HERITAGE ASSESSMENT OF THE PROPOSED UPGRADE TO THE STORMWATER AND RETENTION FACILITIES AT BEAUFORT WEST, WESTERN CAPE

(Assessment conducted under Section 38 (8) of the
National Heritage Resources Act (No. 25 of 1999) as part of an BAR)

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EXECUTIVE SUMMARY

The Archaeology Contracts Office was asked by Kayad Knight Piesold (Pty) Ltd to undertake a heritage impact assessment for the upgrading of the stormwater management facilities within Beaufort-West, in the Western Cape. The project is required under the environmental legislation and forms part of an environmental impact assessment.

This report considered the impact of the upgrading of stormwater facilities and the construction of retention dams in the Hillside suburb of Beaufort West. The sites are situated between residential stands and the railway shunting yards on the western side of town. The preferred areas are much degraded and have been significantly transformed by dumping of rubble.

A separate Palaeontological Impact Assessment (Case ID 1424) was requested by Heritage Western Cape (11 May 2011) and is attached at the end of this report.

The following conclusions were made:

- Due to the paucity of fossils in town, the flat low lying geography and absence of steep-sided gullys that would preserve fossils, the general lack of exposure due to vegetation cover and the overall degraded nature of the proposed sites, impact on the palaeontology of the area is negligible;
- No archaeological remains were identified;
- There are no issues of built environment which will be impacted;
- There are no obvious above ground graves;
- The visual impact of the retention dams on the landscape of the immediate area would appear to be limited as the embankments for the retention ponds will reach a maximum height of 2.5 m. The retention ponds will not be visible from the N1 or the main axis roads through town.

Subject to the approval of the various relevant authorities, the proposed developments should be allowed to proceed

Contents

1. INTRODUCTION

The Archaeology Contracts Office was asked by Kayad Knight Piesold (Pty) Ltd to undertake a heritage impact assessment for the upgrading of the stormwater management facilities within Beaufort-West, in the Western Cape (Figure 1). The development will include the construction of two retention ponds, the construction of three new channels and the upgrading of existing culverts in the Hillside suburb of Beaufort West. The aim of the upgrade is to accommodate the occasional flood event and to prevent damage to people and property.

This impact assessment study considers general heritage and archaeology but not palaeontology.

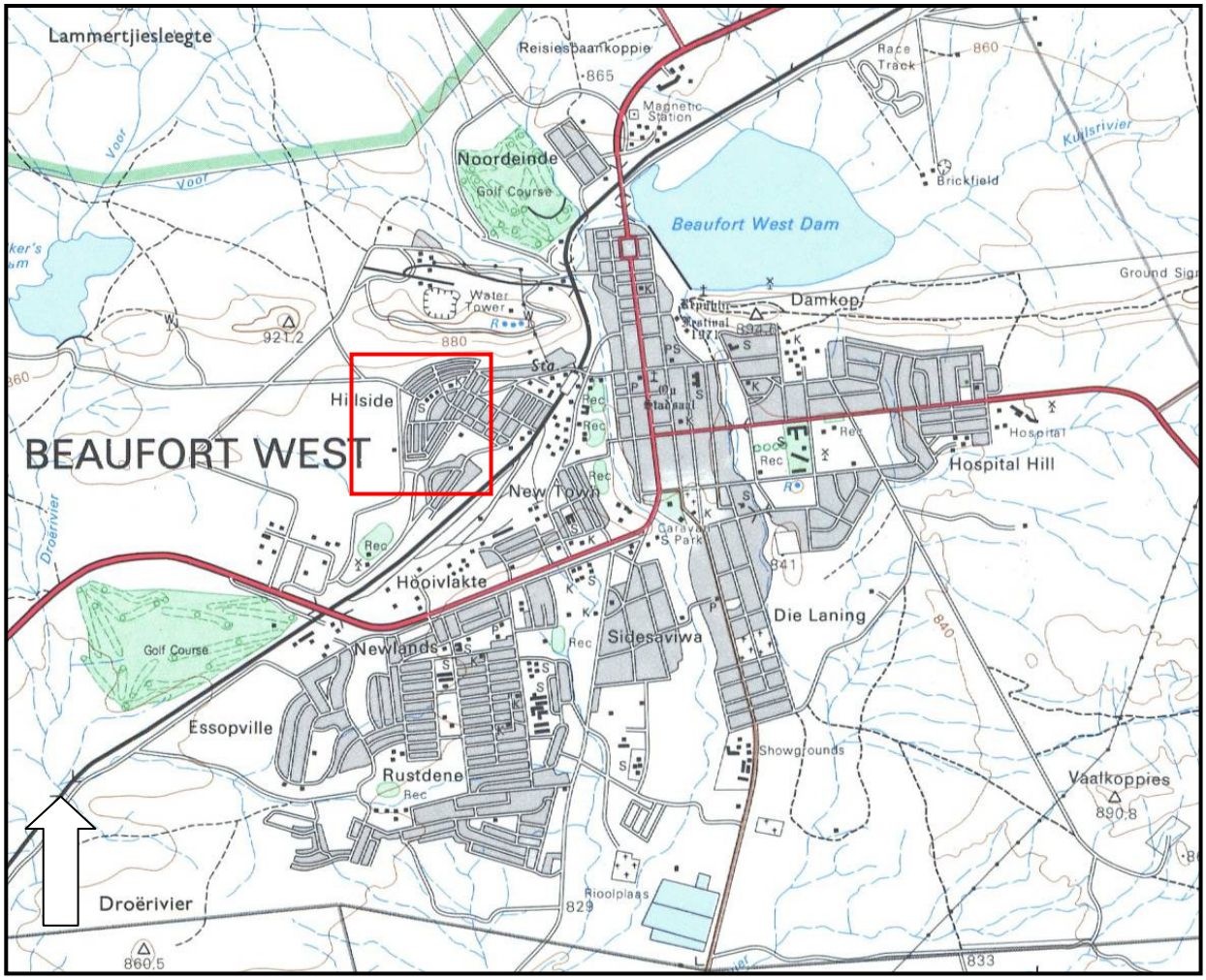

Figure 1: The position of the proposed stormwater management facilities (including retention ponds) in the Hillside suburb of Beaufort West, to the west of the railway line (1:50 000 map of Beaufort West 3222 BC)

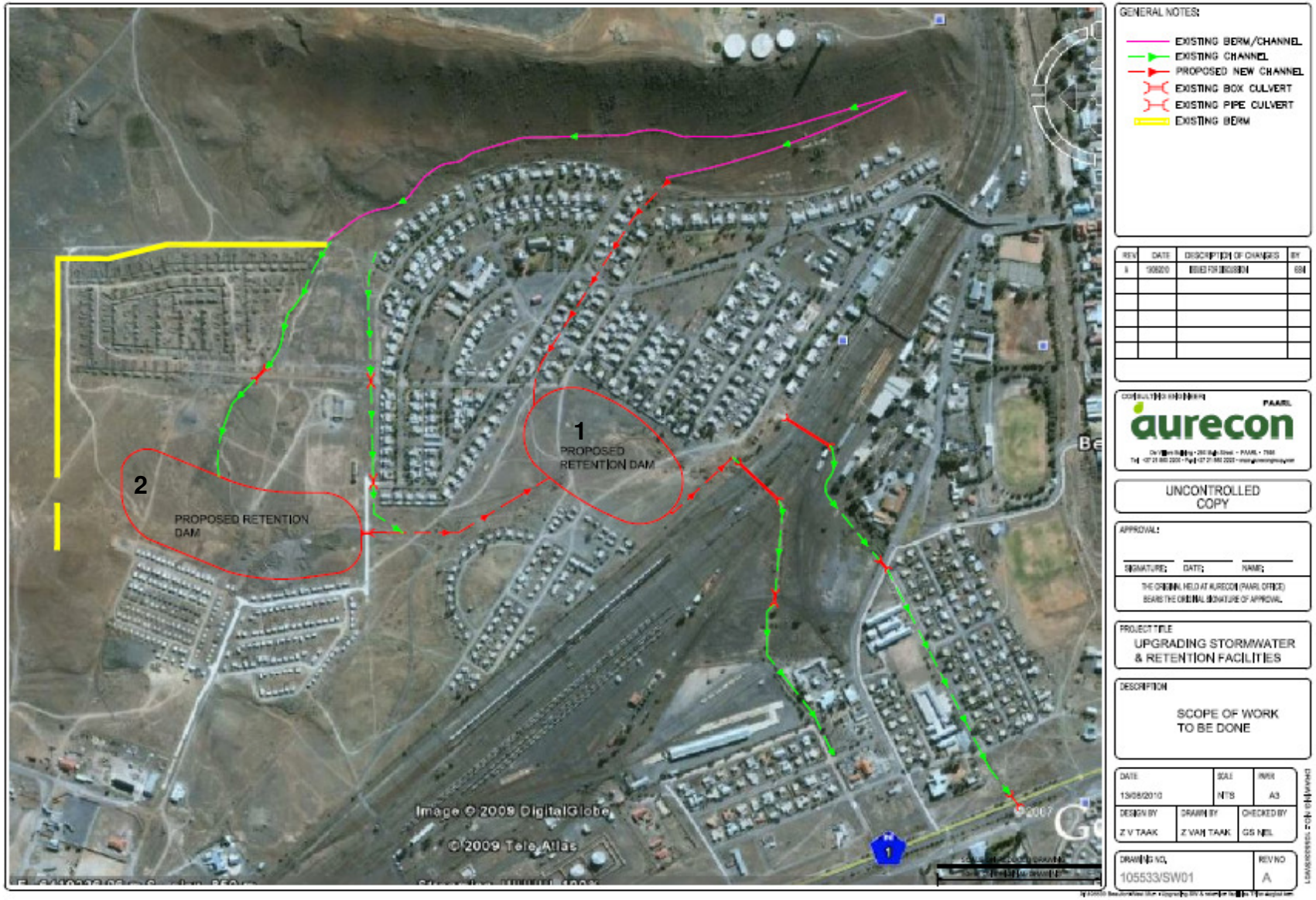

Figure 2: Map showing the location of the study area on the western side of town. This is an old image, as the settlement now completely encloses the area for retention dam 2.

1.1. Project proposal

The Beaufort-West Municipality proposes the construction of a 49 500 m^3 and 35 000 m^3 stormwater retention dam with areas of approximately 5 ha and 3.5 ha respectively. However marginal changes to the volume of the storage facilities may occur during the preliminary design phase. The dams will have wall heights of 2.0 m and 2.5 m respectively (Figure 3) and the dams will be constructed within a residential area and border against a railroad. The closest natural water body is approximately 660m from where construction activities will take place.

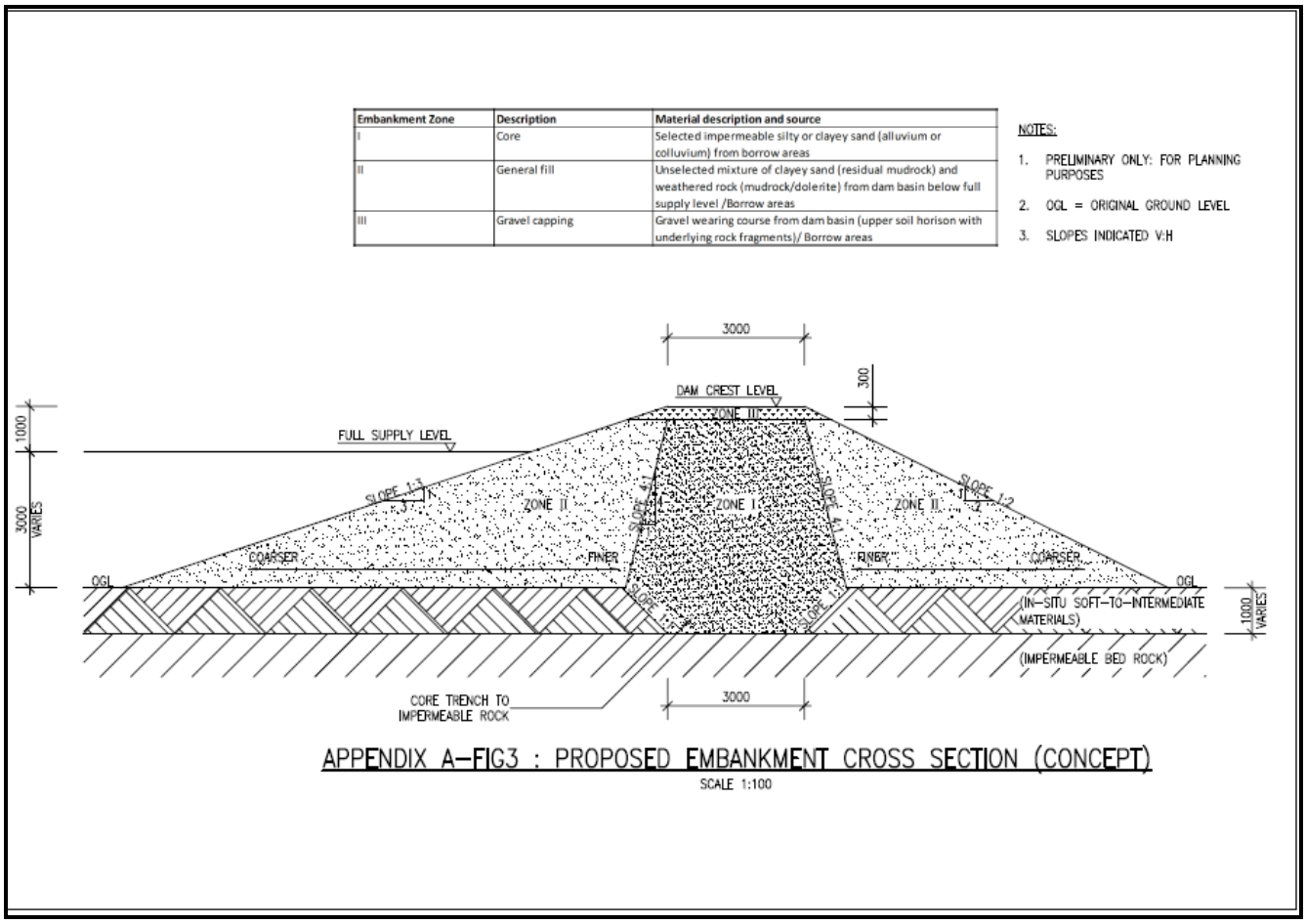

Figure 3: Cross section of the embankment for the retention ponds (figure supplied by client)

The dams will intercept flow from an existing stormwater cut-off channel and in some areas the cut-off channel will have to be reconstructed. Other existing channels in the area may also need to be repaired. The dams are proposed to attenuate run-off and will have the capacity to safely accommodate the 1:50 year flood. Downstream of the dams the flow will be collected in stormwater culverts, which passes underneath the railroad, which will discharge it into the existing, downstream channels. The discharge flow is estimated to be 12 m^3/s. No additional roads or pipelines are proposed to be constructed. Three new channels will however need to be constructed of lengths 350 m, 430 m, and 530 m respectively. Furthermore, as part of the suggested stormwater management measures, existing culverts and channels in the immediate vicinity would be rehabilitated.

2. HERITAGE LEGISLATION

The basis for all heritage impact assessment is the National Heritage Resources Act 25 (NHRA) of 1999, which in turn prescribes the manner in which heritage is assessed and managed. The National Heritage Resources Act 25 of 1999 has defined certain kinds of heritage as being worthy of protection, by either specific or general protection mechanisms. In South Africa the law is directed towards the protection of human made heritage, although places and objects of scientific importance are covered. The National Heritage Resources Act also protects intangible heritage such as traditional activities, oral histories and places where significant events happened. Generally protected heritage which must be considered in any heritage assessment includes:

- Cultural landscapes
- Buildings and structures (greater than 60 years of age)
- Archaeological sites (greater than 100 years of age)
- Palaeontological sites and specimens
- Shipwrecks and aircraft wrecks
- Graves and grave yards.

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The suburb of Hillside lies to the west of the railway line which bisects the town. A small hill, reaching a height of 800 m, is positioned to the north of the suburb. It has a water tower and reservoirs on top. The suburb of Hillside is a mix of older houses (probably dating to the early part of the 20th century) along the base of the hill. However, there are more recent houses (from the 1970s) to the south, abutting the area identified for retention dam 1 (Figure 2). Retention dam 2 is located next to a recently constructed township (post 1999). Both vacant areas comprise a mix of shale bedrock and alien vegetation. These areas have been used as a general dumping ground by residents and they contain builder's rubble and rubbish. After recent heavy rains in the area, there were also pools of water.

Plate 1: Proposed location for retention dam 1 - view eastward toward the railway lines.

Plate 2: Retention dam 1 - view to the north. Note the hill to the north of the suburb with radio mast and water reservoirs.

Plate 3: Retention dam 1 – view of the shale substrate, the alien vegetation and the dumping of rubble.

The vacant land identified for retention dam 2 (Figure 2) is now completely enclosed by sub-economic housing. It has more evidence for dumping of builders rubble and the vegetation is also higher, suggesting a greater water flow in the area.

Plate 4: Retention dam 2 – view of the houses which surround the property and the dense vegetation which covers the area.

Plate 5: View of the rubbish which has been deposited on the site.

In addition to the 2 retention dams, the development also includes a number of channels (Figure 2). The longest channel runs from the existing berm/channel on the slopes of the hill to the north of the suburb, down Basson Street to retention dam 2.

4. HERITAGE CONTEXT

4.1. Palaeontology Background

Heritage Western Cape requested a specialist desktop palaeontological study on the 11 May 2011 (Unique ID 1316; Unique Case ID: 1424) and this is attached at the end of this report. Briefly, the specialist, Dr Jennifer Botha-Brink noted that: "Due to the paucity of fossils in town, the flat low lying geography and absence of steep-sided gullys that would preserve fossils, the general lack of exposure due to vegetation cover and the overall degraded nature of the proposed sites, impact on the palaeontology of the area is negligible". She has therefore approved the upgrade of the stormwater detention facilities.

4.2. Archaeology Background

The semi-arid region of the Karoo, which is located in the central part of South Africa, comprises vast farm complexes, widely spaced. Farm buildings are of varying age and include examples from throughout the 19th and 20th centuries. The vastness of the scenery along the N1 freeway and other roads is generally broken only by the occasional town and service station. The Karoo, and particularly the Beaufort West area, is very rich in palaeontological resources.

Archaeologically, little research has been conducted in the general vicinity, although a few cultural resource management (CRM) surveys have been done in the vicinity of Beaufort West. Kaplan (2006, 2007, 2008) has recorded the remains of shepherd's huts, some graves, a stone kraal and a variety of scatters of stone artefacts on adjoining farms. At least one of the latter contained good diagnostic material pertaining to the Later Stone Age. He also reports rock paintings in the Karoo National Park (Kaplan 2002). Near Beaufort West Dreyer (2005) has also reported both Early and Later Stone Age material. Just east of Three Sisters, Deacon (2007) found background scatters of Middle and Later Stone Age artefacts as well as one small, ephemeral site with both ages represented. He also recorded a site with rock engravings some 15 km east of Three Sisters. Orton (2010) recorded rock engravings between Beaufort West and Three Sisters. The Nelspoort area has recently become known for its rock engravings (Parkington *et al.* 2008). Engravings are found all over the Karoo region wherever dolerite occurs. This darkly weathered rock is favoured for engravings since the dark patina can be removed to reveal a much lighter colour beneath, thus creating the art.

4.3. Historical Background

Beaufort West lies below the southern heights of the Nuweveld Range. During the second half of the 18th century, farmers started moving northward into the Karoo, settling in what was known as the Nuweveld and the Koup. A shortage of surface water meant that populations of San hunter-gatherers, and later Khoekhoe pastoralists were confined to areas with springs. *Hooivlakte in de Carro* was first settled by Abraham de Klerk because of its good source of water. In 1818 a new district was proclaimed and the farms Hooivlakte and Bosjesmansberg were bought as the site for a proposed town. The new district and town subsequently became known as Beaufort West. The town was laid out in 1820 and furrows, channelling water, were constructed along the streets. Beaufort West became a municipality in 1836, making it the oldest in the country. The railway from Cape

Town reached the town in 1880 and it became a major locomotive depot and marshalling yard on the way to the north (Bulpin 1986). However, the town is built on the banks of the Gamka (lion) River which occasionally floods its banks. In 1877, it completely overflowed the town. A great dam with a 63m retaining wall was built on the Gamka River in 1955 and it provides the town with water.

Although context is generally poor, it is clear that the Karoo is very rich in archaeological and colonial heritage.

The proposed eastern retention dam will be located on Erven 11 and 12. Erf 11 was surveyed in 1919 and is described as “portions of land commonage granted to the Commissioners for the time being of the Municipality of Beaufort West on 7 November 1890” (No 2242/1919). Erf 12 was surveyed in 1929 (No 2682/1929) and described in similar terms.

It is more difficult to identify the erf number for the proposed western retention dam. The land would appear to have formed part of Farm 185. Properties to the north of the proposed retention dam location were subdivided in 1976 and those to the south in 1999. This supports the view that the adjoining properties are all recent and of little heritage significance.

5. METHODS

The survey was conducted on the 23 February 2011 by Lita Webley and John Lanham.

Finds were recorded photographically and their positions were taken using a hand-help GPS receiver set to the WGS84 datum. The GPS was also used to log walk-paths through the study areas.

5.1. Limitations

The only limitation was the dense stands of vegetation on the land identified for retention dam 2.

6. FINDINGS

Findings will be dealt with according to type.

6.1. Palaeontology

A desktop palaeontological assessment is added at the end of this report.

6.2. Pre-colonial Archaeology

No material was recovered from the retention dam areas, along Basson Street or from the foot of the hill to the north of town. We examined the hill closely, in view of the presence of rock engravings on dolerite boulders along the N1 to the north of Beaufort West. However, there are very few rocks on the slopes of the hill and they are not suitable for rock engravings (i.e. not dolerite).

6.3. Colonial Archaeology

A number of fragments of European stoneware, possibly representing a single vessel, were found at the base of the water tower hill (Plate 6). They were mixed with more common 20th century bottle glass and debris, including scrap metal and builders rubble.

Plate 6: A few fragments of European stoneware found at the base of the hill, above the houses on Park Avenue.

6.4. Graves

No graves were identified in the area. It seems unlikely that an informal graveyard would exist in this area due to the hard, shale substrate.

6.5. Built Environment

No issues of built environment will be impacted. A channel will run down Basson Street, connecting to retention dam 1. This street was examined for heritage indicators. The channel will be below ground and no heritage issues were identified.

Plate 7: Basson Street is wide and lined with trees. It has a gravel surface, making it the most appropriate road for a channel to connect the retention dam 1 to the existing channel (Figure 2). Note the hill at the end of the road and the water reservoir.

6.6. Visual impacts and sense of place

The embankments for the retention dams reach a maximum height of 2.5 m. They will not be visible from the eastern side of railway, in other words from the N1 which passes through the main road of Beaufort West. The dams will only contain water after heavy flooding and for the most part, will be empty. The channels connecting the retention dams are below ground. It is therefore anticipated that the impact on the Cultural Landscape, represented by the western section of Beaufort West, will be minimal.

7. CONCLUSIONS

This report considered the impact of the upgrading of stormwater facilities and the upgrading of retention dams on the Hillside suburb of Beaufort West. The sites are situated between residential stands and the railway shunting yards. These areas are much degraded and have been significantly transformed by dumping of rubble.

A desktop palaeontological impact assessment is attached at the end of this report, as requested by Heritage Western Cape on the 11 May 2011. The specialist, Dr Jennifer Botha-Brink, has concluded: “Due to the paucity of fossils in town, the flat low lying geography and absence of steep-sided gullys that would preserve fossils, the general lack of exposure due to vegetation cover and the overall degraded nature of the proposed sites, impact on the palaeontology of the area is negligible”.

No archaeological remains were identified. There are no issues of built environment which will be impacted. There are no obvious above ground graves. The visual impact of the retention dams on the landscape of the immediate area would appear to be limited.

8. RECOMMENDATIONS

Subject to the approval of the various relevant authorities, the proposed developments should be allowed to proceed.

9. REFERENCES

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PALAEONTOLOGICAL IMPACT ASSESSMENT OF THE PROPOSED UPGRADE TO THE STORMWATER AND DETENTION FACILITIES IN HILLSIDE, BEAUFORT WEST, WESTERN CAPE

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EXECUTIVE SUMMARY

The Beaufort West Municipality requires the establishment of two detention ponds and the upgrading of existing stormwater earth channels in the suburb of Hillside 2, Beaufort West, Western Cape, in order to solve the problem of frequent flooding and destruction of property in the area. Due to the National Heritage Resources Act, a palaeontological impact assessment is required to detect the presence of fossil material at the proposed development. Although the Beaufort West District is well known for its rich fossil record, only three vertebrate fossil species have been recovered from the Beaufort West Commonage. Due to the paucity of fossils in the town, the flat low lying geography and absence of steep-sided gullys that would preserve fossils, the general lack of exposure due to vegetation cover and the overall degraded nature of the proposed sites, impact on the palaeontology in the area is negligible. Thus, subject to approval from the relevant authorities, the upgrade of the stormwater and detention facilities in Hillside, Beaufort West, Western Cape should proceed.

CONTENTS

1. INTRODUCTION

A problem with flooding and stormwater management in the suburb Hillside 2, Beaufort West, Western Cape has been identified. As a solution to the problem, the Beaufort West Municipality proposes the formalization of two stormwater detention ponds and the rehabilitation and extension of existing stormwater earth channels in Hillside 2, Beaufort West. The building of formal detention ponds appears to be the best solution to the current problem as they will detain stormwater and prevent nearby houses from being flooded. It is envisaged that earth channels will carry water from the surrounding high-lying area to the detention ponds, and from there the water will be allowed to dissipate more slowly into the existing downstream stormwater systems. The proposed sites for the detention ponds are situated on municipal and transnet property within the suburb of Hillside.

Lita Webley, from the Archaeology Contracts Office, Department of Archaeology at the University of Cape Town was asked to conduct a heritage impact assessment of these sites in February 2011. The assessment considered the general heritage and archaeology of the site, but did not consider the palaeontology of the area. The conclusions of the report were that there would be no impact on the archaeology, but there was a possibility that fossil remains were present as the region is known for its fossiliferous strata (Webley, 2011). As palaeontological material is unique and non-renewable, it is protected by the National Heritage Resources Act (Act No. 25 of 1999, section 35). A Palaeontological Impact Assessment of the proposed development is thus necessary to ensure that palaeontological material is either removed, or is not present.

1.1 Objective

To conduct a desktop study on the Western Detention Pond (Beaufort West Municipality Erf 8918) and Eastern Detention Pond (Transnet Erven 11 and 12), and associated earth channels to determine the impact on potential palaeontological material at these sites.

2. BACKGROUND TO THE GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The Beaufort Group, Karoo Supergroup of South Africa is world-renowned for its rich fossil record. The rocks of this region contain some of the most significant evidence of the origins of dinosaurs, mammals and turtles resulting in South Africa being one of the top palaeontological destinations in the world. Beaufort Group rocks are Permo-Triassic in age and characterized by fluvially deposited rocks occasionally intruded by Jurassic dolerite dykes and sheets (Catuneanu et al., 2005). Beaufort West itself contains rocks from the Upper Permian Teekloof Formation, Adelaide Subgroup and are approximately 262 million years old (Catuneanu et al., 2005; Walker and Geissman, 2009).

The rocks of the Beaufort Group are subdivided into assemblage zones according to the various vertebrate fossils found in each zone. Beaufort West falls within the *Pristerognathus* Assemblage Zone, named after the most common therocephalian therapsid fossil found in the zone. Fossils in this biozone are found in mudrock sequences between major channel sandstone units. They are usually preserved as

isolated skulls or postcranial fragments in beds of greenish-grey siltstone (Keyser and Smith, 1995).

Vertebrate fossils that have been recovered from the *Pristerognathus* Assemblage Zone include two fish species, one amphibian species, and several reptile species. However, by far the most common vertebrates recovered are the therapsid synapsids, ancient ancestors of mammals. These include biarmosuchians, gorgonopsians, therocephalians and anomodonts (see Appendix 1 for detailed species list). Three plant taxa, namely *Glossopteris*, *Phyllotheca* and *Schizoneura*, have also been recovered from this zone (Keyser and Smith, 1995). Potential trace fossils include vertebrate burrows and trackways (Keyser and Smith, 1995). Although numerous fossils have been recovered from the *Pristerognathus* Assemblage Zone, relatively few taxa have been found in the Beaufort West Commonage itself. The late Dr James Kitching, a world-renowned palaeontologist, famous for his ability to locate fossils, surveyed the Beaufort West Commonage during the 1970s and published his findings in his 1977 Memoir (Kitching, 1977). Taking species validity into account, Kitching only recovered the dicynodont anomodont *Endothiodon*, the gorgonopsian *Gorgonops* and the therocephalian *Ictidostoma* from the Commonage (Kitching, 1977).

3. NAME AND GEOGRAPHICAL LOCATION OF THE SITE

Western Detention Pond: Beaufort West Municipality Erf 8918, Hillside, Beaufort West, Western Cape (32° 21′ 22.04″ S, 22° 33′ 53.51″ E).

Eastern Detention Pond: Transnet Erven 11 and 12, Hillside, Beaufort West, Western Cape (32° 21′ 15.77″ S, 22° 34′ 16.22″ E).

Earth channels: extension along existing service roads, Hillside, Beaufort West, Western Cape.

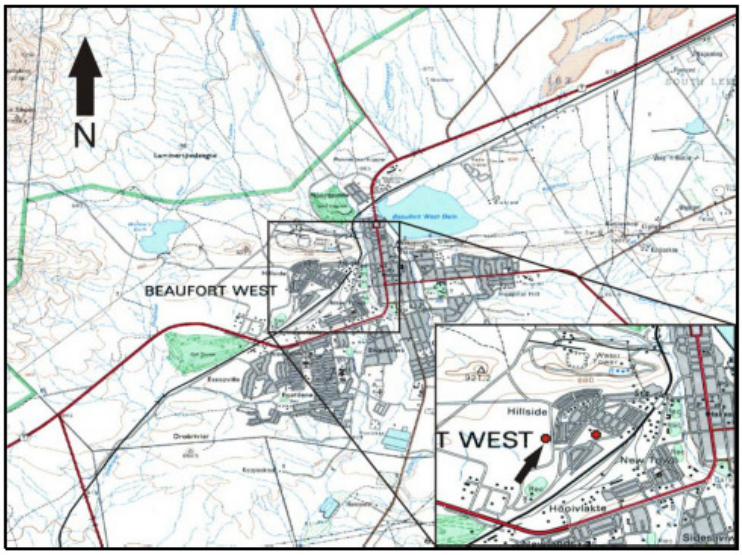

Figure 1. Site and close up (insert) of the proposed development in Hillside, Beaufort West, Western Cape (1: 50 000 map of Beaufort West 3222 BC, 1979). Informal housing has since encroached onto the proposed site for the Western Detention Pond (arrow in insert).

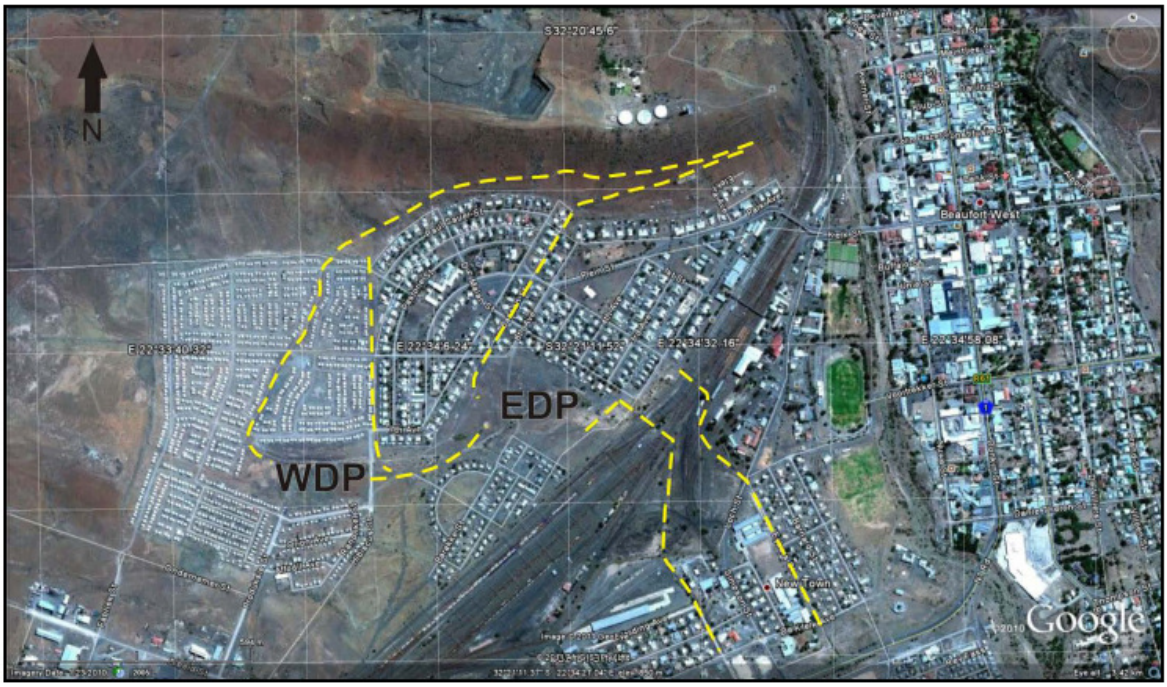

Figure 2. Aerial photograph of site (current), Western Detention Pond (WDP), Eastern Detention Pond (EDP), and associated earth channels (in yellow) of the proposed development in Hillside, Beaufort West, Western Cape.

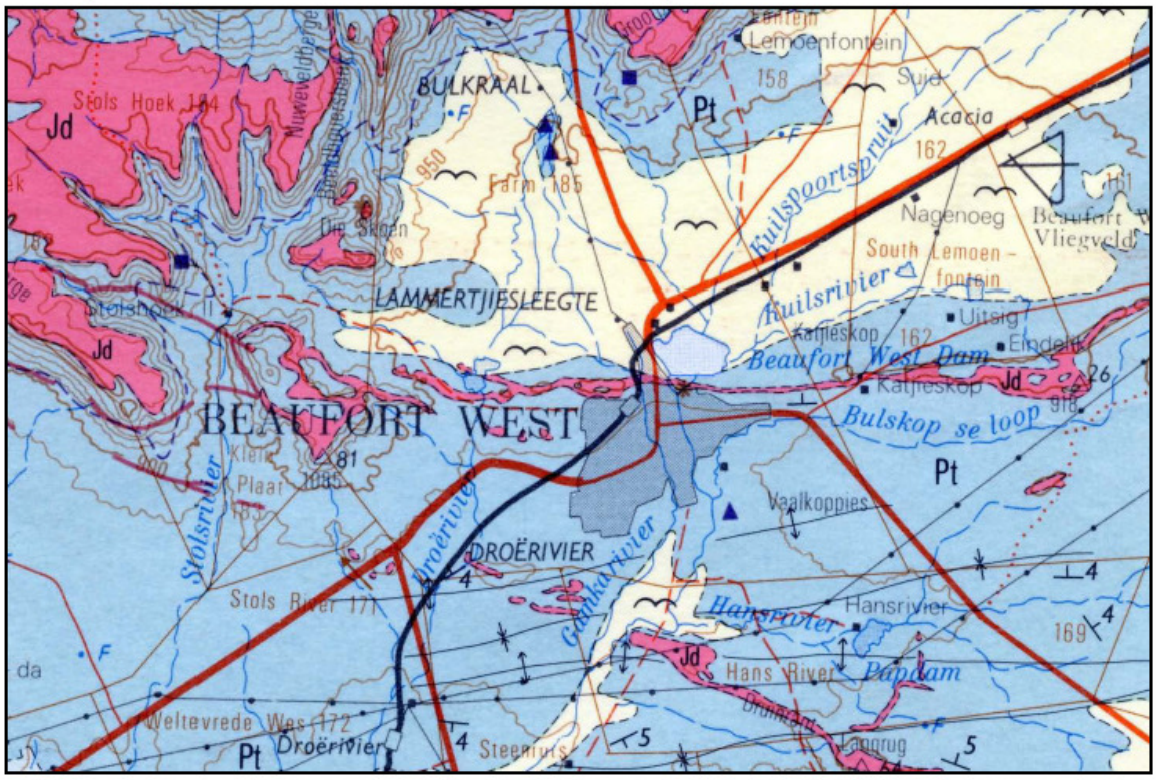

Figure 3. Geological map (1: 250 000, Beaufort West 3222), showing the geology of the Beaufort West area. Jd (area shaded in pink), Jurassic dolerite; Pt (area shaded in blue), Permian rocks that may contain fossils; area shaded in yellow is alluvium.

4. METHODS

A desktop study was conducted to assess the potential risk to palaeontological material (fossils, trace fossils) in the proposed area of development. Aerial photos (using Google, 2010), topographical and geological maps were examined. The Basic Assessment Report, the Foundation and Materials Investigation conducted by Aurecon and the Heritage Impact Assessment completed by the Archaeological Contracts Office were also examined.

5. FINDINGS AND RECOMMENDATIONS

The Beaufort West District is well known for its fossiliferous strata, found in Upper Permian rocks of the Beaufort Group (Figure 3; Appendix 2). Numerous vertebrate fossils, mostly therapsid synapsids (Appendix 1), have been recovered from the outcrops surrounding the town Beaufort West. However, these outcrops are situated mostly in the Nuweveldberge protected by the Karoo National Park. In contrast, very few fossils have been recovered from the Beaufort West Commonage; these comprise *Endothiodon*, *Gorgonops* and *Ictidostoma.* There is no record of trace or plant fossils being recovered from the town itself. The geology of the area for the proposed detention ponds includes a thin layer of sand overlying mudrock and dolerite. Fossils are only preserved in mudrock. However, much of this mudrock appears to be broken up, is particularly hard and partially covered in vegetation (see Aurecon's geological report for photographs). Furthermore, fossils are usually preserved in the high lying areas in outcrops on hills, or low lying areas, but in river channels. They are not usually preserved on flat surfaces such as those found in Hillside. As no loose fossil bone was found by either Aurecon or Webley, it is highly unlikely that fossils have been preserved in these areas. When fossil bone is preserved *in situ* (i.e. fixed in solid rock), loose fossil bone is always found in the vicinity. The absence of loose (or *in situ*) fossil material excludes the possibility that fossils are present at either the Western or Eastern detention pond sites. The rehabilitation of the earth channels includes upgrading existing channels and extending these channels along service roads, which also excludes the possibility of disturbing fossils and this would have already occurred when the roads were made. Furthermore, the service road along the hill, north of Hillside, was made along an outcrop that consists mostly of dolerite, which does not preserve fossils (Figure 3, area shaded in pink is Jurassic dolerite).

Thus, considering the rarity of fossil preservation at the Beaufort West Commonage, the poor nature of fossil-bearing sediments and lack of appropriate exposure (i.e. steep-sided gullys) at the proposed sites and the degraded nature of the area (partially covered in vegetation, housing encroachment, acting as a rubbish dump and being routinely flooded by stormwater), the impact on palaeontological material at these sites is negligible.

In conclusion, subject to approval from the relevant authorities, I recommend that the upgrade of the stormwater and detention facilities in Hillside, Beaufort West, Western Cape proceed.

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