DESKTOP SURVEY OF THE PROPOSED NORTHERN AUQAUADUCT AUGMENTATION, PHASE 4, KWA-ZULU NATAL

FOR KNIGHT PIÉSOLD (PTY) LIMITED

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TABLE OF CONTENT

TABLE OF FIGURES

INTRODUCTION

"Knight Piésold Consulting are undertaking the environmental investigations associated with the proposed Northern Aqueduct Augmentation PHASE 4 (NAA Ph4) for the additional provision of potable water to areas that lie north of the Umgeni River; south of the Ohlanga River and east of Ntuzuma. NAA Phase 4 involves a short 6km link between Duffs Road, Phoenix 6 Reservoir and Phoenix 2 Reservoir just north of Phoenix Highway.

EThekwini Water and Sanitation (EWS) is currently constructing a new bulk water pipeline from Cato Ridge to Inchanga, Pinetown, Tshelimnyama and Ntuzuma (and surrounds) with gravity-fed potable water (The Western Aqueduct (WA)). The pipeline ties into Umgeni Water's existing bulk water infrastructure beyond the municipal boundary, which receives potable water from the Midmar Dam system. The pipeline currently under construction consists of a steel pipe of varying diameters (1.6m – 0.6m). Application has been made to the Department of Environmental Affairs for the NAA which will inject water from the WA into the NAA system via an off-take at KwaDabeka. This will involve the construction of a new bulk water pipeline from Emachobeni to Umhlanga via the proposed Blackburn Reservoir, supplying areas north of the Umgeni River, south of the Ohlanga River and east of Ntuzuma (and surrounds) with gravity-fed potable water. The 50km pipeline (recently approved by the Department of Agriculture, Environmental Affairs and Rural Development (DAEARD)), will consist of a steel pipe of varying diameters, and will be named the 'Northern Aqueduct Augmentation'.

Phase 4, which is now being proposed (in the previous EIA the NAA had three phases), is named NAA Phase 3 by the engineers (due to the construction timing). There is an existing Northern Aqueduct (NAX), which will be augmented by the NAA. Once completed, Phase 1 of the NAA project will provide an important link between the existing NAX and the new developments in the north

including Cornubia, Umhlanga, Waterloo and Nyaninga. The NAX however is presently operating very close to its maximum capacity and does not have spare capacity to supply the new developments such as Cornubia. The problem when the new demands are tagged onto the end of the system is the high velocities that will occur in the trunk mains running from Durban Heights to Phoenix 2 Reservoir via Duffs Road. This in turn results in high friction losses and inadequate flow through the system.

The most severe bottleneck in the existing NAX occurs in the section of trunk mains between Duffs Road and Phoenix 2. This section of the existing system consists of a DN525 (diameter of 525cm) pipe in parallel with a DN450 pipe between Duffs Road and the Phoenix 1 off-take and thereafter, a DN450 pipe in parallel with a DN375 pipe up to Phoenix 2 Reservoir. These pipelines are completely inadequate for the purposes of providing a water supply into the NA Phase 1.

Because the construction of the WA (Phase 2) has been put on hold, an alternative link (NAA Phase 4 (or the Engineers Phase 3) is currently being proposed. This is to provide water from the EXISTING NAX into NAA Phase 1, so that Cornubia and other developments in the north of Durban, can be provided with water within the next 18 months, as the construction of the WA Ph2 will only reach the starting point of the NAA Ph2 (at Emachobeni) in five years time (optimistically).

It is thus proposed that a new DN1200 pipe be laid in parallel with the existing pipelines to remove the bottleneck in the system between Duffs Road and Phoenix 2 Reservoir. This pipeline forms Phase 3 (or Phase 4 – in the Environmental Report) of the NAA and is required to be commissioned at the same time as NAA Ph 1, i.e. 2014.

We have established that the existing two pipes within the servitude will continue to be used (current daily volume approximately 50,000m3). The new bigger pipe will merely augment the existing pipelines which are presently a bottleneck in the system. The old pipes are much smaller (450 – 500mm) in diameter, and as such when the new pipe is tied into the system, the water will prefer the path of least resistance, and thus most of it, will 'choose' the bigger pipe. The ultimate 30-year demand in the system will result in a total flow of about 120,000 m3 per day, of which 100,000 m3 per day will flow in the new (bigger) pipe as a result of its lower friction loss" (Knight Piésold ToR - Heritage NAA Ph4 - ML 12.10.2012).

Umlando was contracted by Knight Piésold (Pty) Limited to undertake the heritage survey of the proposed Northern Aquaduct Augmentation Phase 4 (NAAA4), in northeastern KwaZulu-Natal. During the quotation process, Umlando suggested that a letter requesting an HIA exemption be written to Amafa KZN. This was due to the fact that most of the line would occur in mostly developed areas of Phoenix. The HIA of the NAA route (Umlando 2011) clearly showed that there was very little affected heritage in this area.

FIG. 1 GENERAL LOCATION OF THE PROPOSED NAA4

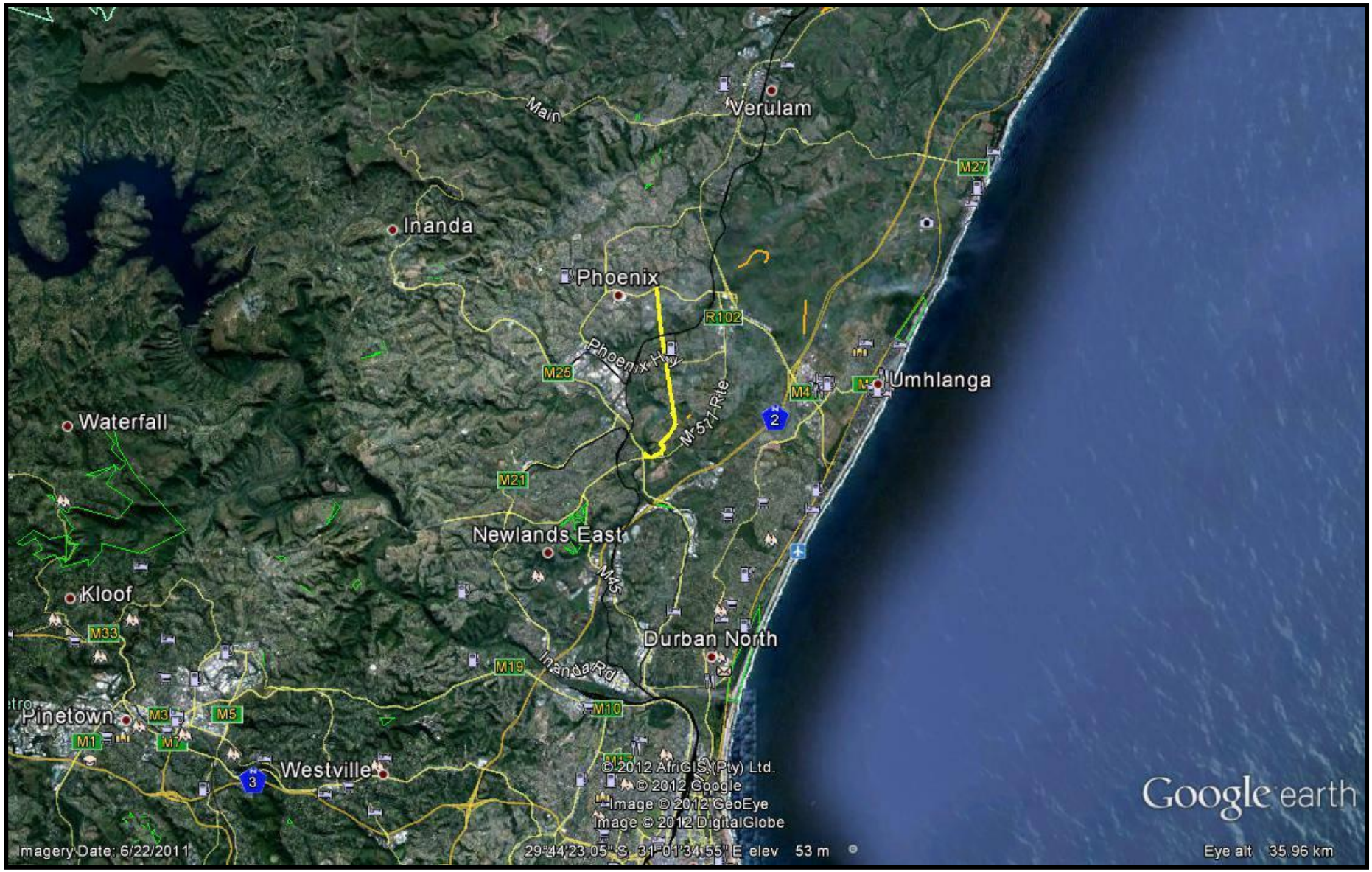


FIG. 2: NORTHERN AERIAL OVERVIEW OF THE PROPOSED NAA4

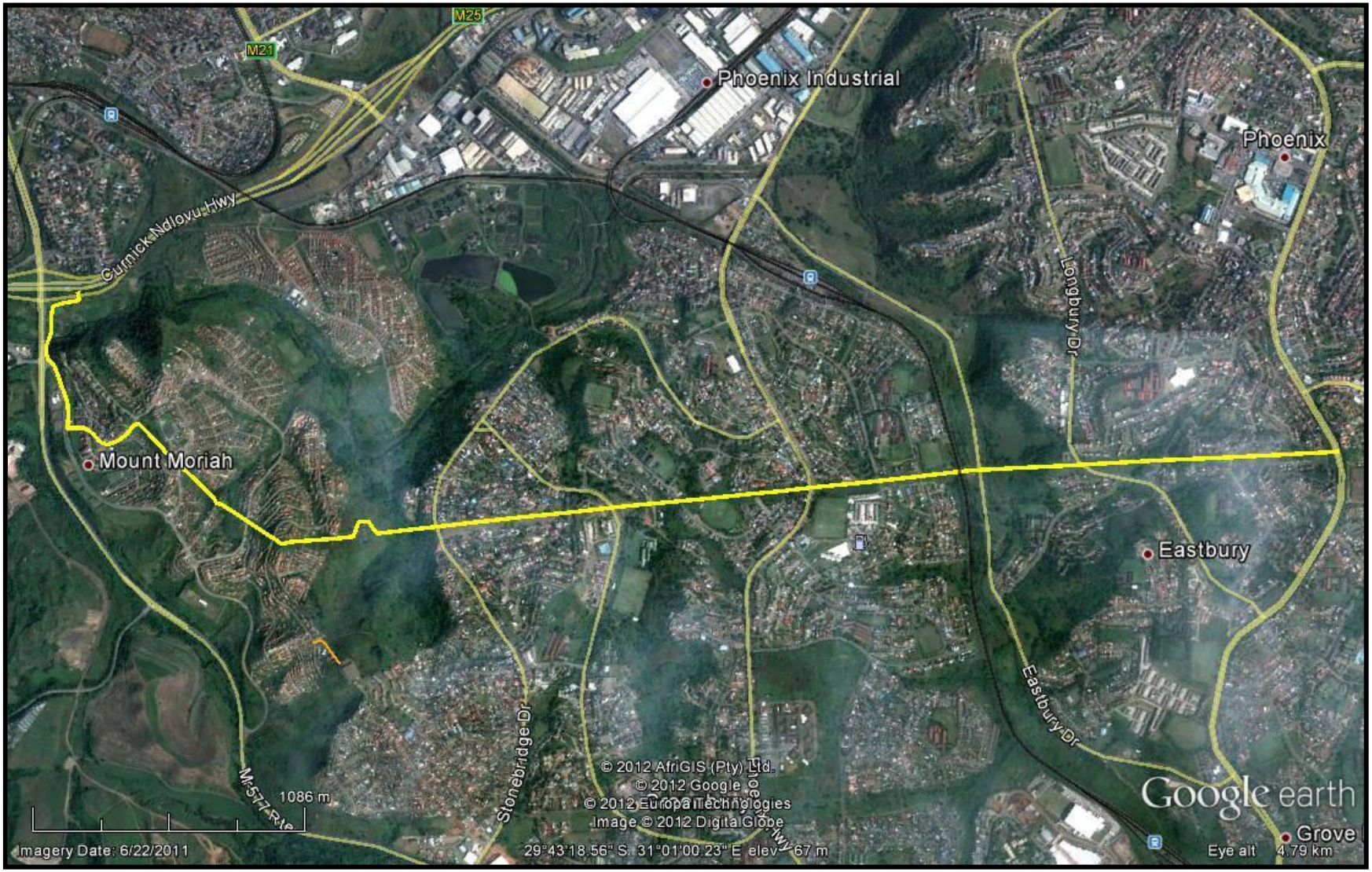
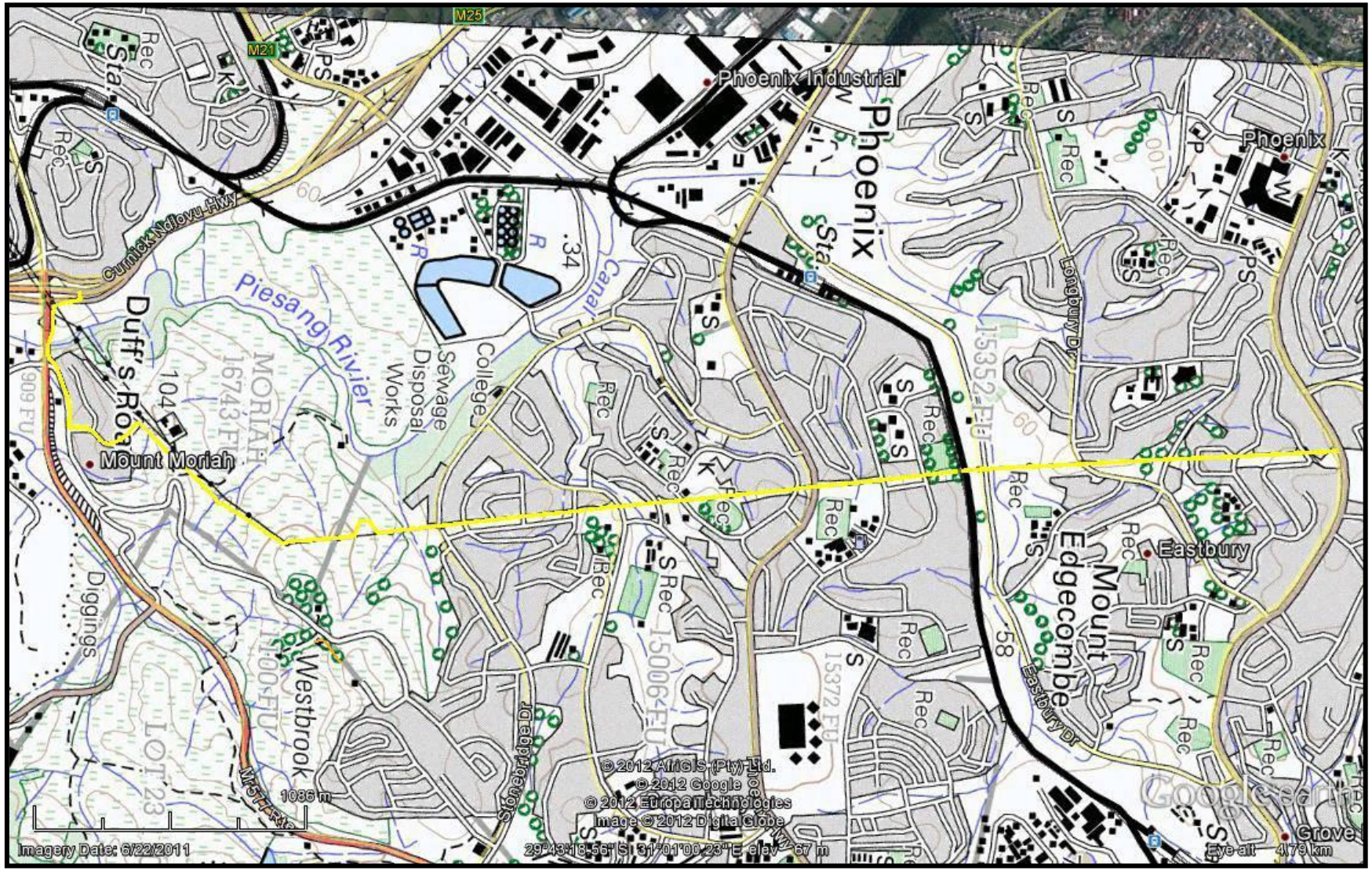


FIG. 3: TOPOGRAPHICAL MAP OF THE NORTHERN SECTION OF THE PROPOSED NAA4[1]



[1] 2931CA Verulam 2000

KWAZULU-NATAL HERITAGE ACT NO. 4 OF 2008

1. " General protection: Structures.—
    a. No structure which is, or which may reasonably be expected to be older than 60 years, may be demolished, altered or added to without the prior written approval of the Council having been obtained on written application to the Council.
    b. Where the Council does not grant approval, the Council must consider special protection in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
2. The Council may, by notice in the *Gazette*, exempt—
    a. a defined geographical area; or
    b. defined categories of sites within a defined geographical area, from the provisions of subsection where the Council is satisfied that heritage resources falling in the defined geographical area or category have been identified and are adequately protected in terms of sections 38, 39, 40, 41 and 43 of Chapter 9.
    c. A notice referred to in subsection (2) may, by notice in the *Gazette*, be amended or withdrawn by the Council.
3. General protection: Graves of victims of conflict.—No person may damage, alter, exhume, or remove from its original position—
    a. the grave of a victim of conflict;
    b. a cemetery made up of such graves; or
    c. any part of a cemetery containing such graves, without the prior written approval of the Council having been obtained on written application to the Council.
4. General protection: Traditional burial places.—
    a. No grave—
    b. not otherwise protected by this Act; and
    c. not located in a formal cemetery managed or administered by a local authority, may be damaged, altered, exhumed, removed from its original position, or otherwise disturbed without the prior written

approval of the Council having been obtained on written application to the Council.

5. The Council may only issue written approval once the Council is satisfied that—
    a. the applicant has made a concerted effort to consult with communities and individuals who by tradition may have an interest in the grave; and
    b. the applicant and the relevant communities or individuals have reached agreement regarding the grave.
    c. 36. General protection: Battlefield sites, archaeological sites, rock art sites, palaeontological sites, historic fortifications, meteorite or meteorite impact sites.—
6. No person may destroy, damage, excavate, alter, write or draw upon, or otherwise disturb any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.
7. Upon discovery of archaeological or palaeontological material or a meteorite by any person, all activity or operations in the general vicinity of such material or meteorite must cease forthwith and a person who made the discovery must submit a written report to the Council without delay.
8. The Council may, after consultation with an owner or controlling authority, by way of written notice served on the owner or controlling authority, prohibit any activity considered by the Council to be inappropriate within 50 metres of a rock art site.
9. No person may exhume, remove from its original position or otherwise disturb, damage, destroy, own or collect any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site without the prior written approval of the Council having been obtained on written application to the Council.

10. No person may bring any equipment which assists in the detection of metals and archaeological and palaeontological objects and material, or excavation equipment onto any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, or meteorite impact site, or use similar detection or excavation equipment for the recovery of meteorites, without the prior written approval of the Council having been obtained on written application to the Council.
11. The ownership of any object or material associated with any battlefield site, archaeological site, rock art site, palaeontological site, historic fortification, meteorite or meteorite impact site, on discovery, vest in the Provincial Government and the Council is regarded as the custodian on behalf of the Provincial Government." (KZN Heritage Act of 2008)

METHOD

The method for Heritage assessment consists of several steps.

The first step forms part of the desktop assessment. Here we would consult the database that has been collated by Umlando. This databases contains archaeological site locations and basic information from several provinces (information from Umlando surveys and some colleagues), most of the national and provincial monuments and battlefields in Southern Africa (http://www.vuvuzela.com/googleearth/monuments.html) and cemeteries in southern Africa (information supplied by the Genealogical Society of Southern Africa). We use 1st and 2nd edition 1:50 000 topographical and 1937 aerial photographs where available, to assist in general location and dating of buildings and/or settlements with graves. The database is in Google Earth format and thus used as a quick reference when undertaking desktop studies. Where required we would consult with a local data recording centre, however these tend to be fragmented between different institutions and areas and thus difficult to access at

times. We also consult with an historical architect, palaeontologist, and an historian where necessary.

The use of historical maps allows us to note the locations of potential heritage sites in areas where the vegetation is too dense, or where there is no physical evidence of a settlement. That is, some areas have a high rate of deterioration of archaeological/organic remains, and human graves are generally ephemerally marked or demarcated with organic remains. By using the maps we can indicate sensitive areas and suggest appropriate management plans.

The survey results will define the significance of each recorded site, as well as a management plan.

All sites are grouped according to low, medium, and high significance for the purpose of this report. Sites of low significance have no diagnostic artefacts or features. Sites of medium significance have diagnostic artefacts or features and these sites tend to be sampled. Sampling includes the collection of artefacts for future analysis. All diagnostic pottery, such as rims, lips, and decorated sherds are sampled, while bone, stone, and shell are mostly noted. Sampling usually occurs on most sites. Sites of high significance are excavated and/or extensively sampled. Those sites that are extensively sampled have high research potential, yet poor preservation of features.

Defining significance

Heritage sites vary according to significance and several different criteria relate to each type of site. However, there are several criteria that allow for a general significance rating of archaeological sites.

These criteria are:

1. State of preservation of:

1.1. Organic remains:

1.1.1. Faunal

1.1.2. Botanical

1.2. Rock art

1.3. Walling

1.4. Presence of a cultural deposit

1.5. Features:

1.5.1. Ash Features

1.5.2. Graves

1.5.3. Middens

1.5.4. Cattle byres

1.5.5. Bedding and ash complexes

2. Spatial arrangements:

2.1. Internal housing arrangements

2.2. Intra-site settlement patterns

2.3. Inter-site settlement patterns

3. Features of the site:

3.1. Are there any unusual, unique or rare artefacts or images at the site?

3.2. Is it a type site?

3.3. Does the site have a very good example of a specific time period, feature, or artefact?

4. Research:

4.1. Providing information on current research projects

4.2. Salvaging information for potential future research projects

5. Inter- and intra-site variability

5.1. Can this particular site yield information regarding intra-site variability, i.e. spatial relationships between various features and artefacts?

5.2. Can this particular site yield information about a community's social relationships within itself, or between other communities?

6. Archaeological Experience:

6.1. The personal experience and expertise of the CRM practitioner should not be ignored. Experience can indicate sites that have potentially significant aspects, but need to be tested prior to any conclusions.

7. Educational:

7.1. Does the site have the potential to be used as an educational instrument?

7.2. Does the site have the potential to become a tourist attraction?

7.3. The educational value of a site can only be fully determined after initial test-pit excavations and/or full excavations.

8. Other Heritage Significance:

8.1. Palaeontological sites

8.2. Historical buildings

8.3. Battlefields and general Anglo-Zulu and Anglo-Boer sites

8.4. Graves and/or community cemeteries

8.5. Living Heritage Sites

8.6. Cultural Landscapes, that includes old trees, hills, mountains, rivers, etc related to cultural or historical experiences.

The more a site can fulfill the above criteria, the more significant it becomes. Test-pit excavations are used to test the full potential of an archaeological deposit. This occurs in Phase 2. These test-pit excavations may require further excavations if the site is of significance (Phase 3). Sites may also be mapped and/or have artefacts sampled as a form of mitigation. Sampling normally occurs when the artefacts may be good examples of their type, but are not in a primary archaeological context. Mapping records the spatial relationship between features and artefacts.

RESULTS

DESKTOP STUDY

The desktop study consisted of analysing various maps for evidence of prior habitation in the study area, as well as for previous archaeological surveys. The Natal Museum database indicates that several archaeological sites have been recorded in the general area. Most of these are the results of systematic surveys undertaken G Anderson, T. Maggs and G Whitelaw (under the auspices of the Natal Museum).

The database indicates that there no known, or previously recorded, heritage sites in the study area (fig. 4). The archaeological sites that have been recorded are the result of systematic surveys and include a wide spectrum of types of sites: from the Early Stone Age to the recent Historical Period.

The 1937 aerial photographs indicate that most of the route was already under sugar cane (fig. 5). Plantation houses are clearly visible, and no labourer's houses occur within the study area. Thus, the area should be free of post 1930s graves.

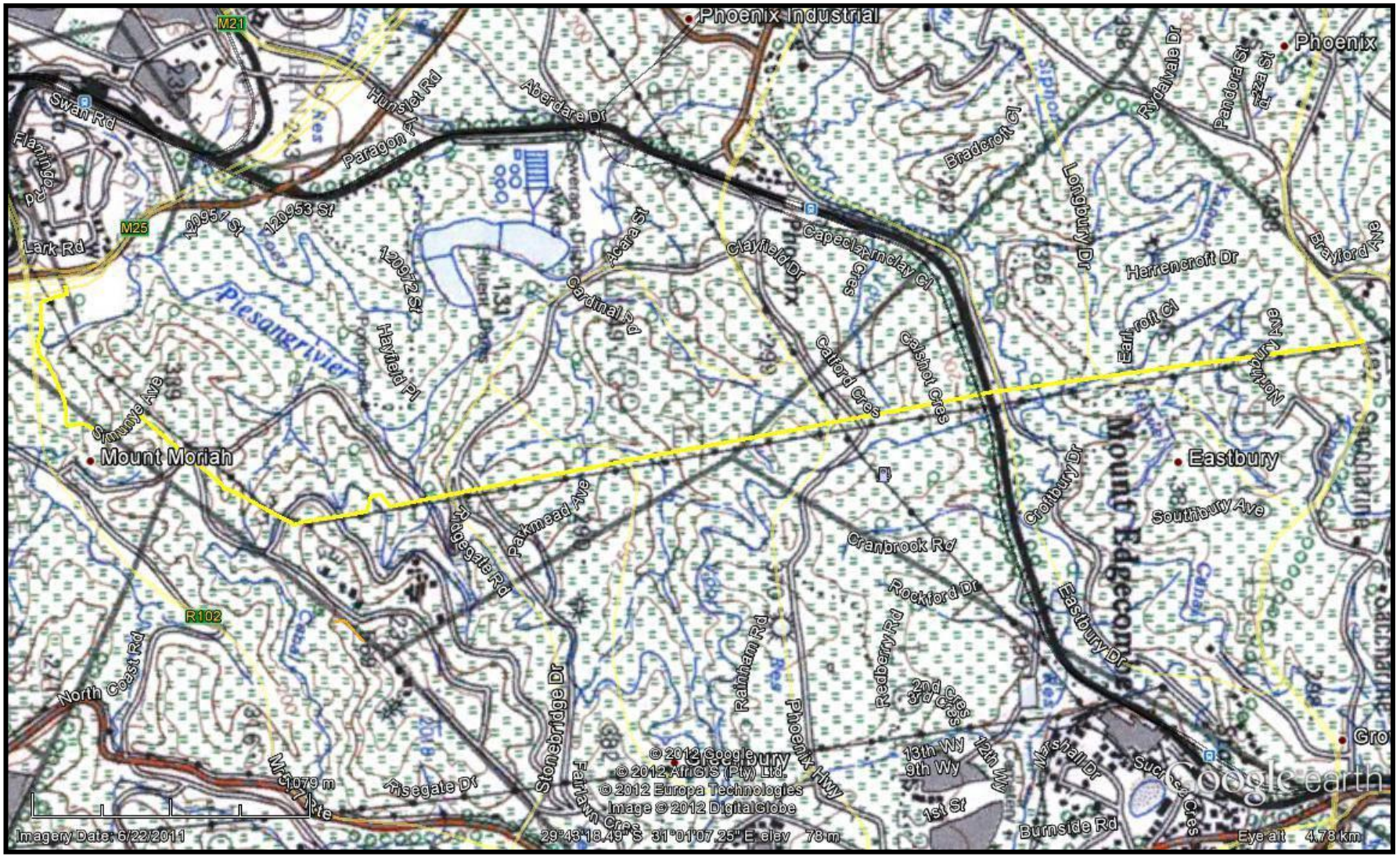
The 1966 1:5000 topographical map indicates the same type of environment as in 1937 (fig. 6).

FIG. 4: LOCATION OF KNOWN HERITAGE SITES IN THE GENERAL AREA[2]

Purple = Archaeological sites from the Natal Museum database; Orange = Historical Buildings; Red = Historical Cemeteries; White = NAA sites.

FIG. 5: LOCATION OF SETTLEMENTS ALONG THE NORTHERN NAA4 IN 1937

FIG. 6: LOCATION OF SETTLEMENTS ALONG THE NORTHERN NAA4 IN 1968



By 2000, most of the area is inundated with Phoenix residential units. Only one hill and two river valleys are unoccupied (fig. 3). By 2010, even less of the area is unoccupied or undeveloped (fig. 2). Those areas where the route cross river valleys can be excluded from previous human occupation as they are too small for Early Iron Age sites, and in the wrong location for Late Iron Age sites. In addition to this, these are not favoured areas for any of the Stone Age occupations. If stone tools do occur in the area, then they would be in a secondary context.

The only bit of land that could have Stone Age, Late Iron Age, and/or Historical Period occupation is the hill on the Erf Moriah 16743FU (fig. 7). This is a small area of land that has had some form of agriculture for at least 80 years, and any archaeological site would have been completely damaged. The survey for the NAA line occurred on the same hill system, but 450m to the east. The geology on that hill is the same as this hill, and it is not conducive to human occupation, due to the shallow soils and shale substrate.

The shale substrate was shown to be palaeontologically sensitive in the NAA desktop. The sensitive area was Orange flagged: it is ~350m east of the undeveloped hill on Moriah 16743FU. In this desktop it was “recommended that outcrops of the Vryheid Formation, where present, be recorded for closer inspection by a trained palaeontologist. Where deep excavation into Vryheid Formation shale is expected, it is recommended that a trained palaeontologist visit the sites of excavation and, if ichnofossils are present; obtain a permit from SAHRA and/or AMAFA for collection of a representative sample for study purposes” (PIA in Anderson 2011)

Thus by extrapolating the PIA desktop study one would expect to find palaeontological material on the hill. This hill would then require monitoring during construction phase.

FIG. 7: LOCATION OF NAA4 AND NAA SURVEY[3]

[3] Yellow = NAA4 line; Purple = previous survey; Black = palaeontologically sensitive

MANAGEMENT PLAN

The desktop study suggests that a full HIA survey should not be necessary, as most of the route has been damaged due to housing and/or agriculture. Only one section of the line would have palaeontological material and this area should be monitored during construction.

This area would occur from S29°44'11.23" E31° 1'18.27"E to S29°43'57.83" E31° 1'16.90"

We thus request an exemption for an HIA based on the findings of the desktop study.

CONCLUSION

A desktop heritage survey was undertaken for the NAA4. Umlando was originally asked to quote for a full HIA; however, we noted that the area would not yield any heritage sites apart from palaeontological fossils.

We requested an exemption of an HIA from Amafa KZN, with the desktop findings being sufficient

REFERENCES

Anderson, G. 2011. Heritage Survey Of The Proposed Northern Aquaduct Augmentation Pipeline. HIA Report for Knight Piésold Consulting.