinct, prior to establishment, comprised extensive *Phragmites* marshlands and mangrove and swamp forests associated with the Mhlatuze estuary. This is an environment that would have been unsuitable for human settlement. Consequently no archaeological residues are anticipated. No buildings, equipment or structures of historical significance occur within the study area.

To comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed project.

Table 1: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (2014)

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 must contain:	**Relevant section in report**
Details of the specialist who prepared the report	Appendix A
The expertise of that person to compile a specialist report including a curriculum vitae	Appendix A
A declaration that the person is independent in a form as may be specified by the competent authority	Page 1
An indication of the scope of, and the purpose for which, the report was prepared	Section 1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section ii
An identification of any areas to be avoided, including buffers	N/A
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;	N/A
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section
Any mitigation measures for inclusion in the EMPr	N/A
Any conditions for inclusion in the environmental authorisation	N/A
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	N/A
If the opinion is that the proposed activity 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	N/A

A description of any consultation process that was undertaken during the course of carrying out the study	N/A
A summary and copies if any comments that were received during any consultation process	N/A
Any other information requested by the competent authority.	N/A

Figure 1: Google Earth map of the proposed route for the edible oil pipeline for Wilmar SA (Pty) Ltd, from Berth 706 / 707 / 708 to Richards Bay IDZ, Phase 1a, Richards Bay, KwaZulu Natal.

2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and
4. Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

3. Geology and Palaeontology

i. Project location and geological context

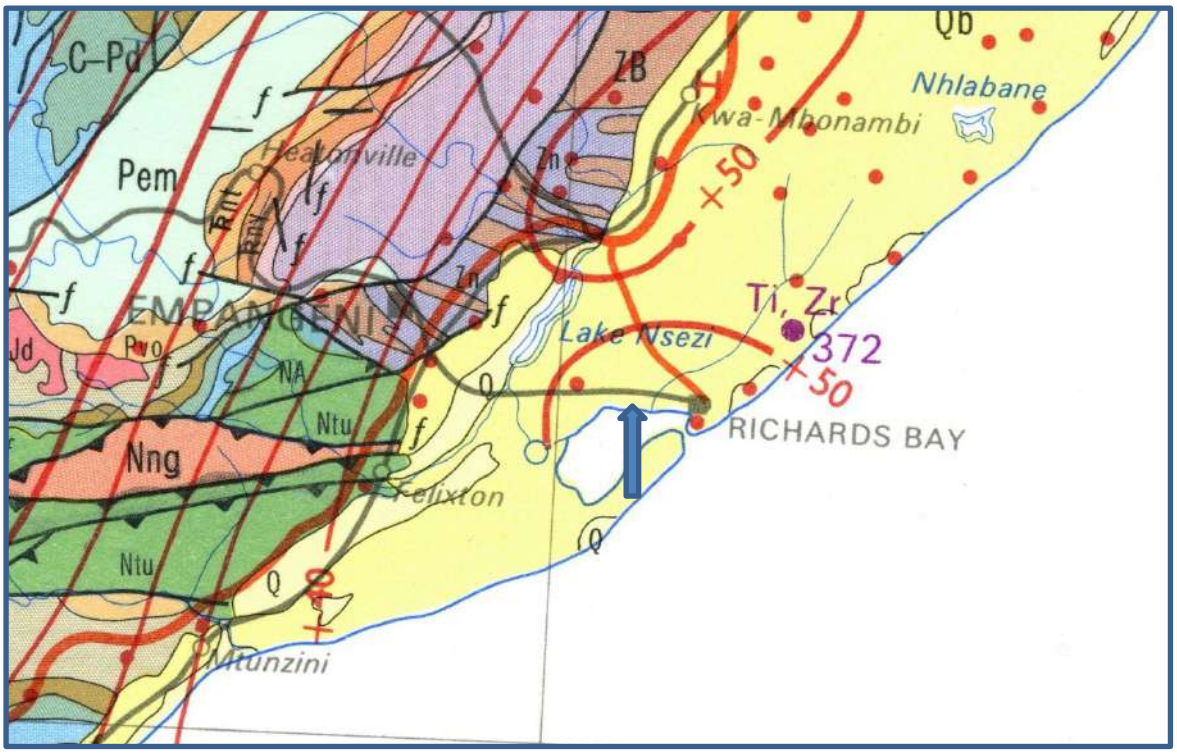

Figure 2: Geological map of the area around Richards Bay harbour. The location of the proposed project is indicated with the arrow. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Table 2: Explanation of symbols for the geological map and approximate ages (Cornell et al., 2006. Johnson et al., 2006; Marshall, 2006; Roberts et al., 2006). SG = Supergroup; Fm = Formation.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Neogene, ca 25 Ma to present
Qb	Bluff, Berea Fm, Maputaland Group, Quaternary	Aeolianite, sand, clay, limestone	Mio-Plio-Pleistocene Ca last 25 Ma
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Pem	Emakwazini Fm, Beaufort Group, Karoo Supergroup	Shales	Early Permian, Early Ecca, ca 240 Ma
C-Pd	Dwyka	Tillite, sandstone, mudstone shale	Late Carboniferous – Early Permian
Ntu	Tugela Group, Tugela Terrane	Amphibolite, gneiss, schist	Ca 1250 – 1135 Ma
ZB	Basement complex	Potassic granite, granodiorite	>3200 Ma

The oldest rocks are the basement rocks of the Barberton Greenstone Belt. Then there are ophiolites of oceanic affinity that were thrust northwards onto the southern flank of the Kaapvaal craton (Cornell et al., 2006). There are a number of plutons of the Namaqua-Natal Province along the coast from Margate to the Tugela River, for example the Tugela Group of the Tugela Terrane. These rocks are also highly metamorphosed. The Natal Group sediments were probably derived from the Pan-African orogenic belt in southern Mozambique and deposited in the Natal Trough during the Ordovician (ca 500-450 Ma ago) (Marshall, 2006). Palaeoenvironmental indications are that there were a series of cycles of uplift, erosion and uplift. Fluvial activity and debris flow processes would have been instrumental in the deposition of the various conglomerate members.

The Dwyka Group sediments unconformably overlie the Natal Group rocks (Johnson et al., 2006). This group comprises a number of different facies (massive diamictites, stratified diamictites, conglomerates, sandstones, mudrocks) and represent a series of ice formation and melts (Isbell et al,. 2012) that occurred throughout Gondwana during the Carboniferous to Early Permian when the polar ice sheets formed and melted.

Emakwazini Formation shales and mudrocks represent a fluvio-deltaic deposit formed by meandering rivers and different deltaic environments (Johnson et al., 2006; Bordy and Prevec, 2008). Coals are known to occur in this formation.

The project site lies on the youngest rocks in the area, the Quaternary aeolianites, sand, clay and limestone of the Bluff and Berea Formations of the Maputaland Group and they extend for many kilometres along the coast from Scottburgh to southern Mozambique.

ii. Palaeontological context

The palaeontological sensitivity of the area under consideration is presented in Figure 4. Tugela Terrane amphibolites, gneisses and schists are igneous and have been metamorphosed so would not preserve any fossils. Conglomerates and sands are reworked and do not contain primary fossils. Furthermore the Natal group rocks are too old for body fossils as they had not evolved by then (Plumstead, 1969). Jurassic dolerite does not preserve fossils as it is igneous in origin and would have destroyed any fossils that might have occurred in the Karoo sediments through which they intruded. The aeolianites and sands of the Berea and Bluff Quaternary sediments do sometimes preserve fossils but along the Natal coast these are restricted to the Port Durnford Formation which does not occur in this site.

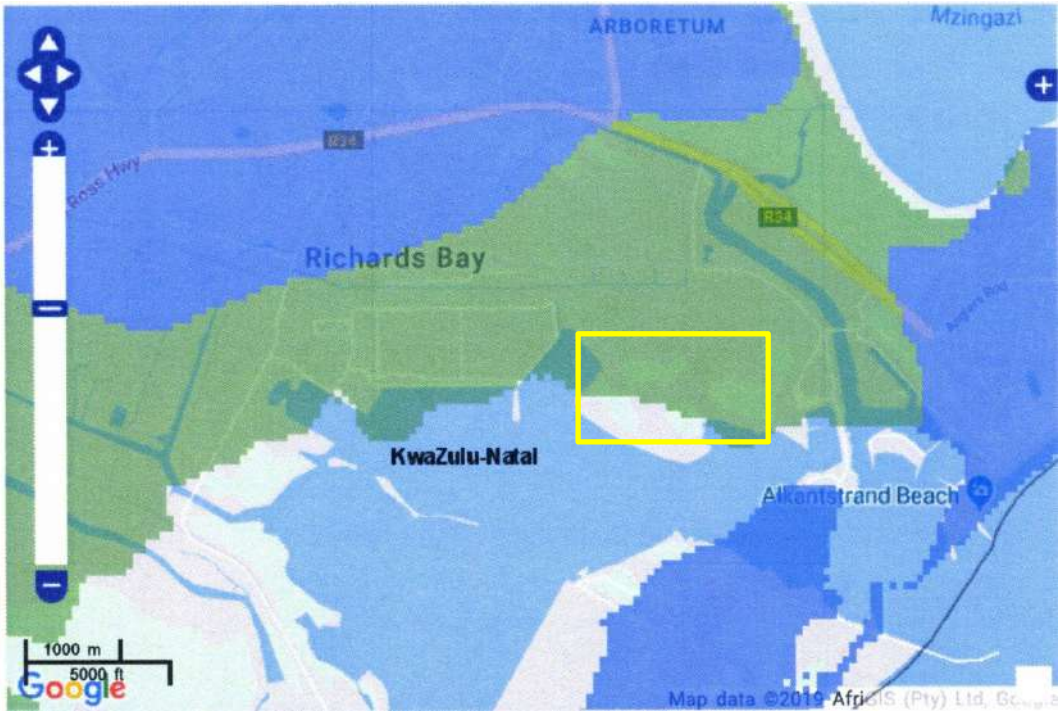

Figure 3: SAHRIS palaeosensitivity map for the proposed edible oil pipeline indicated within the yellow rectangle. Colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

The Maputuland Group occurs along the coast from Durban to Mozambique and comprises a number of Formations: according to Du Preez and Wolmarans, 1986, in Groenewald, 2012, there are five, namely the Uloa, Muzi, Port Durnford, Bluff and Berea Formations. However, according to Roberts et al. (2006, p 608) there are eight formations, also from base to top, the Uloa, Umkwelane, Berea-type red sand (informal

unit), Port Durnford, Kosi Bay, Isipingo, KwaMbonambi and Sibayi Formations. The geological map indicates that the coastal margin around Richards Bay is “Qb” or Bluff Formation so there is some confusion.

Confining the geological interpretation to the members of the Maputaland Group that occur around Richards Bay, (following Roberts et al., 2006, from older to younger) it is likely that the following fossils could occur in the footprint of the development:

Berea-type red sand informal formation (weathered calcareous deposits) – no fossils.

Port Durnford Formation (Early to Late Pleistocene; carbonaceous muds, lignites and sand) – fossil burrows; terrestrial vertebrates such as hippopotamus, buffalo, antelope, rhinoceros and elephant; marine fossils including crustaceans and fish remains, foraminifera, marine molluscs and fragments of turtle and crocodile; lignite with pollen and fossil wood.

Kosi Bay Formation (Late Pleistocene; non-calcareous uncemented dune sands) – fossil wood fragments e.g *Syzygium* sp, and pollen.

4. Impact assessment

An assessment of the potential impacts to possible palaeontological resources considers the criteria encapsulated in Table 3:

TABLE 3A: CRITERIA FOR ASSESSING IMPACTS

PART A: DEFINITION AND CRITERIA		
Criteria for ranking of the SEVERITY/NATURE of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national
PROBABILITY	**H**	Definite/ Continuous
	M	Possible/ frequent

(of exposure to impacts)	**L**	Unlikely/ seldom

TABLE 3B: IMPACT ASSESSMENT

PART B: ASSESSMENT		
SEVERITY/NATURE	**H**	-
	M	-
	L	There is a small chance that trace fossils (burrows), vertebrates, invertebrates or plants could occur in the Bluff Formation in the sands along the coast but would be difficult to find in the heavily vegetated or disturbed areas. The impact would be very unlikely.
	L+	-
	M+	-
	H+	-
DURATION	**L**	-
	M	-
	H	Where manifest, the impact will be permanent.
SPATIAL SCALE	**L**	Since the only possible fossils within the area would be trace fossils, invertebrates, vertebrates or plants buried in the sands, the spatial scale will be localised within the site boundary.
	M	-
	H	-
PROBABILITY	**H**	**-**
	M	**-**
	L	It is extremely unlikely that any trace fossils would be found intact in the vegetated site and contructed site. Other fossils may be exposed when excavations commence but would not be visible on the disturbed surface. Nonetheless a chance find protocol should be added to the eventual EMPr.

Based on the nature of the project, surface activities may impact upon the fossil heritage if preserved in the development footprint. The geological structures suggest that the rocks could possibly contain invertebrate trace fossils but these are likely to have been disturbed by the vegetation and construction of the harbour in the 1970s. This applies to all the other fossil forms. Since there is a small chance that fossils from the Maputaland Group could occur here a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage resources is extremely low. None has been reported from this site to date.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the calcareous sands, aeolianites, lignites, sandstones and sands are typical for the country and could contain trace fossils, fossil plant, insect, invertebrate and vertebrate material. As the area is heavily vegetated in parts and disturbed in other parts by urban development, construction of the

harbour and dredging of the bay to build the harbour, fossils would not be visible or well preserved on the surface. They may be present below the surface and would only become evident once excavations begin.

6. Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is extremely unlikely that any fossils would be preserved in the surface of the Bluff and Berea Formation, Maputaland Group, because they have been bioturbated in the past and recently by natural vegetation and urban development. However, there is a small chance that trace fossils may occur in the aeolianites and sands so a Fossil Chance Find Protocol should be added to the EMPr: if fossils are found once excavations have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

7. References

Bordy, E.M., Prevec, R. 2008. Sedimentology, palaeontology and palaeo-environments of the Middle (?) to Upper Permian Emakwezini Formation (Karoo Supergroup, South Africa). South African Journal of Geology 111, 429-458.

Cornell, D.H., Thomas, R.J., Moen, H.F.G., Reid, D.L., Moore, J.M., Gibson, R.L., 2006. The Namaqua-Natal Province. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 325-379.

Groenewald, G. 2012. Palaeontological Technical report for KwaZulu Natal, AMAFA. 61 pages.

Johnson, M.R., van Vuuren, C.J., Visser, J.N.J., Cole, D.I., Wickens, H.deV., Christie, A.D.M., Roberts, D.L., Brandl, G., 2006. Sedimentary rocks of the Karoo Supergroup. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 461 – 499.

Marshall, G.G.A., 2006. The Natal Group. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 433-441.

Roberts, D.L., Botha, G.A., Maud, R.R., Pether, J., 2006. Coastal Cenozoic deposits. In: Johnson, M.R., Anhaeusser, C.R. and Thomas, R.J., (Eds). The

Geology of South Africa. Geological Society of South Africa, Johannesburg / Council for Geoscience, Pretoria. Pp 605-628.

8. Chance Find Protocol

Monitoring Programme for Palaeontology – to commence once the excavations begin.

1. The following procedure is only required if fossils are seen on the surface and when excavations for the pipeline commence.
2. When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (trace fossils, burrows, tracks, bones, shells, plants) should be put aside in a suitably protected place. This way the excavation activities will not be interrupted.
3. Photographs of similar fossils can be provided to the developer to assist in recognizing them in the shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Any fossils that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site an AMAFA permit must be obtained. Annual reports must be submitted to AMAFA as required by the relevant permits.
7. If no good fossil material is recovered then the site inspections by the palaeontologist will not be necessary. Annual reports by the palaeontologist must be sent to SAHRA.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

Appendix A – Details of specialist

Curriculum vitae (short) - Marion Bamford PhD
January 2019

I) Personal details

Surname : **Bamford**
First names : **Marion Kathleen**
Present employment : Professor; Director of the Evolutionary Studies Institute.
Member Management Committee of the NRF/DST Centre of
Excellence Palaeosciences, University of the Witwatersrand,
Johannesburg, South Africa-
Telephone : +27 11 717 6690
Fax : +27 11 717 6694
Cell : 082 555 6937
E-mail : marion.bamford@wits.ac.za ; marionbamford12@gmail.com

ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) Professional qualifications

Wood Anatomy Training (overseas as nothing was available in South Africa):
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards
International Association of Wood Anatomists - First enrolled: January 1991
International Organization of Palaeobotany – 1993+
Botanical Society of South Africa
South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
SASQUA (South African Society for Quaternary Research) – 1997+
PAGES - 2008 –onwards: South African representative
ROCEEH / WAVE – 2008+
INQUA – PALCOMM – 2011+onwards

vii) Supervision of Higher Degrees

All at Wits University

Degree	Graduated/ completed	Current
Honours	6	1
Masters	8	1
PhD	10	2
Postdoctoral fellows	9	3

viii) Undergraduate teaching

Geology II – Palaeobotany GEOL2008 – average 65 students per year
Biology III – Palaeobotany APES3029 – average 25 students per year
Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology; Micropalaeontology – average 2-8 students per year.

ix) Editing and reviewing

Editor: Palaeontologia africana: 2003 to 2013; 2014 – Assistant editor
Guest Editor: Quaternary International: 2005 volume
Member of Board of Review: Review of Palaeobotany and Palynology: 2010 –
Cretaceous Research: 2014 -

Review of manuscripts for ISI-listed journals: 25 local and international journals

x) Palaeontological Impact Assessments

Selected – list not complete:

- Thukela Biosphere Conservancy 1996; 2002 for DWAF
- Vioolsdrift 2007 for Xibula Exploration
- Rietfontein 2009 for Zitholele Consulting
- Bloeddrift-Baken 2010 for TransHex
- New Kleinfontein Gold Mine 2012 for Prime Resources (Pty) Ltd.
- Thabazimbi Iron Cave 2012 for Professional Grave Solutions (Pty)

Ltd
- Delmas 2013 for Jones and Wagener
- Klipfontein 2013 for Jones and Wagener
- Platinum mine 2013 for Lonmin
- Syferfontein 2014 for Digby Wells
- Canyon Springs 2014 for Prime Resources
- Kimberley Eskom 2014 for Landscape Dynamics
- Yzermyne 2014 for Digby Wells
- Matimba 2015 for Royal HaskoningDV
- Commissiekraal 2015 for SLR
- Harmony PV 2015 for Savannah Environmental
- Glencore-Tweefontein 2015 for Digby Wells
- Umkomazi 2015 for JLB Consulting
- Ixia coal 2016 for Digby Wells
- Lambda Eskom for Digby Wells
- Alexander Scoping for SLR
- Perseus-Kronos-Aries Eskom 2016 for NGT
- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipoortjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
-

xi) Research Output

Publications by M K Bamford up to June 2018 peer-reviewed journals or scholarly books: over 125 articles published; 5 submitted/in press; 8 book chapters.
Scopus h index = 26; Google scholar h index = 30;
Conferences: numerous presentations at local and international conferences.

xii) NRF Rating

NRF Rating: B-2 (2016-2020)
NRF Rating: B-3 (2010-2015)
NRF Rating: B-3 (2005-2009)
NRF Rating: C-2 (1999-2004)

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APPENDIX 3: Heritage Screening Assessment

CTS HERITAGE

HERITAGE SCREENER

CTS Reference Number:	**CTS18_211**
SAHRIS Reference:	
Client:	**Savannah**
Date:	**22 November 2018**
Title:	**Proposed Development Of The Proposed Edible Oil Pipeline For Wilmar Sa (pty) Ltd From Berth 706 / 707 / 708 To Rb IDZ Phase 1a, Richards Bay**

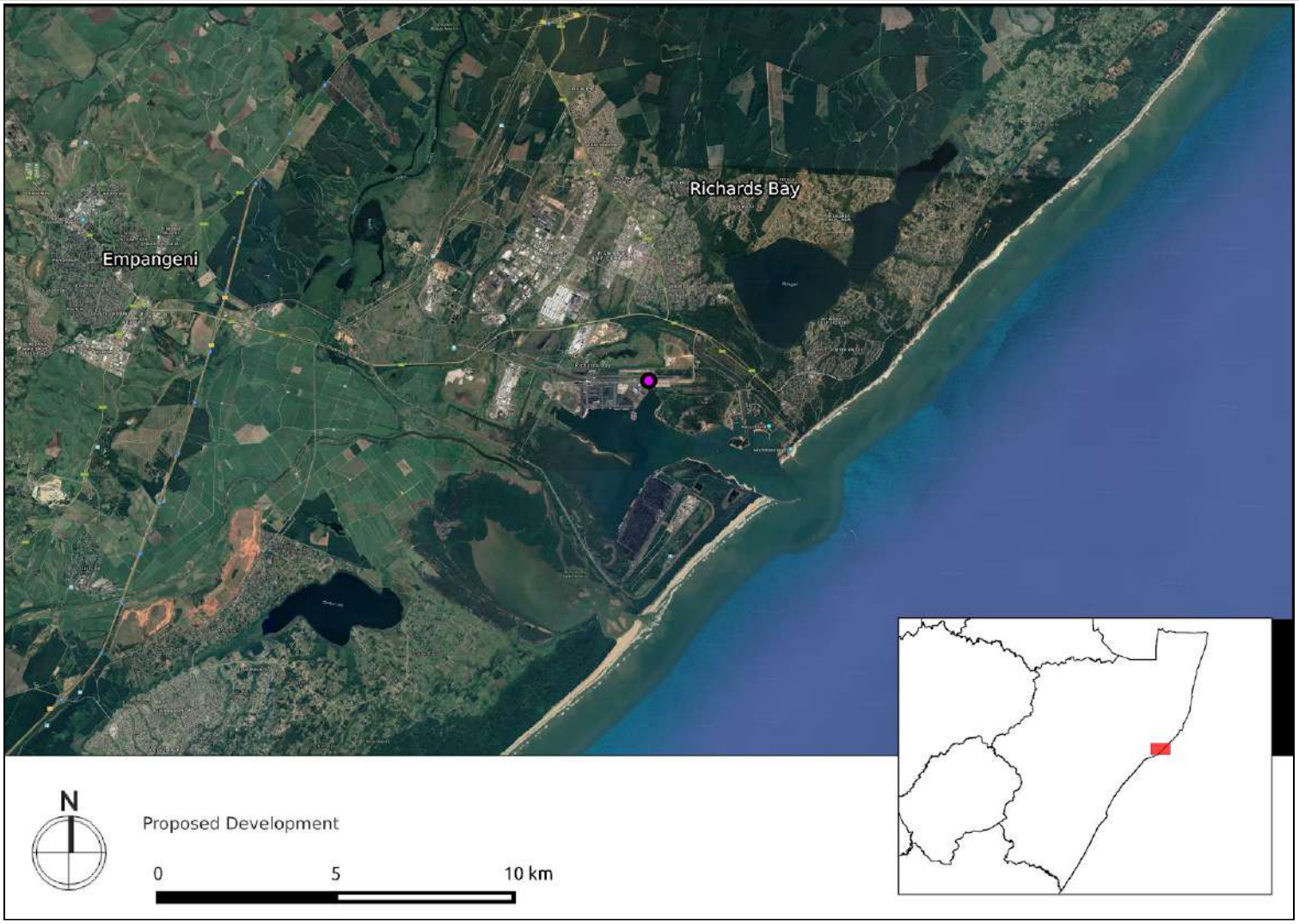

Figure 1a. Satellite map indicating the location of the proposed development in KwaZulu Natal

CTS Heritage
34 Harries Street, Plumstead, Cape Town, 7800
Tel: +27 (0)87 073 5739 **Email:** info@ctsheritage.com **Web:** www.ctsheritage.com

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1. Proposed Development Summary

Wilmar Processing (Pty) Ltd (Wilmar) are proposing the development of vegetable oil pipeline that will consist of 4 x 216mm-wide pipes, that will extend for ~2.6km within the Richard's Bay Port. The proposed development will consist of four (4) pipelines stacked vertically or in double rows, running side by side (depending on support and space restrictions) and will comprise of the following dimensions: Width: 216mm, Total Length: ~2.6km.
Furthermore, the proposed development will include the following infrastructure: Steel pipes; Multiple duct access shafts; Overhead steel bridges; Site Offices and Maintenance Buildings, including workshop areas for maintenance; Temporary laydown areas; Fencing and access roads; and Security Offices.

2. Application References

Name of relevant heritage authority(s)	Amafa
Name of decision making authority(s)	

3. Property Information

Latitude / Longitude	28°47'5.24"S 32° 3'15.53"E
Erf number / Farm number	NA
Local Municipality	uMhlathuze
District Municipality	Uthungulu
Previous Magisterial District	Lower Umfolozi
Province	KwaZulu Natal
Current Use	Richards Bay Harbour
Current Zoning	Infrastructure
Total Extent	NA

4. Nature of the Proposed Development

Total Surface Area	2,644km long Transnet Property: Transnet will own the pipe on their property, hence no servitude will be required; the construction corridor is expected to be limited to 8 m IDZ and Municpality Property: Estimated permanent servitude = 4 m, Estimated construction corridor = 10 m
Depth of excavation (m)	No excavation of trenches is planned, the pipe will be above ground except under roads and rail lines
Height of development (m)	NA
Expected years of operation before decommission	NA

5. Category of Development

x	**Triggers: Section 38(8) of the National Heritage Resources Act**
	Triggers: Section 38(1) of the National Heritage Resources Act
x	1. Construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier over 300m in length.
	2. Construction of a bridge or similar structure exceeding 50m in length.
	3. Any development or activity that will change the character of a site-
	a) exceeding 5 000m^2 in extent
	b) involving three or more existing erven or subdivisions thereof
	c) involving three or more erven or divisions thereof which have been consolidated within the past five years
	4. Rezoning of a site exceeding 10 000m^2
	5. Other (state):

6. Additional Infrastructure Required for this Development

Steel pipes supported on steel supports with top of pipes approx. 1,8 m above ground, mounted on cast insitu, concrete pad foundations (approx 1,5 x 1,5 m and underside 1,2 m below ground); No crossings under roads and rail, comprising access shafts each side (approx 3225 x 2060 m and underside 2800 m below ground), with 4 No, 400 mm diameter pipe sleeves between the access shafts (pipe c/l approx 1700 m) below road / rail surface)

Where pipe crosses under roads of rail lines, an access shaft will be constructed on either side of the road or rail, and 4 No, 400 mm diameter pipe sleeves will be installed between the access shafts (pipe c/l approx 1700 m below surface).

It is anticipated that HDPE sleeves will be installed under the roads by means of horizontal directional drilling, and that a steel sleeve will be installed under the rail line by thrust boring.

7. Mapping (please see Appendix 3 and 4 for a full description of our methodology and map legends)

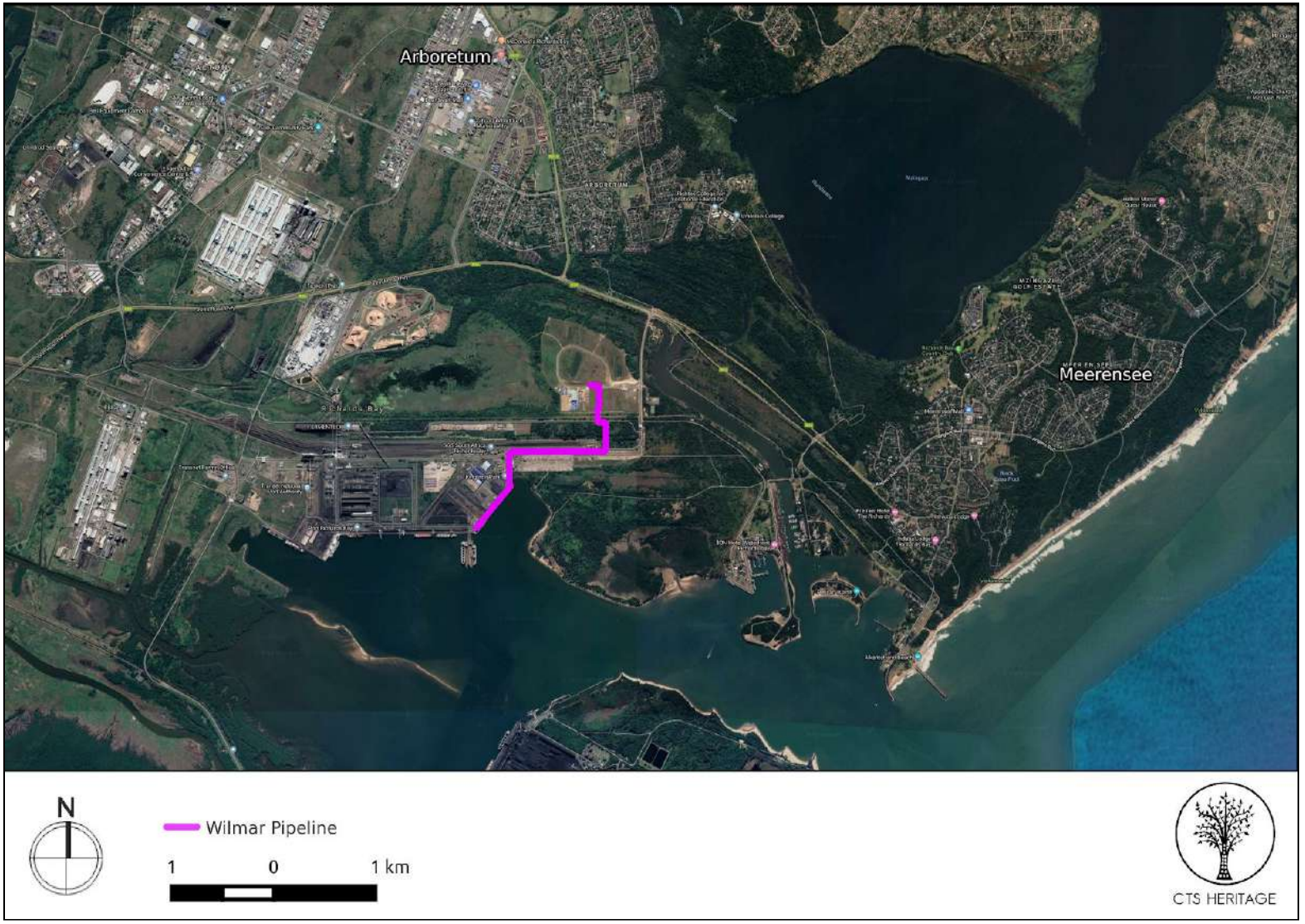

Figure 1b. Overview Map. Satellite image (2017) indicating the proposed development area at closer range within Richards Bay

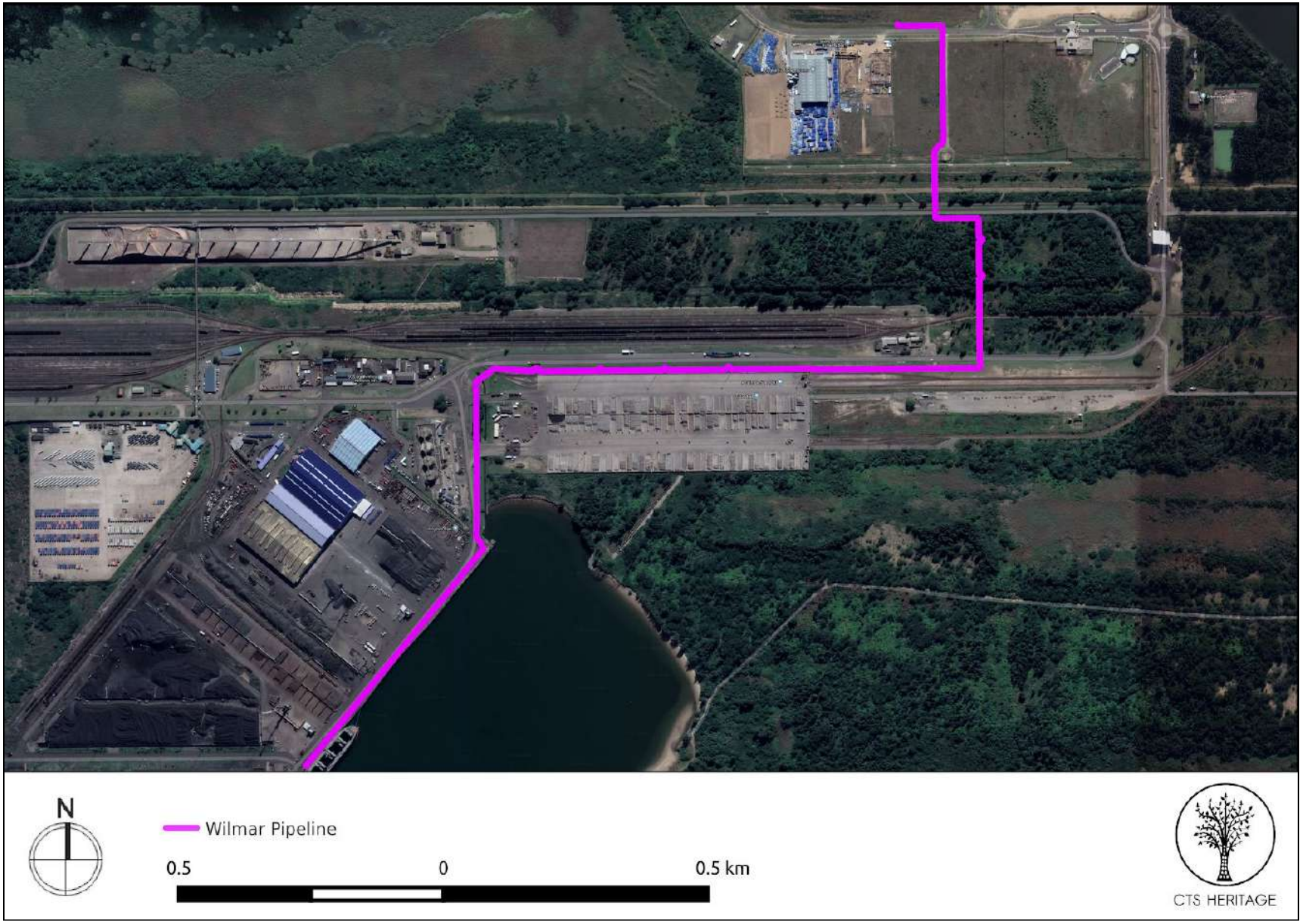

Figure 1c. Overview Map. Satellite image (2017) indicating the proposed development area at closer range.

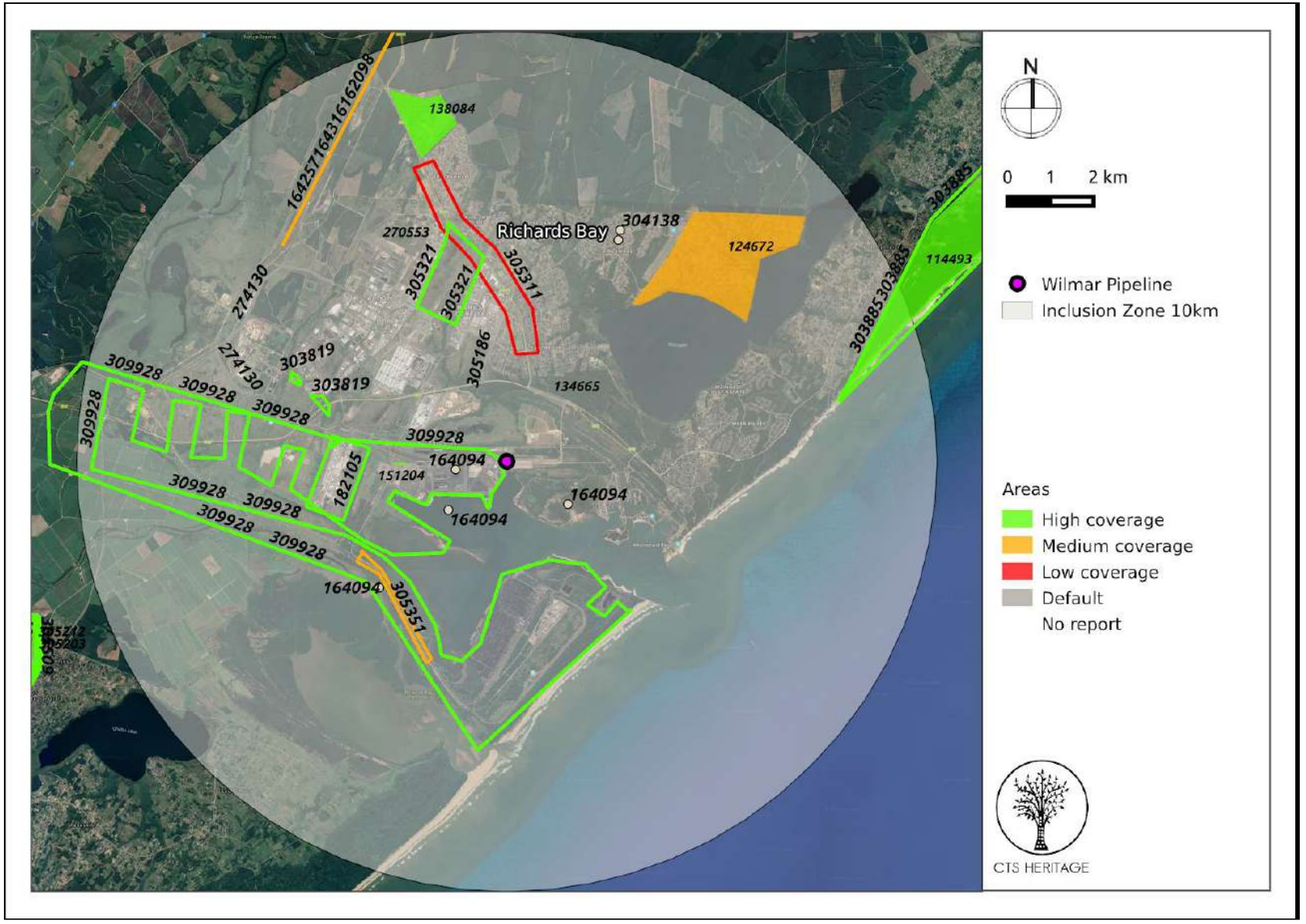

Figure 2. Previous HIAs Map. Previous Heritage Impact Assessments surrounding the proposed development area within 15km, with SAHRIS NIDS indicated. Please see Appendix 2 for full reference list.

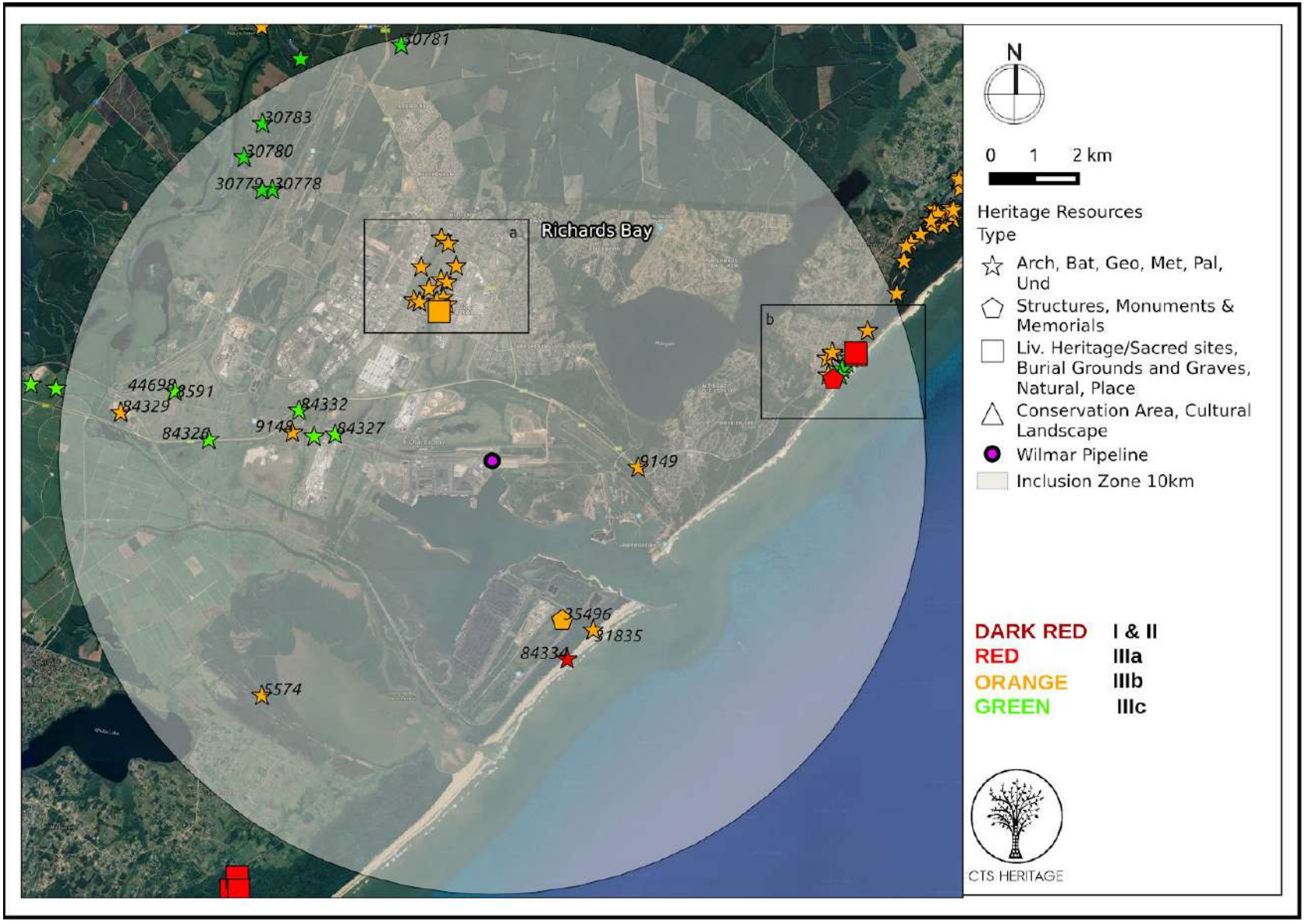

Figure 3. Heritage Resources Map. Heritage Resources previously identified in and near the study area, with SAHRIS Site IDs indicated. Please See Appendix 4 for full description of heritage resource types.

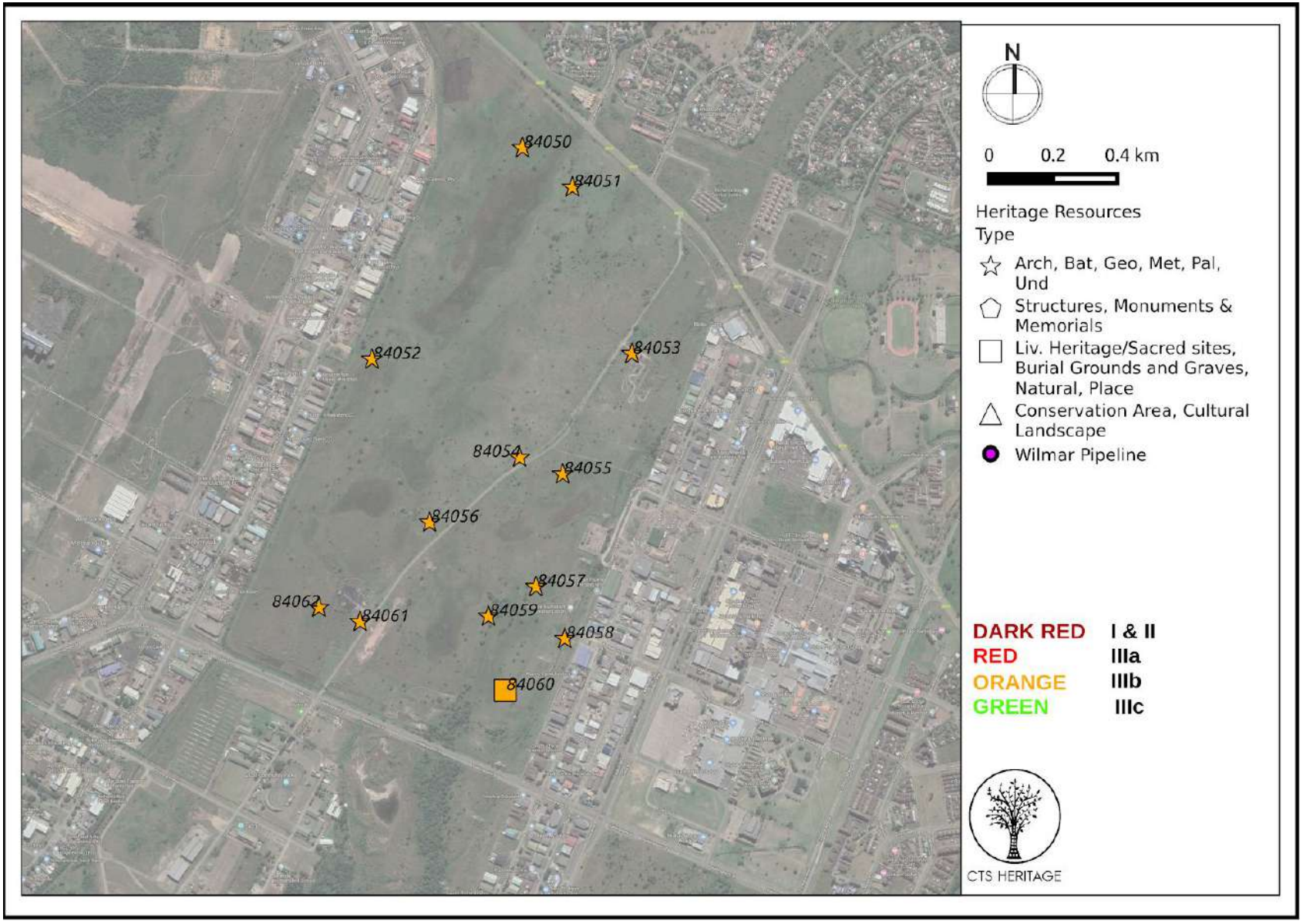

Figure 3a. Heritage Resources Map. Inset

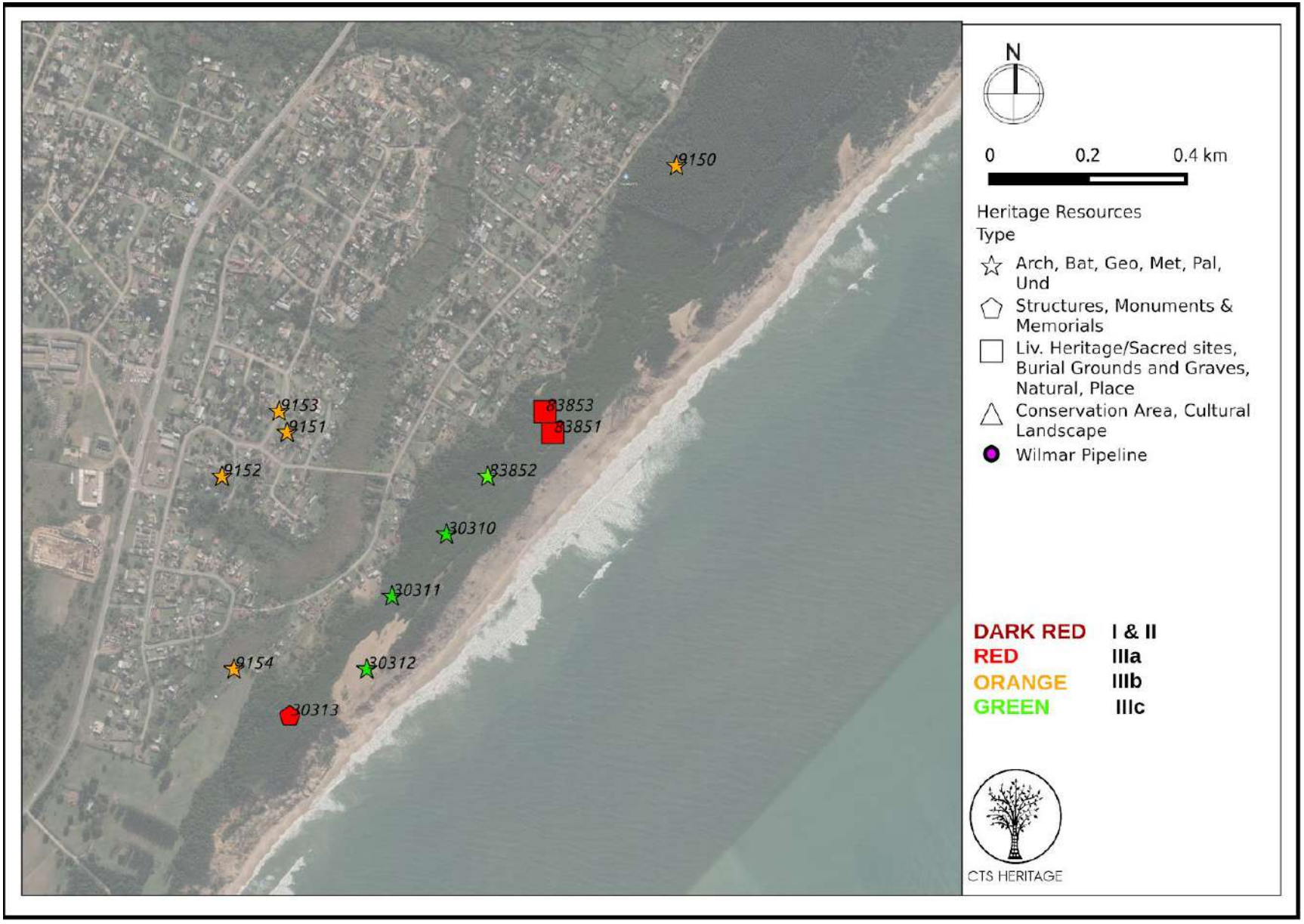

Figure 3b. Heritage Resources Map. Inset

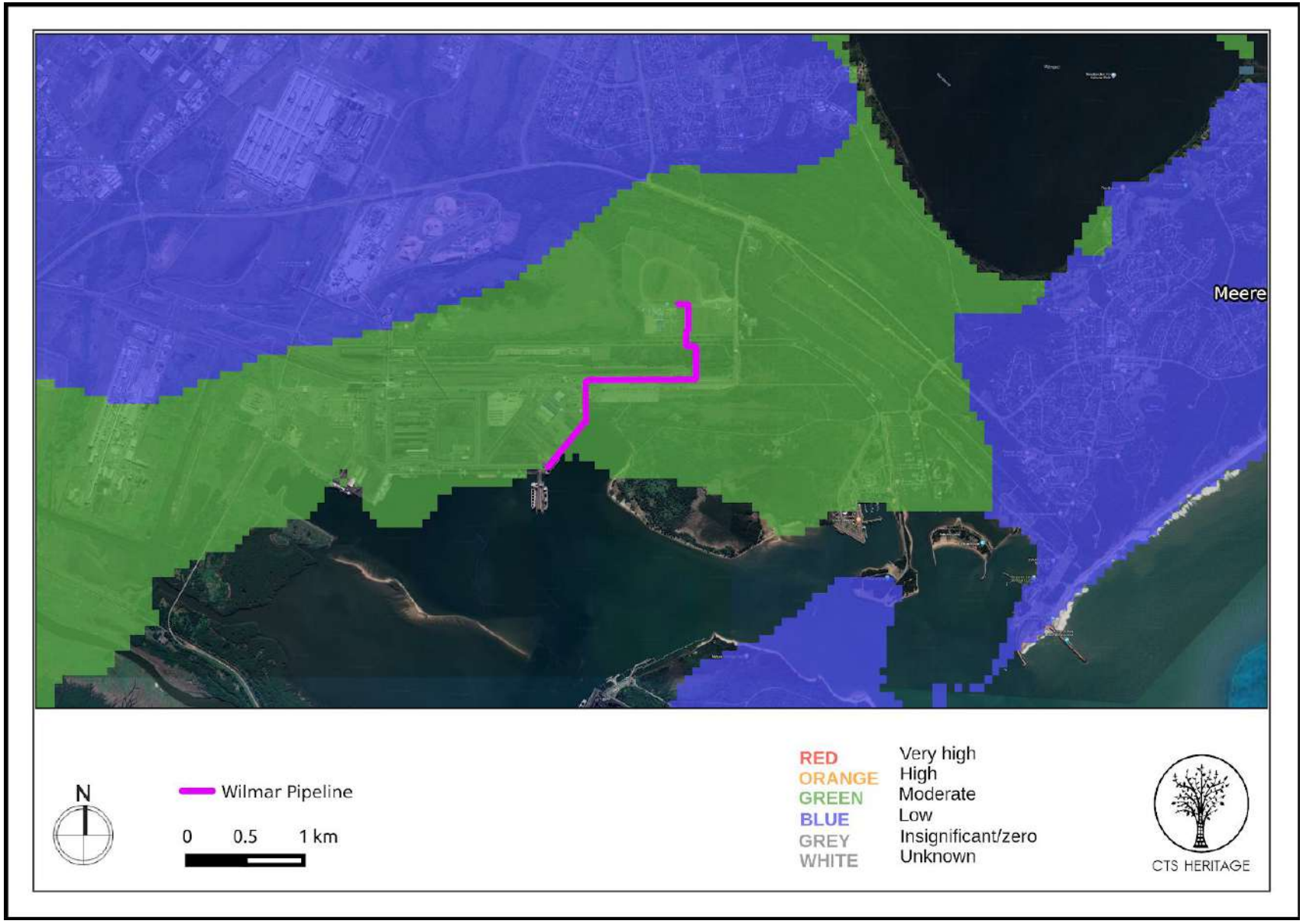

Figure 4. Palaeosensitivity Map. Indicating varied fossil sensitivity underlying the study area. Please See Appendix 3 for full guide to the legend.

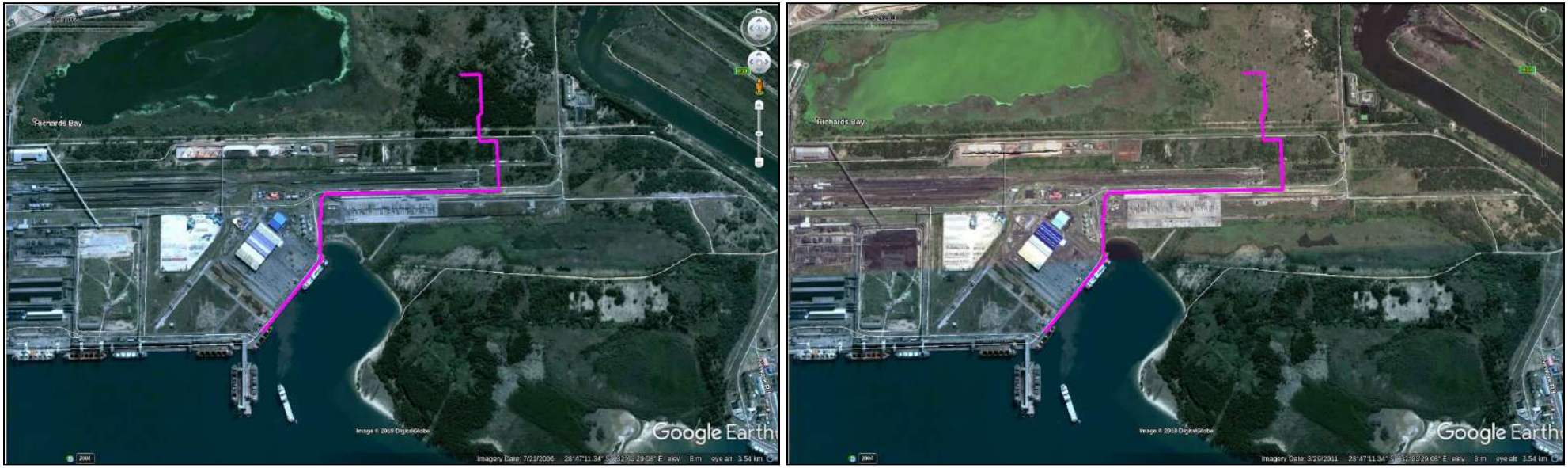

Figure 5a and b.Aerial imagery from Google Earth: Indicating development of the area from 2006 and 2011.

8. Heritage statement and character of the area

Wilmar Processing (Pty) Ltd (Wilmar) are proposing the development of vegetable oil pipeline that will consist of 4 x 216mm-wide pipes, that will extend for ~2.6km within the Richard's Bay Port. The proposed development will consist of four (4) pipelines stacked vertically or in double rows, running side by side (depending on support and space restrictions).

Richard's Bay began as a makeshift harbour established during the Anglo-Zulu War of 1879. The town was laid out on the shores of the lagoon in 1954 and proclaimed a town in 1969. In 1976 Richards Bay harbour was converted into a deep water harbour with railway and an oil/gas pipeline linking the port to Johannesburg. In 1965 the South African Government decided to build a deep-sea harbour at Richard's Bay which was completed on 1 April 1976. According to Anderson (2009, SAHRIS NID 309928), "Port Durnford had been used since the 1870s as a regular port by the British Navy. The Richards Bay Harbour is north of this port that was originally envisaged in 1902. The environment surrounding the harbour has been heavily impacted by the original harbour construction in the early 1970s. The harbour dredged the deep Thulazihleka Lake and cleared areas to create a harbour entrance at the Mhlatuze River mouth. The lake was divided into two parts with the southern part of the lake becoming a sanctuary with its own newly created river mouth south of the harbour entrance… Subsequent to the harbour being built, the wetlands to the south of the harbour increased and large drainage canals have also been built. Some of these canals are part of the original rivers. There has also been a lot of industrial activity in the general area. The rest of the study area is under sugarcane agriculture with electrical, rail, gas pipeline, and vehicle servitudes. The general study area has been severely impacted by other activities."

Further, according to Anderson (2009), "Several archaeological and palaeontological sites have been recorded in the surrounding area: both inland and along the coast, and within a 10km radius of the development area. The archaeological surveys for Richards Bay Minerals clearly show that the coastal dune system is very sensitive in terms of archaeological sites (over 350 sites have been recorded in the mining lease). The construction of the Berth 306 revealed an important Cretaceous Layer in the harbour area." Anderson (2009) completed a thorough field assessment of the proposed Richard's Bay Harbour expansion area. He identified 9 archaeological sites, 7 of low significance, one of low-moderate significance and one fossil site of high significance. The proposed pipeline does not impact on any of these identified sites (Figure 3). In addition, the area proposed for development does fall within Anderson's (2009) identified locations of sensitive archaeological areas that require monitoring, sampling and/or excavations.

The area proposed for development falls within an area of moderate palaeontological sensitivity according to the SAHRIS Palaeosensitivity Map (Figure 4). This area is underlain by Alluvial sediments. However, previous palaeontological work has identified significant fossil material in this area. According to Anderson (2009), "A palaeontological monitoring program was set up during the construction of Berth 306 in 2006. Umlando and Mr A. van Jaarsveld were involved in the project. Several Cretaceous period fossils were excavated, sampled and rescued during this program. In addition to this Palaeocene, Miocene and Pleistocene sediments were also noted, and these contained diverse macrofaunal assemblages. The Cretaceous layers began at ~10m below the current surface at Berth 306. Just over 100 fossils were sampled from this excavation."

As no excavation of trenches is planned and the pipe is to be above ground except under roads and rail lines, it is very unlikely that significant palaeontological heritage will be impacted by the proposed development. It is, however, recommended that a Chance Finds Procedure be implemented for all excavations activities.

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APPENDIX 1

List of heritage resources within the 10km Inclusion Zone

Site ID	Site no	Full Site Name	Site Type	Grading
83851	UMLANDO-TB 01	RBM March 2005	Artefacts, Burial Grounds & Graves	Grade IIIa
83853	UMLANDO-TB 03	RBM March 2005/03	Artefacts, Shell Midden, Deposit, Burial Grounds & Graves	Grade IIIa
83852	UMLANDO-TB 02	RBM March 2005/02	Artefacts	Grade IIIc
35496	Richards Bay Terminal		Transport infrastructure	Grade IIIb
84327	UMLANDO-RBPO2	RICHARDS BAY PORTS 02	Artefacts	Grade IIIc
84328	UMLANDO-RBPO3	RICHARDS BAY PORTS 03	Artefacts	Grade IIIc
44698	SWAZIRL22	Swaziland Railway Link Ermelo to Richards Bay 22	Archaeological	Grade IIIc
9148	2832CC 001	Bhizele Halt	Artefacts	Grade IIIb
9149	2832CC 002	Richards Bay	Artefacts	Grade IIIb
9150	2832CC 005		Artefacts	Grade IIIb
9151	2832CC 006	Nontshingo	Archaeological	Grade IIIb
9152	2832CC 007	Nontshingo	Archaeological	Grade IIIb
9153	2832CC 008	Nontshingo	Archaeological	Grade IIIb
9154	2832CC 009		Archaeological	Grade IIIb
30778	UMLANDO-NSE01		Artefacts	Grade IIIc
30779	UMLANDO-NSE02		Artefacts	Grade IIIc
30780	UMLANDO-NSE03		Artefacts	Grade IIIc
30781	UMLANDO-NSE04		Archaeological	Grade IIIc
30783	UMLANDO-NSE06		Artefacts	Grade IIIc
31835	UMLANDO-RBPO9B		Deposit, Artefacts	Grade IIIb

30310	UMLANDO-TB 04		Archaeological	Grade IIIc
30311	UMLANDO-TB 05		Archaeological	Grade IIIc
30312	UMLANDO-TB 06		Artefacts	Grade IIIc
30313	UMLANDO-TB 07		Monuments & Memorials	Grade IIIa
84051	UMLANDO-RICH002	RICHARDS BAY 002	Settlement	Grade IIIb
84052	UMLANDO-RICH003	RICHARDS BAY 003	Settlement	Grade IIIb
84056	UMLANDO-RICH007	RICHARDS BAY 007	Settlement	Grade IIIb
84057	UMLANDO-RICH008	RICHARDS BAY 008	Settlement	Grade IIIb
84059	UMLANDO-RICH010	RICHARDS BAY 010	Settlement	Grade IIIb
84060	UMLANDO-RICH011	RICHARDS BAY 011	Living Heritage/Sacred sites	Grade IIIb
84061	UMLANDO-RICH012	RICHARDS BAY 012	Settlement	Grade IIIb
84326	UMLANDO-RBPO1	RICHARDS BAY PORTS 01	Artefacts	Grade IIIc
84050	UMLANDO-RICH001	RICHARDS BAY 001	Settlement	Grade IIIb
84332	UMLANDO-RBPO7	RICHARDS BAY PORTS 07	Artefacts	Grade IIIc
84053	UMLANDO-RICH004	RICHARDS BAY 004	Settlement	Grade IIIb
84054	UMLANDO-RICH005	RICHARDS BAY 005	Settlement	Grade IIIb
84334	UMLANDO-RBPO8	RICHARDS BAY PORTS 08	Geological	Grade IIIa
84055	UMLANDO-RICH006	RICHARDS BAY 006	Settlement	Grade IIIb
84336	UMLANDO-RBPO9	RICHARDS BAY PORTS 09	Shell Midden	Grade IIIb
84058	UMLANDO-RICH009	RICHARDS BAY 009	Settlement	Grade IIIb
84062	UMLANDO-RICH013	RICHARDS BAY 013	Settlement	Grade IIIb
84329	UMLANDO-RBPO4	RICHARDS BAY PORTS 04	Artefacts	Grade IIIb
8591	2831DD 013		Artefacts	Grade IIIb
5574	2831DD 033	Uqupu dunes	Artefacts	Grade IIIb

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APPENDIX 2

Reference List

Heritage Impact Assessments				
Nid	**Report Type**	**Author/s**	**Date**	**Title**
114493	Archaeological Specialist Reports	Gavin Anderson, Louise Anderson	21/01/2013	The Archaeological Survey of the Zulti North Mining Lease for Richards Bay Minerals, 2012 Annual Report
124672	HIA Phase 1		01/03/2013	HIA Mandlazini Agric-Village Sewer Network Installation
134665	HIA Letter of Exemption	Len van Schalkwyk, Elizabeth Wahl	20/06/2013	Application for Exemption from a Phase 1 Heritage Impact Assessment of the Proposed Widening of Medway Road and Associated Interchanges within Richards Bay, KwaZulu-Natal
138084	Archaeological Specialist Reports	Gavin Anderson	03/07/2012	Heritage Survey of the Proposed Aquadene Housing Project, Kwa-Zulu Natal
151204	HIA Letter of Exemption	Gavin Anderson		
162098	HIA Phase 1	Johnny Van Schalkwyk	01/09/2013	Cultural heritage impact assessment for THE PROPOSED SWAZILAND RAIL LINK, WESTERN SECTION, MPUMALANGA REGION
164094	Built Environment and Cultural Landscapes	Deshni Naicker	17/07/2015	DRAFT EIA REPORT: PROPOSED RICHARDS BAY PORT EXPANSION PROGRAMME WITHIN UMHLATHUZE LOCAL MUNICIPALITY IN KWA-ZULU NATAL PROVINCE
164257	Palaeontological Specialist Reports	Gideon Groenewald	15/02/2014	Paleontological desktop assessment for the proposed upgrade of the Davel to Nerston Rail Line in the Mpumalanga Province
164316	Palaeontological Specialist Reports	Gideon Groenewald	16/02/2014	Palaeontological Desktop Assessment for the proposed upgrade of the Golela to Nsezi Line in KwaZulu - Natal Province.
182105	HIA Letter of Exemption	Elizabeth Wahl	18/11/2014	Application for Exemption from a Phase 1 Heritage Impact Assessment of Proposed Decommissioning of the Legacy Landfills at The Bayside Aluminium Smelter, Richards Bay, KwaZulu-Natal, South Africa
270553	Heritage Impact Assessment Specialist Reports		24/04/2015	Heritage Screener for the Proposed 60MW Biomass Plant within the Ricahrds Bay IDZ, Umhlautze Local Munucipality, KwaZulu-Natal
274130	HIA Phase 1	Gavin Anderson	14/04/2015	RICHARDS BAY-NSEZI ACCESS ROAD, RICHARDS BAY, KWAZULU-NATAL
303819	AIA Phase 1	Gavin Anderson	09/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED ALTON SEWER PIPE UPGRADE

303885	AIA Phase 1	Gavin Anderson, Louise Anderson	01/09/2004	The Archaeological Survey Of The Richards Bay Minerals Mining Lease: August 2004
304138	AIA Phase 1	Gavin Anderson	13/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED BIRDSWOOD PRIMARY SCHOOL
305186	AIA Phase 1	Gavin Anderson	13/10/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED EAST CENTRAL ARTERIAL
305311	AIA Phase 1	Gavin Anderson	06/11/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED BOUBLING OF THE NORTH CENTRAL ARTERIAL, RICHARDS BAY
305321	HIA Phase 1	Gavin Anderson	16/05/2010	HERITAGE SURVEY OF THE PROPOSED RICHARDS BAY CENTRAL INDUSTRIAL AREA
305351	AIA Phase 1	Gavin Anderson	16/11/2008	ARCHAEOLOGICAL SURVEY OF THE PROPOSED NEW INFRASTRUCTURE AT THE ARRIVAL YARD AT THE RICHARDS BAY COAL TERMINAL
309638	HIA Phase 1	Gavin Anderson	28/04/2009	HERITAGE SURVEY OF THE PROPOSED BIRDSWOOD SHOPPING CENTRE FOR MSA ENVIRONMENTAL, LEGAL & MINING SERVICES
309928	HIA Phase 1	Gavin Anderson, Louise Anderson	01/06/2009	HERITAGE SURVEY OF THE PROPOSED EXPANSION TO THE TRANSNET NATIONAL PORTS AUTHORITY, RICHARDS BAY.

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APPENDIX 3 - Keys/Guides

Key/Guide to Acronyms

AIA	Archaeological Impact Assessment
DARD	Department of Agriculture and Rural Development (KwaZulu-Natal)
DEA	Department of Environmental Affairs (National)
DEADP	Department of Environmental Affairs and Development Planning (Western Cape)
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism (Eastern Cape)
DEDECT	Department of Economic Development, Environment, Conservation and Tourism (North West)
DEDT	Department of Economic Development and Tourism (Mpumalanga)
DEDTEA	Department of economic Development, Tourism and Environmental Affairs (Free State)
DENC	Department of Environment and Nature Conservation (Northern Cape)
DMR	Department of Mineral Resources (National)
GDARD	Gauteng Department of Agriculture and Rural Development (Gauteng)
HIA	Heritage Impact Assessment
LEDET	Department of Economic Development, Environment and Tourism (Limpopo)
MPRDA	Mineral and Petroleum Resources Development Act, no 28 of 2002
NEMA	National Environmental Management Act, no 107 of 1998
NHRA	National Heritage Resources Act, no 25 of 1999
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
VIA	Visual Impact Assessment

Full guide to Palaeosensitivity Map legend

	RED:	VERY HIGH - field assessment and protocol for finds is required
	ORANGE/YELLOW:	HIGH - desktop study is required and based on the outcome of the desktop study, a field assessment is likely
	GREEN:	MODERATE - desktop study is required
	BLUE/PURPLE:	LOW - no palaeontological studies are required however a protocol for chance finds is required
	GREY:	INSIGNIFICANT/ZERO - no palaeontological studies are required
	WHITE/CLEAR:	UNKNOWN - these areas will require a minimum of a desktop study.

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APPENDIX 4 - Methodology

The Heritage Screener summarises the heritage impact assessments and studies previously undertaken within the area of the proposed development and its surroundings. Heritage resources identified in these reports are assessed by our team during the screening process.

The heritage resources will be described both in terms of **type**:

- Group 1: Archaeological, Underwater, Palaeontological and Geological sites, Meteorites, and Battlefields
- Group 2: Structures, Monuments and Memorials
- Group 3: Burial Grounds and Graves, Living Heritage, Sacred and Natural sites
- Group 4: Cultural Landscapes, Conservation Areas and Scenic routes

and **significance** (Grade I, II, IIIa, b or c, ungraded), as determined by the author of the original heritage impact assessment report or by formal grading and/or protection by the heritage authorities.

Sites identified and mapped during research projects will also be considered.

DETERMINATION OF THE EXTENT OF THE INCLUSION ZONE TO BE TAKEN INTO CONSIDERATION

The extent of the inclusion zone to be considered for the Heritage Screener will be determined by CTS based on:

- the size of the development,
- the number and outcome of previous surveys existing in the area
- the potential cumulative impact of the application.

The inclusion zone will be considered as the region within a maximum distance of 50 km from the boundary of the proposed development.

DETERMINATION OF THE PALAEONTOLOGICAL SENSITIVITY

The possible impact of the proposed development on palaeontological resources is gauged by:

- reviewing the fossil sensitivity maps available on the South African Heritage Resources Information System (SAHRIS)
- considering the nature of the proposed development
- when available, taking information provided by the applicant related to the geological background of the area into account

DETERMINATION OF THE COVERAGE RATING ASCRIBED TO A REPORT POLYGON

Each report assessed for the compilation of the Heritage Screener is colour-coded according to the level of coverage accomplished. The extent of the surveyed coverage is labeled in three categories, namely low, medium and high. In most instances the extent of the map corresponds to the extent of the development for which the specific report was undertaken.

Low coverage will be used for:

- desktop studies where no field assessment of the area was undertaken;
- reports where the sites are listed and described but no GPS coordinates were provided.
- older reports with GPS coordinates with low accuracy ratings;
- reports where the entire property was mapped, but only a small/limited area was surveyed.
- uploads on the National Inventory which are not properly mapped.

Medium coverage will be used for

- reports for which a field survey was undertaken but the area was not extensively covered. This may apply to instances where some impediments did not allow for full coverage such as thick vegetation, etc.
- reports for which the entire property was mapped, but only a specific area was surveyed thoroughly. This is differentiated from low ratings listed above when these surveys cover up to around 50% of the property.

High coverage will be used for

- reports where the area highlighted in the map was extensively surveyed as shown by the GPS track coordinates. This category will also apply to permit reports.

RECOMMENDATION GUIDE

The Heritage Screener includes a set of recommendations to the applicant based on whether an impact on heritage resources is anticipated. One of three possible recommendations is formulated:

(1) The heritage resources in the area proposed for development are sufficiently recorded - The surveys undertaken in the area adequately captured the heritage resources. There are no known sites which require mitigation or management plans. No further heritage work is recommended for the proposed development.

This recommendation is made when:

- enough work has been undertaken in the area
- it is the professional opinion of CTS that the area has already been assessed adequately from a heritage perspective for the type of development proposed

(2) The heritage resources and the area proposed for development are only partially recorded - The surveys undertaken in the area have not adequately captured the heritage resources and/or there are sites which require mitigation or management plans. Further specific heritage work is recommended for the proposed development.

This recommendation is made in instances in which there are already some studies undertaken in the area and/or in the adjacent area for the proposed development. Further studies in a limited HIA may include:

- improvement on some components of the heritage assessments already undertaken, for instance with a renewed field survey and/or with a specific specialist for the type of heritage resources expected in the area
- compilation of a report for a component of a heritage impact assessment not already undertaken in the area

- undertaking mitigation measures requested in previous assessments/records of decision.

(3) The heritage resources within the area proposed for the development have not been adequately surveyed yet - Few or no surveys have been undertaken in the area proposed for development. A full Heritage Impact Assessment with a detailed field component is recommended for the proposed development.

Note:
The responsibility for generating a response detailing the requirements for the development lies with the heritage authority. However, since the methodology utilised for the compilation of the Heritage Screeners is thorough and consistent, contradictory outcomes to the recommendations made by CTS should rarely occur. Should a discrepancy arise, CTS will immediately take up the matter with the heritage authority to clarify the dispute.

The compilation of the Heritage Screener will not include any field assessment. The Heritage Screener will be submitted to the applicant within 24 hours from receipt of full payment. **If the 24-hour deadline is not met by CTS, the applicant will be refunded in full.**

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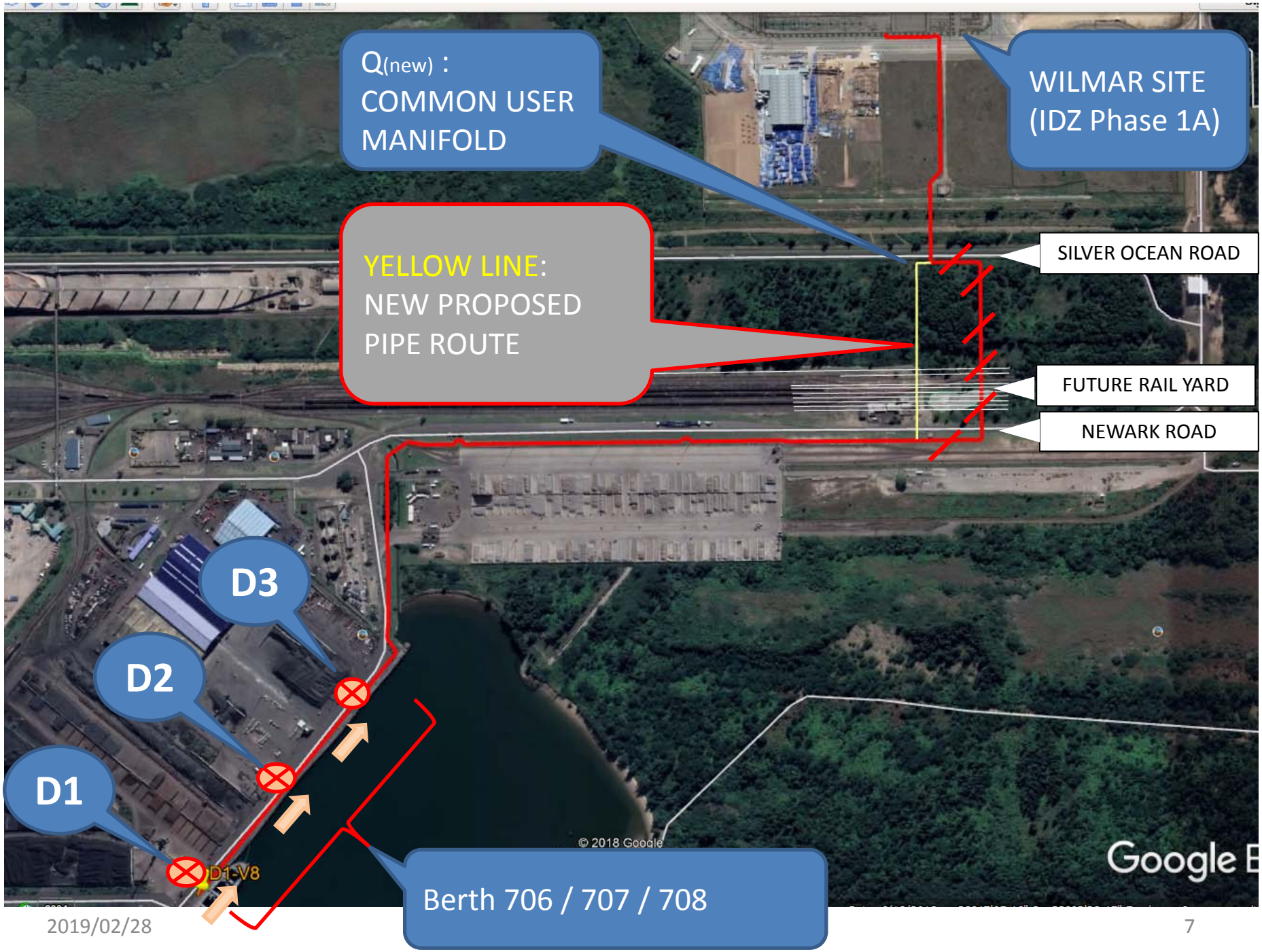
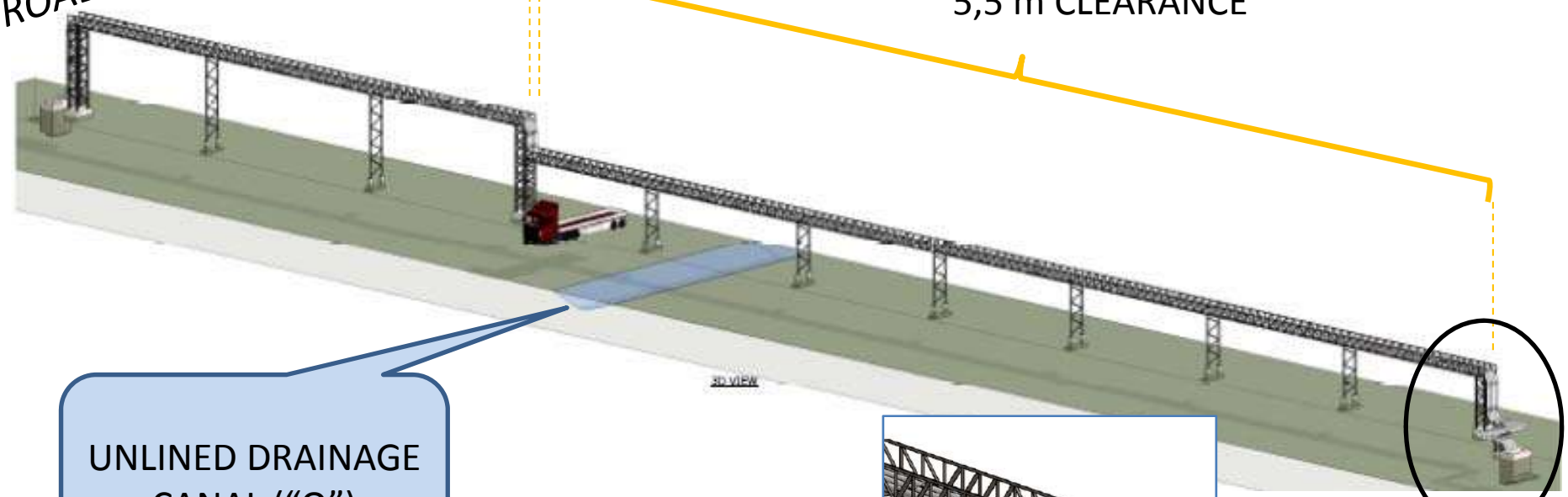
APPENDIX 4: Detailed Designs


Q(new) :
COMMON USER
MANIFOLD
WILMAR SITE
(IDZ Phase 1A)
YELLOW LINE:
NEW PROPOSED
PIPE ROUTE
SILVER OCEAN ROAD
FUTURE RAIL YARD
NEWARK ROAD
D3
D2
D1
D1-V8
© 2018 Google
Berth 706 / 707 / 708

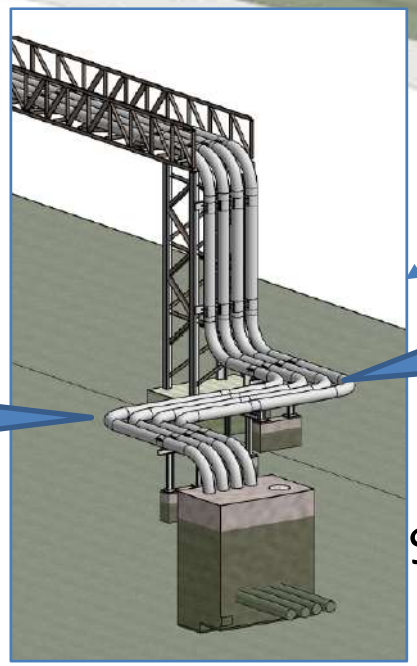
FUTURE RAIL YARD:
12 m CLEARANCE

NEWARK ROAD

UNDEVELOPED AREA:
5,5 m CLEARANCE



UNLINED DRAINAGE CANAL ("O")



SILVER OCEAN ROAD

TYPICAL PLAN
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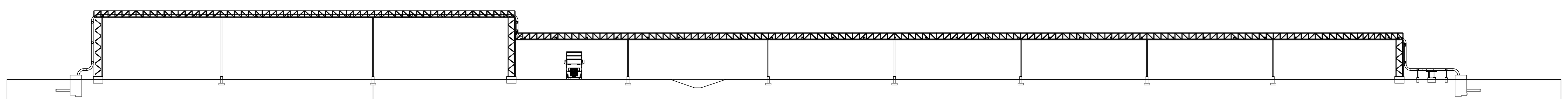

SOUTH ELEVATION
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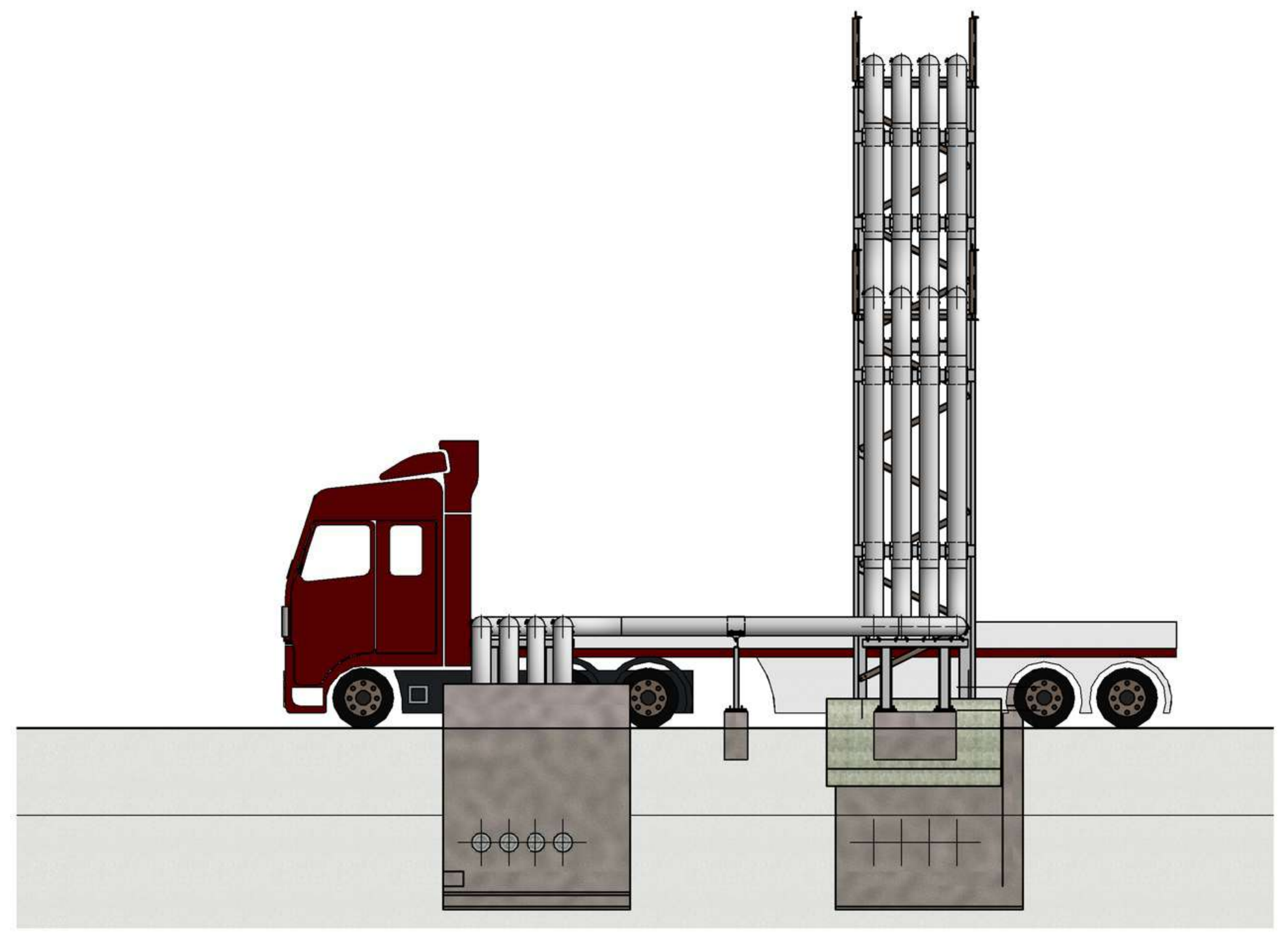

EAST ELEVATION
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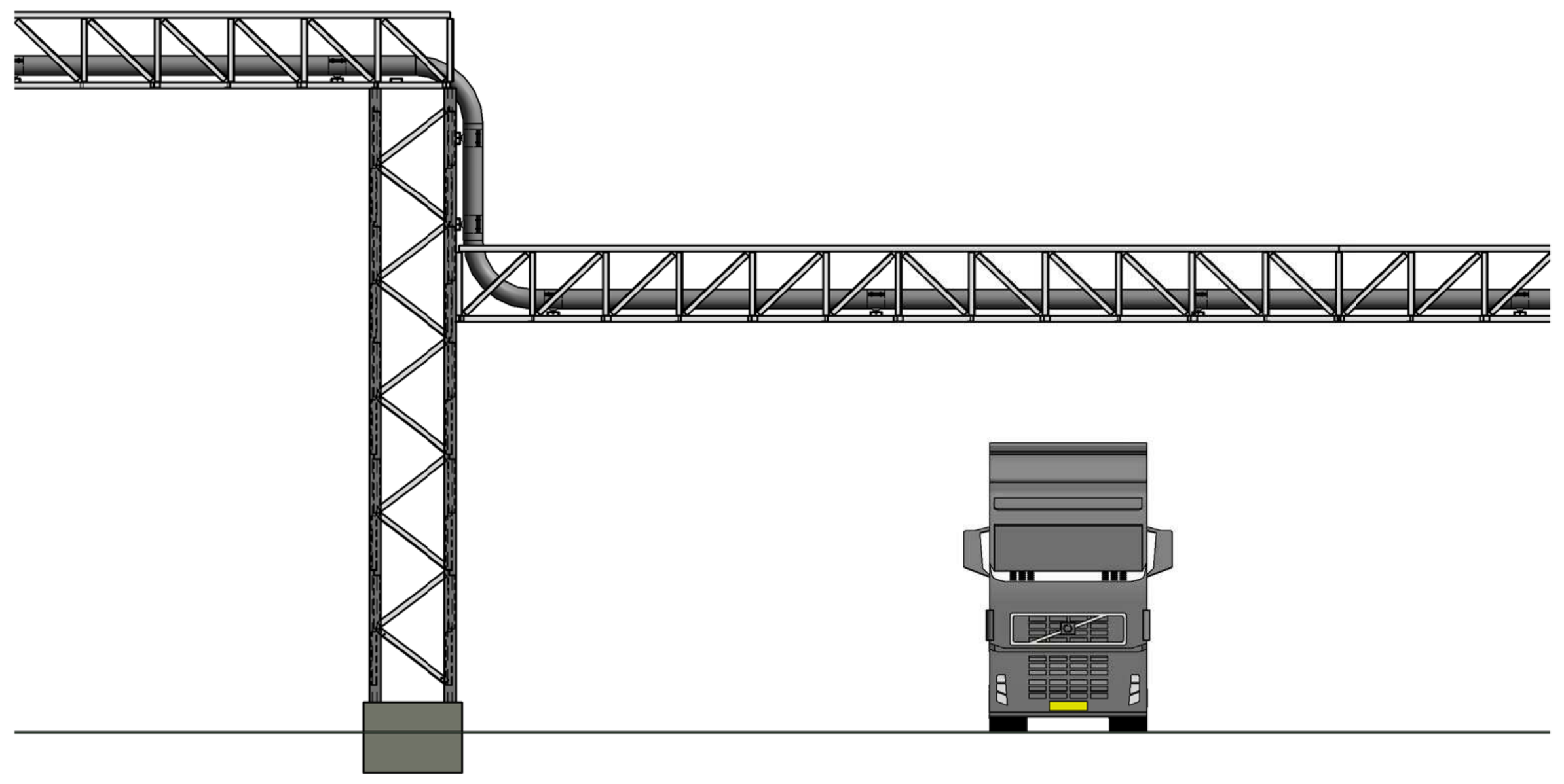

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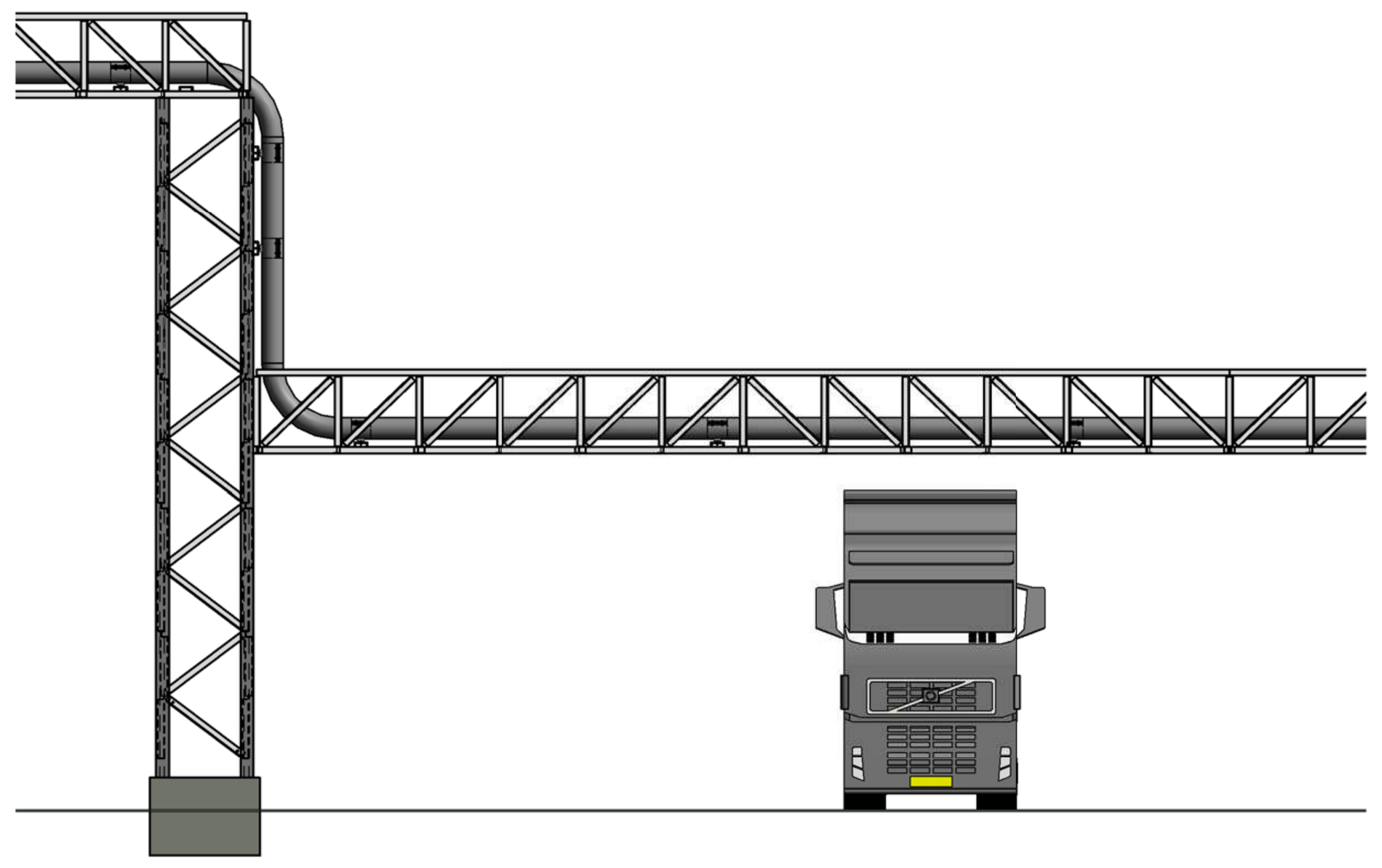

TYPICAL LONG SECTION 5,5m HIGH
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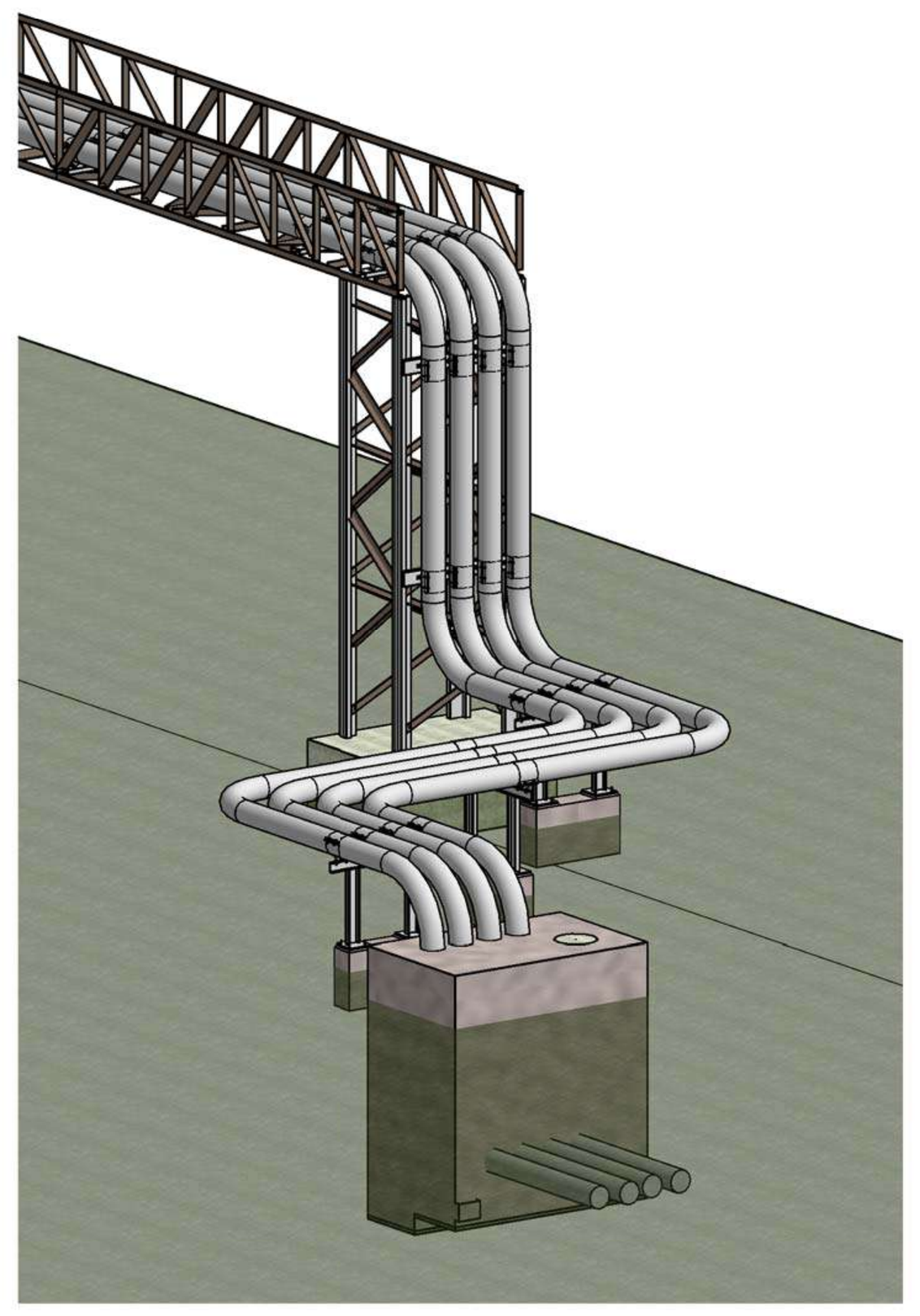
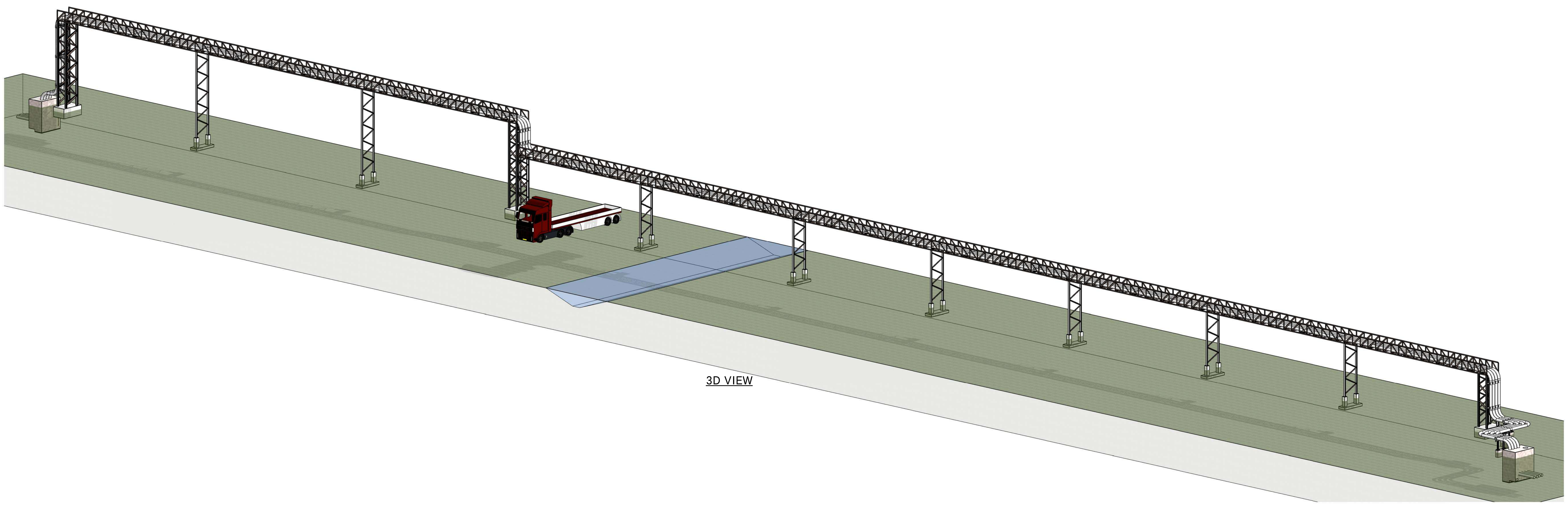


3D VIEW A
?
SCALE:



3D VIEW

NOTES

CLIENT
WILMAR

Royal HaskoningDHV
Enhancing Society Together

The Boulevard
Umhlangha
19 Park Lane
Umhlanga Rocks
4319

PO Box 1243
Umhlanga Rocks
4320

Tel No. +27 (0) 87 350 6660

PROJECT
WILMAR EDIBLE OIL PIPELINE

DRAWING DESCRIPTION
INDICATIVE DETAIL SHOWING ALTERNATIVE TYPICAL STEEL BRIDGE ASSEMBLY

FOR INFORMATION ONLY

DESIGNED **P.G. FISCHER**	SIGNATURE AND DATE
DRAWN **B. MANS**	SIGNATURE AND DATE
DRAWING CHECKED **P.G. FISCHER**	SIGNATURE AND DATE
DESIGN CHECKED **P.G. FISCHER**	SIGNATURE AND DATE
PROJ. PRINCIPAL / APPROVED **P.G. FISCHER**	SIGNATURE AND DATE

No.	DATE	REVISION DESCRIPTION	BY	TO
A	16/08/2018	FOR INFORMATION	B.M.	P.G.F.
B	02/02/2019	FOR INFORMATION	B.M.	P.G.F.

PROJECT No. **MD3665**		CONTRACT No.	DATE **2019/02/11 07:02:55 AM**
SHEET No. SHEET 1 OF 1	DISCIPLINE CIVIL	SCALE As indicated	PAPER SIZE **A0**
DRAWING No. **MD3665-RHD-FS-ST-M3-CX-2008**			REV. **B**