HERITAGE IMPACT ASSESSMENT FOR THE PROPOSED UPGRADE AND REHABILITATION OF THE KOGMANSKLOOF PASS, MONTAGU MAGISTERIAL DISTRICT, WESTERN CAPE

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

Prepared for

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and
Specialist landscaping comments from Bernard Oberholzer, Landscape Architect and Environmental Planner

Preface

A Heritage Impact Assessment report and Notice of Intent to Develop for the proposed upgrading and rehabilitation of Trunk Road 31/2 between Ashton and Montagu was submitted to Heritage Western Cape (HWC) on 27 May 2011. In response to the submission HWC requested in their letter of 22 June 2011 that input be provided in terms of palaeontology and landscaping and that an integrated planning approach is followed in this regard. This report has subsequently been updated to fulfil these requirements from HWC.

EXECUTIVE SUMMARY

The UCT Archaeology Contracts Office (ACO) was appointed by CCA Environmental to conduct an assessment of the potential impacts to heritage resources that might occur as a result of a proposed upgrade and rehabilitation of the Kogmanskloof Pass. The stretch to be upgraded extends between the Ashton and Montagu municipal boundaries and is approximately 7.25 km long. The work involves widening, resurfacing, improvements to associated structures (culverts etc.), construction of a walkway in one area, minor geometric improvements (including blasting in one area) and repair or replacement of bridges. Further considerations include upgrading intersections and the addition of cycle lanes. Numerous recent floods have resulted in damage to this busy road and the upgrade has become necessary.

The ACO was asked to identify, describe and map heritage resources, assess their significance and sensitivity, assess the significance of any impacts, recommend protection and maintenance measures, provide legal advice pertaining to the NHRA and to suggest aspects for consideration by a landscape architect. A palaeontologist was also appointed to provide input regarding the fossil record and important geological features within the pass and identify potential impacts.

The Kogmanskloof Pass runs through a dramatic and well known valley alongside the Kogmanskloof River and remnants of the original pass are visible in places where the two alignments are not congruent.

Prehistoric heritage resources are not well known from this area, with the Montagu Cave being the most famed. It preserved Early and Later Stone Age deposits and rock art is present here and at a few other locations. Open scatters of artefacts are documented from a few areas. The history of Montagu, dating back to 1851, is well known and its large number of declared Provincial Heritage Sites makes it special in this regard. Anglo-Boer War fortifications exist in the area, one of which lies within Kogmanskloof.

The site was visited on 21st March 2011. The route was driven in its entirety, but several areas were checked in detail on foot as appropriate.

The survey failed to locate prehistoric archaeological resources, but historical fabric relating to the original pass was found in one area just protruding from the surface. Several structures are present in the vicinity of the pass, but none are affected by the proposed work. The closest and most significant is the Anglo-Boer War fort that lies atop the rock tunnel through Kalkoenkrans. Nearby is a house that is known as “Die Tolhuis” and probably functioned as a toll for the pass at some stage.

Bain’s historic pass is the most significant aspect of heritage present. Travel through the valley has a long history but the first formal pass was finally completed in 1877. It was upgraded in the mid-20th century and new bridges were added. One bridge, Hodge’s Bridge, was built by Bain and opened in 1872. It lies at the south-western end of the pass and will be turned into a rest area during the upgrade work. Survey diagrams failed to reveal much of interest aside from the fact that a piece of land close to Montagu was set aside for a toll house around 1877 but no evidence for the construction of any building could be found here.

The historic and scenic character of the pass itself and the remaining historical fabric are both accorded high heritage significance. However, when the impacts are rated following predefined conventions the significance of impacts with mitigation are found to be ‘low’ in both cases.

Several features of considerable geological interest are found in the pass. Most of these, however, occur well above road level and would not be affected by the proposed project. Mudrocks of the Cederberg Formation that are known to contain fossils crop out at the rest area situated 200 m southeast of the proposed area where blasting is to be undertaken and are unlikely to be directly affected. It is concluded that the proposed project

would not have any significant impact on local fossil heritage and no further palaeontological studies of mitigation is deemed necessary.

It is concluded that the project can enhance the pass with appropriate care and mitigation. Opportunities for design intervention by a landscape architect are discussed and this can serve specifically to emphasize historical aspects and enhance the public's knowledge of local history. The proposed landscaping, using local stone, is supported as it would blend in with the existing historic elements and would enhance the geological and historical character of the area and the experience of scenic resources of the area for road users and visitors.

It is recommended that, subject to the approval of HWC, the proposed development be allowed to proceed. However, the following recommendations are made:

- An archaeologist may be required to excavate and document the historical fabric visible in the rest area east of the rock tunnel (depending on what is done here);
- An archaeologist may be required to monitor excavations alongside the Boy Retief Bridge to check for historical fabric preserved and then record as appropriate; and
- Blasting in the vicinity of Keur Kloof (km 24) should be kept to an absolute minimum to avoid unnecessary scarring of the landscape.

11 May 2011

Declaration of independence:

I, Jayson Orton, am an independent specialist consultant who is in no way connected with the proponent, other than in terms of the delivery of consulting services.

I hold a Masters degree in archaeology and have been consulting since 2004 in the Northern, Eastern and Western Cape Provinces. I am an accredited Principal Investigator with the Association of Southern African Professional Archaeologists (ASAPA, member No. 233).

Contents

1. INTRODUCTION

The UCT Archaeology Contracts Office was appointed by CCA Environmental to conduct an assessment of the potential impacts to heritage resources that might occur as a result of a proposed upgrade and rehabilitation of the Kogmanskloof Pass (R62; Figure 1). The stretch to be upgraded extends between the Ashton and Montagu municipal boundaries and is approximately 7.25 km long.

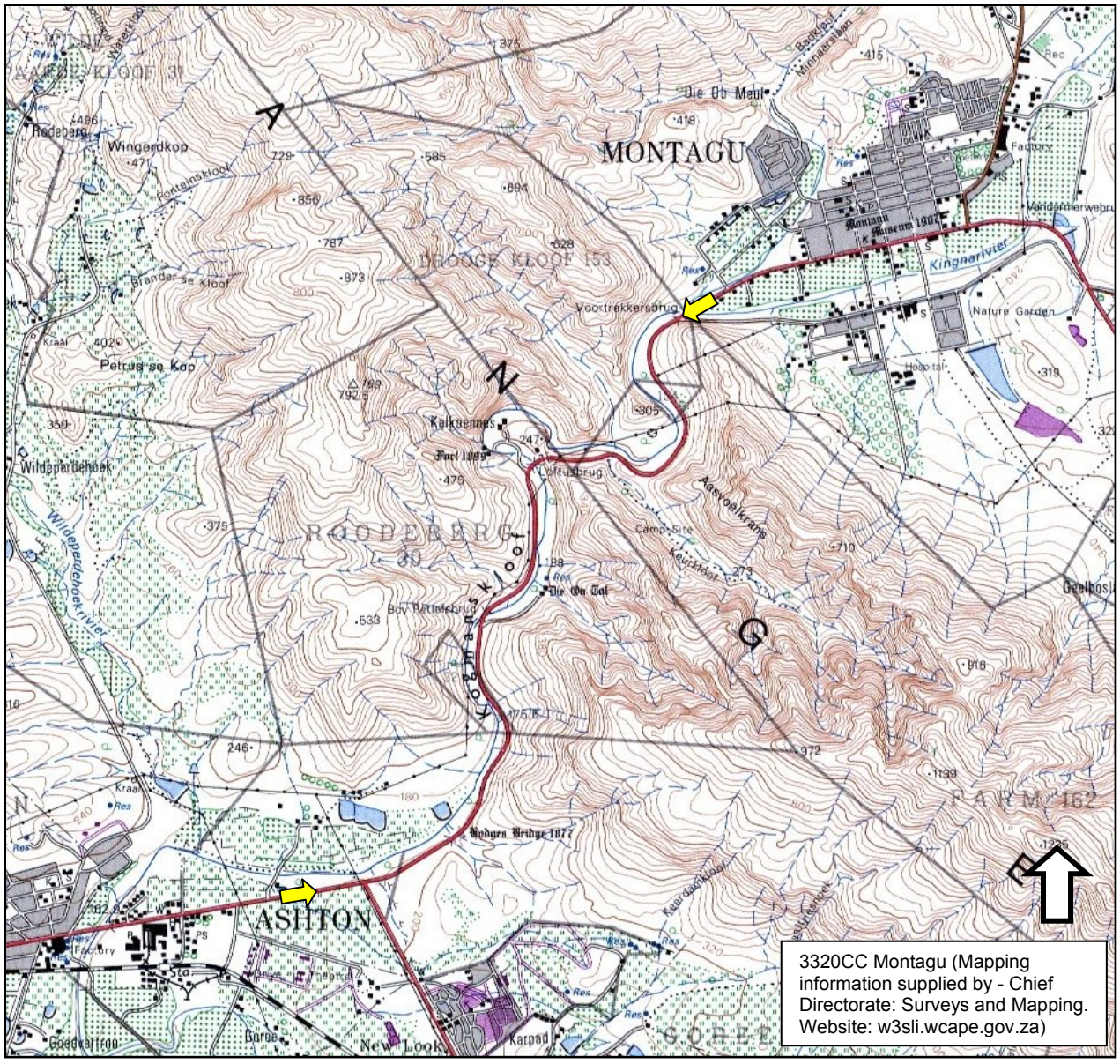


Figure 1: Map showing the location of the study area. The stretch to be upgraded lies between the two larger yellow arrows, while the small ones indicates a further bridge also requiring attention.

The work would involve several aspects:

- Widening and resurfacing of the road to a total surfaced width of 11.8 m (2 x 3.4 m lanes, 2 x 1.5 m shoulders, 1 x 2.0 m paved side drain on one side);
- Improvements to drainage structures and installation of a concrete-lined drain along the entire length of the upgrade section (included in above widths);

- Addition of a 1.5 m wide pedestrian walkway between the Boy Retief Bridge and the rest area at the tunnel on one side of the road only (probably the river side);
- Minor geometric improvements where feasible, but particularly at km 24;
- The capacity and alignment of the various bridges will need improving through repair, lengthening, widening or replacement as appropriate (see below);
- Consideration will also be given to the upgrade of all intersections (major and minor) and view and rest sites; and
- Cycle lanes might be added, which would increase the total width by a further 1.5 m on either side.

The plans for the bridges are as follows:

- Boy Retief Bridge: Replace to the east on altered road alignment with a 57 m long, 3-span bridge, 1.85 m higher than the current bridge (see Appendix A1);
- Tunnel Bridge (a.k.a. Billy Loftus Bridge): no change to the bridge but erosion protection measures at its base will be improved;
- Voortrekker Bridge: replace in the same position and at the same height but with piers correctly oriented for the stream flow. The bridge will be specifically designed to function as a low water bridge during flood events; and
- Van der Merwe Bridge: no change.

Blasting of the road-side cliff would be required at one location only (km 24 at the entrance to Keurkloof) in order to improve the road alignment and shift the road away from the river (see Appendix A2). This is the narrowest part of the valley and floodwaters frequently damage the road here. No blasting or alterations to the road alignment are envisaged in the immediate vicinity of the tunnel. Some location details of the road bridges are shown in Figure 2. Some of these structures have been damaged by floodwaters in recent years and are in need of maintenance. Figures 3 to 5 show examples of flood events during recent decades, illustrating the need for the proposed road and bridge upgrade.

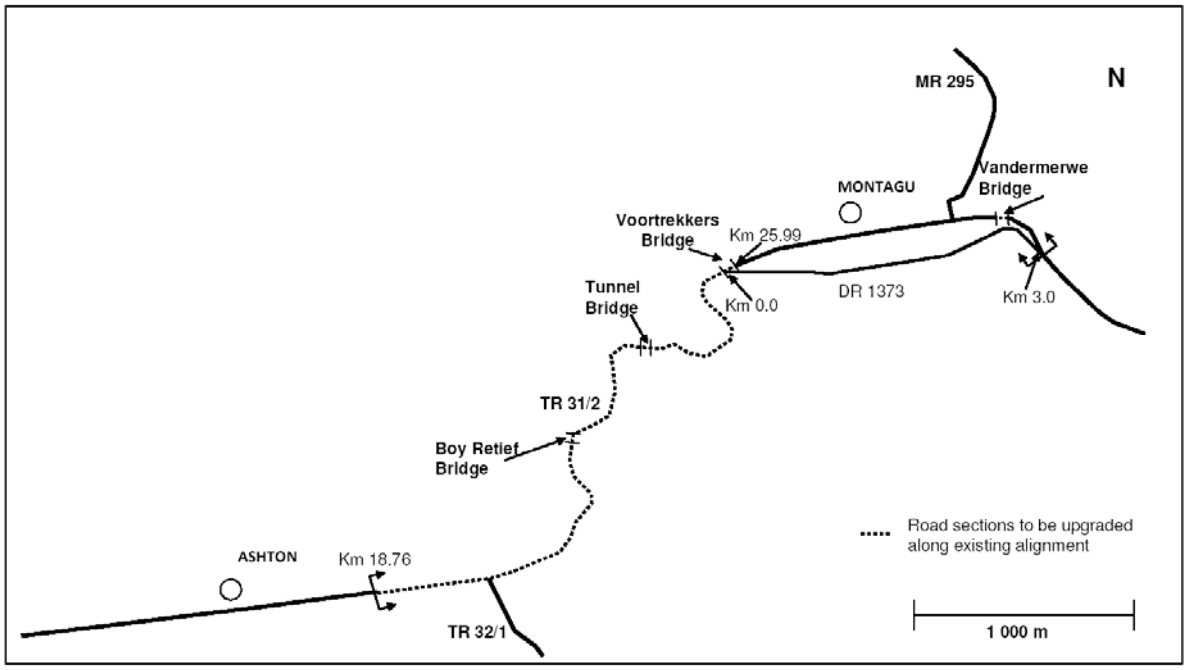


Figure 2: Plan showing the locations of the specific bridges included within the study area. Note that the historic rock tunnel is located immediately east of Tunnel Bridge (a.k.a. Billy Loftus Bridge). TR32/1 leads to Swellendam.

Specific terms of reference for the HIA provided by CCA Environmental were as follows:

- Provide a description of the archaeology and cultural heritage of the study area and identify any sites of archaeological or cultural significance along Kogmanskloof Pass.
- Identify and map any sites of cultural heritage or archaeological significance.
- Assess the sensitivity and conservation significance of any sites of archaeological or cultural heritage significance affected by the proposed road upgrade.
- Determine the significance of any impacts of the proposed project on cultural heritage or archaeological sites.
- Make recommendations on the protection and maintenance of any significant cultural heritage or archaeological site that may occur on site.
- Provide guidance on requirements for any permits from the South African Heritage Resources Agency or Heritage Western Cape (HWC) that might become necessary and complete a Notice of Intent to Develop.

A desktop palaeontological assessment was conducted by Dr John Almond (see Appendix B).

Through discussion with CCA Environmental it was considered appropriate that this report should also make suggestions that might be considered by the appointed landscape architect to help emphasize and protect the heritage in the valley. These suggestions were considered by the landscape architect when developing their landscape plans (see Appendix C) and comments with regards to their suitability within the context of the historic pass were provided by Mr Bernard Oberholzer (see Section 7).

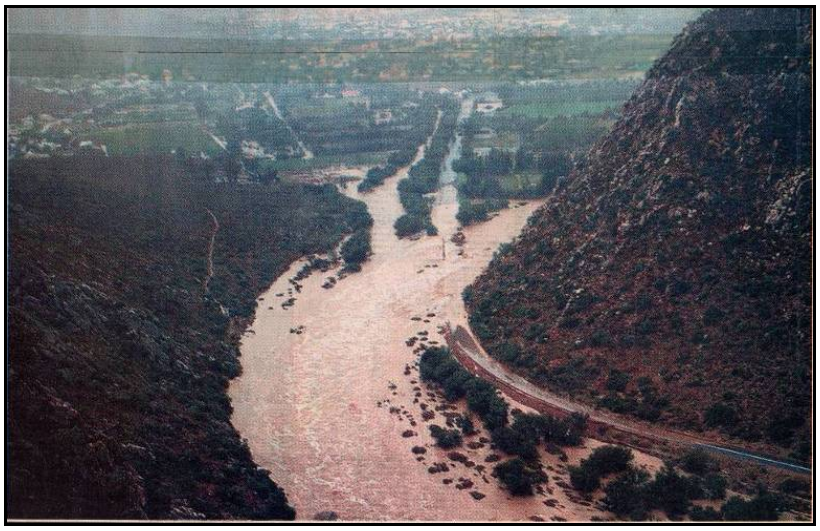


Figure 3: Aerial photo showing the eastern end of the Kogmanskloof Pass during the March 2003 flood event. The Voortrekkers Bridge has been completely overtopped by the floodwaters. The town of Montagu lies in the background (Source: Cape Argus 23 March 2003).

2. HERITAGE LEGISLATION

The National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources including palaeontological, prehistoric and historical material (including ruins) more than 100 years old (Section 35), human remains (Section 36) and non-ruined structures older than 60 years (Section 34). Landscapes with cultural significance are also protected under the definition of the National Estate (Section 3.1d).

Figure 4: Aerial photo showing the eastern end of the Kogmanskloof Pass during the March 1981 flood event (Source: Montagu Museum).

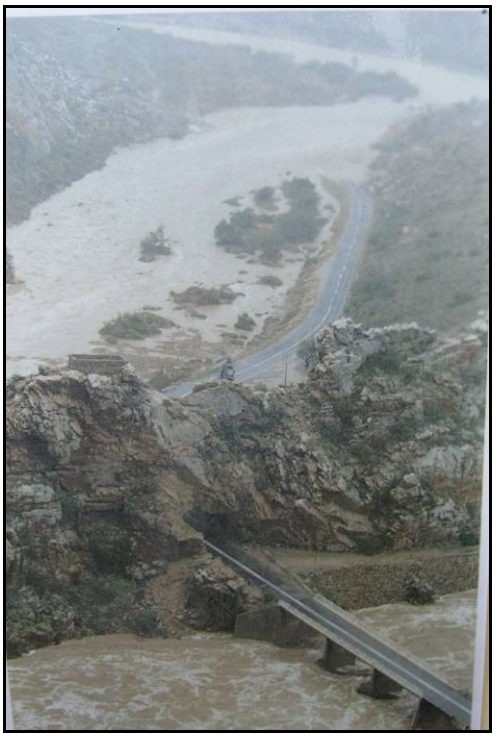


Figure 5: The vicinity of the rock tunnel during a flood event (Source: Montagu Museum).

Since the project is subject to an Environmental Impact Assessment, HWC is required to provide comment on the proposed project in order to facilitate final decision making by the Department of Environmental Affairs and Development Planning (DEA&DP).

Since no declared Provincial Heritage Sites would be affected by the proposed action, all permissions relating to heritage matters should be handled through Heritage Western Cape (HWC).

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The Kogmanskloof Pass runs through the Langeberg Mountains and links the towns of Ashton and Montagu. These mountains are well renowned for the very dramatic scenery that the local geology provides. Despite the fact that the pass is flat, the surrounding mountains are steep and very rugged with spectacular folds in the rock strata exposed (Figure 6). The road snakes along the base of the valley alongside the Kogmanskloof River which flows out of Montagu. Few buildings occur along the road, but among them is the recently renovated old toll house which lies alongside a now disused section of the original pass (Figure 7).

Figure 6: View through Kogmanskloof showing the flat riverbed and steep, rugged mountains.

Figure 7: The recently renovated toll house in Kogmanskloof Pass.

4. METHODS

The project commenced with background research in order to establish the historical and archaeological context of the pass and its surroundings. Old aerial photographs from 1930 and survey diagrams were obtained and documentary sources were examined. The aerial photographs enabled identification of areas with potential significance to be identified during the survey. The site itself was visited on 21st March 2011. The entire stretch was examined from the vehicle but many areas were subjected to detailed foot surveys. All finds were recorded photographically and walk-paths were created on a hand-held GPS receiver set to the WGS84 datum.

4.1. Limitations

The fact that only sections of the roadside were examined does limit the assessment of archaeological significance. However, this aspect is considered to be highly insignificant and is unlikely to have affected the outcome of this investigation in any way.

5. HERITAGE CONTEXT

Almond and Pether (2008) note the presence of fossil shellfish, fish and plants from the Devonian period that are found in the Bokkeveld Group near Montagu. This group has high palaeontological significance. However, the current study area lies predominantly within rocks of the Table Mountain Group which are only of moderate significance and no fossil-bearing formations would be affected by the proposed project.

The well-known Montagu Cave occurs just southeast of the study area (Goodwin 1929; Keller 1969, 1970, 1973) and preserves material from the Early (ESA) and Later Stone Ages (LSA). In addition, rock art is present. Rock art is known from at least three other sites in the Montagu vicinity (personal observation), but, besides Montagu Cave, good archaeological deposits are unknown. Open scatters of artefacts of varying age have been

reported in the immediate Montagu area (Kaplan 2002, 2006), while ESA and/or MSA scatters also occur in the valley southeast of Montagu (Kaplan 2005; Orton 2009). Kaplan (2002) also found some very low density scatters within and on the Ashton side of the Kogmanskloof Pass.

More significant in this area are the development of the town of Montagu and the construction of the original Kogmanskloof Pass. Montagu was founded in 1851 on the farm Uitvlught, which apparently belonged to Pieter Swanepoel from 1841 (McIver 2009) and was bought by Dawid Stephanus van der Merwe in 1851 (Fransen 2004). The community at the time were eager for a church and, in anticipation of the commencement of town development should a new congregation be established, Van der Merwe bought the farm and subdivided it. A large number of well-preserved historical buildings are present with numerous examples having been declared Provincial Heritage Sites[1]. The oldest is said to have been built in 1853 and now houses a local museum. Given that it is central to this report, a detailed account of the historical development of the Kogmanskloof Pass will be presented under Section 6 below.

Specific details of the Anglo-Boer War (or South African War) are notoriously difficult to find. No battles appear to have been fought in the vicinity of Montagu, although two defensive structures were built, one to defend the Kogmanskloof Pass and the access to Montagu from the southwest and the other on a hill at the eastern side of the town[2]. The former structure is described in Section 6 below.

6. FINDINGS

6.1. Archaeology

Although Kaplan (2002) did record scattered artefacts of very low significance in two locations within the current study area, no archaeological resources were encountered during this survey. One or two possible artefacts were noted in one of the areas mentioned by Kaplan (2002). The cliff face where blasting may be required was examined very carefully for traces of rock art but none was found. No significant archaeological resources are expected to be encountered so close to the base of the river valley. No building ruins are present within the area to be impacted, although remnants of the old pass are present in places. Being older than 100 years, these are legally considered to fall under archaeology. While historical aspects of the pass are considered under Section 6.2.2 below, the archaeological aspects are described here.

The area with old road fabric exposed is immediately east of the rock tunnel and fort, in the rest area on the south side of the road. Here, under the trees and against the base of the mountain slope, one can see a stone alignment with a tarred surface on top of it. Most is covered by sediments washed from the slope and grass has grown over that (Figures 8 & 9). It is unknown to what depth the rock wall penetrates, but this is certainly the original river-facing edge of the pass (Figure 10).

[1] A listing is available on www.sahra.org.za.
[2] No reference to the latter fort was found and, having not seen it, I assume it to be similar to the first and to also relate to the Anglo-Boer War.

Figure 8: View of the edging of the old pass just east of the rock tunnel.

Figure 9: View of the old pass edging just east of the rock tunnel.

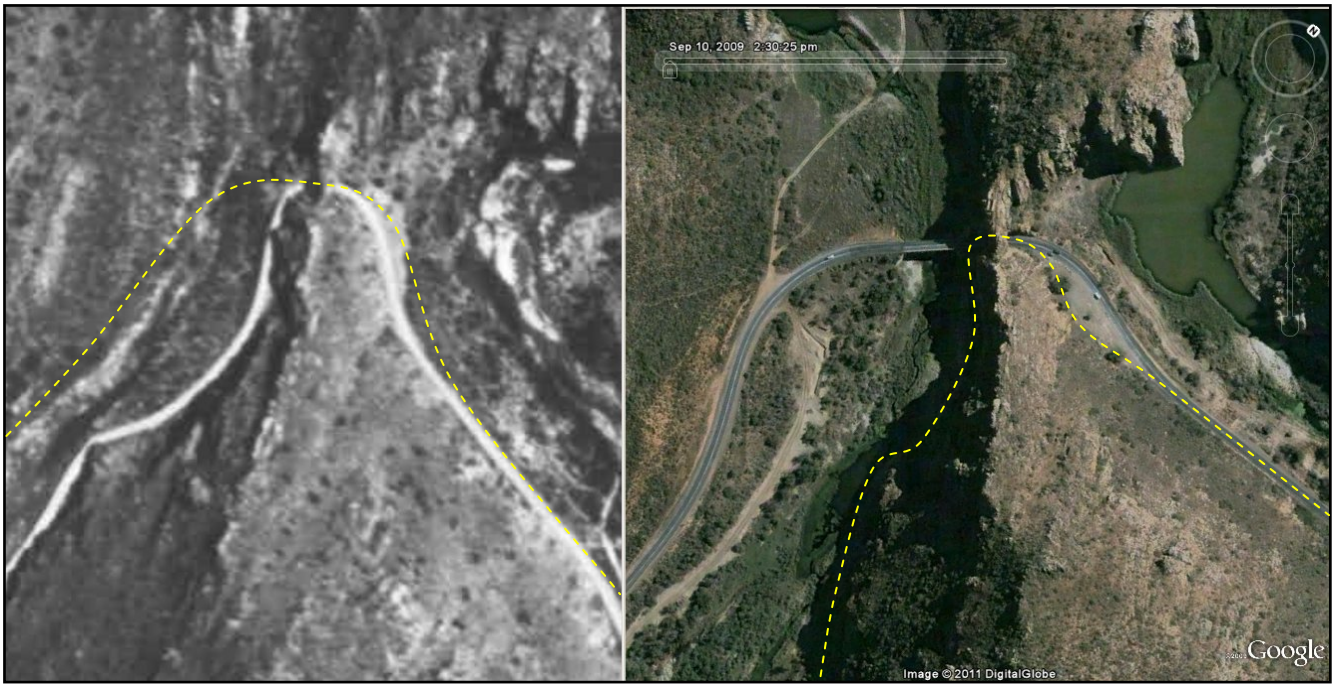


Figure 10: Comparative view of the 1930 (left) and current (right) road layouts in the vicinity of the rock tunnel showing the degree to which the old pass hugs the foot of the mountain slope east of the tunnel. This area is now a rest area. Best estimates of the modern and historic routes have been super-imposed (yellow dashed lines) on each picture.

6.2. History and the built environment

6.2.1. Buildings

No buildings or ruined buildings will be impacted by the proposed development. However, several structures are present in the immediate vicinity of the current and original pass alignments.

The most well-known is the old Anglo-Boer War fortification located above the rock tunnel midway along the pass, atop a rocky ridge known as Kalkoenkrans. The fort was built by Lieutenant-Colonel Sidney of the Royal Field Artillery and was garrisoned by the Gordon Highlanders (Coyne 2010). It is constructed from local stone with the result that it blends well with its surroundings (Figure 11). Tomlinson (1997) does not consider the structure to have been a proper blockhouse, since it bears no roof. However, one may once have been present. The degree of restoration that has taken place over the years is unknown and thus little can be said of its construction. Tomlinson (1997) assumes, however, that a screen wall must have protected the entrance, either just inside or just outside the current opening. It will not be directly affected by the proposed upgrade, although the opportunity to improve public access to this site will be afforded. Figures 11 to 13 illustrate this structure further.

Figure 11: View eastwards towards the rock tunnel with the fort perched on the rocks above (yellow circle).

Figure 12: The northern aspect of the Boer War fort. The gun ports are clearly visible.

Figure 13: The interior of the fort. The circular structure is likely the base of a water tank.

Just south of the rock tunnel is a house that has undergone recent renovation (Figure 7). The house is labelled “Die Ou Tol” on the 1:50 000 topographic map (Figure 1) and this suggests that the building served as a toll house for Thomas Bain’s original road that passes immediately in front of its main entrance. Indeed, its modern name is “Die Tolhuis Guest Farm”. Given that the house is not part of the proposed project and will not be impacted in any way, no detailed research on it was conducted. Note that further discussion relating to this house is, however, contained under Section 6.2.3 below.

Other proximate buildings are set back from the current road in two locations (Figure 14). The first is a group of recent buildings that are not present in the 1930 aerial photographs. They were probably built after 1953 when the new pass was built on their (the northwest) side of the river, although the property was surveyed in 1943 (S.G. No. 4945/43). They are of no further concern to this report and were not visited.

The second group occurs on a farm close to the rock tunnel. Some structures were clearly present here in 1930 but more have since been added (Figure 15). No historical fabric connected to this farm occurs along the roadside and the complex will in no way be affected by the planned upgrade. It was not visited and will not be considered any further here.

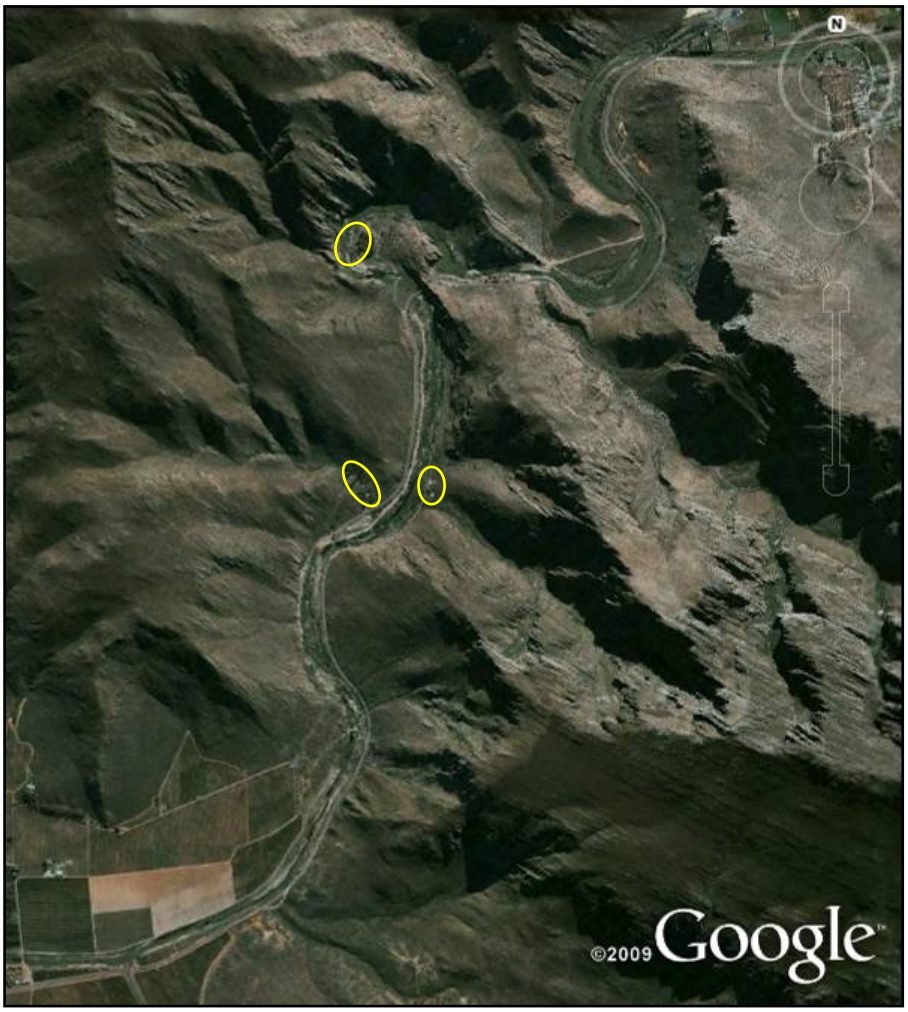


Figure 14: Aerial photograph of part of the Kogmanskloof Pass showing the locations of the buildings present in the vicinity of the pass.

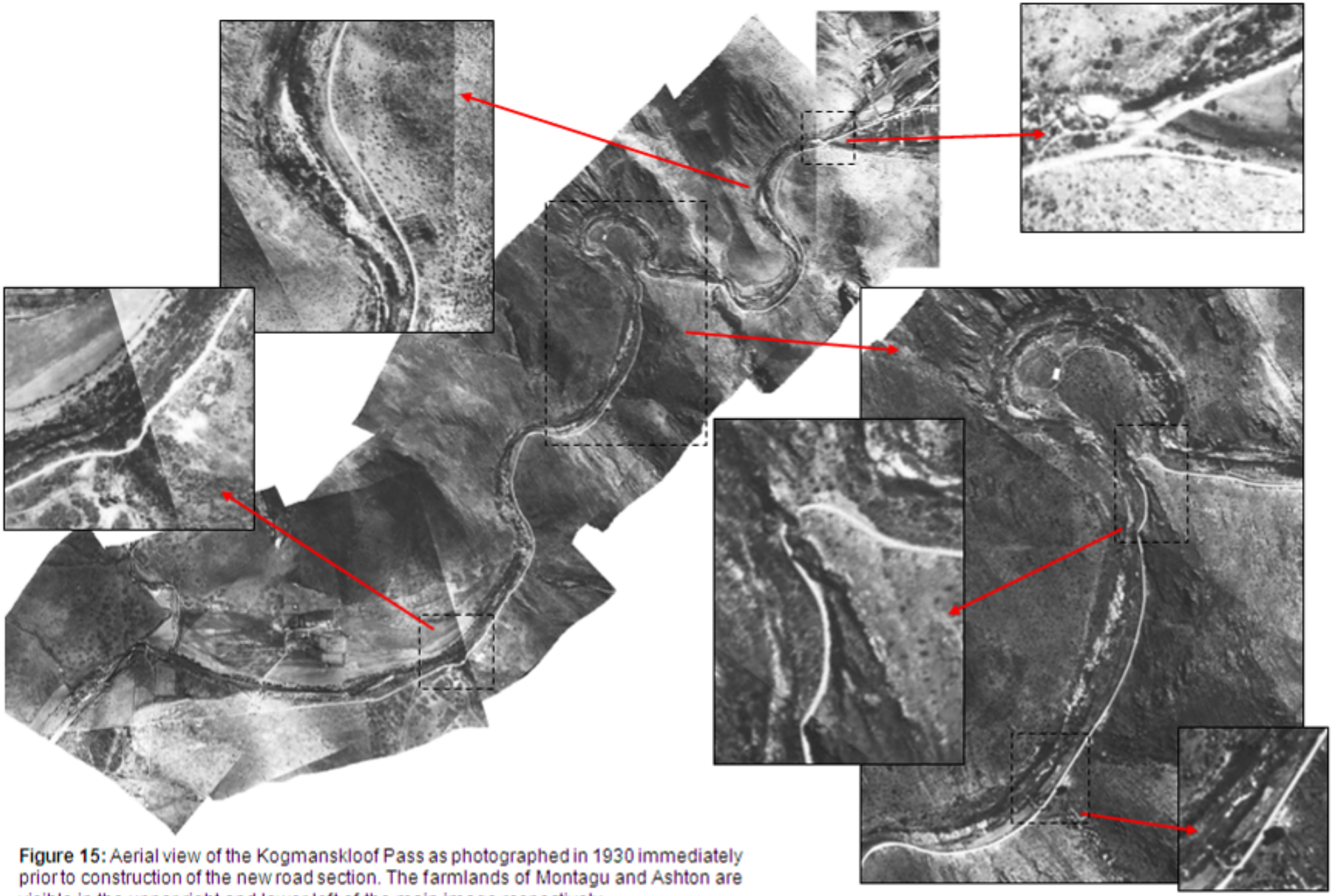


Figure 15: Aerial view of the Kogmanskloof Pass as photographed in 1930 immediately prior to construction of the new road section. The farmlands of Montagu and Ashton are visible in the upper right and lower left of the main image respectively.

6.2.2. Historic Pass

The following timeline, drawn from Fransen (2004), Ross (2004) and Fleminger (2005), charts the history of the Kogmanskloof Pass:

- 1701 – A Khoekhoen tribe called the Koekemans attacked a Dutch military outpost at Land van Waveren (modern Tulbagh) and, when driven back, they fled into what later became Kogmanskloof, thus revealing a route through the Langeberg Mountains for the first time.
- 18th century – Fransen (2004) records the presence of scattered 'trek boere' in Montagu from the mid-18th century and notes that quitrent grants were only being made from the 1820s. Fleminger (2005) and Ross (2004), however, claim that farms were being granted in the Montagu area as early as 1725.
- Pre-1867 – No road penetrated through the kloof and the only access was via a difficult track that crossed the river at least eight times via sandy or boulder-strewn drifts. During times of high water it was impassable, while when the river was low the drifts became muddy bogs that were still difficult to negotiate. The area around the Kalkoenkrans ridge could only be passed by driving through long pools of water. The local farmers frequently pleaded with the Cape government for a road to be built through the pass but to no avail.
- Early 1850s – the track through the kloof was improved by the Swellendam Divisional Council, but was often washed away by floods, sometimes for a month or more at a time.
- 1861 – As a consequence of the repeated flooding, local citizens again called for action and the result was the appointment of a parliamentary Select Committee which decided in 1861 that a road should be built using convict labour. However, no convicts were available for this at the time so it was not possible to act on the decision.
- 1867 – After floods in 1867 caused casualties (and a further significant flood happened in 1868) the British authorities finally agreed that a proper road was required.
- 1869 – A flying survey was undertaken by Mr M.R. Robinson, Chief Inspector of Roads at the time and an estimate of £10 000 (reduced to £2 500 if convict labour was used) for five and a half kilometres of roadwork was approved and construction began using 'distressed labourers'.
- 1870 – However, this effort failed as the previously unemployed labourers were unaccustomed to the overwhelming physical effort required to build the road and worked stopped after one year.
- 1872, 10th January – Despite the setbacks, the first part of the road was completed and opened by Civil Commissioner Hodges from Robertson. 'Hodge's Bridge' was named after him at the south-western end of the pass.
- 1872 – Thomas Bain subsequently took charge of construction of Kogmanskloof pass, as he had on many other passes where progress had come to a halt. He surveyed the kloof and decided what needed to be done.
- 1873 – With C. Hendy, Bain began construction using just 32 labourers, since few were prepared to enrol for such heavy labour. The 5.5 km of road that needed building included a tunnel through Kalkoenkrans. The tunnel was blasted through the rock at first using the newly discovered dynamite, but when this ran out gunpowder was substituted. The tunnel was 16 m long and 5 m high (Figures 16 & 17). Immediately before (west of) the tunnel, the road was supported above large dry stone walls against the cliffs (Figure 18). Accessing the tunnel from this section involved a very sharp turn rightwards into the tunnel. The work was completed in 1877 at a cost of £12,282 3s 10d.
- 1877, 28th February - Hodges again performed the opening ceremony and the Montagu farmers could now pass through the valley in relative safety. Bain declared that: "The Cogmans Kloof pass has been very substantially made. The walls are massive and well built and the road is protected by good drains and culverts ... the pass will not be subject to much damage by heavy rains and will consequently cost little in repairs".
- 1915 – At times, however, access to the town was still cut off where the road crossed the Kingna River. This was ameliorated through construction of the De Waal Bridge (today referred to as Voortrekkers Bridge).
- 1931, 21st November – After being tarred the road was officially reopened.

- 1953 – Traffic, and vehicle size, gradually increased eventually making Bain's original pass unsuitable. New bridges were constructed immediately west of Bain's tunnel (Billy Loftus Bridge, a.k.a. Tunnel Bridge) and slightly further downstream (Boy Retief Bridge) and his rock tunnel was enlarged (Figure 17).
- 1981 – Floods badly damaged the approaches to the Boy Retief Bridge and Bain's 1877 declaration was proved true as his old road fell back into use until the necessary repairs could be effected.

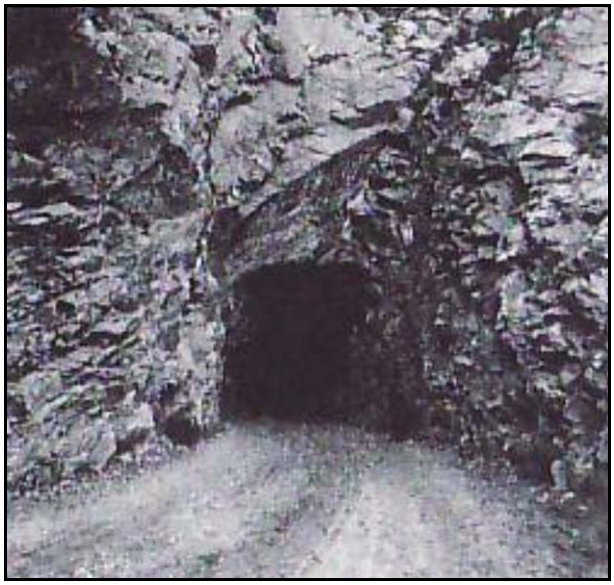


Figure 16: View into Bain's original tunnel from the Montagu side (Source: Montagu Archives[3]).

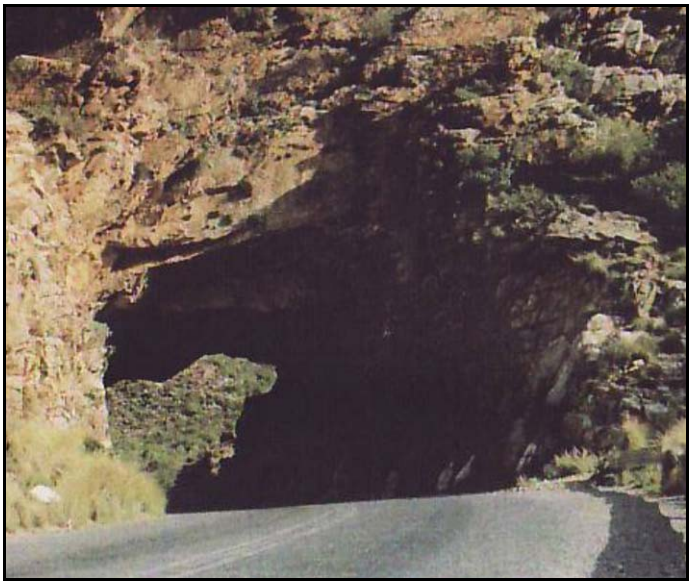


Figure 17: View into the now enlarged tunnel post-1953 (Source: Montagu Archives).

As described above, the original track was quite unsuited to regular use so Bain built a pass that incorporated many dry-stone walls and other structures. These walls are still evident in some areas, notably immediately to the southwest of the rock tunnel (Figures 18 - 20). Unfortunately parts of these walls are now heavily degraded and are falling apart. This affects mainly the uppermost part protruding above the road surface (Figures 21 & 22).

[3] The assistance of Hennah Flesch of the Montagu Museum is gratefully acknowledged in the sourcing of historical photographs from the Montagu Archives.

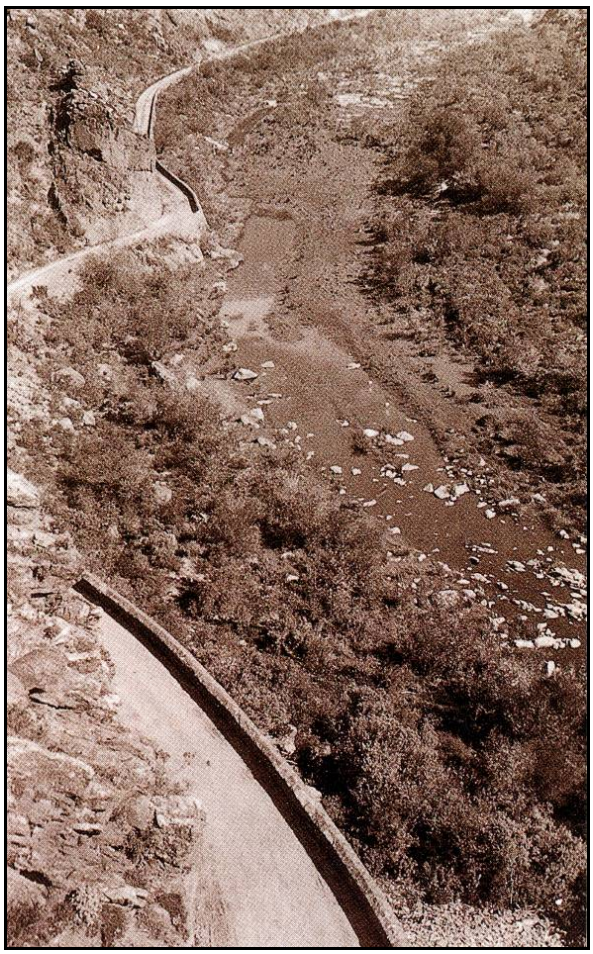
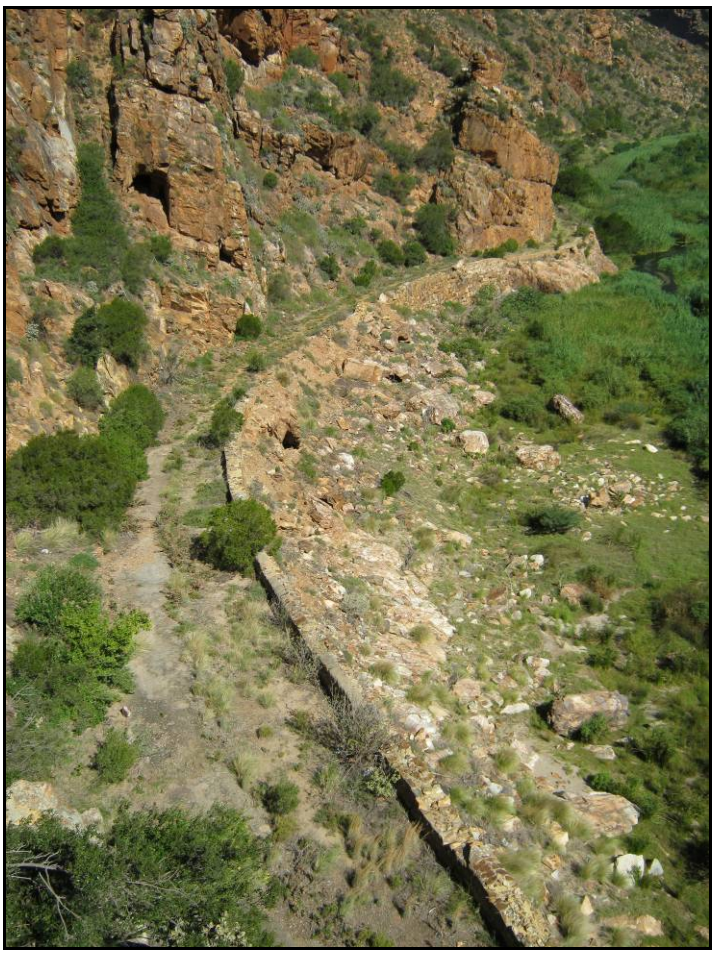


Figure 18: Historical view of Thomas Bain's old pass. Date unknown (Source Ross 2004).



F**igure 19:** Currrent view of the old pass from Kalkoenkrans.

Figure 20: View of the old stone retaining walls built by Bain at the point where his pass turned eastwards through the rock tunnel, which is visible on the far left above the Billy Loftus Bridge.

Figure 21: View of Bain's retaining wall (right) where the new bridge meets it and carries the road into the tunnel. Bain's wall is broken down to level with the old road surface.

Figure 22: Slightly further from the new bridge Bain's walls are better preserved but still falling apart.

Artists frequently painted the Cape passes and Kogmanskloof is no exception. Jan Ernst Abraham Volschenk (1853-1936) was born in Riversdale and many of his paintings were of subjects in the Langeberg Mountains and surrounds (Berman 1994). Volschenk did a painting entitled "The road in Kogmanskloof Pass" in 1925, but it does not show any formal aspects of the road (Figure 23). It was not possible to identify with certainty which part of the kloof he painted and, likewise, it is not known how accurate his depiction is; the 'road' appears rather more like a small track when compared with the photograph in Figure 24.

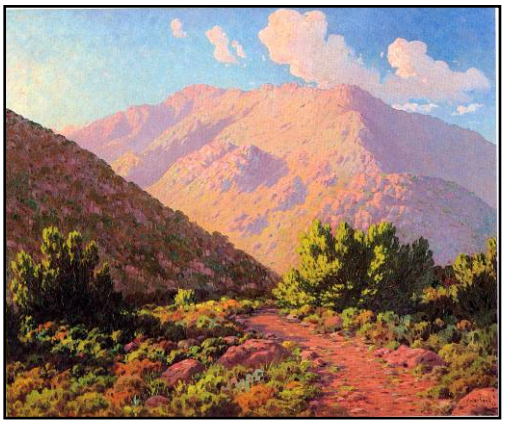


Figure 23: "The road in Kogmanskloof Pass" painted by Volschenk in 1925 (Source: Steyn & Roux 1992).

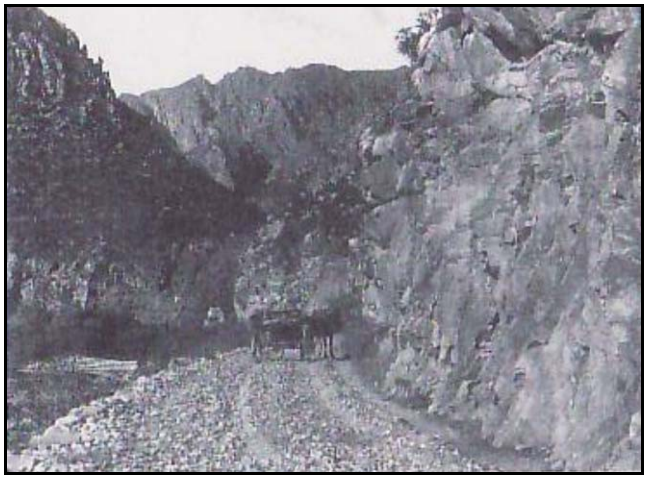


Figure 24: The corner immediately northeast of the entrance to Keur Kloof as built by Bain (Source: Montagu Archives).

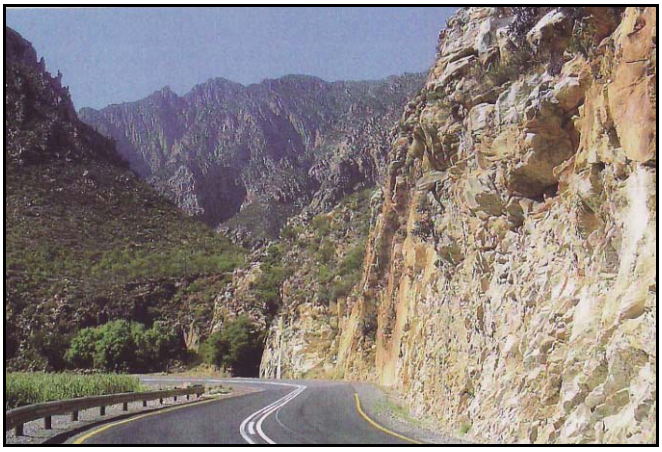


Figure 25: View of the modern road northeast of the entrance of Keur Kloof (Source: Montagu Archives).

6.2.3. Bridges

The original pass made use of two small neighbouring bridge structures together termed “Hodges Bridge” near the Ashton end of the pass (Figures 26 & 27). It seems likely that the upper parts were plastered and whitewashed more recently given that the rest of Bain’s walls were exposed stone.

Figure 26: View of Hodge’s Bridge looking towards the east. The two individual structures are visible.

Figure 27: Close up of Hodge’s Bridge.

The four bridges along the current road are not of heritage concern since all are less than 60 years of age. They date as follows:

- Boy Retief Bridge: Undated on bridge but built in identical style to Billy Loftus Bridge.
- Billy Loftus Bridge: Dated 1953 on the structure itself.
- Voortrekker Bridge: Undated on bridge but built in identical style to Van der Merwe Bridge.
- Van der Merwe Bridge: Dated 1963 on the structure itself.

6.2.4. Survey diagrams

The Chief Surveyor General’s website yielded several early survey diagrams of the farms over which the Kogmanskloof Pass crosses. Several important pieces of information can be gleaned from these. Unfortunately the key diagram of Roodeberg 30 was illegible, save for a few words around the edges (Figure 28). Included are “...koen Nes”, which are assumed to correspond with the currently named place on the modern map (Figure 1). A very large, prominent and unused bird’s nest has for many years rested atop a rock formation in the kloof near Die Ou Meul in Montagu and such a nest was probably the inspiration for the name of this farm, and hence also the Kalkoen Krans on which the nest may have been located. Unfortunately the shape of the property does not match the currently delineated one and nothing further can be understood from this survey diagram.

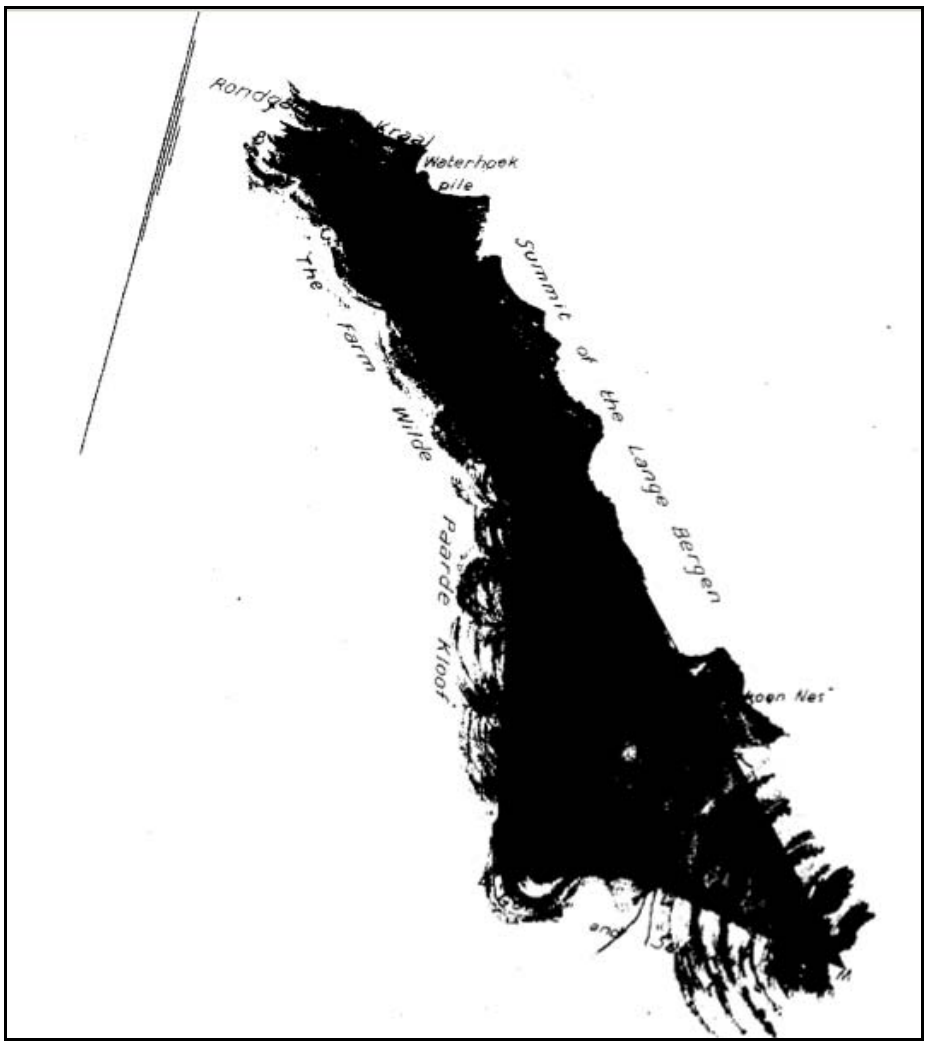


Figure 28: Survey diagram B 237/1869 showing the farm Roodeberg No. 30. Little of use can be seen but "…koen Nes" is visible along the eastern edge.

Portion 3 of this same farm (at its southern end) was surveyed in 1884 (Figure 29). It shows a further peculiar small internal (and older) subdivision that lies along and immediately south-east of the alignment of Bain's old road. An older survey diagram specifically of this smaller property dates to 1860 (Figure 30). This predates the construction of the road and shows the river running immediately alongside the land. The survey diagram indicates the presence of a hut and a kraal, neither of which seem to be present there today.

Even more peculiar is another survey diagram of the farm Aasvogel Krantz No. 155. This indicates a portion "reserved for the toll in Cogmans Kloof" (Figures 31 & 32). The modern 1:50 000 topographic map indicates that this portion of land is now Farm 154 (Figure 33). It is currently entirely undeveloped. The road passes directly through the middle of this piece of land but its intended use seems to have never been enacted.

A further property appears to have been subtracted from Farm 30. This was called Sadowa No. 32. This farm appears to have never had any structures built on it, but the diagram does show that the original road was very windy (Figure 34), a feature no longer part of the modern road. Intriguingly, an in-stream dam is indicated in the far north of the property where none is evident today. It may have been built by a local farmer without realising that it would not last very long given the flood regime of the river.

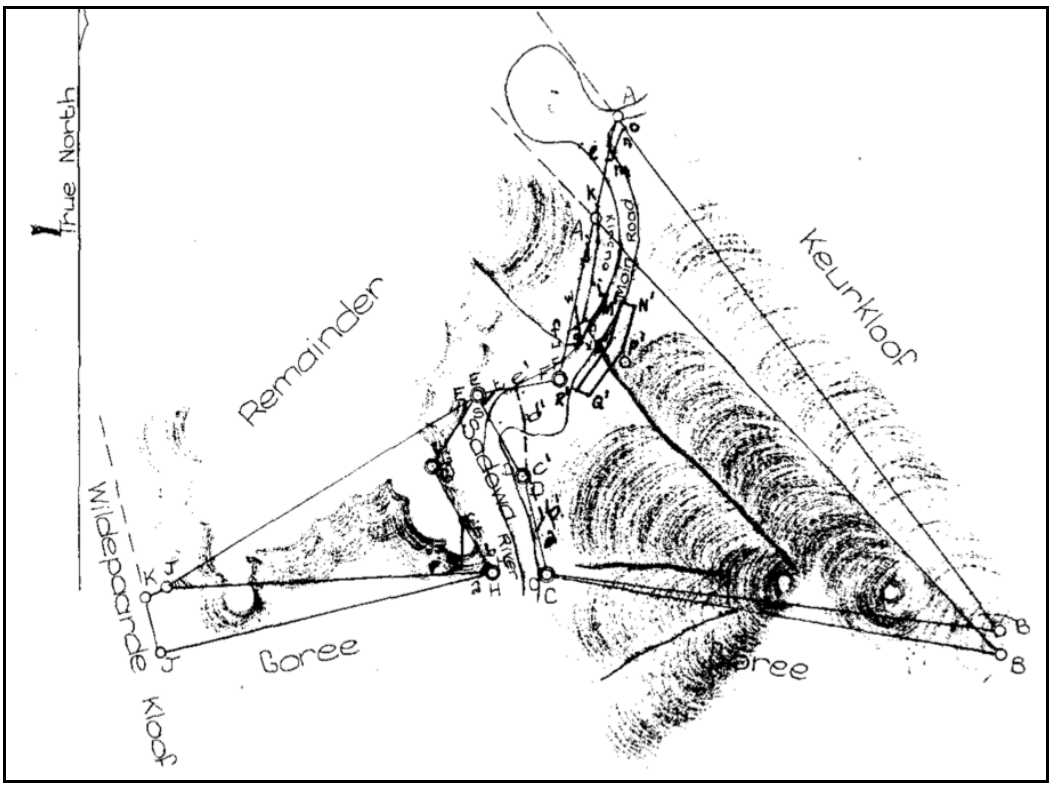


Figure 29: Survey diagram 1023/1884 showing Portion 3 of the Farm Roodeberg 30. It shows the road built by Bain, as well as the Kingna River and a peculiar elongated subdivision (MNPQRS).

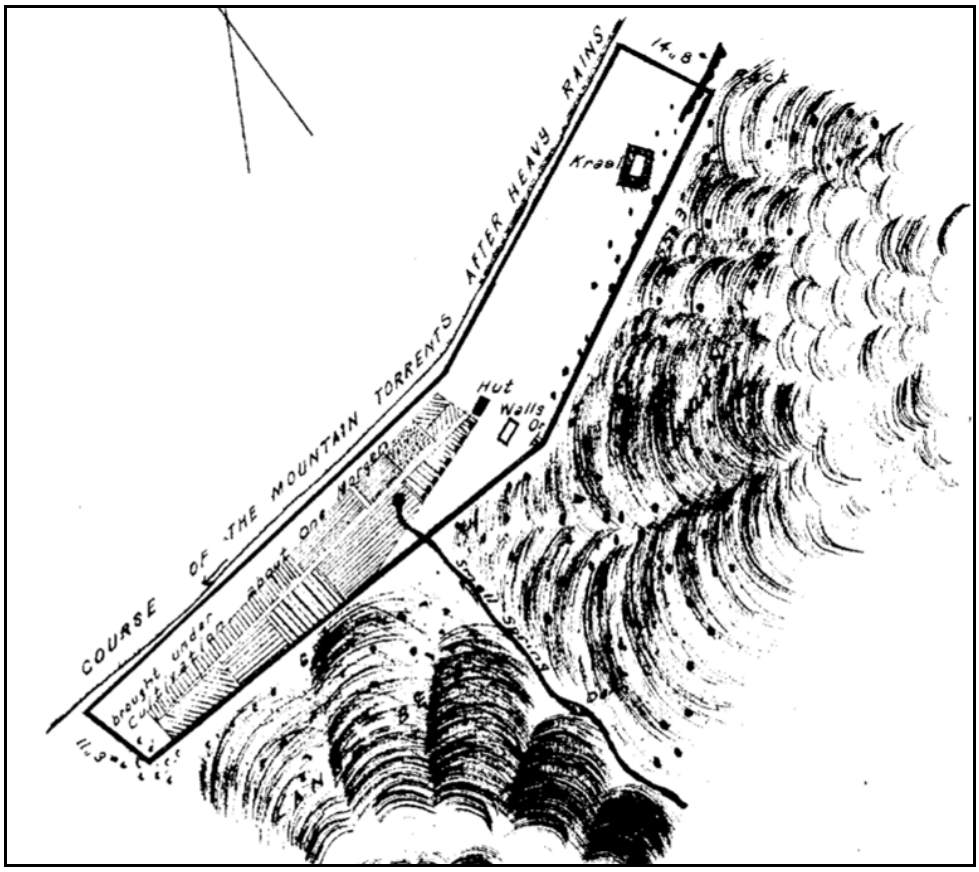


Figure 30: Survey diagram B/1660/1860 showing the small portion of land subdivided from Farm 30. The house marked “Die Ou Tol” on the modern map is located at the end of the stream in the area shown here as being “brought under cultivation”. A hut is indicated here but it in the incorrect position for the current house.

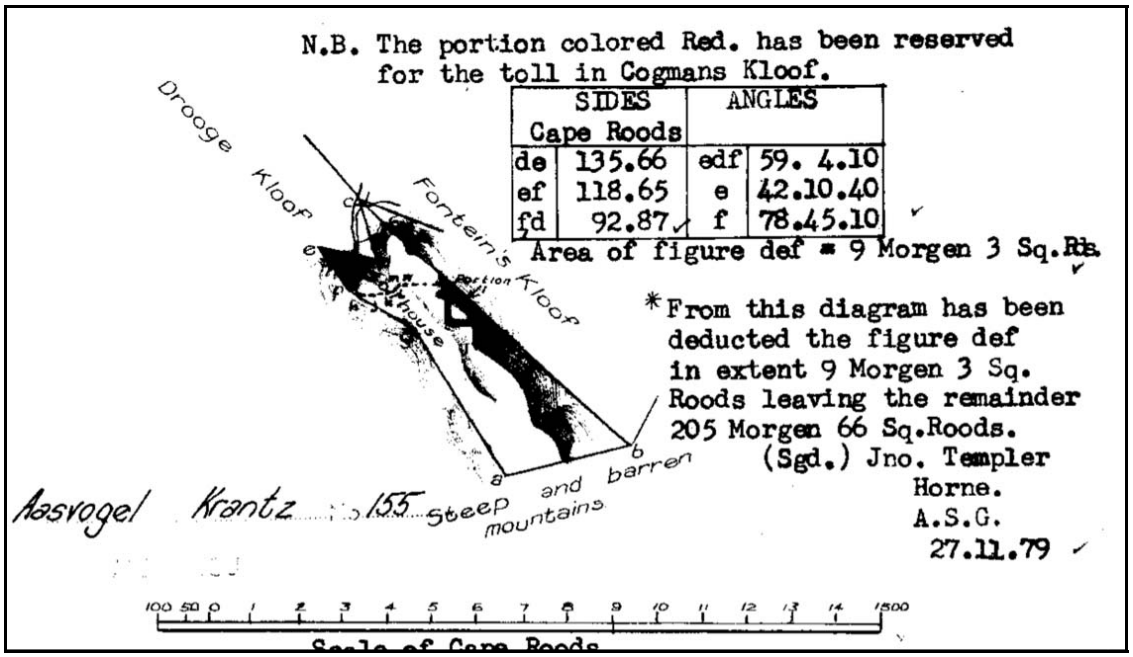


Figure 31: Survey diagram B305/1877 showing the Farm Aasvogel Krantz 155. Importantly this diagram indicates a portion of land set aside for “the toll in Cogmans Kloof”. The relevant section is assumed to be the triangular “Area of figure def” (see below). This type script appears to have been added onto the original 1877 diagram in 1879.

Figure 32: Extract from survey diagram B305/1877 showing the portion subdivided off to become today’s Farm 154.

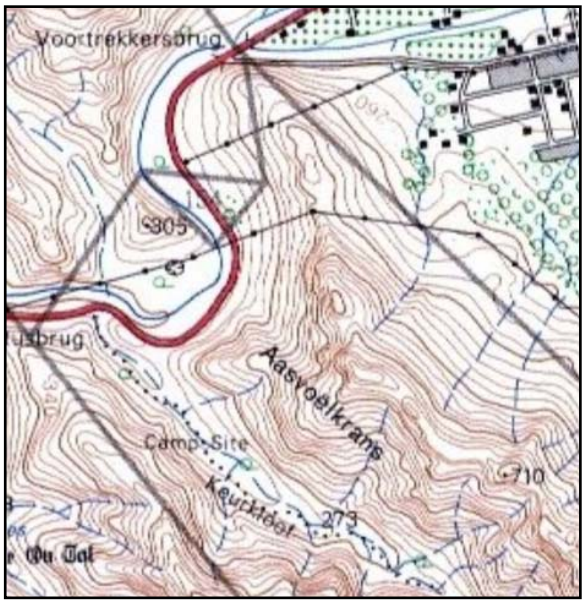


Figure 33: Extract from the modern map showing the position of Farm 154 along the road.

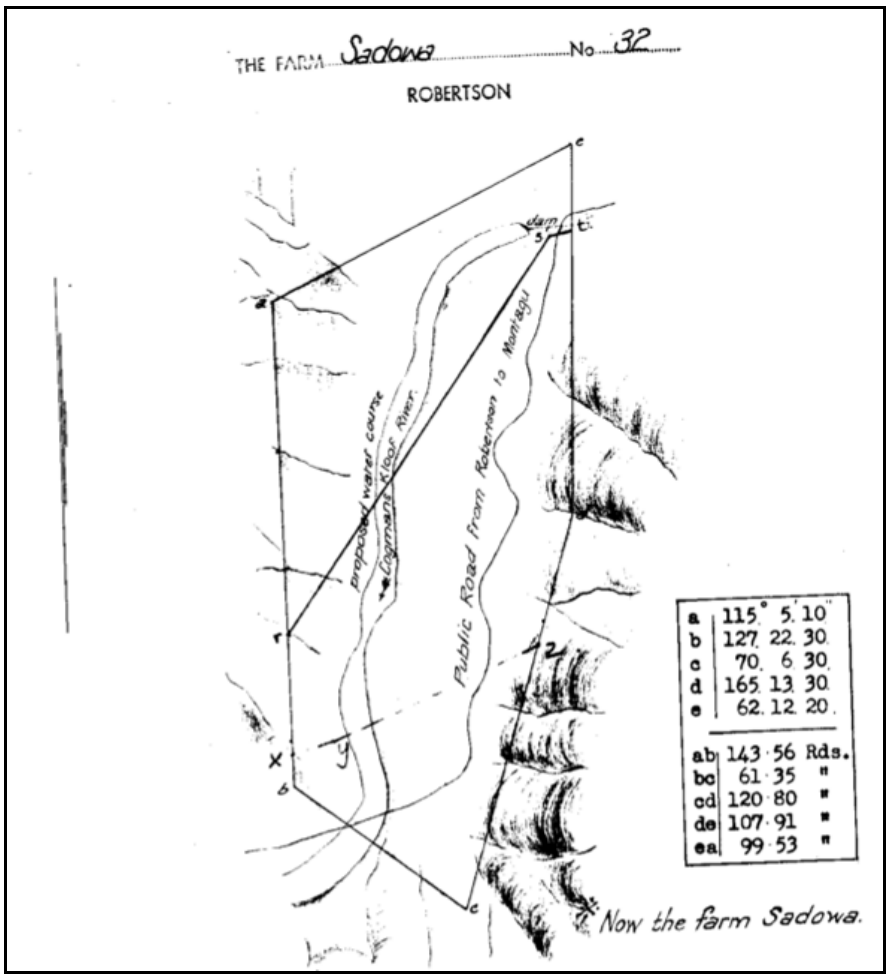


Figure 34: Survey diagram 301/1864 showing the Farm Sadowa 32.

6.3. Scenic route

Route 62 takes the Kogmanskloof Pass between Ashton and Montagu and is a well-marketed tourist route. The pass is extremely scenic with its spectacular rock formations and rugged mountain terrain. The historical resources (Bain's dry stone walls and the fort) add to its scenic value and general character. It is considered a scenic route of great value.

6.4. Geology and palaeontology

Several features of considerable geological interest are found in Kogmanskloof, the scenic *poort* between Ashton and Montagu (see Figure 35 and Appendix B). Most of these features, such as the spectacular folding within the Table Mountain Group rocks, occur above road level and would not be affected by the proposed road development. The well-known contact between rocks of the Malmesbury and Table Mountain Group near the southern entrance to Kogmanskloof, as well as the unusual succession of lowermost Table Mountain Group rocks immediately to the north are of scientific as well as educational importance. These rocky outcrops and roadcuttings on the east side of the kloof, close to the current road level, should be safeguarded from damage during construction work.

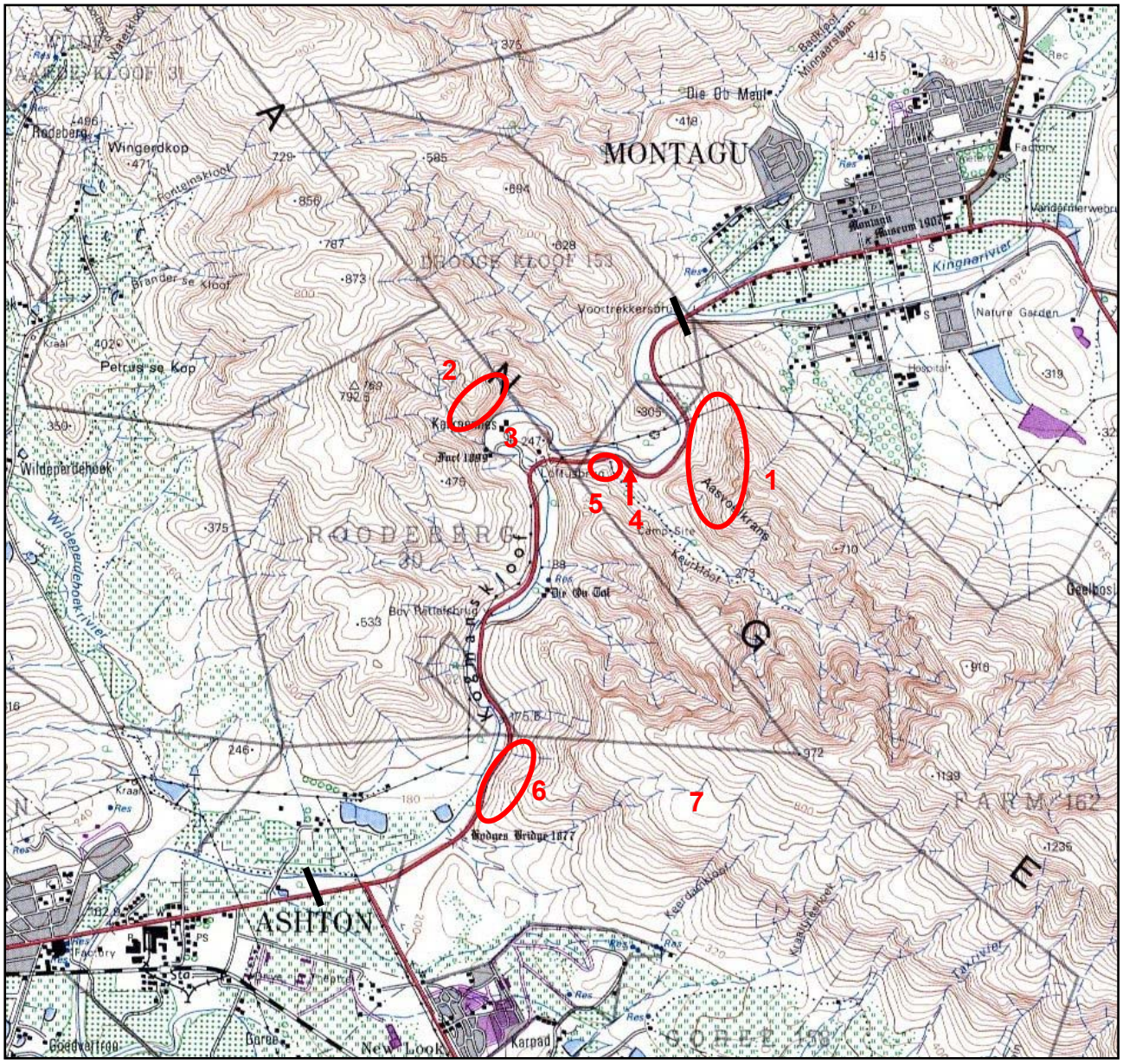


Figure 35: Extract from 1:50 000 sheet 3320CC showing several features of geological interest: (1) Cascade folds within Nardouw Subgroup (upper Table Mountain Group), Aasvoelkrans; (2) Spectacular vertical beds of Peninsula Formation quartzites, Kalkoennes area; (3) Incised meander of Cogmanskloof River near Kalkoennes; (4) Probable exposure of Cederberg Formation mudrocks, rest area at km 24.3; (5) Road cutting of uppermost Peninsula Formation quartzites that are earmarked for blasting; (6) Key roadside section through the contact between the Malmesbury Group and basal sediments of the Table Mountain Group; and (7) Gently-sloping pediment (ancient land surface) at 600-700m amsl along the southwestern slopes of the Langeberg.

Substantial bedrock excavations along the existing R62 through Kogmanskloof are only envisaged at about km 24.1. The fluvial uppermost Peninsula Formation quartzites exposed here on the south side of the road are probably entirely unfossiliferous. Mudrocks of the Cederberg Formation (Soom Member) crop out in the rest area situated an estimated 200 m to the southeast. They are unlikely to be directly affected by the proposed blasting or other road works, and in any case their original rich fossil content has probably been largely or completely destroyed by weathering and tectonic deformation (e.g. cleavage formation). It is concluded that the proposed road upgrade will not have any significant impact on local fossil heritage and no further palaeontological studies or mitigation are necessary for this project.

7. LANDSCAPE ASPECTS

Landscape proposals were prepared by OVP Associates, Landscape Architects after review of initial specialist heritage and palaeontology input (see Appendix C). These proposals include plans for bridges and rest areas. The project engineers also confirmed that new bridge designs would be similar to the existing bridges and that safety barriers would consist of stone walling to blend with the existing old walls along parts of the pass.

Landscape proposals for the bridges and rest areas and comments from visual specialist, Mr Bernard Oberholzer, have shortly been summarised below:

Hodge's Bridge Area

This area would consist of two small laterite surfaced parking areas and would involve the construction of stone gabions, low stone walls, stone-lined channels and stone bollards.

The proposed landscaping using local stone would blend in with the existing historic elements and would enhance the geological and historical character of the area. It is also recommended that some interpretive signage be provided to create awareness of the historic remains of the old road.

Boy Retief Bridge

The existing bridge is to be removed and a new bridge constructed adjacent to the existing position. A small parking area would be formalised next to the bridge using similar landscaping elements as proposed for Area 2 above.

The landscaping would blend in with the existing historic elements. It is recommended to provide interpretive signage relating to the history of the old Bain's Road and Toll House.

Tunnel Rest Area

Landscape proposals for the rest area include exposed aggregate paving with the paving taken across the roadway as a measure to make pedestrian crossing safer and to emphasise the historic importance of the area. Low stone walls, stone bollards, stone channels and picnic furniture are proposed along with access paths to the old English Fort and the Keurkloof nature area.

These measures would enhance the experience of the road user and visitors and are supported. Consideration should also be given to providing formalised viewing pull-off areas on both sides of the road to the south of the Billy Loftus Bridge, being an area of high scenic and geological interest. Also consider providing road signage with a historic monument logo as well as educational signage at the rest area and fort.

Keurkloof Nature Reserve Entrance

The landscape proposals include a small parking and picnic area as well as a new path along the river to the tunnel rest area and fort.

The proposals would enhance the experience of the scenic resources and provide access to a popular mountaineering area and are therefore supported.

Quarry Area

No further landscape proposals are envisaged for this area. The quarry sites would eventually be rehabilitated and only locally occurring species would be used in the revegetation of the area.

Voortrekker Bridge

A new bridge would be constructed at the current bridge position. Rest areas with parking would be created on both sides of the road together with visitor information and interpretive signage. Similar landscape details as proposed for the other rest areas would be used.

Being the entrance to the historic town of Montagu and having views of the river and bridge, the landscape proposals are strongly supported. It is also recommended that the existing clutter of inappropriate signage be replaced by more sympathetic signage and advertising signage should be avoided. Consideration should also be given to providing a dedicated pedestrian and cycleway as part of the new bridge design.

8. IMPACT ASSESSMENT

The heritage resources identified as being impacted by the proposed activities are the historical fabric of the pass itself and the general character of the historic and scenic route. These are assessed independently below. The impacts could result primarily from one of the types of impacts identified by Winter and Baumann (2005:27) as follows: "Inappropriate engineering infrastructure associated with scenic routes (curb and channel, crash barriers, signage)".

8.1. Historical fabric of the pass

This aspect of heritage includes all the dry-stone walls connected with the pass but excludes the bridges, which are all less than 60 years of age. In addition to the well visible and still used sections of the pass, the strictly archaeological aspects are also included here. Impacts are thus direct, physical impacts.

In heritage terms, the pass and its remaining historical fabric are regarded as being of high significance. Table 1 provides impact ratings. Given the significance of early mountain passes in South Africa the overall impact significance is rated as 'medium' but, given the potential positive impacts (benefits) the significance with mitigation is low.

Table 1: Assessment of impacts to the historical fabric of the pass.

POTENTIAL IMPACTS ON HISTORICAL FABRIC OF THE PASS:	
Nature of impact:	Physical destruction of original/historical fabric.
Extent and duration of impact:	Local, permanent
Probability of occurrence:	Probable
Degree to which the impact can be reversed:	Irreversible
Degree to which the impact may cause irreplaceable loss of resources:	Medium
Intensity of impact:	Medium
Cumulative impact prior to mitigation:	n/a
Significance rating of impact prior to mitigation:	***Medium***
Degree to which the impact can be mitigated:	Low
Proposed mitigation:	Reduce damage to fabric, expose and preserve fabric, incorporate in designs. See also Section 8.2 below.
Cumulative impact post mitigation:	n/a
Significance rating of impact after mitigation:	***Low***

Historical fabric is unlikely to be affected along most of the route due to the earlier (mid-20th century) remodelling of the road. In one area, however, historical fabric is visible and could be worked with to result in a benefit to the heritage resource. This will be discussed below.

8.2. Historic and scenic route

This aspect of heritage is quite broad and considers the general character of Kogmanskloof that is created through the presence of dramatic natural scenery and the historical man-made features. The impacts are thus less tangible.

In heritage terms, the character of the historic and scenic route are regarded as being of high significance. Table 2 provides impact ratings. Owing to the high degree of significance attached to the scenic route, the overall assigned significance rating is 'medium'. However, with careful mitigation through landscaping, the quality of the receiving environment can be improved such that a significance rating of 'low' after mitigation can be achieved.

Table 2: Assessment of impacts to the historic and scenic route.

POTENTIAL IMPACTS ON HISTORIC AND SCENIC ROUTE:	
Nature of impact:	Addition of further modern structures to the pass and addition of further/larger man-made structures to the natural scenery of the route.
Extent and duration of impact:	Local, permanent
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	Partially reversible
Degree to which the impact may cause irreplaceable loss of resources:	Medium
Intensity of impact:	Medium
Cumulative impact prior to mitigation:	n/a
Significance rating of impact prior to mitigation:	***Medium***
Degree to which the impact can be mitigated:	Low
Proposed mitigation:	Careful landscaping (particularly at raised Boy Retief Bridge), minimising scarring to natural landscape, introduction of interpretative signage at appropriate places. See also Section 8.2 below.
Cumulative impact post mitigation:	n/a
Significance rating of impact after mitigation:	***Low***

The general character of the road itself will necessarily be altered through the proposed modifications to it, but these changes will not really alter the general character of the overall route and the experience of traversing it, perhaps with one exception. This is at the Boy Retief Bridge where the new raised bridge (1.85 m higher) and altered road alignment will dominate the old pass to a greater degree than it does at present. Sensitive treatment of the interface between the two will help mitigate this. The opportunity to emphasize the history of the pass through interpretative signage is seen as having a positive impact on the historic and scenic route.

9. CONCLUSIONS

While the Kogmanskloof Pass, its associated historical fabric and historic and scenic character are all regarded as being of high significance, this assessment finds that negative impacts of low significance are most likely if mitigation is successfully achieved. In fact there is a clear opportunity to enhance the pass through sensitive input from a landscape architect and perhaps also through installation of interpretative signage. This is discussed further below. It should be noted, however, that further widening and straightening of the road will result in additional loss of character of the original pass which was narrow and sinewy. Most of the damage to this aspect was done in the mid-20th century upgrades though.

Palaeontological resources are unlikely to be directly affected by the proposed blasting or other road works. It is concluded that the proposed road upgrade will not have any significant impact on local fossil heritage and no further palaeontological studies or mitigation are necessary for this project.

Archaeological resources relating to the historic pass were found in one rest area just east of the rock tunnel. They comprise of remaining drystone walling capped by early tar. While this resource could be damaged during remedial work, it is felt that with appropriate input from an archaeologist and landscape architect this fabric can be revealed and incorporated in a new design for this rest area. Again, this is discussed below. Archaeological resources in the form of historic stone walling may be preserved below the surface alongside the Boy Retief Bridge. Should destruction of any historical fabric be required then a permit may be required from HWC.

With regards to landscaping, specific features of the design could serve to emphasize the 'differentness' between the original pass and the modern one in terms of their fabric. This applies particularly where historical fabric will be incorporated within the project at, for example, Hodge's Bridge. The proposed landscaping, using local stone, is supported as it would blend in with the existing historic elements and would enhance the geological and historical character of the area and the experience of scenic resources of the area for road users and visitors. This could be further enhanced by providing interpretive signage at rest areas.

10. RECOMMENDATIONS

It is recommended that, subject to the approval of HWC, the proposed development be allowed to proceed. However, the following recommendations are made:

- An archaeologist may be required to excavate and document the historical fabric visible in the rest area east of the rock tunnel (depending on what is done here);
- An archaeologist may be required to monitor excavations alongside the Boy Retief Bridge to check for historical fabric preserved and then record as appropriate;
- Blasting in the vicinity of Keur Kloof (km 24) should be kept to an absolute minimum to avoid unnecessary scarring of the landscape;
- At the rest area immediately east of the tunnel a new design could incorporate the old fabric present under the trees and serve to physically demonstrate and emphasize the differences between the old and the new;
- Sensitive treatment of the interface between the proposed new Boy Retief Bridge and any historical fabric that remains preserved beneath the vegetation cover may be required if it is found that Bain's dry stone wall extends towards the road beneath the current gravel area. Also, the landscaping should seek to reduce the degree to which the raised bridge will dominate the surroundings.
- In general, the project offers the opportunity to emphasize historic features, educate the public on the history of the pass and improve access to the historic Anglo-Boer War fort. In this regard, interpretive signage should be provided.

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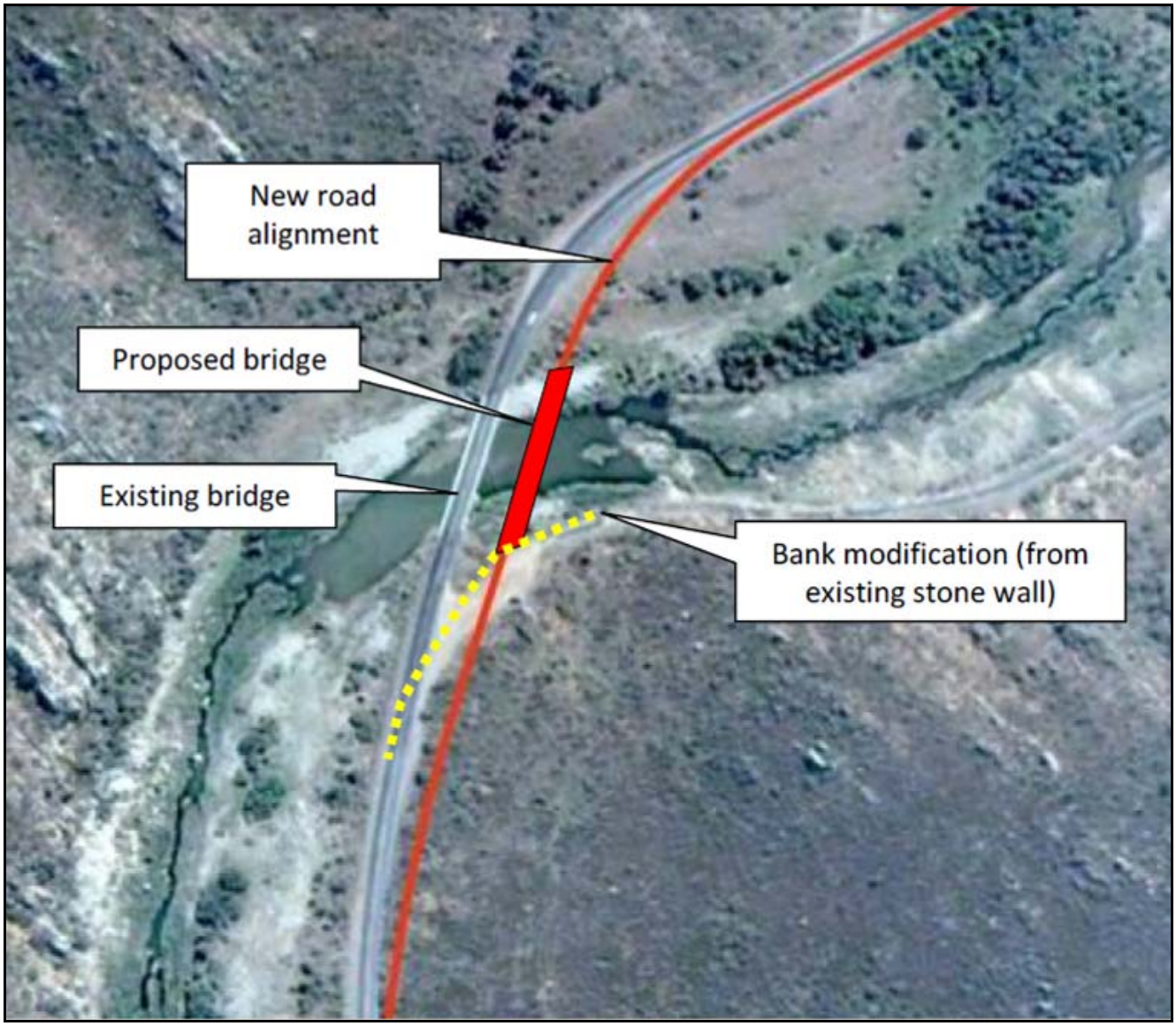
12. INVESTIGATION TEAM

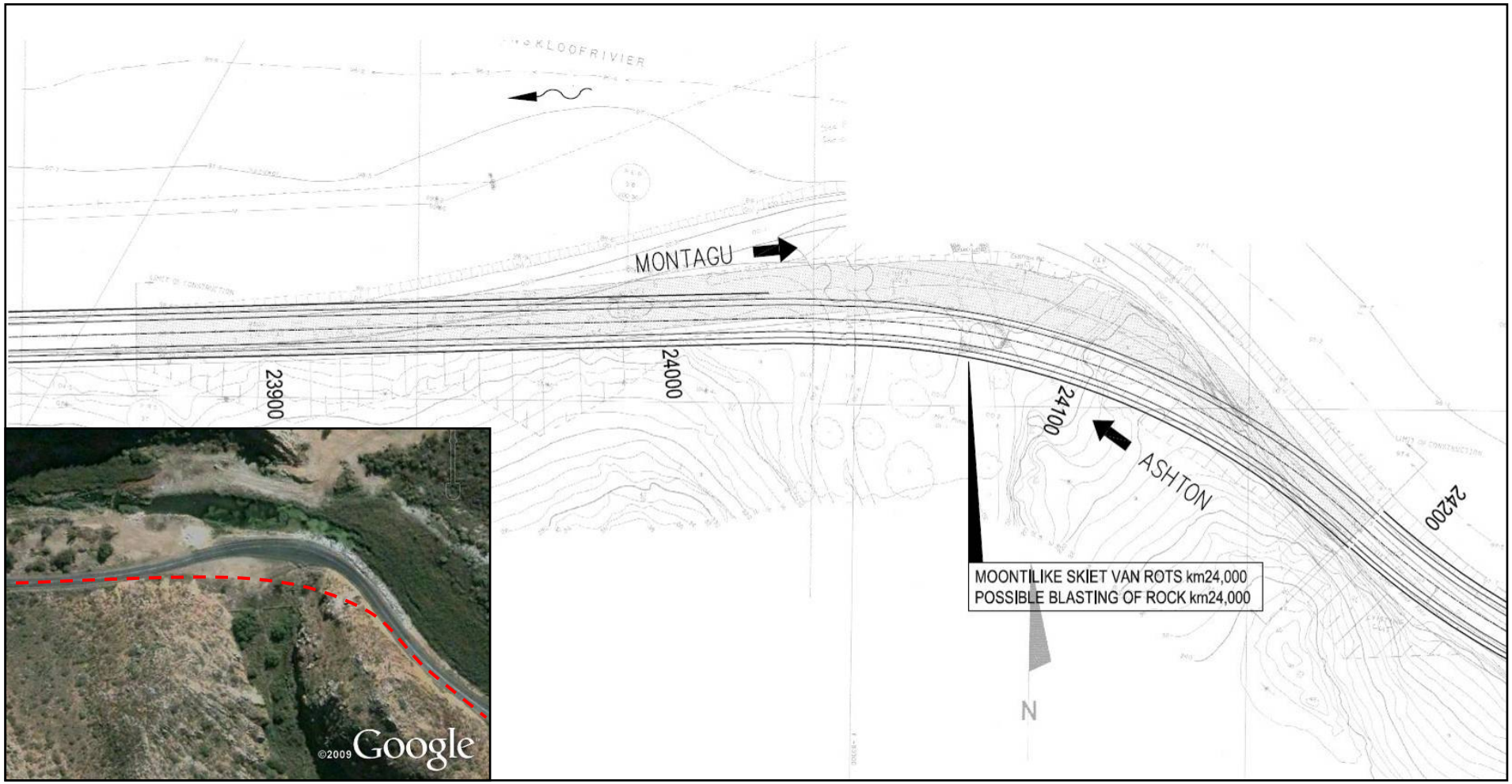
Fieldwork:	Jayson Orton MA (Principal Investigator: Archaeology; 11 years heritage experience, 7 as consultant) Carol Orton (final year MLA student and part time assistant to ACO)
Report:	Jayson Orton
Background research:	Carol Orton
Montagu archives assistance:	Hennah Flesch (Montagu Museum staff member)

APPENDIX A

LAYOUT PLANS



A1: Plan for the relocation of the Boy Retief Bridge near the Ashton end of the Kogmanskloof Pass.



A2: Plan of the section where blasting might be implemented. This would serve to increase the channel width available for the river. The inset shows the approximate proposed position of the road on a current aerial photograph.

APPENDIX B

PALAEONTOLOGICAL DESKTOP STUDY

PALAEONTOLOGICAL IMPACT ASSESSMENT: DESKTOP STUDY

Proposed upgrading of Cogmanskloof Pass between Ashton and Montagu, Western Cape

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November 2011

1. SUMMARY

The Western Cape Provincial Department of Transport and Public Works is proposing to upgrade and rehabilitate a 7.25 km long section of the R62 tar road through Cogmanskloof Pass between the towns of Ashton and Montagu, Western Cape. Several features of considerable geological interest are found in this very scenic *poort*. Most of these features, such as the spectacular folding within the Table Mountain Group rocks, occur well above road level and will not be affected by the proposed road development. The well-known contact between rocks of the Malmesbury and Table Mountain Group near the southern entrance to Cogmanskloof, as well as the unusual succession of lowermost Table Mountain Group rocks immediately to the north, are of scientific as well as educational importance. These rocky outcrops and roadcuttings on the east side of the R62, close to the current road level, should be safeguarded from damage during construction work.

Substantial bedrock excavations (rock blasting) along the existing R62 through Cogmanskloof are only envisaged at about km 24.1. The fluvial uppermost Peninsula Formation quartzites exposed here on the south side of the road are probably entirely unfossiliferous. Mudrocks of the Cederberg Formation (Soom Member) crop out in the rest area situated an estimated 200m to the southeast. They are unlikely to be directly affected by the proposed blasting or other road works, and in any case their original rich fossil content has probably been largely or completely destroyed by weathering and tectonic deformation (*e.g.* cleavage formation). It is concluded that the proposed road upgrade will not have any significant impact on local fossil heritage and no further palaeontological studies or mitigation are necessary for this project.

2. INTRODUCTION & BRIEF

The Provincial Department of Transport and Public Works, Western Cape, is proposing to upgrade and rehabilitate a 7.25 km long section of the R62 tar road through Cogmanskloof Pass between the towns of Ashton and Montagu (Fig. 1). The proposed work involves widening and resurfacing of the existing road, minor realignment of the route that would involve rock blasting in one small area, improvements to associated structures such as culverts and bridges, the construction of a walkway, upgrading road intersections and the addition of cycle lanes.

The road upgrade will largely follow the existing alignment. In order to smooth out a dangerous curve, a short sector of rock at km 24.1 (some 0.54 km east of the tunnel) has been earmarked for blasting, as shown in Figs. 1, 2 and 4.

Cogmanskloof is an important Western Cape geoheritage site while the proposed blasting area lies close to the outcrop area of the potentially fossil-rich Cedarberg Formation. A desktop palaeontological assessment for the proposed road project has therefore been commissioned by CCA Environmental (Pty) Ltd, Unit 35 Roeland Square, 30 Drury Lane, Cape Town 8001, in accordance with the requirements of the National Heritage Resources Act, 1999. The various categories of heritage resources recognised as part of the National Estate in Section 3 of the National Heritage Resources Act include, among others:

- geological sites of scientific or cultural importance
- palaeontological sites
- palaeontological objects and material, meteorites and rare geological specimens

2.1. General approach used for palaeontological impact desktop studies

In preparing a palaeontological desktop study the potentially fossiliferous rock units (groups, formations *etc*) represented within the study area are determined from geological maps. The known fossil heritage within each rock unit is inventoried from the published scientific literature, previous palaeontological impact studies in the same region, and the author's field experience (Consultation with professional colleagues as well as examination of institutional fossil collections may play a role here, or later following field assessment during the compilation of the final report). This data is then used to assess the palaeontological sensitivity of each rock unit to development (Provisional tabulations of palaeontological sensitivity of all formations in the Western, Eastern and Northern Cape have already been compiled by J. Almond and colleagues; *e.g.* Almond & Pether 2008). The likely impact of the proposed development on local fossil heritage is then determined on the basis of (1) the palaeontological sensitivity of the rock units concerned and (2) the nature of the development itself, most notably the extent of fresh bedrock excavation envisaged. When rock units of moderate to high palaeontological sensitivity are present within the development footprint, a field-based assessment by a professional palaeontologist is usually warranted.

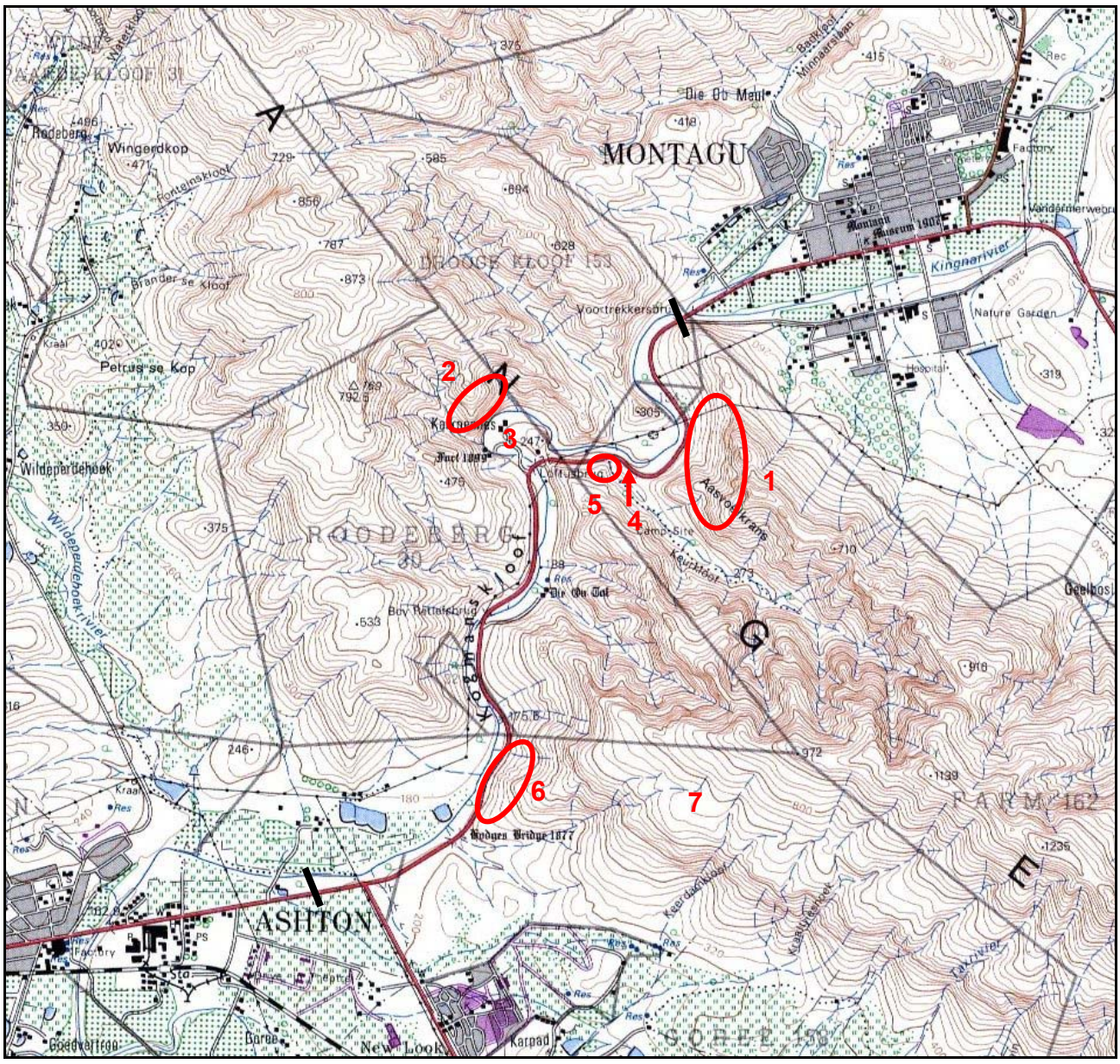

Fig. 1. Extract from 1: 50 000 sheet 3320CC Montagu (Courtesy of the Chief Directorate of Surveys & Mapping, Mowbray) showing location of 7.25 km – long section of the R62 tar road through Cogmanskloof, between Ashton and Montagu, Western Cape, that is to be upgraded (between two black markers).

Several features of geological interest are indicated in red:

1. Cascade folds within Nardouw Subgroup (upper Table Mountain Group), Aasvoelkrans.
2. Spectacular vertical beds of Peninsula Formation quartzites, Kalkoennes area.
3. Incised meander of Cogmanskloof River near Kalkoennes.
4. Probable exposure of Cederberg Formation mudrocks, rest area at km 24.3.
5. Road cutting of uppermost Peninsula Formation quartzites that are earmarked for blasting.
6. Key roadside section through the contact between the Malmesbury Group and basal sediments of the Table Mountain Group.
7. Gently-sloping pediment (ancient land surface) at 600-700m amsl along the southwestern slopes of the Langeberg.

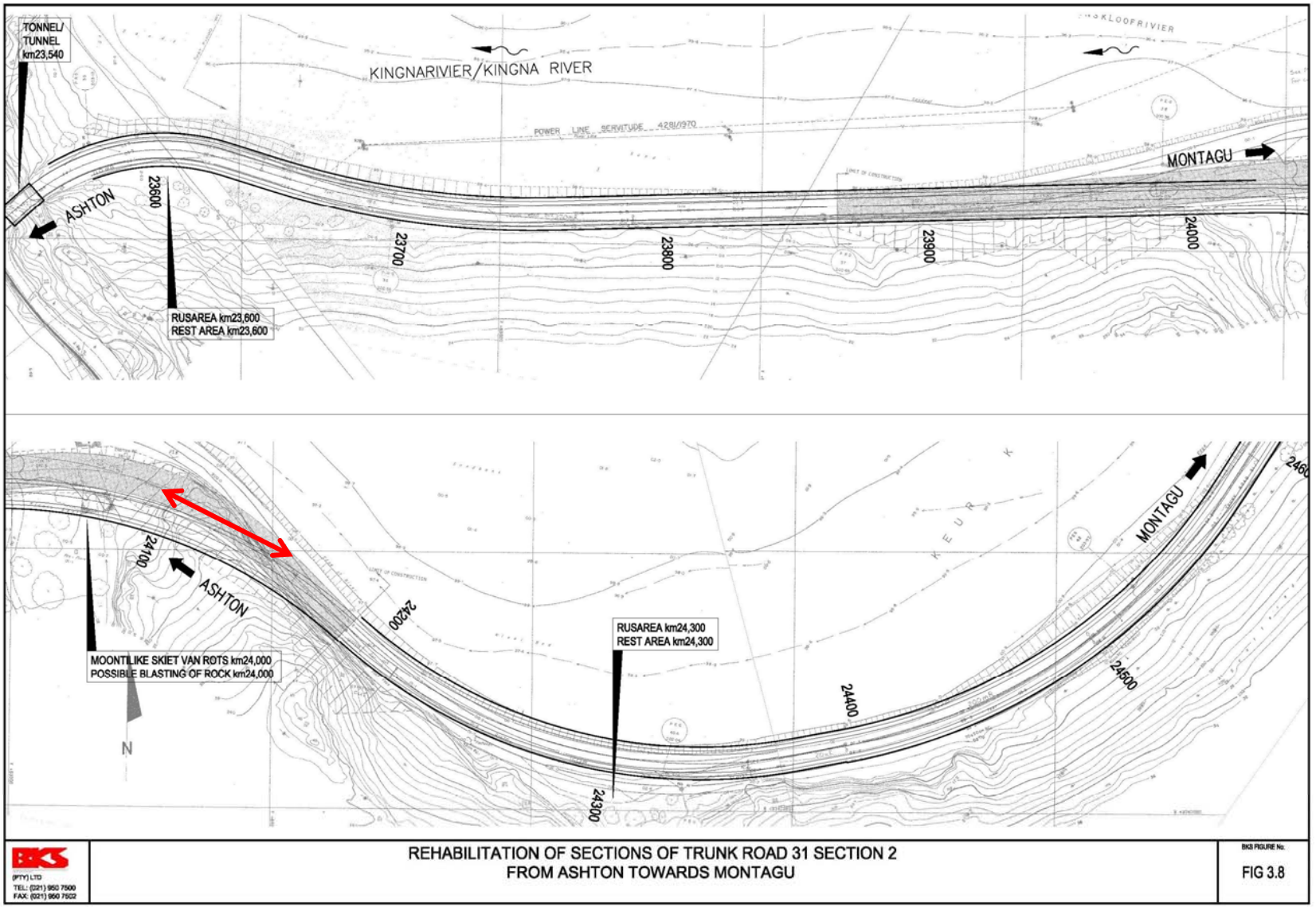

Fig. 2. Detail of road alignment in sector to the east of the tunnel, Cogmanskloof, showing the short section at km 24.1 (red arrow) that is to be blasted to allow a reduction in road curvature at this point. The Cedarberg Formation probably crops out in the rest area at km 24.3.

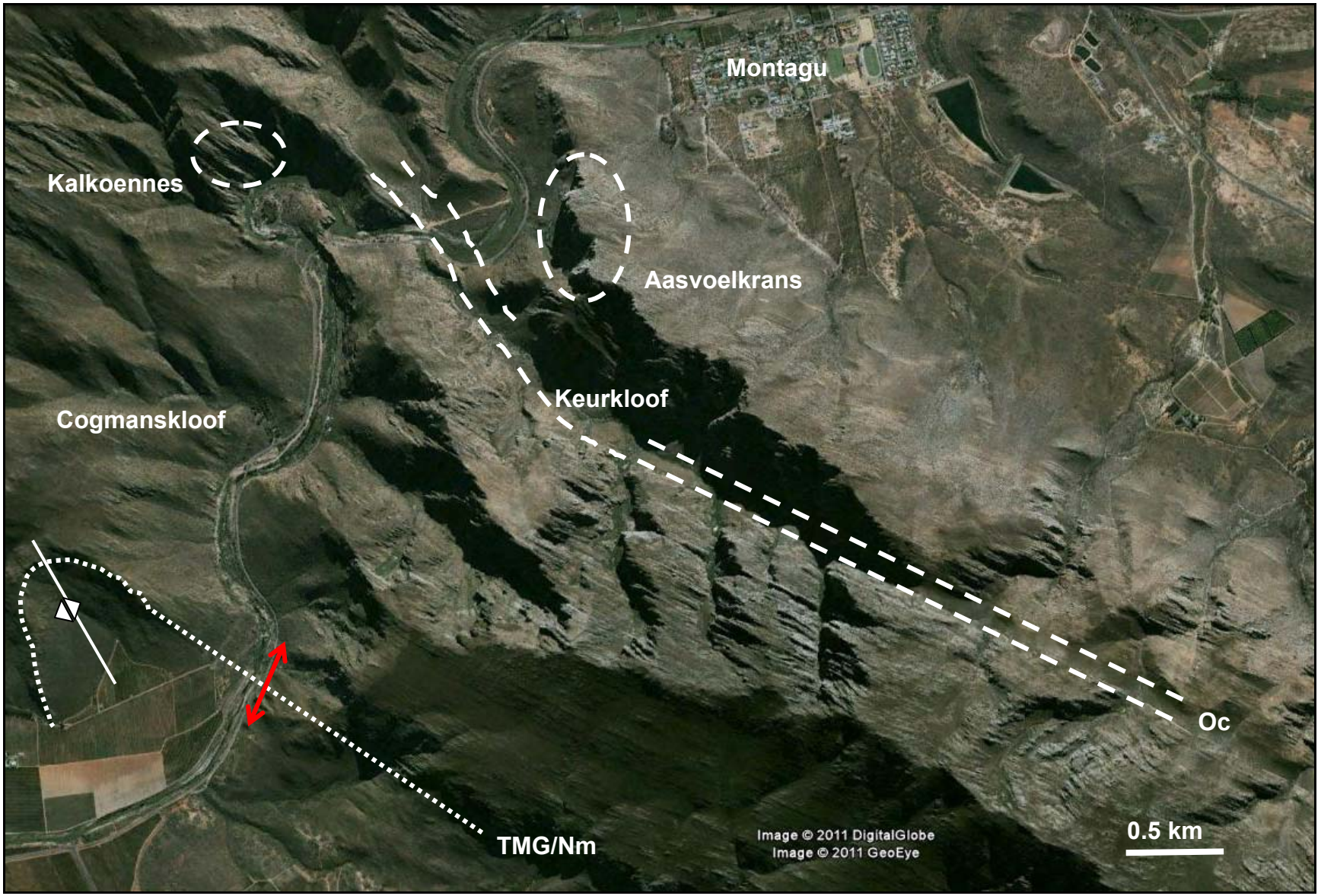

Fig. 3. Satellite image of Cogmanskloof Pass near Montagu. Oc = outcrop of the Cedarberg Formation ("Shale band"). TMG/Nm = approximate trace of contact between the Malmesbury and Table Mountain Groups. Scientifically important roadside rock exposures along the sector marked by the red arrow should be safeguarded during road construction.

Figure 4. Satellite image of the central portion of Cogmanskloof showing inferred outcrop of the Cedarberg Formation (Oc, between white dashed lines), a laterally-persistent recessive weathering unit within the uppermost Peninsula Formation (yellow arrows), the likely position of an exposure of dark Cedarberg Formation mudrocks in the rest area at km 24.3 (white arrow) and the rocky section earmarked for blasting (red ellipse).

3. GEOLOGICAL BACKGROUND

The geology of the Cogmanskloof study area is outlined on the 1: 250 000 geology sheet 3320 Ladismith (Fig. 5) (Theron *et al.* 1991). This scenic kloof or gorge has been carved through the NW-SE trending range of the Langeberg range between Ashton and Montagu by the Cogmanskloof River. This is now a small, north-bank tributary of the Breede River that drains the western Little Karoo *via* its own tributaries, the Kingna and Keisie Rivers, that meet at the eastern entrance to the kloof.

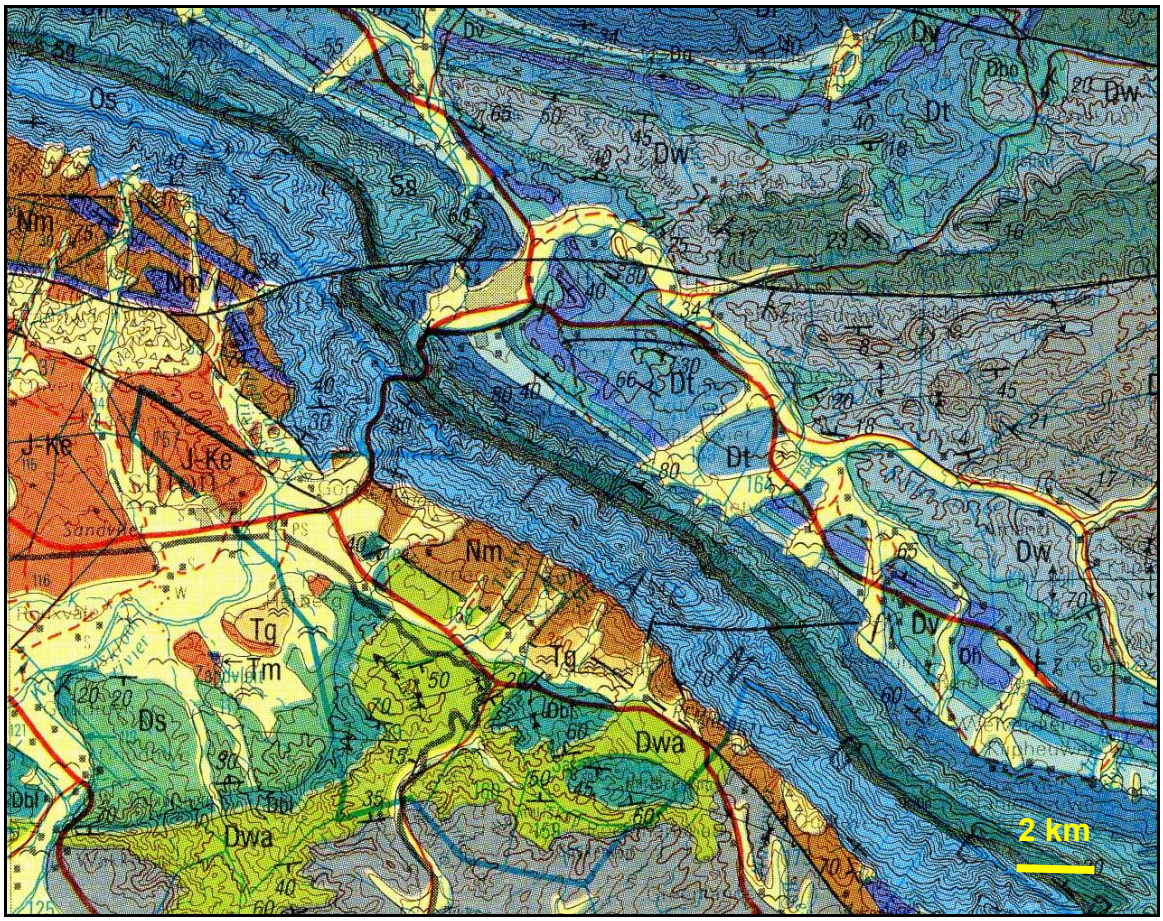

Fig. 5. Extract from 1: 250 000 geology sheet 3320 Ladismith (Council for Geoscience, Pretoria) showing the geology of the Cogmanskloof area between Ashton and Montagu. The main rock units represented in the study area include:

Nm (brown) = Malmesbury Group
Ope (blue) = Peninsula Formation
Oc Op (grey) = Pakhuis + Cedarberg Formations
Sg (green) = Goudini Formation
Ss (blue-green) = Skurweberg Formation
Dr (dark blue) = Rietvlei Formation

Tg (medium yellow) = Tertiary High Level Gravels
Pale yellow = Quaternary to Recent alluvium

Cogmanskloof has long been recognised as an area of outstanding geological interest (*e.g.* Taljaard 1949, Viljoen & Reimold 1999). Indeed, it is the subject of an excellent illustrated leaflet produced by the Conservation Committee of the Geological Society of South Africa (Western Cape Branch; C.H. De Beer (ed), undated), a scanned copy of which is appended to this report.

Among the numerous features of geological interest that are present in the Cogmanskloof area may be mentioned here:

1. Spectacular examples of **folded quartzites of the Table Mountain Group**, generated during the Permo-Triassic Cape Orogeny or mountain-building event (Newton *et al.* 2006). The folding is best seen within the Nardouw Subgroup (upper TMG) on the steep, west-facing slopes of Aasvoelkrans towards the eastern end of the pass. These upright to inclined, disharmonic, cascade folds may possibly be generated by gravitational collapse on the steepened, northern limb of the Langeberg mega-anticline (Theron *et al.* 1991, pp. 72-73). Further west vertically-upturned beds of Peninsula Formation quartzites (lower TMG) are seen forming impressive cliffs on the northern bank of the river near Kalkoennes (Figs. 3, 4 & 6).

2. Cogmanskloof is an impressive example of a **narrow river gorge transecting an elevated mountain range** composed of resistant-weathering, quartzitic rocks. It is now considered that such gorges, of which there are numerous examples in the Little Karoo and Cape Fold Belt regions, generally formed by aggressive headwards erosion by rivers, a process that was accelerated by repeated episodes of continental uplift in Mid to Late Tertiary times (*e.g.* Twidale & Van Zyl 1981; see also Maske 1957, Lenz 1957). The course of the Kogman's Kloof River shows a couple of well-developed incised meanders – most notably in the Kalkoesnnes and Aasvoelkrans areas – which were generated during erosive down-cutting of the river bed.

3. A well-developed, gently-sloping **pediment surface** (old land surface) incised into tough Peninsula Formation quartzites runs along the south-western face of the Langeberg (well-seen from Ashton) at elevations of some 600-700m amsl. (Figs. 1 & 3). The surface can be traced across the southern entrance to Cogmanskloof and appears to pre-date the latter; it is probably of Early to Mid-Tertiary age. Similarly, steeply-dipping Peninsula quartzites on the upper NE-facing slopes of the Langeberg to the southeast of Cogmanskloof have clearly been bevelled up to elevations of 1200m amsl or more. These gently-sloping, high-elevation ancient land surfaces truncating steeply-dipping beds of TMG quartzite are visible from inside the kloof, for example north of Kalkoensnes (Fig. 6).

4. The inferred **basal contact of the Ordovician Table Mountain Group with the underlying metasediments of the Late Proterozoic Malmesbury Group** is exposed in a culvert towards the southern entrance to Cogmanskloof (Fig. 7; see also undated Geological Society pamphlet, edited by De Beer). The contact seen here is clearly unconformable and erosive. Steeply south-dipping (possibly overturned), medium-bedded, buff-weathering greywackes and intensely-cleaved pelites (phyllites) of the Malmesbury Group to the south are erosionally overlain by a meter or so of quartz-rich, gravelly breccio-conglomerates of the Table Mountain Group. The lowermost Table Mountain Group beds and their basal contact at this site are subvertical. However, the contact itself is clearly folded on a regional scale, as shown by the antiformal structure cored by Malmesbury beds that is exposed one kilometer to the NE on the opposite side of the Cogmanskloof River (Fig. 3, bottom LHS).

Although the exposure of the TMG / Malmesbury contact in Cogmanskloof is an important geosite that has been visited by numerous geological groups in the past, it should be noted that the stratigraphic interpretation of the lowermost TMG succession here is equivocal and has not yet been described in detail. The basal breccio-conglomerates are overlain by several meters of thin- to medium-bedded quartzites of probable fluvial origin. There follows a 3 to 4m thick, thin-bedded, heterolithic interval comprising pale, cleaved and horizontally laminated quartzites interbedded with much darker laminated mudrocks containing striking horizons of pseudonodules (Figs. 8 & 9. N.B. The irregular rounded "blobs" seen here might alternative represent the mineral ottrelite, a chlorite-

related mineral created during dynamic metamorphism near the base of the TMG that has been described elsewhere in the Boland area – C.De Beer, pers. comm., 2011). A dark grey mudrock lenticel here displays well-developed crenulation cleavage (Fig. 10) suggesting secondary compressive deformation of an earlier axial-planar cleavage following rotation of the mega-anticline during a later stage of Cape folding (C. de Beer, pers. comm., 2011). The stratigraphic relationships and palaeoenvironmental interterpretation of these heterolithic TMG beds remain uncertain. It is important that they, as well as the well-known basal unconformity exposure, are protected from damage or destruction during the proposed road upgrade.

5. The outcrop of the postglacial, mudrock-dominated **Cederberg Formation** - informally known as the Upper Shale Band - that separates the quartzite-dominated Peninsula Formation and Nardouw Subgroup within the Table Mountain Group strikes NW-SE across Cogmanskloof, intersecting the tar road some 0.75km east of the tunnel. The comparatively smooth trace of this recessive-weathering formation is clearly seen running south-eastwards along the axis of the Langeberg where it has been exploited by the stream along Keurkloof (Fig. 3). As usual, exposures of the Cederberg mudrocks are minimal due to pervasive scree, soil and vegetation cover. According to Theron *et al.* (1991) the Cederberg Formation in the Cogmanskloof area has an average thickness of *c*. 60m, of which some 15-20m belong to the upper, sandier Disa Member. The mudrocks here are typically highly tectonised, with pervasive cleavage and deformation has often been concentrated along this relatively incompetent rock unit. These authors also note the presence of a basal glacigenic unit equivalent to the latest Ordovician **Pakhuis Formation** which is reduced to a thickness of only 3cm at the Keurkloof Camp Site (The latter is indicated in map Fig. 1).

The approximate trace of the Cederberg Formation in the study area, as inferred from satellite images as well as the 1: 250 000 Ladismith geology sheet map, is indicated by the dashed white line in Figs. 3 and 4 above. Dark Cederberg mudrocks are exposed in a road cutting on the south side of the Kloof, near the entrance to Keurkoof, most probably at the point marked with a white arrow in Fig. 4 (Rest area at km 24.3 in Fig. 2). The well-defined, narrow, curving valley cut by the Keurkloof stream just to the west of this point probably transects beds of the uppermost Peninsula Formation. A narrow, laterally-persistent, recessive-weathering band within the uppermost Peninsula Formation can be traced on both sides of the kloof (yellow arrows in Fig. 4). It is overlain by irregular-elongate quartzitic bodies of uncertain character that probably also build the short sector of road cutting that is earmarked for blasting on the south side of the kloof. The precise location of the Cederberg mudrock exposure requires confirmation through fieldwork. If the position shown in Fig. 4 is indeed correct, this suggests that Cederberg Formation rocks are unlikely to be directly affected by the proposed blasting operations some 200m to the northwest.

Fig. 6. View of the Kalkoennes area, Cogmanskloof, looking to the NW showing steeply dipping quartzites of the Peninsula Formation. Note elevated pediment surface truncating steeply-dipping TMG quartzites in background.

Fig. 7. Subvertical, unconformable contact between the basal breccio-congomerates of the Table Mountain Group (TMG) and the highly cleaved phyllites of the Malmesbury Group (MLB), indicated by the red dashed line. This exposure is seen on the SE side of the tar road close to the southern entrance to Cogmanskloof.

Fig. 8. Unusual rock succession within the lowermost Table Mountain Group showing thinly interbedded sandstones and mudrocks beneath hammer (*c*. 27cm long) overlain by lenticle of dark cleaved mudrocks. Southern entrance of Cogmanskloof, viewed towards the SE.

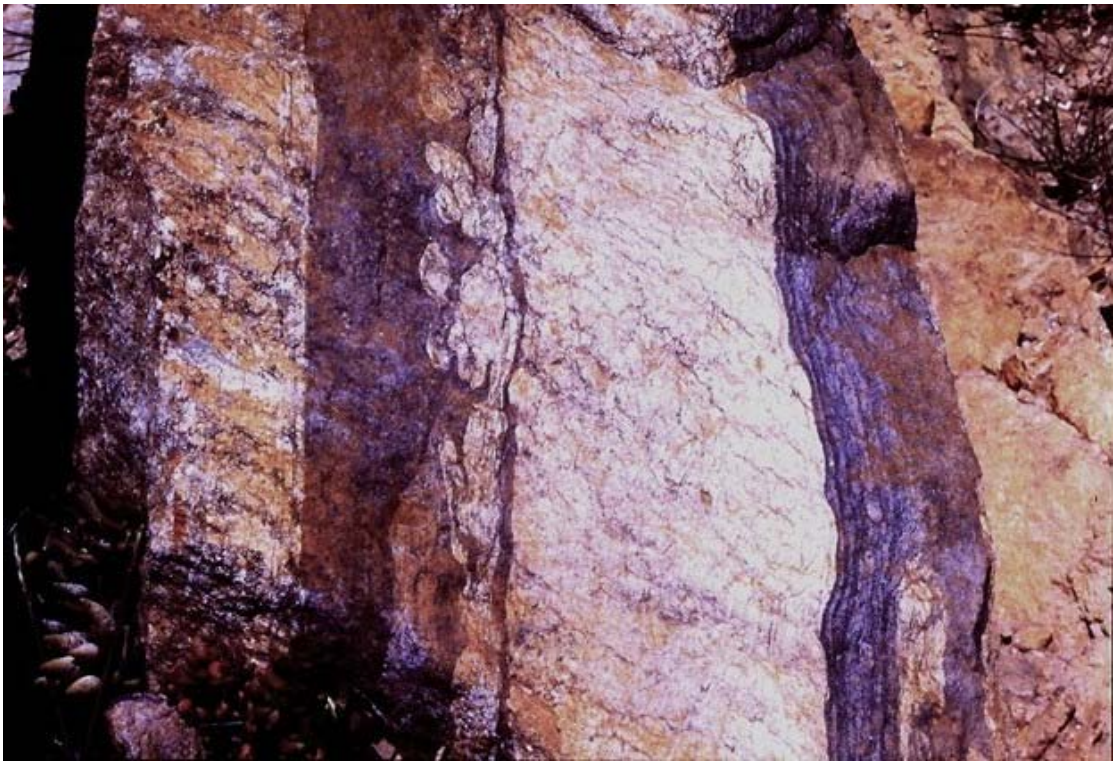

Fig. 9. Detail of interbedded, thinly laminated dark mudrocks and sandstones seen in previous figure. The irregular blob-like features may be pseudonodules or perhaps the mineral ottrelite associated with dynamic metamorphism.

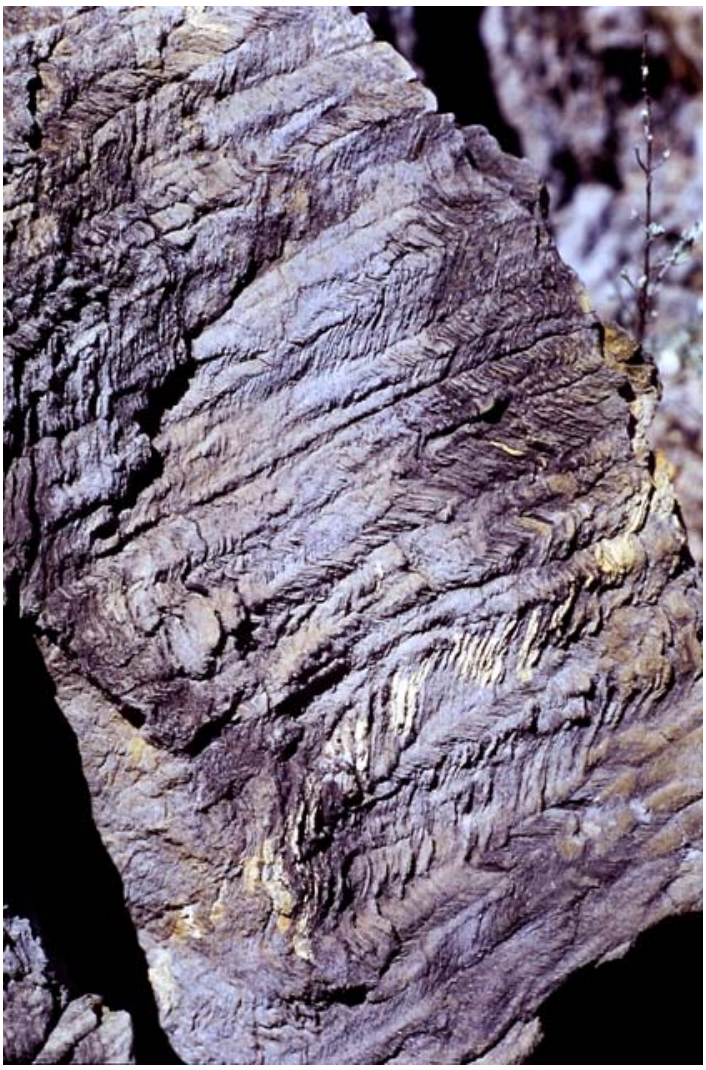

Fig. 10. Well-developed crenulation cleavage within lenticle of dark mudrocks seen in Fig. 8, implying two successive phases of intense deformation.

4. PALAEONTOLOGICAL HERITAGE

Fossil heritage recorded within the rocks units represented within Cogmanskloof that might be directly impacted by the proposed road works is briefly outlined here.

The **Peninsula Formation** is a thick (*c*. 2km) braided fluvial succession of medium- to think-bedded quartzose sandstones and quartzites with thin pebbly lenticles and layers. The fossil record of this rock unit is very sparse indeed. Thin heterolithic zones towards the top of several thinning-upwards cycles are associated with sparse, low-diversity trace fossil assemblages suggesting intermittent marine transgression or flooding of the paralic fluvial braidplain (Rust 1967a, Potgieter & Oelofsen 1983, Broquet 1992, Almond 2008). These traces include biostratigraphically significant members of the ichnogenus *Cruziana* (probable trilobite feeding burrows) and linear to palamate forms of *Arthrophycus*. Other notable trace fossils include arthropod trackways, some attributable to small eurypterids (water scorpions), large vertical cyclindrical burrows (possibly related to *Heimdallia*), and dense populations of vertical *Skolithos* dwelling tubes known as “pipe rock”. So far no indubitable body fossils have been recorded from this formation. Organic-walled microfossils such as acritarchs can be expected within some of the darker, finer-grained mudrock interbeds. Trace fossils or other organic remains are unlikely to occur within the typical pebbly facies that occur just below the contact with the Pakhuis Formation. These are the rocks that are likely to be blasted at km 24.1 within Cogmanskloof.

Body fossils are unknown from the glacigenic **Pakhuis Formation**, while vague meniscate backfilled burrows are reported from late glacial or postglacial dropstone argillites in the Hex River Valley (Almond 2008).

The palaeontology of the **Cedarberg Formation** has been reviewed by Aldridge *et al.* (1994, 2001), Selden and Nudds (2004) and Almond (2008). The laminated **Soom Member** mudrocks at the base of the succession contain sparse but exquisitely preserved specimens of primitive fish (anaspids, giant conodonts), small eurypterids, orthocone nautiloids, articulate and inarticulate brachiopods, at least two groups of trilobites as well as a small range of mollusks (nuculid bivalves, bellerophontid "gastropods") and other shelly invertebrates. Microfossils include chitinozoans, terrestrial spores and marine acritarchs. Since the Cedarberg Formation mudrocks in the Ladismith sheet area are typically high tectonised (see Section 3 above) and often deeply weathered, it is unlikely that significant fossil remains are still preserved within the roadside exposures in Cogmanskloof.

A low diversity, brachiopod-dominated shelly faunule of cool water, Malvinokaffric aspect is recorded from nearshore, bioturbated fine sandstones and siltstones in the middle of the **Disa Member** (Almond 2008 and refs. therein). These represent the first body fossils recorded from the Table Mountain Group (Rust 1967a, 1967b). The Disa shelly fauna comprises inarticulate brachiopods (*Plectoglossa, Trematis, Orbiculoidea*), articulate brachiopods (*Heterorthella, Eostropheodonta, Plectothyrella*), a homalonotid trilobite, branching and frondescent bryozoans, crinoids, cricoconarids (tentaculitids) and crustaceans. Most fossils are preserved as moulds, some showing casts of biogenic borings, while the phosphatic-shelled inarticulate brachiopods appear to retain their original shelly material. Low diversity ichnoassemblages of the shall water *Skolithos* and *Cruziana* ichnofacies are recorded from heterolithic facies of the Disa Member in the northern Cederberg (Almond 2008). The Disa fossil assemblage is a typical representative of the post-glacial Hirnantian Fauna of latest Ordovician / Hirnantian age (Cocks & Fortey 1986, Theron *et al*. 1990) rather than Early Silurian as argued by some earlier authors.

5. CONCLUSIONS & RECOMMENDATIONS

Several features of considerable geological interest are found in Cogmanskloof, the scenic *poort* between Ashton and Montagu. Most of these features , such as the spectacular folding within the Table Mountain Group rocks, are occur above road level and will not be affected by the proposed road development. The well-known contact between rocks of the Malmesbury and Table Mountain Group near the southern entrance to Cogmanskloof, as well as the unusual succession of lowermost Table Mountain Group rocks immediately to the north, are of scientific as well as educational importance. These rocky outcrops and roadcuttings on the east side of the R62, close to the current road level, should be safeguarded from damage during construction work.

Substantial bedrock excavations along the existing R62 through Cogmanskloof are only envisaged at about km 24.1. The fluvial uppermost Peninsula Formation quartzites exposed here on the south side of the road are probably entirely unfossiliferous. Mudrocks of the Cederberg Formation (Soom Member) crop out in the rest area situated an estimated 200m to the southeast. They are unlikely to be directly affected by the proposed blasting or other road works, and in any case their original rich fossil content has probably been largely or completely destroyed by weathering and tectonic deformation (*e.g.* cleavage formation). It is concluded that the proposed road upgrade will not have any significant impact on local fossil heritage and no further palaeontological studies or mitigation are necessary for this project.

6. ACKNOWLEDGEMENTS

Ms Eloise Costandius of CCA Environmental (Pty) Ltd, Cape Town, is thanked for commissioning this study and for kindly providing the necessary background information. I ma grateful to Mnr Coenie de Beer of the Council for Geosciences (Bekllville) for informative discussions on the geology of Cogmanskloof.

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8. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian - Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

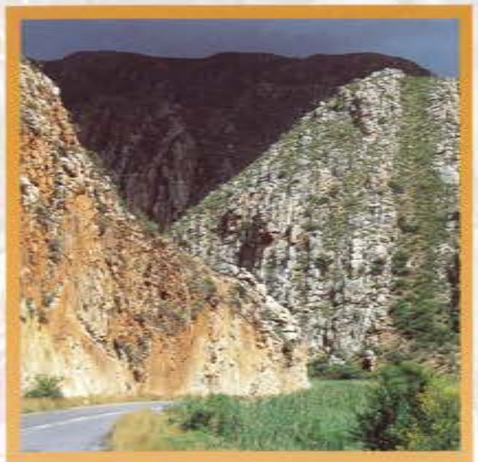
Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape under the aegis of his Cape Town-based company *Natura Viva* cc. He is a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHAP (Association of Professional Heritage Assessment Practitioners – Western Cape).

Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed road development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Dr John E. Almond
Palaeontologist
***Natura Viva* cc**

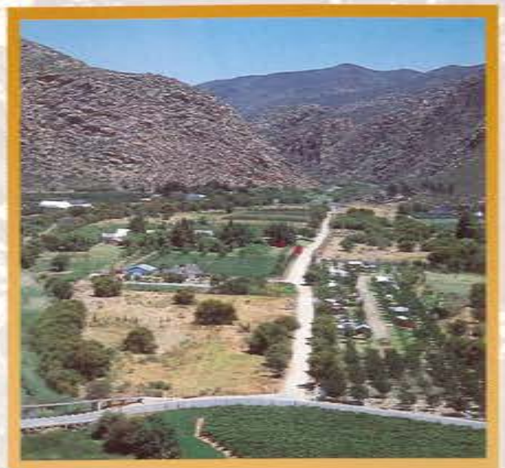
The most striking feature of Cogmans Kloof is the way it cuts through the mountain range. It is one of several such features found in the Cape Ranges, perhaps the best known being the Seven Weeks Poort which slices through the Great Swartberg Range to the northeast. Exactly which processes acted to form these features are unknown, but several possibilities need to be considered. The first of these is antecedent drainage. This implies that rivers existed prior to uplift of the mountain range and that their erosional power was able to keep pace with the rise of the land, that is, it could cut down as fast, or faster than the rate of uplift. If this model is correct, we must be dealing with very ancient drainage indeed. In fact, if it is appropriate, the early kloof must have been a very grand feature because it is probable that the range through which it cuts may originally have been several thousand metres high. The same problem of great antiquity applies to the second possibility which is that the modern drainage is the result of superposi-



Steeply dipping sandstone beds of the Peninsula Formation (looking west).

tioning of streams onto the folded mountain range from some earlier elevated landscape, the sort of process one sees operating in the Grand Canyon of Arizona, U.S.A. In the case of Cogmans Kloof, this process seems less likely than the former. A third and probably the most feasible possibility, recognises that all the great east-west ranges of the Cape Fold Belt possess deep canyons cut by streams draining their flanks e.g. a north-bank tributary of the Breede River eroding northwards from the Ashton area towards the Montagu area. These often do not penetrate the ranges, but pairs originating on opposite flanks may intersect. If at some time in the past this intersection occurred, and if the land north of the range was higher than in the south, then it is possible that, by aggressive headward erosion of the southern canyon, the drainage from the north may have been tapped and a poort formed through the process of river capture.

Whatever processes were involved in the formation of the kloof, it must be accepted that its aspect today is in a sense unique, because it is undergoing continuous modification. Although in any single lifetime little or no change may be apparent, over a longer period, say millions of years, many aspects of the kloof would be expected to alter. Broadly these would involve downcutting of the active channel and widening by sidewall retreat. If for any reason, climatic or tectonic, downcutting was reduced or halted, the stream would tend to cut sideways, widening the valley. Renewed downcutting would leave parts of the previously-cut floor abandoned and these would remain as terraces. It is upon one of these terraces that you are standing whilst reading the plaque. A reminder of the powerful forces of erosion was provided in January, 1981, when heavy rains in the southern Karoo caused the Keisie and Kingna Rivers to flood and to meet at their confluence in Montagu, before rushing through Cogmans Kloof to Ashton and the Breede River, with considerable loss of life and damage to property.



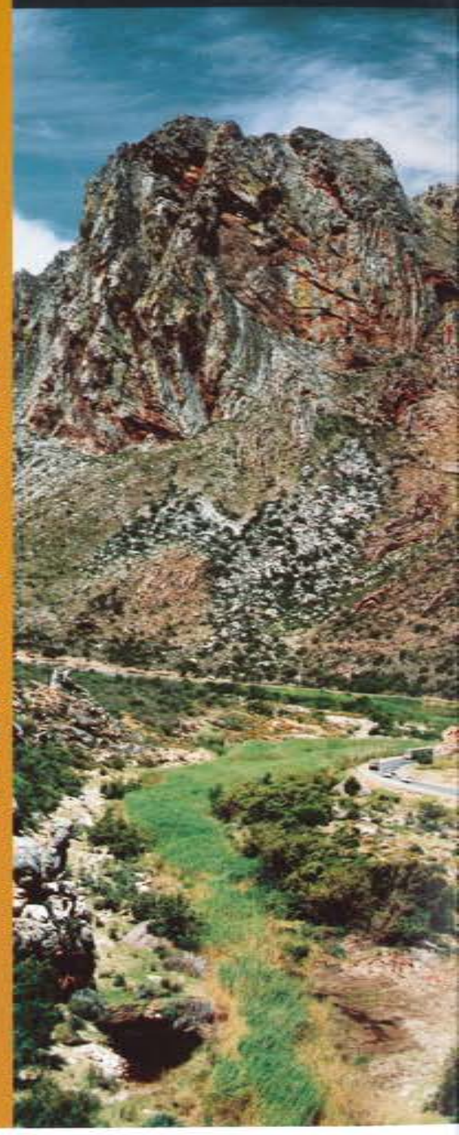
Montagu at the northern end of Cogmans Kloof, a juvenile valley cut through the Table Mountain Group.

Site C10

Cogmans Kloof

Geological Society of South Africa

Folding and erosion in the Cape Mountains



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Paarl Mountain | Chapman's Peak | Sea Point | Brandvlei
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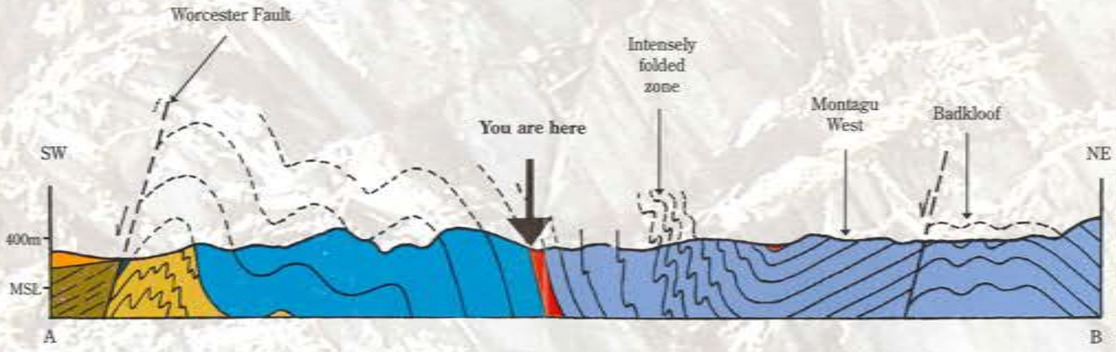
BM055
Design and layout: Out of the Blue graphic design solutions (021) 947-3008

Cogmans Kloof

The plaque describing the area has been placed near the arch on which the old Anglo-Boer War fort stands.

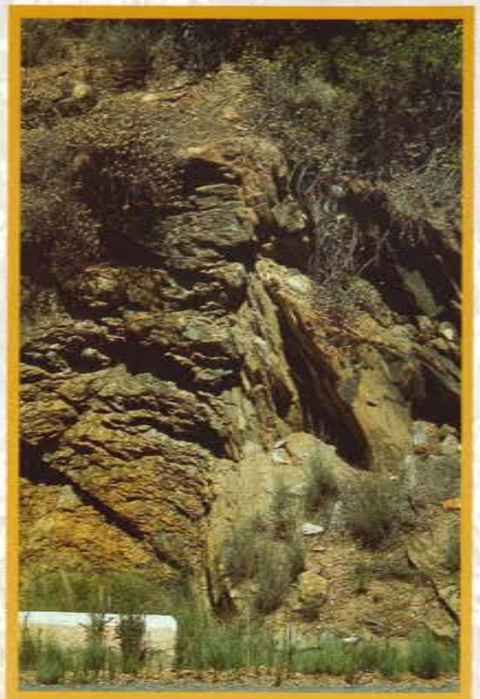
At the southern (Ashton) end of Cogmans Kloof, yellowish-brown phyllites(metamorphosed shales) of the Malmesbury Group underlie the steeply tilted and folded younger sandstones of the Table Mountain Group (TMG) that dominate the scenery of the kloof. In contrast to the horizontal contact between the Malmesbury and Table Mountain Groups at Cape Town, this plane (called an angular unconformity) at Cogmans Kloof is vertical, because it was folded along with the other strata.

The rock sequence surrounding the site (see map) is dominated by sandstones of the Peninsula Formation and the Nardouw Subgroup. Sandy sedimentation was briefly interrupted by a period of glaciation (Pakhuis Formation diamictite) and mud deposition (Cedarberg Formation shale). These sediments were deposited in coastal settings 400-450 millions of years (Ma) ago when Africa was part of the supercontinent Gondwana. The beds have been thoroughly lithified by processes associated with deep burial, compaction and cementation. Originally the layers of sand (now sandstones) would have been almost flat-lying. If you look around you at the site, you will see that these layers (beds) are now for the most part steeply inclined. This is because from 280 to 220 Ma ago, the whole mass was subjected to tremendous compressional forces, which had been directed from the south and occurred in several pulses, as controlled by interaction between major plates of the earth's crust during that time. The geological cross-section provided shows a large anticlinorium (arch) consisting of smaller folds in the SW and a syncline (trough) at Montagu. Tight, small folds that decorate the northern, steep limb of the anticlinorium are beautifully revealed on the steep mountain slopes north of the site. It has been suggested that these folds represent collapse of folded strata under the influence of gravity.



The geological cross-section shows that the southern entrance of the kloof is marked by a major crustal dislocation (fault) - the Worcester Fault - which extends for a great distance along the southern margin of the Langeberg Mountains in the foothills immediately north of Ashton, Robertson and Worcester. The formations to the south of the fault have been lowered by several kilometres and major earthquakes would have accompanied the faulting as Gondwana started to break up. This fault is as geologically important to the region as the San Andreas Fault is to California. You will also see a smaller fault at the northern (Montagu) end of the kloof. In 1969, a subsidiary fault between Tulbagh and Ceres was reactivated, leading to a destructive earthquake with a magnitude of 6.5 on the Richter Scale. Rockfalls were reported at the time.

It is an interesting fact that were it not for the Table Mountain Group with its thick quartz-rich sandstones, we would not have had any Cape Ranges, at least not on their present scale. The sandstones are often very pure and these quartz-rich rocks are extremely resistant to weathering, being chemically relatively inert. Most of the chemical attack is related to lichens which typically coat the outcrops and generally impart a grey tone, but as you can see, also colourful tints on some of the high rock faces. Because of their inertness to weathering and thorough induration, the TMG tends to occupy the high ground in landscapes, which nature is constantly trying to reduce to sea level. What erosion we occasionally observe, is usually of a mechanical nature, involving rock-falls, sometimes triggered by earthquakes. It is probable that this is the dominant mechanism operating to reduce the relief of the Cape Mountains. The rockfalls provide source materials for the gravels found in the modern river channels.



Vertical angular unconformity between the Malmesbury Group to the south and pebbly sandstone of the Peninsula Formation to the north.

APPENDIX C

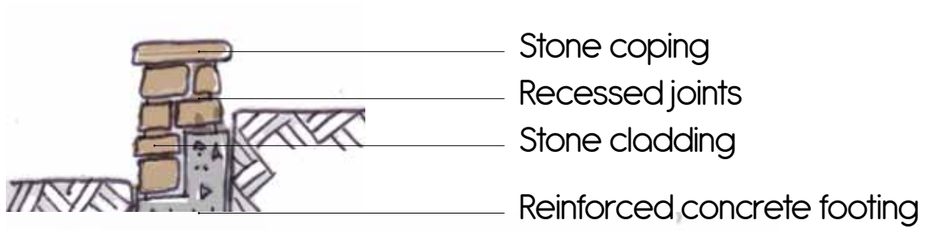
LANDSCAPE PROPOSALS

Cogmanskloof pass
Landscape Finishes

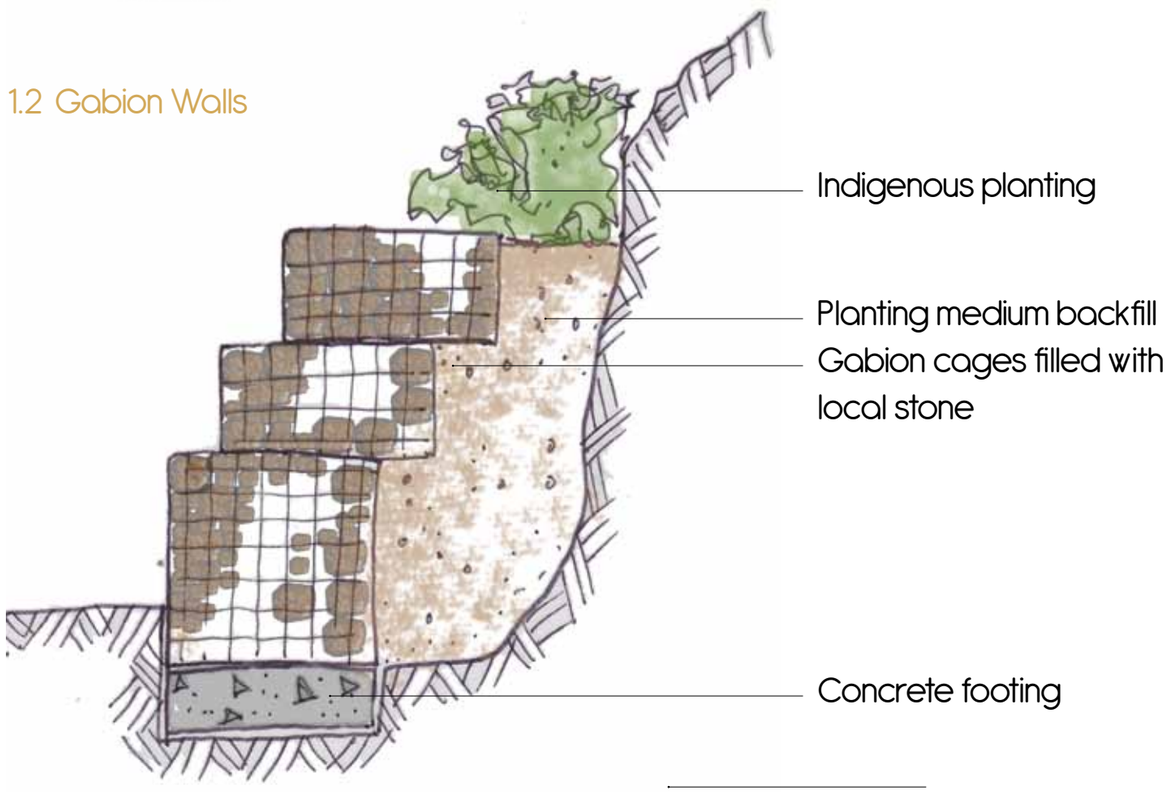
1. WALLS: Use stone from local excavations

1.1 Retaining Walls

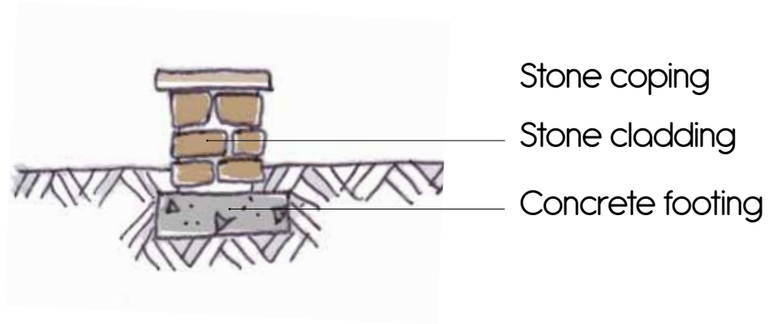
Retaining walls with recessed mortar joints or dry-packed facing to reinforce concrete structure.



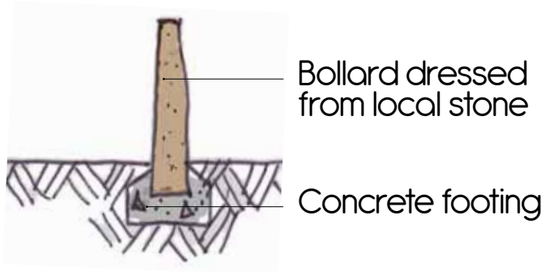
1.2 Gabion Walls



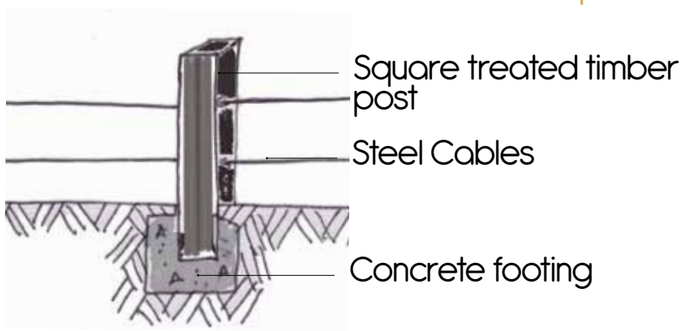
1.3 Minor Walls: with recessed mortar joints



2. BOLLARDS

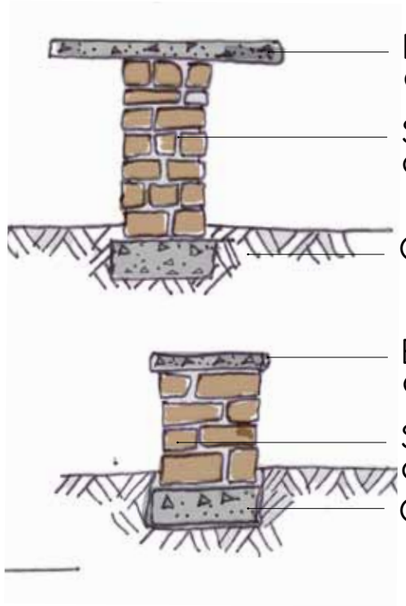


3. CRASH RAILS: Stone walls where possible

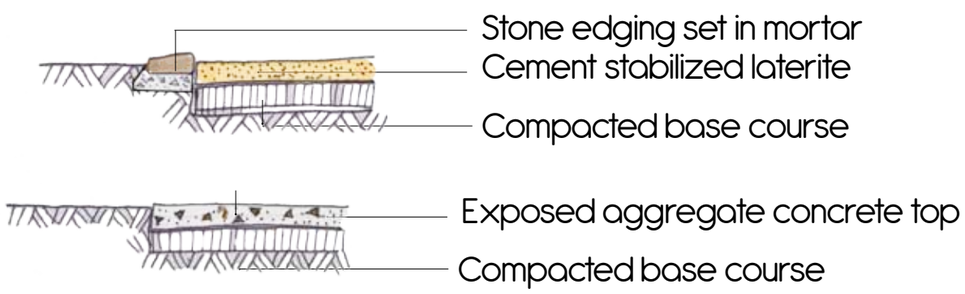


Cogmanskloof pass
Landscape Finishes

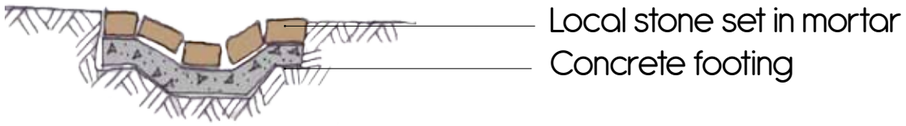
4. FURNITURE



5. PAVING

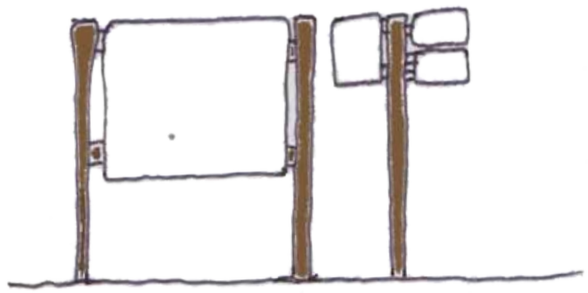


6. WATER CHANNELS



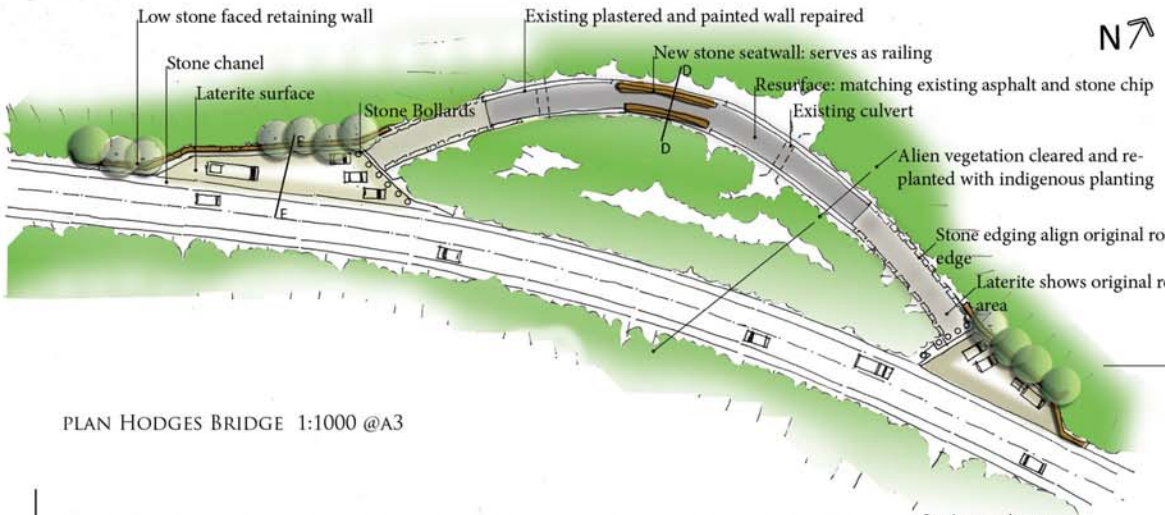
7. SIGNAGE

- Signs should be kept to a minimum in number and in height and grouped to avoid visual clutter.
- Signage shall be rationalised to minimize clutter, maximise legibility, be unobstructive to the setting.
- Silhohetted effects against the sky shall be avoided. Low signs in horizontal format are less obtrusive and uniformity in mounting heights will improve the elgibility and tidiness.
- A consitent vocabulary of materials, typeface graphics and co-lumbs shall be considered functionally and aesthetically to compli-ment the Cogmanskloof landscape.

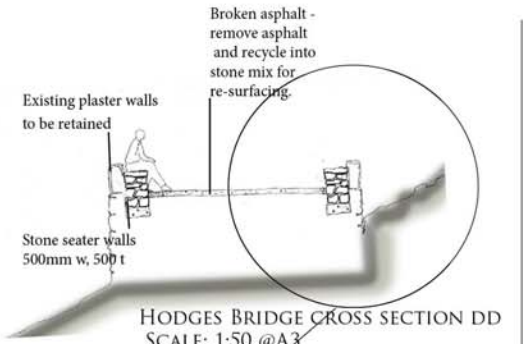


COGMANSKLOOF AREAS OF FOCUS FOR INTERVENTION:
HODGES BRIDGE AND PARKING LOT WITH RETENTION

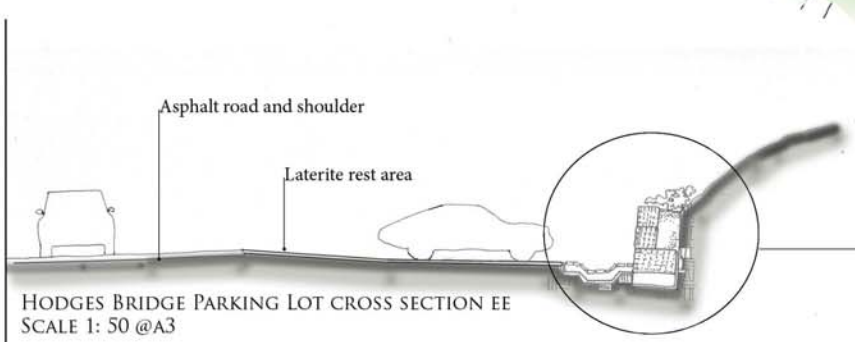
MILEMARKER: 20500



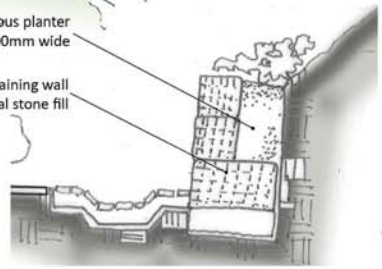
PLAN HODGES BRIDGE 1:1000 @A3



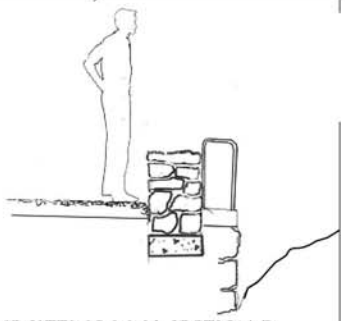
HODGES BRIDGE CROSS SECTION DD
SCALE: 1:50 @A3



HODGES BRIDGE PARKING LOT CROSS SECTION EE
SCALE 1: 50 @A3



DETAIL RETAINING WALL SECTION E
SCALE 1:20 @ A3

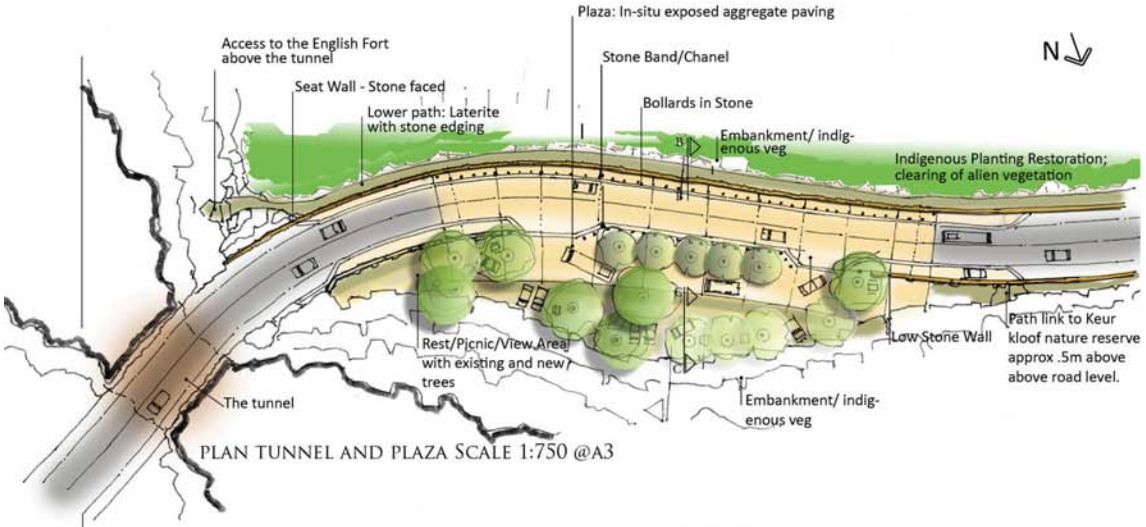


STONE SITTING WALL SECTION D
SCALE 1:20 @A3

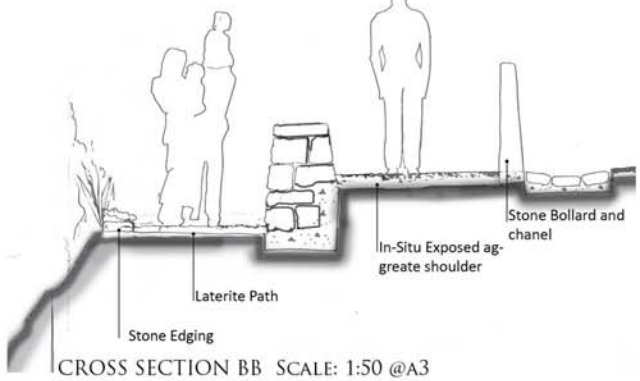
COGMANSKLOOF AREAS OF FOCUS FOR INTERVENTION:

TUNNEL REST AREA

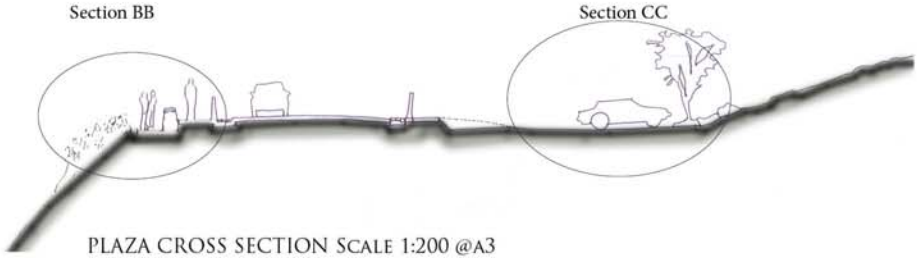
MILEMARKER: 23640



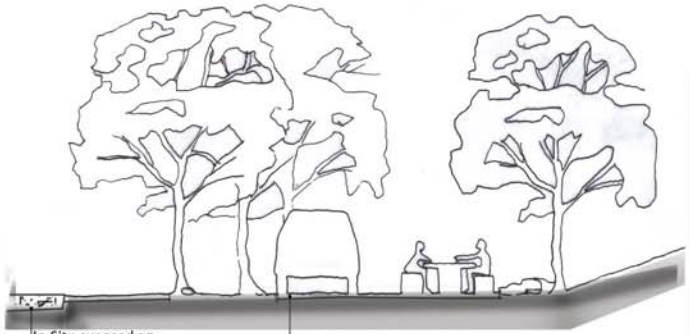
PLAN TUNNEL AND PLAZA SCALE 1:750 @A3



CROSS SECTION BB SCALE: 1:50 @A3



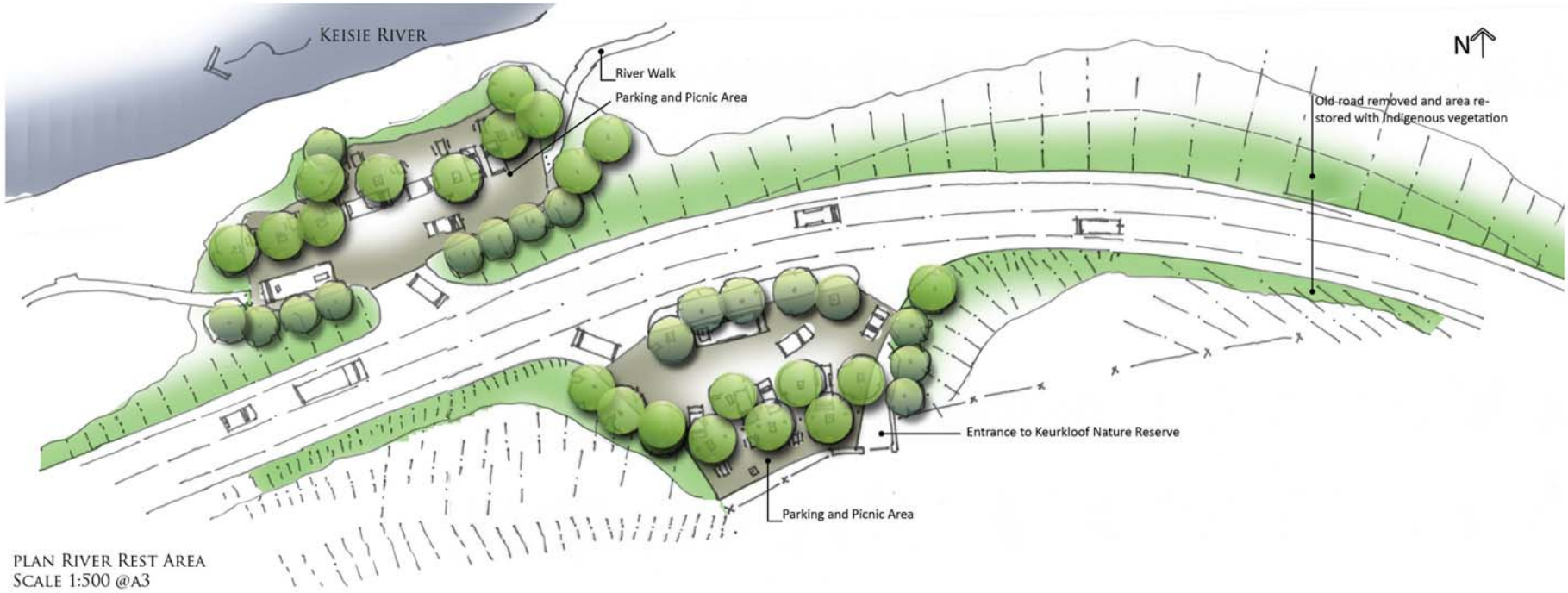
PLAZA CROSS SECTION SCALE 1:200 @A3



CROSS SECTION CC SCALE: 1:100 @A3

COGMANSKLOOF AREAS OF FOCUS FOR INTERVENTION:
RIVER REST AREA

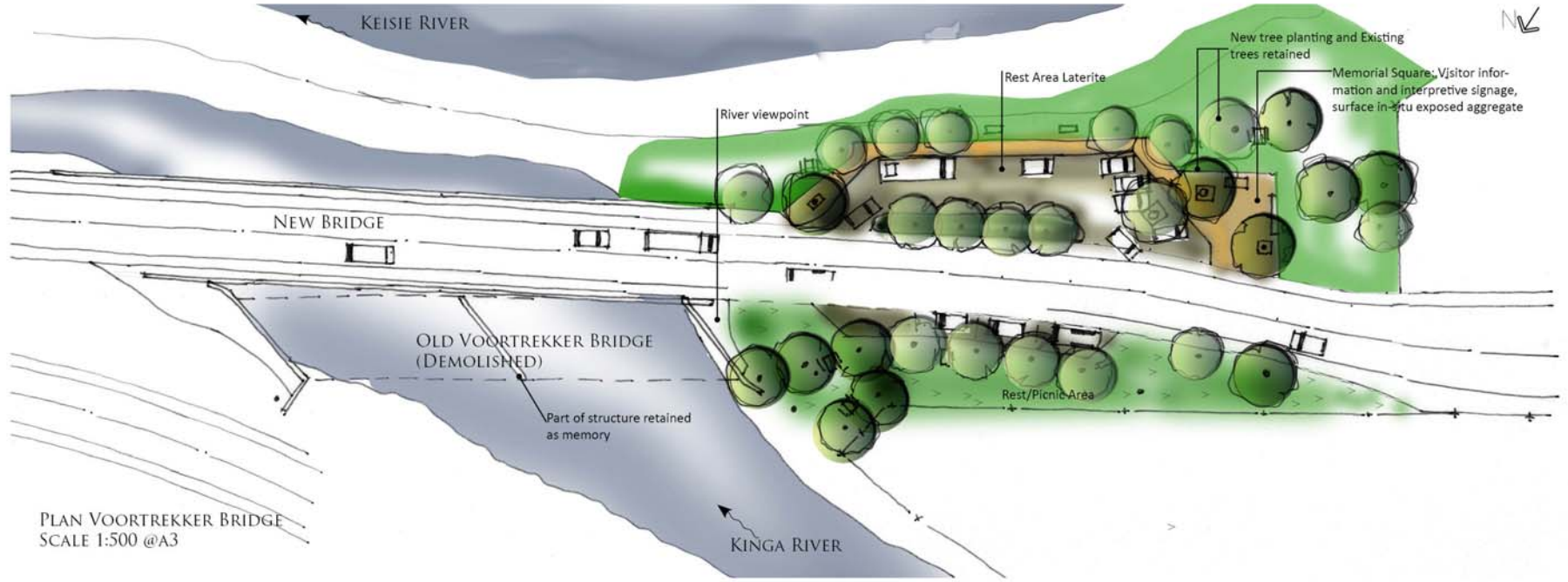
MILEMARKER: 24100



PLAN RIVER REST AREA
SCALE 1:500 @A3

COGMANSKLOOF AREAS OF FOCUS FOR INTERVENTION:
VOORTREKKER BRIDGE

MILEMARKER: 25800



PLAN VOORTREKKER BRIDGE
SCALE 1:500 @A3