

AN ARCHAEOLOGICAL DESKTOP STUDY AND PHASE 1 ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED CLIDET DATA CABLE BETWEEN BLOEMFONTEIN, ORANGE FREE STATE AND GRAAFF REINET, EASTERN CAPE PROVINCE; COLESBERG, ORANGE FREE STATE AND PORT ELIZABETH, EASTERN CAPE PROVINCE; GEORGE, WESTERN CAPE PROVINCE AND PORT ELIZABETH, EASTERN CAPE PROVINCE AND; ALIWAL NORTH AND EAST LONDON, EASTERN CAPE PROVINCE

Prepared for: SRK Consulting
P.O.Box 15739
East London
5205
Email: robyn.thomson@srk.co.za
Contact person: Ms Robyn Thomson

Compiled by: Dr Johan Binneman, Ms Celeste Booth, and Ms Natasha Higgitt
Department of Archaeology
Albany Museum
Somerset Street
Grahamstown
6139
Tel: (046) 622 2312
Fax: (046) 622 2398
Email: celeste.booth@ru.ac.za
Contact person: Ms Celeste Booth

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Note: This report follows the minimum standard guidelines required by the South African Heritage Resources Agency (SAHRA) for compiling a Phase 1 Archaeological Impact Assessment (AIA).

EXECUTIVE SUMMARY

Purpose of the Study

The purpose of the study was to conduct an archaeological desktop study and phase 1 archaeological impact assessment (AIA) for the proposed Clidet fibre optic data cable between Bloemfontein, Orange Free State and Graaff Reinet, Eastern Cape Province; Colesberg, Orange Free State and Port Elizabeth, Eastern Cape Province; George, Western Cape Province and Port Elizabeth, Eastern Cape Province and; Aliwal North and East London, Eastern Cape Province. The proposed area extends across various districts and municipalities.

Brief Summary of Findings

The area for the proposed Clidet fibre optic data cable stretches across a large extent of South Arica, including Johannesburg, Bloemfontein, Durban, Grahamstown, Graaff Reinet, Port Elizabeth, George, and Cape West Coast, however, the Albany Museum was appointed to conduct sections of four routes: along the N6 national road, R58, R391, R56, N9 national road and R61, between Bloemfontein and Graaff Reinet (R2); along the N9 and N10 national roads between Colesburg and Port Elizabeth (R6); along the N2 national road between George and Port Elizabeth (R4); and along the N6 national road between Aliwal North and East London (R7). The proposed area for the installation of the fibre optic data cable is limited to within the municipal boundary fences (road reserves) along the four routes.

The proposed areas along the above-mentioned routes have been heavily disturbed by footpaths, the construction of the municipal boundary fences, telephone poles that stretch for the entire extent of the proposed area surveyed and the construction of road and general signboards, telephone poles, bridges, underground and sub-soil drainage systems as well as sewage and water pipes. The proposed area has also previously been

bulldozed and disturbed by routine road maintenance and upgrading activities. The towns are developed and therefore disturbed, however, historical buildings older than 60 years and declared national monuments do occur along the proposed route through the towns and along routes that the proposed fibre optic data cable will follow.

Thick dense vegetation and thick indigenous bush occurs along most of the route that made archaeological visibility difficult, however, the exposed open areas were investigated for possible archaeological heritage and material remains. Four surface scatters of stone artefacts were documented along the four routes; however, the stone artefacts occur in a secondary context owing to disturbances caused by the construction and bulldozing activities associated with the building of the roads and continuing routine road maintenance and other associated disturbances. It is highly unlikely that there would be any archaeological sites and materials present *in situ* within the proposed fibre optic data cable route. The proposed area for development is rated as having low local cultural significance. Development may proceed as planned.

Recommendations (see page 53 for full recommendations)

The area is of a low cultural sensitivity and development may proceed as planned, although the following recommendation must be considered:

1. The extent of the area proposed for the installation of the Clidet fibre optic data cable has been highly disturbed, therefore, it is unlikely that any *in situ* archaeological and historical sites/remains, and human remains would be uncovered during construction. However, if concentrations of archaeological heritage material and human remains are uncovered during construction, all work must immediately cease and be reported to the Albany Museum and/or the South African Heritage Resources Agency (SAHRA) so that systematic and professional investigation/excavation can be undertaken.

BACKGROUND INFORMATION

The phase 1 archaeological impact assessment (AIA) is a section of the required environmental impact assessment (EIA) study.

The project entails the establishment of a long-haul fibre optic data cable network stretching across South Africa to carry data communications over long distances and at higher bandwidths than are currently available. It is foreseen that a repeater will be situated approximately every 80 to 100km along the route housed in existing base station site infrastructure owned by one of the promoters of the project. Prefabricated Telco grade equipment shelters will be constructed at repeater sites to house approximately 30m² of optical amplification equipment racks (typically 8 racks) with cooling units and

backup generator. The facility's primary power source will be the national grid using existing transmission cables. Trenches will be excavated to a maximum depth of one metre using various construction methods. Excavation will take place in a manner that aims to avoid damage to existing utilities. Once the excavation has been completed, suitable bedding material (e.g. soil or sand) will be placed in the bottom of the trench. Where the excavated material is not suitable for this purpose, material will be obtained from existing permitted borrow pits.

In urban areas, excavated material will be handled in accordance with the requirements of the relevant local authority. Directional drilling will be undertaken in places where the cable crosses key lines of infrastructure (rail, national roads etc.) and will be suitably aligned and sufficiently deep so as to comply with legislation and authorities' guidelines. Buried hand pulling holes will be established every 900m along the fibre optic data cable route. In addition, round man holes (with visible 600 to 800mm covers) will occur on average every 4km along the cable route or on either side of a physical feature crossing (bridge, rivers etc.), with large man holes (with visible double covers of 1,8mx2m) being installed as required at major junction points and at repeater sites.

The exact location of the trench in the servitude will be determined by the landowner (SANRAL or Department of Transport and Public Works). SANRAL generally require that data cables are installed two metres from the servitude boundary. In urban areas, excavated land will be returned to its original condition. Trenches will be backfilled and compacted to original ground level. Spoil and approved backfill material will be placed in such a manner so as to avoid future subsidence. Stones, rock and paving material will be removed from site. Trees within the affected area will be protected as far as possible.

Developer:

FibreCo Telecommunications (Pty) Ltd
33 Fricker Road
Illovo
Johannesburg
South Africa

Consultant:

SRK Consulting
P.O.Box 15739
East London
5205
Email: robyn.thomson@srk.co.za
Contact person: Ms Robyn Thomson

Terms of Reference

To conduct an archaeological desktop study and phase 1 archaeological impact assessment (AIA) survey of possible archaeological heritage sites and material remains within the area proposed for the installation of the Clidet fibre optic data cable between Bloemfontein, Orange Free State and Graaff Reinet, Eastern Cape Province; Colesberg, Orange Free State and Port Elizabeth, Eastern Cape Province; George, Western Cape Province and Port Elizabeth, Eastern Cape Province and; Aliwal North and East London, Eastern Cape Province. The survey was conducted to establish the range and importance of the exposed and *in situ* archaeological heritage feature and remains, the potential impact of the development and, to make recommendations to minimize possible damage to these sites.

BRIEF LEGISLATIVE REQUIREMENTS

Parts of sections 35(4), 36(3) and 38(1) (8) of the National Heritage Resources Act 25 of 1999 apply:

Archaeology, palaeontology and meteorites

35 (4) No person may, without a permit issued by the responsible heritage resources authority—

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.*

Burial grounds and graves

36. (3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or*
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.*

Heritage resources management

38. (1) *Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as -*
- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
 - (b) the construction of a bridge or similar structure exceeding 50m in length;*
 - (c) any development or other activity which will change the character of the site -*
 - (i) exceeding 5000m² in extent, or*
 - (ii) involving three or more erven or subdivisions thereof; or*
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;*
 - (d) the re-zoning of a site exceeding 10 000m² in extent; or*
 - (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must as the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.*

DESKTOP STUDY: ARCHAEOLOGICAL BACKGROUND AND HERITAGE

The archaeological desktop study has been included in the full phase 1 archaeological impact assessment (AIA).

Little is known about the archaeology of the immediate area as no systematic archaeological research has been conducted on the proposed route for the installation of the proposed Clidet fibre optic data cable; however, various phase 1 archaeological impact assessments have been conducted for road upgrades and developments within the surrounding areas. Some systematic archaeological research has been conducted in the areas surrounding the proposed route for the installation of the Clidet fibre optic data cable. Previous archaeological impact assessments conducted and various literatures will be used to assess the possible archaeological heritage and material remains to be encountered during the survey.

The following sections describe the possible archaeological heritage and material remains that may be encountered during the survey that includes discussions on the Early Stone Age (ESA), Middle Stone Age (MSA), Later Stone Age (LSA) and pastoralism within the last 2000 years, rock art (paintings and engravings), Iron Age, Historical / Colonial Period, as well as National Monuments. The possible occurrences of archaeological heritage and material remains within and surrounding the four routes will be discussed under each main heading.

The Early Stone Age (ESA)

The Early Stone Age spans a period of between 1.5 million and 250 000 years ago and refers to the earliest that *Homo sapiens sapiens* predecessors began making stone artefacts. The earliest stone artefact industry was referred to as the Olduvai Industry originating from stone artefacts recorded at Olduvai Gorge, Tanzania. The Acheulian Industry which replaced the Olduvai Industry approximately 1.5 million years ago is attested to in diverse environments and over wide geographical areas. The hallmark of the Acheulian Industry is its large cutting tools (LCTs or bifaces), primarily handaxes and cleavers. Bifaces emerged in East Africa more than 1.5 million years ago (mya) but have been reported from a wide range of areas, from South Africa to northern Europe and from India to the Iberian coast. The end products were astonishingly similar across the geographical and chronological distribution of the Acheulian techno-complex: large flakes that were suitable in size and morphology for the production of handaxes and cleavers perfectly suited to the available raw materials (Sharon 2009).

Early Stone Age of the Karoo includes the so-called "Victoria West industry". From as early as 1915, stone artefacts which were of a "peculiar character", referred to as hand-axes and tortoise-cores by Reginald A. Smith, were plentiful within the Victoria West district. The latter were only found in certain areas and the hand-axes occurred in conjunction with the cores or without them (Smith 1919). During the 1920's A.H.J. Goodwin (1926, 1946), identified the Victoria West stone artefact industry, presumably referring to those artefacts with a "peculiar character" found within the district, the wider Karoo region, as well as along the Vaal River. They comprised mainly of stone artefacts that had been manufactured using a prepared core technique, and were regarded as being transitional between the Early Stone Age and Middle Stone Age. Recent research has established that the Victoria West cores were the "evolutionary step" towards the Levallois prepared core industry, indicating an outward spread of this technological change (Lycett 2009).

Early Stone Age stone artefacts endure for long periods and generally occur as open air surface scatters either as isolated occurrences or in large quantities and very rarely in association with other archaeological heritage, plant and material remains. South African exceptions include the sites of Wonderwerk, Northern Cape near Kimberly, and Montagu Cave in the Western Cape Province situated on the outskirts of the small town of Montagu, and Amanzi Springs near to the small town of Uitenhage, whereby some bone and plant material was found to be *in situ* and associated with the stone artefacts.

One of South Africa's most important Earlier Stone Age sites, Amanzi Springs, was excavated by H.J. Deacon during the 1970's (Deacon 1970) is situated a few kilometres north-west of the surveyed area. In a series of spring deposits a large number of stone artefacts were found to be *in situ* to a depth of 3-4 meters. Wood and seed material

preserved remarkably very well within the spring deposits, and possibly date to between 800 000 to 250 000 years old.

The Albany Museum database includes records of occurrences of Acheulian handaxes between Middelburg and the Camdeboo National Park near Graaff Reinet, Sampson (1985) located a large number of sites and there is also a collection in the Albany Museum from the Cradock area, Early Stone Age stone artefacts in the Addo Elephant National Park, and amongst the gravels of old river terraces which line most of the Coega River and estuary. Large Early Stone Age handaxes were also reported from Coega Kop and between the N2 national road and the Cerebos salt works (Albany Museum collections).

Characteristic Early Stone Age stone artefacts have also been identified along East London coastal belt, in the Sundays River Valley, at the site Geelhoutboom near the Klasies River Mouth sites (Laidler 1947) along the Tsitsikamma coast area, and at the foothills of the Sneeuberg Mountains.

It possible that Early Stone Age stone artefacts may be encountered over the four sections within the area proposed for the fibre optic data cable route. However, it is unlikely that the stone artefacts would be in a primary context with any substantial associated archaeological deposit and would occur mainly as secondary surface scatters.

Middle Stone Age (MSA)

The large Early Stone Age handaxes and cleavers were replaced by smaller stone tools called the Middle Stone Age flake and blade industries. The Middle Stone Age spans a period from 250 000-30 000 years ago and focuses on the emergence of modern humans through the change in technology, behaviour, physical appearance, art, and symbolism. Various stone artefact industries occur during this time period, although less is known about the time prior to 120 000 years ago, extensive systemic archaeological research is being conducted on sites across southern Africa dating within the last 120 000 years (Thompson & Marean 2008). Surface scatters of these flake and blade industries occur widespread across southern Africa although rarely with any associated botanical and faunal remains. It is also common for these stone artefacts to be found between the surface and approximately 50-80cm below ground. Fossil bone may be associated with MSA occurrences. These stone artefacts, like the Earlier Stone Age handaxes are usually observed in secondary context with no other associated archaeological material.

An early South African Middle Stone Age stone artefact industry referred to as the Mangosian had a very wide distribution stretching across Limpopo, Griqualand West, the eastern Orange Free State, around Cape Point and Natal (Malan 1949). This stone artefact industry, according to the period, may have represented the final development that the prepared core technique of the Middle Stone Age reached prior to its replacement by the

microlithic techniques of the Later Stone Age. It was reported that these stone artefacts were made predominantly on indurated shale raw materials in the Free State (the then Orange Free State) and Kwa-Zulu Natal (the then Natal). Malan (1949) also made mention of variations of Middle Stone Age assemblages from the Eastern Cape Province that occurred at Glen Grey and, Matatiele and Steynsburg where burins predominated over other types of stone artefacts.

Relevant phase 1 archaeological impact assessments conducted by the Albany Museum have recorded Middle Stone Age stone artefacts in the area between Molteno and Sterkstroom (Binneman *et al.* 2010) comprising the characteristic Middle Stone Age faceted platform flakes, blades and, cores manufactured on hornfels and shale raw materials. The stone artefacts occurred mainly as surface scatters on flat dolerite bedrock areas and between the surface and 80cm below ground as observed in the side of the dongas and disturbed farm gravel roads.

The Albany Museum database holds records of the occurrence of Middle Stone Age stone artefacts around the Cradock area and the Department of Archaeology has curated Middle Stone Age stone artefacts in its collection from the Cradock area including Highlands Rock Shelter excavated by H.J. Deacon during the 1970's. Relevant archaeological impact assessments conducted by the Archaeology Contracts Office of the National Bloemfontein Museum in 2006 (Van Ryneveld & Koortzen 2006) and the Albany Museum in 2008 have recorded surface scatters of Middle Stone Age stone artefacts in the Cradock vicinity (Binneman & Booth 2008). Middle Stone Age stone artefacts (long blades and points) are found throughout the region, but because these are found in the open areas it is difficult to know where they fit into the cultural time sequence. At Highlands Rock Shelter MSA stone artefacts, possibly a Howieson's Poort Industry, was dated older than 30 000 years (Deacon 1976). Sampson on the other hand reported many open-air MSA sites which he assigned to the Orangian Industry (dating between 128 000 - 75 000 years old), Florisbad and Zeekoegat Industries dating between 64 000 and 32 000 years old.

A phase 1 archaeological impact assessment conducted by the Albany Museum in 2010 (Binneman *et al.* 2010a) within the area immediately surrounding the small town of Paterson yielded mainly isolated occurrences of ephemeral Middle Stone Age stone artefacts made predominantly on fine-grained quartzite, quartz, silcrete, chalcedony and hornfels. It is unlikely that the artefacts are *in situ* and occur in secondary context owing to the previous and present disturbances occurring within the area. In addition, no other archaeological materials were observed to be in association with stone tool surface scatters and no depth of archaeological deposit recorded

Middle Stone Age stone artefacts are found in the gravels and along the banks of the Coega River. These stone artefacts, like the Earlier Stone Age handaxes are in secondary context with no other associated archaeological material. Two phase 1 archaeological

impact assessments for housing developments were conducted in the township of Motherwell situated approximately 20km from the Port Elizabeth city centre. Concentrated surface scatters of Middle Stone Age stone artefacts were recorded within the widespread adjacent areas proposed for the housing developments, however, the stone artefacts were observed in a secondary context owing to human and animal disturbances as well as the processes of natural erosion down slopes (Binneman & Booth 2010b; Binneman *et al.* 2010b).

Occurrences of fossil bone remains and Middle Stone Age stone tools were reported south of Coega Kop (Gess 1969). During excavations the remains were found in the surface limestone, but the bulk of the bone remains were found some 1-1.5 metres below the surface. The excavations exposed a large number and variety of bones, teeth and horn corns strongly suggesting that they were deposited there by humans. The bone remains included warthog, leopard, hyena, rhinoceros and ten different antelope species. A radiocarbon date of greater than 37 000 years was obtained for the site.

Extensive Middle Stone Age research has been conducted along the Tsitsikamma coast and southern Cape between Nature's Valley and Mossel Bay at various cave sites along the coast. Sites along the Tsitsikamma coast in the well-known Klasies River Mouth cave complex, first excavated during the 1960's by Singer & Wymer, that contained coastal shell middens (rubbish dumps) and a few fragmentary human remains that resembled anatomically modern human skeletal features. Other significant Middle Stone Age sites along the southern Cape coastline include Nelson Bay Cave (NBC), Mossel Bay Cave and the Pinnacle Point cave complex that yielded significant archaeological heritage and material remains.

Relevant phase 1 archaeological impact assessments have been conducted by J. Binneman of the Albany Museum between Thornhill and Humansdorp. Early Stone Age handaxes and Middle Stone Age stone artefacts manufactured on the locally available quartzite raw materials were encountered between Thornhill and Gamtoos River Mouth (Binneman 2006, 2008). Surface scatters of Middle Stone Age stone artefacts also made on quartzite raw materials were encountered between Jeffreys Bay and Humansdorp (Binneman 2010).

It possible that Early Stone Age stone artefacts may be encountered over the four sections within the area proposed for the fibre optic data cable route. However, it is unlikely that the stone artefacts would be in a primary context with any substantial associated archaeological deposit and would occur mainly as secondary surface scatters.

It possible that Middle Stone Age stone artefacts may be encountered over the four sections within the area proposed for the fibre optic data cable route. However, it is unlikely that the stone artefacts would be in a primary context with any substantial

associated archaeological deposit and should occur mainly as secondary surface scatters or between the surface and 50cm-80cm below ground.

The Later Stone Age (LSA) and Pastoralism within the last 2000 years

The Later Stone Age spans a period from 30 000 years ago to the historical period (the last 500 years) until 100 years ago and is associated with the archaeology of San hunter-gatherers. The majority of archaeological sites date from the past 10 000 years where San hunter-gatherers inhabited the landscape living in rock shelters and caves as well as on the open landscape, inland and along the coast. The open sites are difficult to locate because they are in the open veld and often covered by vegetation and sand and those along the coast are sometimes opened and closed by the movement of the dunes. Sometimes these sites are only represented by a few stone artefacts and fragments of bone. The preservation of these sites is poor and it is not always possible to date them (Deacon & Deacon 1999). Caves and rock shelters, however, in most cases, provide a more substantial preservation record of pre-colonial human occupation.

Some 2 000 years ago Khoekhoen pastoralists entered into the region and lived mainly in small settlements. They were the first food producers in South Africa and introduced domesticated animals (sheep, goats and cattle) and ceramic vessels to southern Africa. Often, these archaeological sites are found close to the banks of large streams and rivers and along the coast. Large piles of freshwater mussel shell (called freshwater middens) usually mark the large stream and river sites and large piles of marine shellfish middens mark the coastal sites. Precolonial groups collected the freshwater mussel from the muddy banks of the rivers as a source of food. Mixed with the shell and other riverine and terrestrial food waste are also cultural materials. Human remains are often found buried in the middens along the coast (Deacon and Deacon 1999).

The Later Stone Age archaeology of the Great Karoo is rich and varied. Various studies (Beaumont & Morris 1990, Beaumont & Vogel 1984, Morris & Beaumont 1990, Sampson 1985) have shown that the general area surrounding the proposed route for the fibre optic data cable has been relatively marginal regarding pre-colonial human settlement, but is in fact exceptionally rich in archaeological sites and rock art. Bifacial and tanged barbed arrow heads made on very fine-grained dark or black chalcedony are distributed over the southern two-thirds of the Free State, the Kimberly area in the west, Lesotho in the east and along the southern boundary of this area as far south as Britstown and Steynsburg (Humphreys 1969).

Smithfield settlement sites are concentrated among hills and ridges in preference to flats and mountains. Early efforts by archaeologists to establish classification schemes for the inland stone artefact assemblages were made difficult without the aid of radiocarbon dating. All Later Stone Age assemblages were classified into three phases using mainly

scraper shape and size, namely, Smithfield A, large circular scrapers, Smithfield B, long, narrow end scrapers (both manufactured of black hornfels) and Smithfield C, small thumbnail scrapers (manufactured of chalcedonies and agates) (Goodwin and Van Riet Lowe 1929). When radiocarbon dating became available many years later it indicated that there were no sites which date between 9 500 and 4 600 years old for the drier inland plateaux (Deacon 1974).

Today the term Smithfield is only used for stone tool assemblages with backed bladelets and long end scrapers dating within the last 1000 years and replaces the term Smithfield B (Sampson 1988). The term Smithfield A has been replaced by Oakhurst and Smithfield C by Interior or Post-Wilton. Oakhurst is similar to the Albany Industry in the adjacent Cape Mountains, dating between 10 500 and 8 000 years old and also replaces the previously termed Lockshoek Industry (Sampson 1985).

One of the most complete archaeological surveys in South Africa was conducted in the Agter Sneeuberg region in the central and upper Seacow River Area some 180 km north-west (Sampson 1985). Later Stone Age Lithics and rare Khoekhoe pottery sherds were uncovered during systematic surveys of the area (Sadr & Sampson 1999).

In general little systematic archaeological research and regional surveys/recordings have been conducted in the Cradock area. The only systematic survey and recording in the immediate vicinity was conducted in the Mountain Zebra National Park (Brooker 1974) and H.J. Deacon (1976) excavated Highlands Rock Shelter some 50-60 km to the north-east. Sampson's, Brooker's, and Deacon's research and surveys, together with records/collections of the Albany Museum, provide the background information for compiling an archaeological time sequence for the region. The LSA deposits at Highlands Rock Shelter date to 4 500 years old (Deacon 1976). Better preservation of organic material at Highlands Rock Shelter provides some insight into hunter-gatherer subsistence in the area. Collecting of underground plant remains such as *Cyperus usitatus* and *Freezia corymbrosa* would appear to have been an important food source together with the hunting of mountain zebra/quagga, mountain reedbuck, warthog and various small antelope such as duiker, klipspringer and steenbok. The survey of the Mountain Zebra National Park (Brooker 1974) confirmed that the area is rich in archaeological remains and that some of the LSA time sequence for the region was present, as well as rock art. Unfortunately no rock engravings were found to compare with that of Samekoms, but there is another engraved and painted site listed in the Albany Museum records, only a few kilometres away. Unfortunately, apart from the stone tools, little else is preserved and it is not possible to reconstruct subsistence patterns. Also listed in the museum records are freshwater shell middens along the banks of the Great Fish River and small quantities of crab and freshwater mussel were also found in the excavations. Many stock enclosures with stone walls and fragments of sand-tempered ceramic vessels are found throughout

the Seacow River area and are most probably associated with Khoi pastoralists who settled in the area during the past 1 000 years.

Sites in the Paterson area include Melkhoutboom, which was occupied from before 15 000 years ago up to 2000 years ago, when the ceramic period began. The artefacts that were found were unique as organic material had preserved in the cave. Leather, fibre string, netting, reed arrow shafts, fire sticks, plant food remains and bone had survived in the archaeological record (Smith *et al.* 2004:10). Later Stone Age artefacts were recorded in the sand dune area near Paterson during a survey for sand mining. These included flakes and one scraper (Binneman *et al.* 2010a).

The most common archaeological sites along the nearby coast are shell middens (relatively large piles of marine shell) found usually concentrated opposite rocky coasts, but also along sandy beaches (people refer to these as 'Strandloper middens') (Rudner 1968). These were campsites of San hunter-gatherers, Khoekhoen herders and San hunter-gatherer communities who lived along the immediate coast (up to 5 km) and collected marine foods. Mixed with the shell are other food remains, cultural material and often human remains are found in the middens. In general, middens date from the past 6 000 years. Also associated with middens are large stone floors which were probably used as cooking platforms (Binneman 2001, 2005).

A large number of shell middens were situated east of Coega River Mouth. Several of the middens were sampled and excavated just before the harbour was constructed. Many middens, ceramic pot sherds (from Later Stone Age Khoekhoen pastoralist origin - last 2 000 years) and other archaeological material, are situated between the Coega and Sunday's River Mouths. These remains date mainly from Holocene Later Stone Age (last 10 000 years). Human remains have also been found in the dunes along the coast.

Later Stone Age archaeological research along the Tsitsikamma and southern Cape coasts has been extensive with several cave sites along the coast showing evidence of long-term human occupation over the last 5 000 years by the large accumulation of shell middens. Excavated sites include Klasies River Mouth, Coldstream Cave, Hoffman's Cave situated on the Robberg Peninsula, and Noetzie situated close to Knysna, which is an open air shell midden. Open air shell middens also occur along the coast that shows evidence of both Later Stone Age San hunter-gatherer societies and Khoekhoen herder communities. J. Binneman has conducted extensive archaeological research in the sand dunes along the St Francis Bay coastline. Research has also been conducted in the adjacent Tsitsikamma Mountains and Kouga valley. Relevant phase 1 archaeological impact assessments conducted within this area that numerous open-air shell middens occur between the coast and 5km inland.

Very little Later Stone Age research has been conducted in the former Ciskei (Derricourt 1977); however, reports of caves and rock shelters containing stones and deposit have been reported. The Albany Museum houses archaeological heritage and material remains collected from the East London and former Ciskei region.

It possible that Later Stone Age stone artefacts may be encountered over the four sections within the area proposed for the fibre optic data cable route. However, it is unlikely that the stone artefacts would be in a primary context with any substantial associated archaeological deposit and would occur mainly as secondary surface scatters.

Iron Age / First-Farming Communities

The Early Iron Age first-farming communities during the first millennium AD generally preferred to occupy river valleys within the eastern half of southern Africa owing to the summer-rainfall climate that was conducive for growing millet and sorghum. Thus far the closest documented and well-researched Early Iron Age site is located within the Great Kei River Valley. The site is situated some 200 m below the plateau and 60 km inland from the coast, within the borders of the Transkei, approximately 100 km up the coast towards Durban. There has been some speculation that EIA populations may have spread well south of the Transkei into the Ciskei, possibly up to the Great Fish River (Binneman et al. 1992), however, no further research has been undertaken to confirm these statements. Two closer EIA sites have been documented, one to the south of East London (Cronin 1982) and the other is situated 12 km west of East London on the west bank of the Buffalo River (Nogwaza 1994). Thicker and decorated pottery sherds, kraals, possible remains of domesticated animals, upper and lower grindstones and storage pits are associated for identifying Early Iron Age sites. The sites are generally large settlements, but the archaeological visibility may in most cases be difficult owing to the organic nature of the homesteads. Metal and iron implements are also associated with Early Iron Age communities.

Hilltop settlement is mainly associated with Later Iron Age settlement patterns that occurred during the second millennium AD. The Later Iron Age communities later moved from settlement in river valleys to the hilltops. Later Iron Age settlements have been formally recorded by the Albany Museum and cover a relatively extended area in comparison with the EIA settlement patterns.

The south-eastern Free State is a landscape of contact between migrating Iron Age first-farming communities and San hunter-gatherers. During the sixteenth and eighteenth centuries the Iron Age farmers began to move across the Vaal River and into the Free State. As they moved into the area, the first-farming communities came into contact with hunter-gatherers (Klatzow 1994). This region sees a numerous stone walled structures as well as pottery dating between the 16th and 18th centuries, and it lies on a frontier zone,

where hunter-gatherers came into contact with agro-pastoralists (Thorp 1996). Some settlements are not characterised by the presence of stone walls, but rather cattle dung deposits with pits and burials (Huffman 1982). Iron Age Settlements have been recorded along the Caledon River Valley, that were settled by the Fokeng group that eventually settled at Metlaeeng, after dwelling the foot of Ntsuana-tsatsi (between Frankfort and Vrede) (Walton 1953).

Very little Iron Age / first farming community research has been conducted within the former Ciskei region. The most southern Iron Age site, Kulubele, excavated by archaeologists from the Albany Museum during the 1990's, is situated along the banks of the Kei River in the Kei River Valley. The earliest date for the site is 1250 BP yielded numerous settlement areas, thick-walled pottery, animal bones, and most importantly chicken bones that illustrates contact between the first-farming communities and European seafarers.

It may be possible, however, unlikely, that archaeological heritage and material remains of Iron Age / first-farming communities would be encountered along the four sections of the within the area proposed for the fibre optic data cable route. Archaeological traces of the settlements are ephemeral unless the characteristic stone-wall towns are identified or surface scatters of thick-walled pottery.

Rock Art (paintings and engravings)

Rock art is generally associated with the Later Stone Age period mostly dating from the last 5000 years to the historical period. It is difficult to accurately date the rock art without destructive practices. The southern African landscape is exceptionally rich in the distribution of rock art which is determined between paintings and engravings. Rock paintings occur on the walls of caves and rock shelters across southern Africa. Rock engravings, however, are generally distributed on the semi-arid central plateau, with most of the engravings found in the Orange-Vaal basin, the Karoo stretching from the Eastern Cape (Cradock area) into the Northern Cape as well as the Western Cape, and Namibia. At some sites both paintings and engravings occur in close proximity to one another especially in the Karoo and Northern Cape. The greatest concentrations of engravings occur on the andesite basement rocks and the intrusive Karoo dolerites, but sites are also found on about nine other rock types including dolomite, granite, gneiss, and in a few cases on sandstone (Morris 1988).

The south-eastern Free State area has many recordings of cattle paintings and these are often depicted in conflict scenes. These include figures with the "hourglass" Sotho shields, which could refer to the Difaqane, where discord and unrest was prominent. There are very few paintings of sheep, and one such site is situated on the farm Kwartelfontein near Smithfield, and is found associated with depictions of cattle (Manhire et al. 1986: 24).

Other rock art that has been recorded here includes men walking with hunting dogs painted in brick red ochre, on the farm Strathmere, Steynsburg District, which was traced by Townley Johnson in 1983 (Woodhouse 1984:4). Paintings have also been documented in the Rouxville area, which include a depiction of a blesbok (Loubser *et al.* 1990: 108). Rock paintings of human figures occur in the Aliwal North District (Schoonraad 1960: 12).

Maria Wilman recorded engraving sites between Colesburg and Middelburg (Parkington *et al.* 2008:33). Rock art of the Middelburg area includes a site with numerous styles such as fine-lined paintings of antelope and human figures, probably done by San individuals, as well as red, yellow, black, orange and white fingerdots done in the Khoekhoen style. Other figures include medium-grained white chalky paints with red accents such as fat-tailed sheep; two horse-and riders; a black rhinoceros; and two stretched-out and spotted animal skins or aprons (Ouzman. 2005: 106).

Albany museum records document the presence of many sites with rock paintings in the Cradock area, including a painting done in black of a baboon, and a possible painting of an aloe plant. Rock art sites have also been recorded in the former Ciskei region and along the Tsitsikamma coastline and adjacent mountain ranges including the Kouga valley.

It is unlikely that caves and rock shelters containing rock art would be encountered within the area proposed for fibre optic data cable. Caves and rock shelters may occur next to the road; however, these would more than likely occur on private land. It is possible, however, unlikely, that boulders containing rock engravings would be encountered within the proposed area across the Karoo.

Historical / Colonial Period

Historical archaeology refers to the last 500 years when European settlers and colonialism entered into southern Africa. The route between Graaff Reinet and Bloemfontein is the same route followed by Afrikaans pioneers of the Great Trek. Therefore, it is expected that various monuments, statues and memorials dedicated to the voyage and its people will be encountered on the proposed route for the fibre optic cable.

The south-eastern Free State is filled with Boer War historical encounters, stories, and material remains. The areas surrounding Bloemfontein feature prominently in Boer War history. Colesburg is known for a number of historical events. A skirmish between the Boers and the Griquas, including Adam Kok (the head of the Philippolis Griquas) occurred in 1845 near Colesburg. One Griqua was killed and 6 captured, while five Boers had been killed and had gained 300 horses and 3600 heads of cattle (Walker 1938: 349). Near Colesburg at Alleman's Drift, Adam Kok, along with many British individuals, created a beacon declaring the whole country from that point to be British Territory, though not including areas that in were in control by the Portuguese and native tribes.

In the early days of colonialism the Karoo was still a sparse and unknown area. It was only until the early travellers and pioneer European farmers ventured into this harsh landscape and documented their encounters with the San hunter-gatherers and Khoekhoen that had originally inhabited the landscape. Therefore, the towns of the Great Karoo were established much later. Between the years 1860 and 1875, there was an increase of travels through the Karoo between Graaff Reinet, Middelburg and Colesburg, due to the improvement of the Frontier Wagon Track or Public Roads Network (Neville *et al.* 1994).

There are records of Observation Posts that were constructed under the leadership of Sir John Cradock, to keep the Xhosa from crossing the Fish River. These were in place and functioning between 1812 and 1817. Positions of observation posts include Addo Heights Post (Addo), Rautenbach's Drift (Addo), Sandflats (Paterson), Coerney, Swartwaterspoort and Kommadagga (Coetzee 1994).

Port Elizabeth contains a great deal of historical heritage ranging from early traveler encounters with the local indigenous people, shipwrecks, and 1820 settler history. Along the Sundays River, 'trekboers' often camped along its banks (Milton 1983). A battle between 300 Boers, under the leadership of General Vandeleur, and 150 Xhosa and Khoi occurred near the Sundays River (Milton 1983). Two well eroded fragments of Willow pattern porcelain fragments were recovered from near the Coega River Mouth (before the harbour was constructed), which may have washed-up from a nearby nineteenth century shipwreck. Bennie (2002) has reported on several ships that floundered between the mouth of the Coega and Zwartkops River, between 1817 and 1880.

The Coega River was first mentioned by historical travellers in 1752 (Theal 1896). The name Coega is of Khoekhoen origin and means literally 'seacow' or hippopotamus (Nienaber & Raper 1977). In November 1776, Anders Sparrman (1785) found a community of Cochoqua Khoekhoen (remnants of the Cochoqua who had fled the Cape after their defeat in the second Khoekhoen-Dutch War one hundred years previously), living on the Coega River. They were caring for the stock of a Dutch burgher. Nearby was a group of Gonaqua Khoekhoen, led by a captain named Tadi, who were also tending to the stock of a Dutch farmer. The nearby Coega Kop is shown on maps dating back to 1834 (Port Elizabeth Museum) and is reported to have been used as a navigation beacon by sailing ships wishing to enter Port Elizabeth harbour in the past. The 'kop' which has been quarried since the 1920s by SA Railways and Harbours for the development of the Port Elizabeth Harbour (Skead 1993) is likely to disappear soon with intensive quarrying.

The salt pan behind Coega Kop (not the present locality of the salt works at the river estuary) was being mined for its salt as early as 1820. However, this salt pan is likely to have been destroyed with developments in the area. A map of 1851 which indicated that the original road between Port Elizabeth and Grahamstown closely followed the present

National road across the Coega River also revealed the presence of a 'Junction Post' on the crossing. While Coetzee's (1995) definitive book on the forts of the Eastern Cape failed to indicate the presence of this military post, it is likely to represent one of Cradock/Somerset's temporary earthen fortifications established between 1812 and 1819 to protect the eastern frontier. This post, in all likelihood, no longer exists.

It is possible that historical archaeological remains may be encountered over the four sections within the area proposed for the fibre optic data cable route owing the dynamic historical landscapes. However, it is unlikely that the historical archaeological remains would be in a primary context and would occur mainly as isolated surface scatters.

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DESCRIPTION OF THE ROUTES

Area surveyed

Location data

The area for the proposed Clidet Data Cable stretches across a large extent of South Africa between Johannesburg, Bloemfontein, Durban, Grahamstown, Graaff Reinet, Port Elizabeth, George, and the west coast, however, the Albany Museum was appointed to conduct sections of four routes: along the N6 national road, R58, R391, R56, the N9 national road and R61 between Bloemfontein and Graaff Reinet (R2); along the N10 national road between Colesburg and Port Elizabeth (R6); along the N6 national road between Aliwal North and East London (R7); and along the N2 national road between George and Port Elizabeth (R4).

Various GPS readings were taken using a Garmin Oregon 550 (see Methodology below).

ARCHAEOLOGICAL INVESTIGATION

Methodology

The survey was conducted by three people, simultaneously from a vehicle and on foot. The four routes on the existing national and main roads were followed and spot checks were conducted every few kilometers and the open exposed areas were investigated for possible archaeological heritage and material remains. The areas proposed for the four routes were individually surveyed and photographed and are described below.

BLOEMFONTEIN - GRAAF REINET (R2)

The route between Bloemfontein and Graaff Reinet, marked Phase 1A (N1, N9, N2) on Map 1, follows the N6 national road from Bloemfontein to Aliwal North and passes through the towns of Reddersburg, Rouxville, Smithfield, and Aliwal North. The route continues from Aliwal North along the R58 road to Burgersdorp and from Burgersdorp along the R391 and R56 to Steynsburg. From Steynsburg the route continues along the R56 to Middelburg and from Middelburg along the N9 and R61 to Graaff Reinet.

The proposed area for the installation of the fibre optic data cable has previously been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to the roads and bridges. The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads. Extensive road works were encountered between the towns of Smithfield and Reddersburg that included stripping of the tarred surface, the erection of temporary shelters, and the implementation of road-side water drainage areas and sub-soil drainage systems (Figs 1-4). No archaeological heritage and material remains

were encountered within the disturbed areas. It is therefore highly unlikely that archaeological heritage and material remains and human remain would be encountered *in situ* within these heavily disturbed areas.



Figs 1-4. Extensive road works occurring between Smithfield and Reddersburg.

Other types of disturbances encountered include the erection of the municipal boundary fences and telephone poles that meanders between the road-side of the fence as well as on private land on the other side of the fence and stretch for the whole extent of the proposed area. Road and general signboards and the construction of entrances off the main roads to farms, sewage and water pipes also occur for the entire extent of the proposed area. In particular areas old roads and bridges, and railways that run adjacent to the national and main roads were identified and add to the extended area disturbed by the construction of these features. Flood damage owing to the recent heavy rains caused extensive damage to fences and may at times have washed over the road. This damage is particularly visible between Burgersdorp and Steynsburg (Figs 5-10). Picnic spots along the road were investigated for possible archaeological heritage and materials remains as they have been cleared and provide good archaeological visibility, however, these areas have also been disturbed and mainly been scattered with gravels and stones or tarred and no archaeological heritage and materials remains were encountered within these areas (Figs 11-12). No archaeological heritage and material remains were encountered within the disturbed areas. It is therefore highly unlikely that archaeological heritage and material remains and human remain would be encountered *in situ* within these heavily disturbed areas.



Figs 5-10. Examples of other disturbances occurring along the Bloemfontein-Graaf Reinet route including telephone poles, signboards, bridges and entrances.



Figs. 11-12. Examples of the picnic spot areas.

Most of the proposed area surveyed comprised dense grass vegetation that made archaeological visibility difficult. Continuous maintenance and mowing of the road-side grass vegetation adds to the list of disturbances to archaeological heritage and material remains. The open exposed areas were investigated for possible archaeological heritage and material remains, most of these have previously been heavily disturbed by bulldozing and had been pushed up at along the sides of the road or were mixed with gravel and broken-up tarred areas (Figs 13-18). Two surface scatters of stone artefacts were

encountered during investigation of these open exposed areas; however, it is unlikely that they occur *in situ*, owing to the various disturbances mentioned above.



Figs. 13-18. Dense grass vegetation (top); exposed areas open for investigation (bottom).

One surface scatter of Later Stone Age stone artefacts made predominantly on fine-grained raw materials were observed on a raised bank on the side of the N6 on the northern side, approximately 100m-200m, across the Caledon River bridge. After investigated of the open exposed area it was established that the stone artefact occurred on both raised banks adjacent to the road. The stone artefacts are in a disturbed context owing to the construction activities associated with the road building and a memorial erected by the Community of Mohokare, Religious Sector, Traditional Healers and the Free State Provincial Government on 24 and 25 September 2005 in memory of those who passed away in road accidents on the N6 (Figs 19-22). No other archaeological heritage and material or plant remains were observed to be in association with the stone artefact surface scatter. It is therefore unlikely that the stone artefacts occur *in situ* within the proposed area for the installation of the fibre optic data cable.



Figs 19-22. Location of the surface scatter of Later Stone Age stone artefacts and the N6 road accident memorial.

One other surface scatter of stone artefacts occurred in the open exposed area on the side of the road entering into Graaff Reinet. The stone artefact surface scatter comprised of three Middle Stone Age stone artefacts including one flake, one blade, and one broken blade made on medium-grained raw materials. The stone artefacts occurred in a developed area and are therefore in a disturbed context owing to the construction of the road and pavements as walkways as well as a stone monument erected to commemorate the passing of the Great Trek through Graaff Reinet (Figs 23-26). The stone monument is fenced and should not be affected by the installation of the proposed fibre optic data cable. No other archaeological heritage and material or plant remains were observed to be in association with the stone artefact surface scatter. It is therefore unlikely that the stone artefacts occur *in situ* within the proposed area for the installation of the fibre optic data cable.





Figs 23-26. Location of the surface scatter of Middle Stone Age stone artefacts and the Great Trek stone memorial.

Various heritage and historical objects occurred along the proposed route including stone-wall structures that resemble kraals and farm boundary fences, however, these structures occur on private land on the other side of the municipal boundary fence and should not be affected by the installation of the proposed fibre optic data cable. A historical graveyard was observed along the route between Smithfield and Aliwal North; however, it is not within the proposed area and is situated on private land on the other side of the municipal boundary fence (Fig. 27). Sporadic occurrences of “accident crosses” in memory of those who passed away in road accidents were observed along the route within proposed area for the installation of the proposed fibre optic data cable, an effort should be made avoid these features during construction activities (Fig. 28).



Figs 27-28. Examples of historical and heritage objects encountered along the route between Smithfield and Aliwal North.

The towns of Reddersburg, Rouxville, Smithfield, Aliwal North, Burgersdorp, Steynsburg, Middelburg, and the northern entrance to Graaff Reinet are developed and built-up. The proposed route that enters into the towns have been disturbed by the construction of buildings, pavements, walkways, bridges, road barricades as well as telephone poles, signboards, and fences. However, a few historical buildings, monuments, and national monuments were encountered along the route in the towns.

A collection of five monuments erected in honour of the Afrikaans culture and people is situated on a corner in the town of Reddersburg. The collection of monuments includes a series of four stone monuments that date between December 1920 and May 1961, the earliest one erected in honour of Gen C.R. de Wet and the rest that commemorates South Africa becoming a Republic (Figs 29-30). A Great Trek stone monument dated to 1838 is



Figs 29-30. The collection of monuments on the proposed route through Reddersburg.

situated in the town of Smithfield at the three-way intersection. The area surrounding the monument is heavily disturbed by digging and construction activities and the installation of the proposed fibre optic data cable should not impact the stone monument negatively (Figs 31-32).



Figs 31-32. The Great Trek stone monument dated 1838 at the intersection in Smithfield and nearby diggings.

The proposed route through Aliwal North passes several historical monuments and buildings, however, it is unlikely that these buildings would be negatively impacted by the installation of the proposed fibre optic data cable as the area is built-up and has previously been disturbed by development activities. The N.G. Church in Aliwal North's main road is dated to 1852 and has modern fencing around; however, the wooden gate is exposed on the pavement and should be avoided during the proposed construction activities (Figs 33-34). In the town of Burgersdorp, several historical buildings including an Dutch Reformed Church, a restaurant, the *Hagenhuis*, dated to 1845 and a series of buildings that includes an information centre occur on the proposed route for the fibre optic data cable. The Afrikaans Taal (Language) Monument is also situated on the adjacent to the pavement along proposed route. The installation activities should not impact negatively on the buildings and the Taal Monument (Figs 35-36). A statue of Andries Pretorius erected in honour of Andries Pretorius is situated about 14km before Graaff Reinet, however, it does not occur within the area proposed for the installation of fibre optic data cable. The statue is situated of the main road and is fenced, however, the area has been vandalised (Figs 37-38).



Figs 33-34. Aliwal North' main street (left) and the Dutch Reformed Church (right).



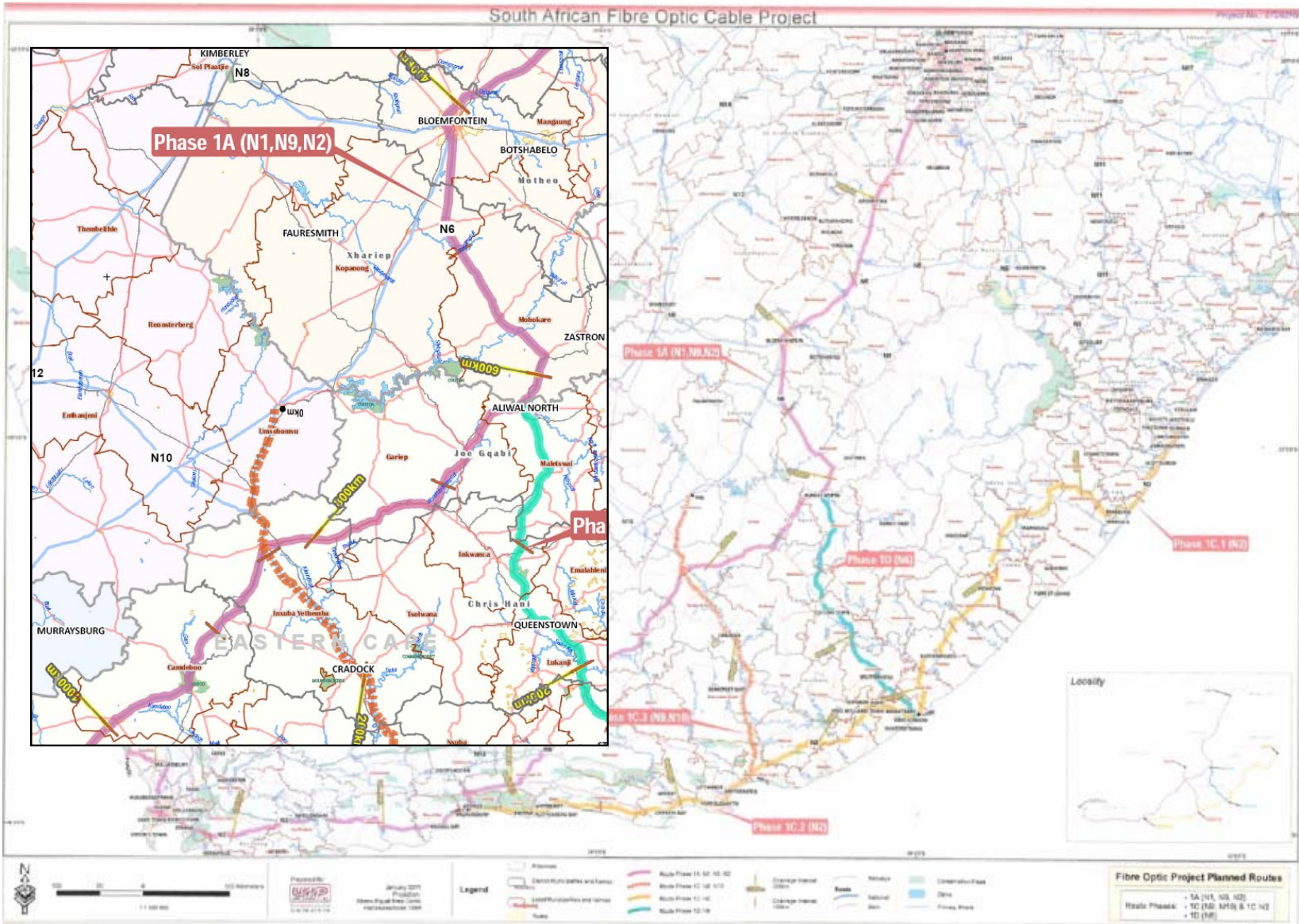
Figs 35-36. View of the Taal Monument and national monuments in Burgersdorp.



Figs 37-38. Andries Pretorius monument near to Graaff Reinet.

The route between Bloemfontein and Graaff Reinet (R2), Phase 1A (N1, N9, N2) for the proposed Clidet fibre optic cable network has been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to the roads and bridges. The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads. the erection of the municipal boundary fences and telephone poles that meanders between the road-side of the fence as well as on private land on the other side of the fence and stretch for the whole extent of the proposed area. Road and general signboards and the construction of entrances off the main roads to farms, sewage and water pipes also occur for the entire extent of the proposed area. Two surface scatters of stone artefacts were encountered during investigation of these open exposed areas; however, it is unlikely that they occur *in situ*, owing to the various disturbances mentioned above.

Several monuments and memorials commemorating the Great Trek, Boer War, and Afrikaans culture, as well as historical buildings and national monuments within certain towns were encountered during the survey of the proposed area. It is unlikely that the proposed installation of the fibre optic data cable network would pose any negative impact.



Map 1. Bloemfontein-Graaff Reinet (R2) route (Phase 1A [N1, N9, N2]) on map (Maps provided by SRK Consulting)

COLESBURG - PORT ELIZABETH (R6)

The route between Bloemfontein and Graaff Reinet, marked Phase 1C (N9, N10) on Map 3, follows the N9 national road from Colesburg to Middelburg passing the town of Noupoort. The route continues from Middelburg along the N10 passing the railway hamlet of Fish River, through the town of Cradock, past Cookhouse, Golden Valley and the hamlet of Middleton. The route continues to Paterson on the N10 until it joins on to the N2 national road at the Grahamstown / Port Alfred turn-offs, past Kinkelbos and Colchester, ending at Port Elizabeth.

The proposed area for the installation of the fibre optic data cable has previously been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to these roads and bridges. The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads. Heavy roads works were encountered between the towns of Noupoort and Middelburg as well as between the Olifantskop Pass, near and Paterson that included the stripping of the tarred surface, the erection of temporary shelters and the implementation of road-side water drainage area and sub-soil drainage systems. Routine road maintenance activities occurred around the Middleton area between Cookhouse and Olifantskop Pass (Figs 39-43). The upgrading of the N2 between Colchester and Coega that includes the widening of the road and the construction of the new Sunday's River Bridge has been underway since January 2011. Archaeologists from the Albany museum conducted a phase 1 archaeological impact assessment for this project during January 2010 and established no archaeological heritage and material remains were encountered during the survey and acknowledged the heavily disturbed area owing to the construction and maintenance of the original N2 national road (Figs 44-45).





Figs 39-43. Extensive road works occurring in certain areas along the proposed route.



Figs 44-45. Upgrade and widening of the N2 national road between Colchester and Coega.

Other disturbances include the erection of the municipal boundary fences road and general signboards, telephone poles and the construction of sewage and water pipes that stretch for the entire extent of the proposed fibre optic data cable route. Road barricades, built-up banks, and railways that run adjacent to the national and main roads were identified and add to the extended area disturbed by the construction of these features add to the disturbances encountered during the survey (Figs 46-47). Picnic spots along the road were investigated for possible archaeological heritage and material remains as they have been cleared and provide good archaeological visibility, however, these areas have also been disturbed and mainly been scattered with gravels and stones or tarred and no archaeological heritage and materials remains were encountered within these areas (Figs 48-49). No archaeological heritage and material remains were encountered within the disturbed areas. It is therefore highly unlikely that archaeological heritage and material remains and human remain would be encountered *in situ* within these heavily disturbed areas.





Figs 46-47. Examples of other disturbances occurring along the Colesburg-Port Elizabeth route including telephone poles, signboards, barricades and railways.



Figs 48-49. Examples of picnic spots.

Most of the proposed area surveyed comprised dense grass vegetation that made archaeological visibility difficult. Continuous maintenance and mowing of the road-side grass vegetation adds to the list of disturbances to archaeological heritage and material remains. The open exposed areas were investigated for possible archaeological heritage and material remains, most of these have previously been heavily disturbed by bulldozing and had been pushed up at along the sides of the road or were mixed with gravel and broken-up tarred areas (Figs 51-54). Two surface scatters of stone artefacts were encountered during investigation of these open exposed areas; however, it is unlikely that they occur *in situ*, owing to the various disturbances mentioned above.



Figs 51-52. Dense grass vegetation.



Figs 53-54. Areas open for investigation (bottom)

One surface scatter of one isolated Middle Stone Age stone artefact made on fine-grained shale was identified at the northern entrance to Cradock with an open exposed area adjacent to the road within the area proposed for the installation of fibre optic data cable. The stone artefact occurred on the edge of a rounded dolerite outcrop (Figs 55-56). The stone artefact is in a disturbed context owing to the construction activities associated with the road building. No other archaeological heritage and material remains occurred in association with the stone artefact.



Figs 55-56. Location of the isolated Middle Stone Age stone artefact adjacent to the road and on the edge of a rounded dolerite outcrop.

Various heritage and historical objects occurred along the proposed route including stone-wall structures that resemble kraals and farm boundary fences, however, these structures occur on private land on the other side of the municipal boundary fence and should not be affected by the installation of the proposed fibre optic data cable. A stone monument dedicated to the 1820 Scottish Settler Party led by Thomas Pringle is situated next to a picnic spot near to the village of Cookhouse. The stone monument is accessible to the public and is on municipal land on the other side of the fence and not within the direct route for proposed fibre optic data cable (Fig. 57). The Slagtersnek stone monument erected in memorial to those killed in the rebellion is situated between Golden Valley and Middleton. The stone monument is fenced off and accessible to the public, however, it is unlikely that the construction activities should negatively affect the monument.



Figs 57-58. The stone monument commemorating the 1982 Scottish Part (left); The Slagtersnek Monument (right).

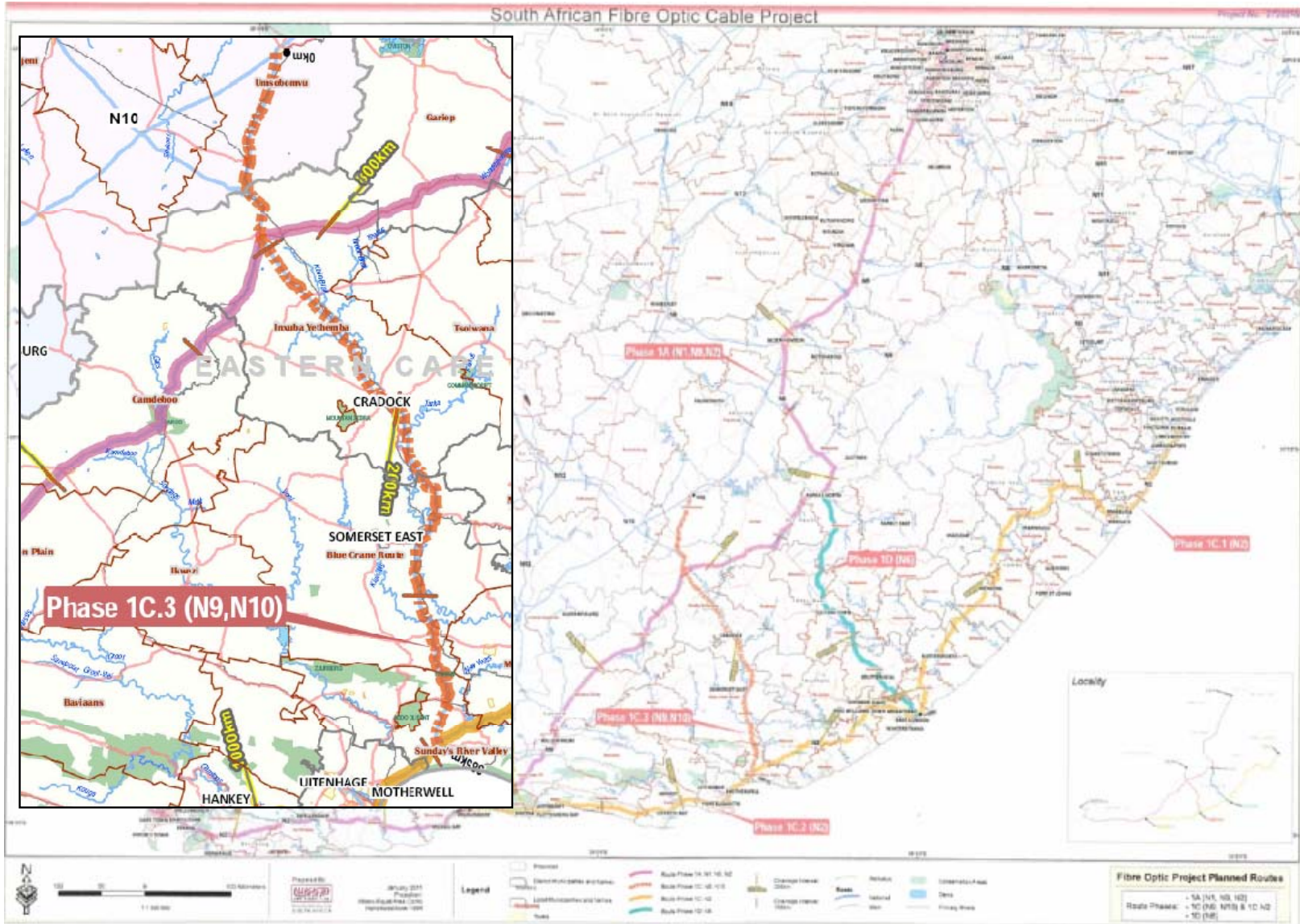
The towns of Noupoort, Middelburg, Cradock, Cookhouse, the hamlets of Golden Valley and Middleton, Colchester, and the entrance into Port are developed and built-up. The proposed route that enters into the towns have been disturbed by the construction of buildings, pavements, walkways, bridges, road barricades as well as telephone poles, signboards, and fences. However, a few historical buildings, monuments, and national monuments were encountered along the route mainly in the town of Cradock. The majority of the buildings along the main road are historical in origin including the Queen Victoria Hotel, the Town Hall complex and library (Fig. 58), as well as several restaurants and shops, as well having national monument status such as the current doctor's surgery (Fig 59). However, it is unlikely that the buildings would be negatively impacted during the construction of the proposed fibre optic data cable.



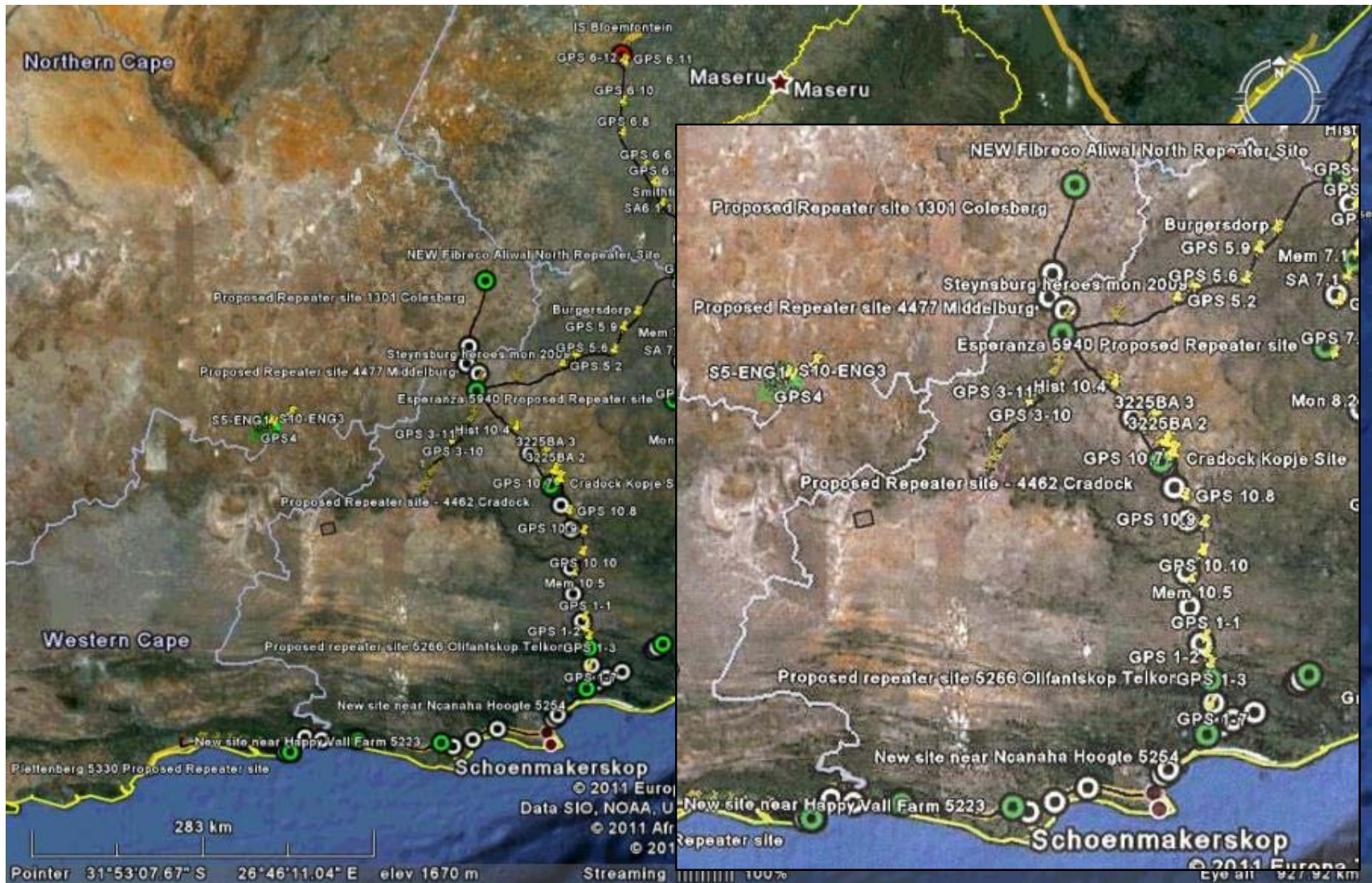
Figs 58-59. The town hall complex and library (left) and the declared national monument that is currently used as a doctor's surgery (right) situated in Cradock's main road.

The route between Bloemfontein and Graaff Reinet (R6), Phase 1C (N9, N10) for the proposed Clidet fibre optic cable network has been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to the roads and bridges. The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads. the erection of the municipal boundary fences and telephone poles that meanders between the road-side of the fence as well as on private land on the other side of the fence and stretch for the whole extent of the proposed area. Road and general signboards and the construction of entrances off the main roads to farms, sewage and water pipes also occur for the entire extent of the proposed area. One surface scatter of one isolated

Middle Stone Age stone artefact made on fine-grained shale was identified at the northern entrance to Cradock; however, it is unlikely that they occur *in situ*, owing to the various disturbances mentioned above. Several monuments and memorials including the commemoration of the 1820 Scottish Party and the rebellion at Slagtersnek, as well as historical buildings and national monuments within certain towns were encountered during the survey of the proposed area. It is unlikely that the proposed installation of the fibre optic data cable network would pose any negative impact.



Map 3. Colesburg - Port Elizabeth route (R6) (Phase 1C.3) [N9, N10] on map (Map courtesy of SRK Consulting)



Map 4. Aerial view of the Clidet fibre optic data cable highlighting the Colesburg - Port Elizabeth (R6) route.

GEORGE - PORT ELIZABETH (R4)

The route between George and Port Elizabeth marked Phase 1C.2 (N2) on Map 5, follows the N2 national road between George to Port Elizabeth passing through the Garden Route towns of Wilderness, Sedgefield, Knysna, Plettenberg Bay, the Tsitsikamma and ending at Port Elizabeth.

The proposed area for the installation of the fibre optic data cable has previously been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to these roads and bridges. The road is continuously being upgraded and maintained as it is the main national road between Port Elizabeth and Cape Town and encounters high levels of traffic. The section of the road between the Witelsbos turn-off onto the N2 national road and the area referred to as Boskor has recently undergone the widening of the road to allow for easier traffic flow. Similarly the section of the road between Wilderness and George referred as Kaaimans Pass has also recently undergone the building of a new road and concrete barriers owing to devastating flood damage within the area during 2008 (Figs 60-61). The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads. No heavy road works were encountered during the survey. It is highly unlikely that *in situ* archaeological heritage and material remains would be encountered within the proposed route owing to the construction and continuing maintenance of the original N2 national road.



Figs 60-61. Views of the new road constructed in the Kaaimans Pass between George and Wilderness.

Other disturbances include the erection of the municipal boundary fences road and general signboards, telephone poles and the construction of sewage and water pipes that stretch for the entire extent of the proposed fibre optic data cable route. Road barricades, built-up banks, and railways that run adjacent to the national and main roads were identified and add to the extended area disturbed by the construction of these features add to the disturbances encountered during the survey (Figs 62-65). Picnic spots along the road were investigated for possible archaeological heritage and material remains as they have been cleared and provide good archaeological visibility, however, these areas have also been disturbed and mainly been scattered with gravels and stones or tarred and

no archaeological heritage and materials remains were encountered within these areas. No archaeological heritage and material remains were encountered within the disturbed areas. It is therefore highly unlikely that archaeological heritage and material remains and human remains would be encountered *in situ* within these heavily disturbed areas.



Figs 62-65. Examples of disturbances observed along the proposed route.

Most of the proposed area surveyed comprised dense grass vegetation and thick indigenous bush vegetation that made archaeological visibility difficult. Continuous maintenance and mowing of the road-side grass vegetation adds to the list of disturbances to archaeological heritage and material remains. The open exposed areas were investigated for possible archaeological heritage and material remains, most of these have previously been heavily disturbed by bulldozing and had been pushed up at along the sides of the road or were mixed with gravel and broken-up tarred areas. Sand dunes occurring between Wilderness, Sedgefield and Knysna have been bulldozed through in order to construct the N2 national road (Figs 66-69). No stone artefacts were encountered during investigation of the open exposed areas; however, it is unlikely that archaeological heritage and material remains occur *in situ*, owing to the various disturbances mentioned above.





Figs 66-69. View of the thick indigenous bush vegetation along the route (top) and the bulldozed and disturbed sand dunes.

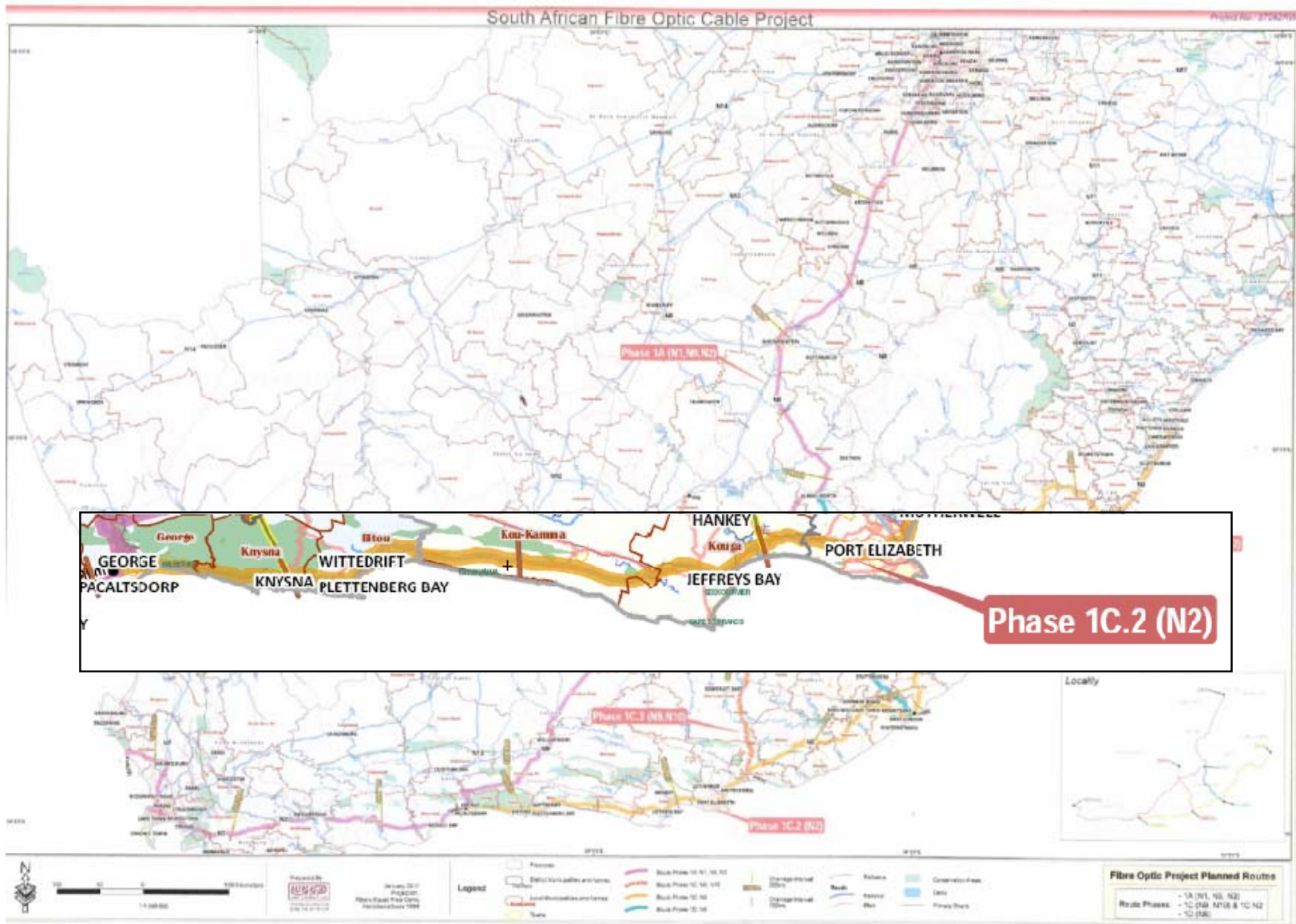
The Garden Route towns of Wilderness, Sedgefield, Knysna, Plettenberg Bay, and the Tsitsikamma area are developed and built-up. The proposed route that enters into the towns and the Tsitsikamma area have been disturbed by the construction of buildings, pavements, walkways, bridges, road barricades as well as telephone poles, signboards, and fences. However, a few historical buildings, monuments, and national monuments were encountered along the route in the coastal town of Knysna. A stone World War I (WWI) memorial erected in honour of the men of Knysna who gave their lives during 1914 and 1918 is situated along the main road of Knysna, however, the area is fenced off and accessible to the public. It is unlikely that the construction activities associated with the fibre optic cable would negatively impact on the memorial area and the stone wall fence (Figs 70-71).



Figs 70-71. Location of the WWI stone memorial situated along Knysna's main road.

The route between George and Port Elizabeth (R4), Phase 1C.2 (N2) for the proposed Clidet fibre optic cable network has been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to the roads and bridges. The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads. The erection of the municipal boundary fences and telephone poles that meanders between the road-side of the fence as well as on private land on the other side of the fence and stretch for the whole extent of the proposed area. Road and general signboards and the construction of entrances off the main roads to farms, sewage and water pipes also occur for the entire extent of the proposed area. One stone memorial

commemorating those who died during World War I was encountered during the survey. It is unlikely that the proposed installation of the fibre optic data cable network would pose any negative impact.



Map 5. George - Port Elizabeth Clidet fibre optic data cable route (R2) (Phase 1C.2 [N2]) (Map courtesy of SRK Consulting)



Map 6. Aerial view of the Clidet fibre optic data cable highlighting the George - Port Elizabeth route (R2)

ALIWAL NORTH - EAST LONDON (R7)

The route between Aliwal North and East London (R7) marked Phase 1D (N6) on Map 7, follows the N6 national road from Aliwal North to East London passing through the towns of Jamestown, Queenstown, Cathcart, Stutterheim and ending at East London.

The proposed area for the installation of the fibre optic data cable has previously been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to these roads and bridges. The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads (Fig 72-75). No current road works were encountered during the survey of route.

Other disturbances include the erection of the municipal boundary fences road and general signboards, telephone poles and the construction of sewage and water pipes that stretch for the entire extent of the proposed fibre optic data cable route. Road barricades and built-up banks add to the disturbances along the route (Figs 71-73). No archaeological heritage and material remains were encountered within the disturbed areas. It is therefore highly unlikely that archaeological heritage and material remains and human remains would be encountered *in situ* within these heavily disturbed areas.



Figs 71-75. Examples of the disturbances encountered along the proposed fibre optic data cable route.

Most of the proposed area surveyed comprised dense grass vegetation and thick indigenous bush vegetation that made archaeological visibility difficult. Continuous maintenance and mowing of the road-side grass vegetation adds to the list of disturbances to archaeological heritage and material remains. The open exposed areas were investigated for possible archaeological heritage and material remains, most of these have previously been heavily disturbed by bulldozing and had been pushed up at along the sides of the road or were mixed with gravel and broken-up tarred areas (Figs 76-79). One surface scatter of stone artefacts was encountered during investigation of the open exposed areas; however, it is unlikely that archaeological heritage and material remains occur *in situ*, owing to the various disturbances mentioned above.



Figs 76-79. Examples of the dense grass vegetation (top) and the open exposed areas investigated for possible archaeological heritage and material remains.

One surface scatter of Middle Stone Age stone artefact made predominantly on medium- to fine-grained shale raw materials was identified on a raised bank on the side of the road approximately 100m-200m south of the Holspruit 2 river within an open exposed area adjacent to the road on the proposed route for the installation of fibre optic data cable. The surface scatter of stone artefact are located on the outskirts of a rocky outcrop area and occur in a disturbed context owing to the construction activities associated with the road building and it is unlikely that the stone artefact would occur *in situ* (Figs 80-81). No other archaeological heritage and material remains occurred in association with the stone artefact.



Figs 80-81. Location of the surface scatter of Middle Stone Age stone artefacts located between Stutterheim and East London.

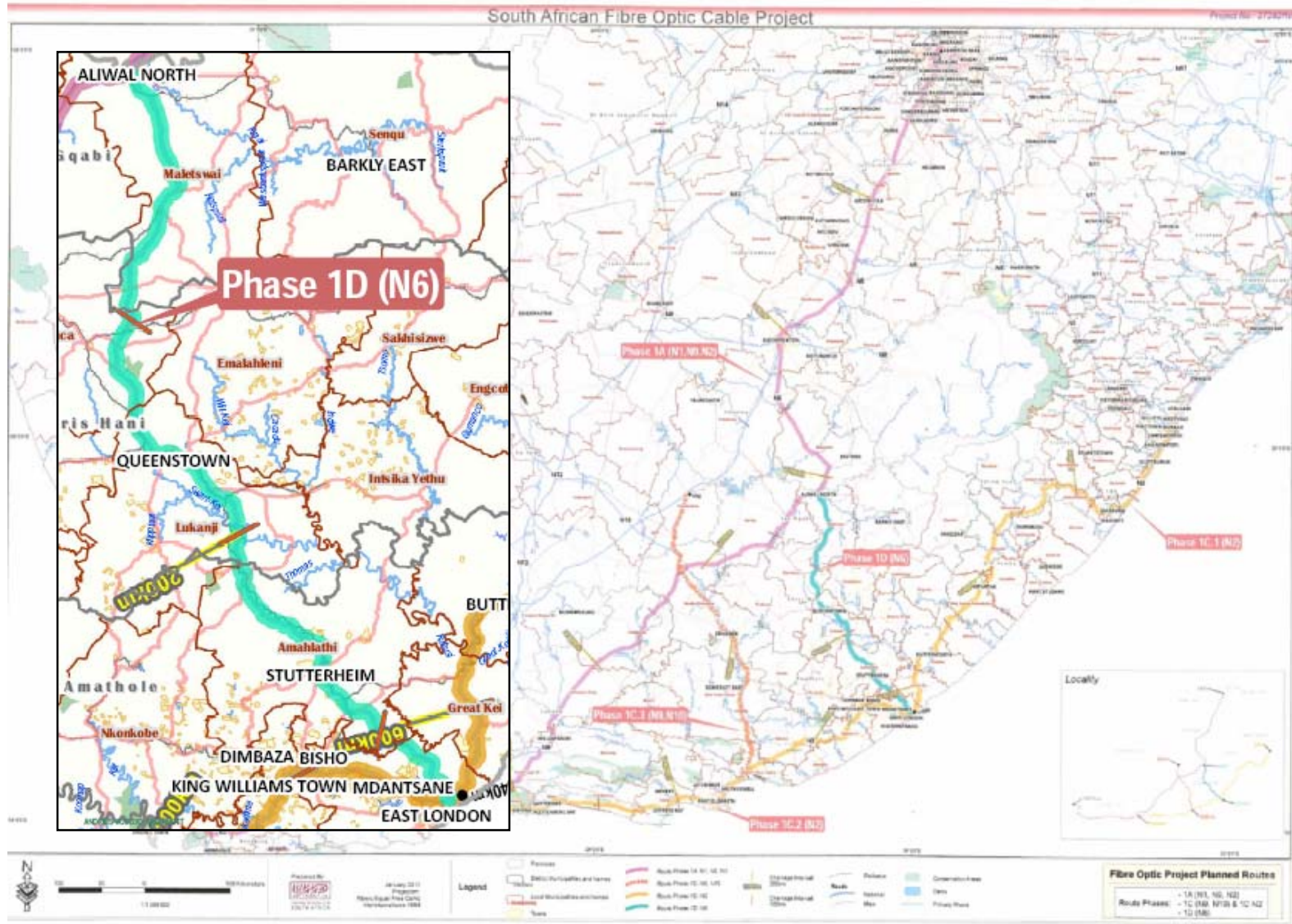
The towns of Jamestown, Queenstown, Cathcart, Stutterheim and entering East London are developed and built-up. The proposed route that enters into the towns have been disturbed by the construction of buildings, pavements, walkways, bridges, road barricades as well as telephone poles, signboards, and fences. However, a few historical buildings, monuments, and national monuments were encountered along the route mainly in the town of Queenstown. A Boer war statue of a soldier commemorating the soldiers from the Queenstown district who fought and died during the Anglo-Boer (1899-1902) is situated in the circle along Queenstown's main road (Fig. 82). A more recent monument established in 2005 marking Queenstown's 150 years anniversary has been erected on the circle. The town hall is a declared national monument and occurs along the proposed route in the main road (Fig. 83). However, it is unlikely that the statue, recently established monument and declared national monument town hall would be negatively impacted during the construction of the proposed fibre optic data cable.



Figs 82-83. Views of the Boer War soldier statue (left) and a view of the town hall (right) occurring along Queenstown's main road within the proposed fibre optic data cable route.

The route between The route North and East London (R7), Phase 1D (N6) for the proposed Clidet fibre optic cable network has been heavily disturbed by the construction of the roads and bridges as well as the continuing road maintenance and upgrades to the roads and bridges. The construction of furrows, barricades, underground and sub-soil drainage systems add to the disturbances associated with the construction of the roads. the erection of the municipal boundary fences and telephone poles that meanders between the road-side of the fence as well as on private land on the other side of the fence and

stretch for the whole extent of the proposed area. Road and general signboards and the construction of entrances off the main roads to farms, sewage and water pipes also occur for the entire extent of the proposed area. One surface scatter of Middle Stone Age stone artefact was encountered. Some monuments and memorials including the commemoration of the Boer War (1899-1902), as well as historical buildings and national monuments within certain towns were encountered during the survey of the proposed area. It is unlikely that the proposed installation of the fibre optic data cable network would pose any negative impact.



Map 7. Aliwal North - East London Clidet fibre optic data cable route (R7) (Phase 1D [N6] on map) (Map courtesy of SRK Consulting)



Map 8. Aerial view of the Clidet fibre optic data cable highlighting the Aliwal North - East London route (R7).

CONCLUSION / DESCRIPTION OF SITES

Only four encounters of archaeological heritage and material remains were encountered during the survey of the four sections of the proposed route for the Clidet fibre optic data cable network. The surface scatters of stone artefacts are located within already heavily disturbed areas and it is unlikely that the stone artefacts would occur *in situ*. No other archaeological heritage and material remains occurred in association with the stone artefact. Several historical features, structures, buildings, memorials and monuments, as well as declared national monuments were encountered during the survey; however, it is unlikely that the proposed installation of the fibre optic data cable network would pose any negative impact.

RECOMMENDATIONS

The area proposed for the Clidet fibre optic data cable network has been rated as having low local cultural significance, although the following recommendations must be considered:

1. In the unlikely event that any concentrations of archaeological material are exposed during construction, all work in that area should stop and it should be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect such material (See appendix 1 for a list of possible archaeological sites that maybe found in the area).
2. Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.
3. The “accident crosses” that occur along the route within the proposed area, are a part of the modern cultural landscape, and should not be removed or disturbed, however, if this is not possible then the crosses should be removed and relocated nearby or returned apriori the installation of the fibre optic data cable.
4. The monuments that occur within the proposed route are clearly marked and most of them are protected by fences. The construction managers/foremen/workers must be made aware of the significance of the monuments and avoid causing any negative impact during the construction activities.

5. Although the proposed route through the towns is already developed and has previously been disturbed, concentrations of historical heritage material remains may occur underneath. If such concentrations are exposed during construction all work in that area should stop and it should be reported immediately to the nearest museum/historical archaeologist or to the South African Heritage Resources Agency so that a systematic and professional investigation can be undertaken.

GENERAL REMARKS AND CONDITIONS

Note: This report is a phase 1 archaeological heritage impact assessment/investigation only and does not include or exempt other required heritage impact assessments (see below).

The National Heritage Resources Act (Act No. 25 of 1999, section 35) requires a full Heritage Impact Assessment (HIA) in order that all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual linguistic or technological value or significance are protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects.

It must be emphasized that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, reflect the true state of affairs. Many sites/features may be covered by soil and vegetation and will only be located once this has been removed. In the event of such finds being uncovered, (such as during any phase of construction work), archaeologists must be informed immediately so that they can investigate the importance of the sites and excavate or collect material before it is destroyed. The onus is on the developer to ensure that this agreement is honoured in accordance with the National Heritage Act No. 25 of 1999.

It must also be clear that Archaeological Specialist Reports (AIAs) will be assessed by the relevant heritage resources authority. The final decision rests with the heritage resources authority, which should grant a permit or a formal letter of permission for the destruction of any cultural sites.

APPENDIX A: IDENTIFICATION OF ARCHAEOLOGICAL FEATURES AND MATERIAL FROM THE SURROUNDING COASTAL AND INLAND AREAS: guidelines and procedures for developers

1. Identification of Iron Age archaeological features and material

- Upper and lower grindstones, broken or complete. Upper grindstone/rubber will be pitted.
- Circular hollows -sunken soil, would indicate storage pits and often associated with grindstones.
- Ash heaps, called middens with cultural remains and food waste such as bone.
- Khaki green soils would indicate kraal areas.
- Baked clay/soil blocks with or without pole impressions marks indicate hut structures.
- Decorated and undecorated pots sherds.
- Iron slag and/or blowpipes indicate iron working.
- Human remains may also be associated with khaki green soils.
- Metal objects and ornaments.

2. Shell middens

Shell middens can be defined as an accumulation of marine shell deposited by human agents rather than the result of marine activity. The shells are concentrated in a specific locality above the high-water mark and frequently contain stone tools, pottery, bone and occasionally also human remains. Shell middens may be of various sizes and depths, but an accumulation which exceeds 1 m² in extent, should be reported to an archaeologist.

3. Freshwater mussel middens

Freshwater mussels are found in the muddy banks of rivers and streams and were collected by people in the past as a food resource. Freshwater mussel shell middens are accumulations of mussel shell and are usually found close to rivers and streams. These shell middens frequently contain stone tools, pottery, bone, and occasionally human remains. Shell middens may be of various sizes and depths, but an accumulation which exceeds 1 m² in extent, should be reported to an archaeologist.

4. Human skeletal material

Human remains, whether the complete remains of an individual buried during the past, or scattered human remains resulting from disturbance of the grave, should be reported. In general the remains are buried in a flexed position on their sides, but are also found

buried in a sitting position with a flat stone capping or in ceramic pots. Developers are requested to be on alert for these features and remains.

5. Fossil bone

Fossil bones may be found embedded in deposits at the sites. Any concentrations of bones, whether fossilized or not, should be reported.

6. Stone artefacts

These are difficult for the layman to identify. However, large accumulations of flaked stones which do not appear to have been disturbed naturally should be reported. If the stone tools are associated with bone remains, development should be halted immediately and archaeologist notified.

7. Stone features and platforms

These occur in different forms and sizes, but easily identifiable. The most common are an accumulation of roughly circular fire cracked stones tightly spaced and filled in with charcoal and marine shell. They are usually 1-2metres in diameter and may represent cooking platforms for shell fish. Others may resemble circular single row cobble stone markers. These occur in different sizes and may be the remains of wind breaks or cooking shelters.

8. Large stone cairns

The most common cairns consist of large piles of stones of different sizes and heights are known as *isisivane*. They are usually near river and mountain crossings. Their purpose and meaning is not fully understood, however, some are thought to represent burial cairns while others may have symbolic value.

9. Historical artefacts or features

These are easy to identify and include foundations of buildings or other construction features and items from domestic and military activities.

Table 1. GPS Co-ordinates of Places of Interest

Description	Coordinates	Route and Location
Later Stone Age stone artefacts	30.16.781S; 26.39.103E	R2 - Near Caledon River between
Middle Stone Age stone artefacts	31.14.249S; 26.32.157E	R2 - Outside Graaff Reinet
Middle Stone Age stone artefact	31.14.608S; 26.45.653E	R6 - Outside Cradock
Middle Stone Age stone artefacts	31.14.964S; 26.45.281E	R7 - Near Holspruit 2 River
Collection of Afrikaans Monuments	29.39.253S; 26.10.626E	R2 - Reddersburg
Great Trek stone monument	30.12.703S; 26.31.826E	R2 - Smithfield
N6 road-death monument	31.16.771S; 26.39.102E	R2 - Near Caledon River between
Historical graveyard	30.33.419S; 26.47.327E	R2 - Near farm stall
N.G. Church (historical)	30.41.615S; 26.42.542E	R2 - Aliwal North (main road)
Taal Monument	30.59.633S; 26.19.856E	R2 - Burghersdorp (main road)
Information Centre (Declared National Monument)	30.59.525S; 26.19.920E	R2 - Burghersdorp (main road)
Hagenhuis Restaurant/Coffee Shop (historical)	30.59.491S; 26.19.938E	R2 - Burghersdorp (main road)
Andries Pretorius monument (Great Trek)	32.13.869S; 24.32.179E	R2 - Outside Graaff Reinet
Great Trek stone monument	32.14.260S; 24.32.169E	R2 - Outside Graaff Reinet
Town Hall complex (historical)	32.10.231S; 25.37.070E	R4 - Cradock (main road)
Doctor's surgery	32.10.031S; 25.32.980E	R4 - Cradock (main road)
1820 Settlers Party stone monument	32.45.811S; 25.48.151E	R4 - Near Cookhouse
Slagtersnek Monument	32.45.095S; 25.47.698E	R4 - Near Middleton
Town Hall (Declared National Monument)	31.53.820S; 26.52.429E	R7 - Queenstown (main road)
Boer War (1988-1902) statue of soldier	31.53.769S; 26.52.255E	R7 - Queenstown (main road)
Church (historical)	31.53.820S; 26.52.429E	R7 - Jamestown (main road)

Table 2.1.1. Bloemfontein - Graaff Reinet (R2): Impact significance before mitigation on the loss of archaeological heritage features, materials, and remains.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the archaeological heritage features, materials, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of archaeological features, materials and remains throughout the four phases, particularly along the Bloemfontein - Graaff Reinet (R2) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** although the *frequency of impact* is **very seldom**. This basically entails that the surface scatters of stone artefacts, as part of the archaeological features, materials, and remains encountered during the survey for the proposed route of the fibre optic data cable network, will be encountered during the **life of the operation** although **very seldom** there are only two occurrences of surface scatters of stone artefacts along the route. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **disastrous** which means that the surface scatters of stone artefacts and other possible below-surface occurrences will be disturbed owing to excavation and construction; the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected by the National Heritage Resources Act (Act 25 of 1999); and the *duration* of the impact is rated as **permanent** meaning that once the surface scatters are disturbed the consequence is permanent.

Table 2.1.2. Bloemfontein - Graaff Reinet (R2): Impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects throughout the four phases, particularly along the Bloemfontein - Graaff Reinet (R2) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** and the *frequency of impact* is **regularly**. This basically entails that in comparison to the archaeological resources the historical resources and other heritage objects were encountered more often during the survey for the proposed route of the fibre optic data cable network. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **significant** which means that the impact on these heritage resources will be significant as they are protected by the National Heritage Resources Act (Act 25 of 1999); the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected' and the *duration* of the impact is rated as **during the life of the operation** meaning that the possibility of impact on these heritage resources will occur only during the excavation and construction.

Table 2.2.1. Colesburg - Port Elizabeth (R6): Impact significance before mitigation on the loss of archaeological heritage features, materials, and remains.

Pre-Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the archaeological heritage features, materials, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of archaeological features, materials and remains throughout the four phases, particularly along the Colesburg - Port Elizabeth (R6) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** although the *frequency of impact* is **very seldom**. This basically entails that the surface scatter of stone artefacts, as part of the archaeological features, materials, and remains encountered during the survey for the proposed route of the fibre optic data cable network, will be encountered during the **life of the operation** although **very seldom** there is only one surface scatter of stone artefacts along the route. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **disastrous** which means that the surface scatters of stone artefacts and other possible below-surface occurrences will be disturbed owing to excavation and construction; the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected by the National Heritage Resources Act (Act 25 of 1999); and the *duration* of the impact is rated as **permanent** meaning that once the surface scatters are disturbed the consequence is permanent.

Table 2.2.2. Colesburg - Port Elizabeth (R6): Impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects throughout the four phases, particularly along the Colesburg - Port Elizabeth (R6) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** and the *frequency of impact* is **regularly**. This basically entails that in comparison to the archaeological resources the historical resources and other heritage objects were encountered more often during the survey for the proposed route of the fibre optic data cable network. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **significant** which means that the impact on these heritage resources will be significant as they are protected by the National Heritage Resources Act (Act 25 of 1999); the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected' and the *duration* of the impact is rated as **during the life of the operation** meaning that the possibility of impact on these heritage resources will occur only during the excavation and construction.

Table 2.3.1. George - Port Elizabeth (R4): Impact significance before mitigation for the loss of archaeological heritage features, materials and remains.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	5 Disastrous	5 National	5 Permanent	Medium-low
<i>Score</i>	5	15			75
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	5 Disastrous	5 National	5 Permanent	Medium-low
<i>Score</i>	5	15			75
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	5 Disastrous	5 National	5 Permanent	Medium-low
<i>Score</i>	5	15			75
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	5 Disastrous	5 National	5 Permanent	Medium-low
<i>Score</i>	5	15			75

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the archaeological heritage features, materials, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of archaeological features, materials and remains throughout the four phases, particularly along the George - Port Elizabeth (R4) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** although the *frequency of impact* is **almost never**. This basically entails that no of archaeological features, materials, and remains were encountered during the survey for the proposed route of the fibre optic data cable network, however, unseen archaeological resources may be encountered during the **life of the operation**. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **disastrous** which means that the unseen archaeological resources as possible below-surface occurrences will be disturbed owing to excavation and construction; the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected by the National Heritage Resources Act (Act 25 of 1999); and the *duration* of the impact is rated as **permanent** meaning that once the surface scatters are disturbed the consequence is permanent.

Table 2.3.2. George - Port Elizabeth (R4): Impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	3 Significant	5 National	4 Life of operation	Medium-low
<i>Score</i>	6	12			72
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	3 Significant	5 National	4 Life of operation	Medium-low
<i>Score</i>	6	12			72
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	3 Significant	5 National	4 Life of operation	Medium-low
<i>Score</i>	6	12			72
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	3 Significant	5 National	4 Life of operation	Medium-low
<i>Score</i>	6	12			72

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects throughout the four phases, particularly along the George - Port Elizabeth (R4) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** and the *frequency of impact* is **regularly**. This basically entails that in comparison to the archaeological resources the historical resources and other heritage objects were encountered more often during the survey for the proposed route of the fibre optic data cable network. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **significant** which means that the impact on these heritage resources will be significant as they are protected by the National Heritage Resources Act (Act 25 of 1999); the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected and the *duration* of the impact is rated as **during the life of the operation** meaning that the possibility of impact on these heritage resources will occur only during the excavation and construction.

Table 2.4.1. Aliwal North - East London (R7): Impact significance before mitigation for the loss of archaeological heritage features, materials, and remains.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	5 Disastrous	5 National	5 Permanent	Medium-High
<i>Score</i>	6	15			90

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the archaeological heritage features, materials, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of archaeological features, materials and remains throughout the four phases, particularly along the Aliwal North - East London (R7) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** although the *frequency of impact* is **very seldom**. This basically entails that the surface scatters of stone artefacts, as part of the archaeological features, materials, and remains encountered during the survey for the proposed route of the fibre optic data cable network, will be encountered during the **life of the operation** although **very seldom** there is only one surface scatter of stone artefacts along the route. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **disastrous** which means that the surface scatters of stone artefacts and other possible below-surface occurrences will be disturbed owing to excavation and construction; the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected by the National Heritage Resources Act (Act 25 of 1999); and the *duration* of the impact is rated as **permanent** meaning that once the surface scatters are disturbed the consequence is permanent.

Table 2.4.2. Aliwal North - East London (R7): Impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	3 Significant	5 National	4 Life of operation	Medium-High
<i>Score</i>	8	12			96

Discussion of the Risk / Impact Significance:

It is difficult to rate and adjudicate scores on the historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects, and remains in an environmental rating table and the scores may be somewhat skewed.

The scores for the above impact significance before mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects throughout the four phases, particularly along the Aliwal North - East London (R7) route shows that according to the section of 'likelihood' the *frequency of activity/duration of the aspect* will be encountered during the **life of the operation** and the *frequency of impact* is **regularly**. This basically entails that in comparison to the archaeological resources the historical resources and other heritage objects were encountered more often during the survey for the proposed route of the fibre optic data cable network. The section on 'consequences' includes the assessment of the *benefit/severity of the impact* which is rated at being **significant** which means that the impact on these heritage resources will be significant as they are protected by the National Heritage Resources Act (Act 25 of 1999); the *spatial/population scope* is rated at **national** meaning that archaeological heritage features, materials and remains are a part South Africa's national heritage and protected and the *duration* of the impact is rated as **during the life of the operation** meaning that the possibility of impact on these heritage resources will occur only during the excavation and construction.

Recommendations / Mitigation Measures (as per the recommendations suggested)

1. In the unlikely event that any concentrations of archaeological material are exposed during construction, all work in that area should stop and it should be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect such material (See appendix 1 for a list of possible archaeological sites that may be found in the area).
2. Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.
3. The memorial 'accident' crosses that occur along the route within the proposed area, area considered as heritage objects and are a part of the modern cultural landscape, and should not be removed or disturbed, however, if this is not possible then the crosses should be removed and relocated nearby or returned apriori the installation of the fibre optic data cable.
4. The monuments that occur within the proposed route are clearly marked and most of them are protected by fences. The construction managers/foremen/workers must be made aware of the significance of the monuments and avoid causing any negative impact during the construction activities.
5. Although the proposed route through the towns is already developed and has previously been disturbed, concentrations of historical heritage material remains may occur underneath the built-up surfaces. If such concentrations are exposed during construction, all work in that area should stop and it should immediately be reported to the nearest museum/historical archaeologist or to the South African Heritage Resources Agency so that a systematic and professional investigation can be undertaken.

Despite the mitigation measures and recommendations for the archaeological heritage features, materials, and remains, the *frequency of the activity* will remain during the **life of the operation** and the *frequency of impact* remains **very seldom** according to the occurrences of surface scatters of stone artefacts along the proposed routes. The *benefit / severity of impact* changes to **potentially harmful** as the excavation and construction will disturb the archaeological resources until concentrations have been observed and work stopped, the *spatial / population scope* remains at a **national** level and the *duration* changes to **during the life of the operation**.

The mitigation measures and recommendations suggested for the historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects changes slightly, the *frequency of activity* remains during the life of the operation, the *frequency of impact*, on most routes, remains very seldom, the *benefit / severity of impact* changes from significant to small, the *spatial / population scope* remains at a national level, and the *duration* will occur one day to one month.

Table 3.1.1. Bloemfontein-Graaff-Reinet (R2): Impact significance after mitigation on the loss of archaeological heritage features, materials, and remains.

Pre-Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66

Table 3.1.2. Bloemfontein-Graaff-Reinet (R2): Impact significance after mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64

Table 3.2.1. Colesburg - Port Elizabeth (R6): Impact significance after mitigation for the loss of archaeological heritage features, materials, and remains.

Pre-Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66

Table 3.2.2. Colesburg - Port Elizabeth (R6) after mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64

Table 3.3.1. George - Port Elizabeth (R4): Impact significance after mitigation for the loss of archaeological heritage features, materials, and remains.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	2 Potentially harmful	5 National	4 Life of operation	Medium-low
<i>Score</i>	5	11			55
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	2 Potentially harmful	5 National	4 Life of operation	Medium-low
<i>Score</i>	5	11			55
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	2 Potentially harmful	5 National	4 Life of operation	Medium-low
<i>Score</i>	5	15			55
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	1 Almost never	2 Potentially harmful	5 National	4 Life of operation	Medium-low
<i>Score</i>	5	15			55

Table 3.3.2. George - Port Elizabeth (R4): after mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Small	5 National	1 One day to one month	Low
<i>Score</i>	6	8			48
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	1 One day to one month	Low
<i>Score</i>	6	8			48
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	1 One day to one month	Low
<i>Score</i>	6	8			48
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	1 One day to one month	Low
<i>Score</i>	6	8			48

Table 3.4.1. Aliwal North - East London (R7): Impact significance after mitigation for the loss of archaeological heritage features, materials, and remains.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	2 Very seldom	2 Potentially harmful	5 National	4 Life of operation	Medium-Low
<i>Score</i>	6	11			66

Table 3.4.2. Aliwal North - East London (R7: after mitigation on the loss of historical buildings, features, graveyards, monuments, and declared national monuments and other heritage objects.

Pre-construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	8			64
Construction:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	11			64
Operation:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	11			64
Closure:					
Likelihood		Consequence			
<i>Frequency of activity</i>	<i>Frequency of impact</i>	<i>Benefit/Severity of impact</i>	<i>Spatial/Population scope</i>	<i>Duration</i>	<i>Rating</i>
4 Life of operation	4 Regularly	2 Small	5 National	1 One day to one month	Medium-Low
<i>Score</i>	8	11			64

Table 4. Mitigation measures recommended for the proposed fibre optic data cable network.

Impact No.	Impact	Mitigation Measure	Objective	Priority	Capacity Requirements	Frequency	Commencement (Project Phase)
1	Concentrations of archaeological material and human remains are exposed during construction	All work in that area should stop and it should be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to remove/collect such material (See appendix 1 for a list of possible archaeological sites that may be found in the area)	Ensure that unknown and below surface concentrations of archaeological material and human remains are identified and protected.	1	Construction managers / foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find sites.	Life of operation	Pre-Construction and Construction phases.
2	The memorial 'accident' crosses that occur along the route within the proposed area, area considered as heritage objects and are a part of the modern cultural landscape	The memorial 'accident' crosses should not be removed or disturbed, however, if this is not possible then the crosses should be removed and relocated nearby or returned apriori the installation of the fibre optic data cable	Ensure that the memorial 'accident' crosses remain within the vicinity of which they were placed and are protected.	2	Construction managers / foremen / workers	Life of operation	Construction and Closure
3	Historical buildings, national monuments, statues, memorials.	The monuments that occur within the proposed route are clearly marked and most of them are protected by fences and should be avoided during construction.	Ensure that the historical building, monuments, statues, and memorials are protected.	3	The construction managers / foremen / workers	Life of operation	Construction